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Design Principles for Teacher Preparation

Enacting the Science of Learning and Development

Learning Policy Institute and EdPrepLab

Linda Darling-Hammond, Maria E. Hyler, and Steve Wojcikiewicz, with Joy Rushing

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This report draws extensively on the ideas and texts of several previous LPI projects, in particular:

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Design Principles Advisory Committee

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Preface

Virtually all teachers enter the profession with the goal of enabling young people to reach their greatest potential. It is typically teachers' ability to meet this goal that offers the intrinsic satisfaction that is most important to keeping them motivated and committed to a career in teaching.

Yet teachers encounter many challenges in realizing this dream. If they are attentive, they quickly realize that each child is a complex individual with many talents, potentials, and unique needs across many domains of development that deserve attention—and that these talents and needs are deeply connected to the contexts that have been constructed both inside the school and in the home, community, and society beyond the school. They strive to find the keys to create a productive context for each child in the classroom and in the school—and they realize that they need an enormous amount of knowledge and skill to do so. They may also have realized that society's conditions and, often, the school itself pose unnecessary obstacles for many children based on their race, class, language, immigration status, sexual orientation, and/or dis/abilities. And they want to know how to be a positive force for change under this set of conditions.

The preparation that educators receive for the important work they do serves them best when it can offer a strong foundation for them to develop students' potential and meet the needs of the children they will serve, and, with their colleagues and children's families, successfully confront the challenges that emerge in the course of doing so.

This is a very tall order. Although there is no panacea, there is a growing body of knowledge on which to build productive possibilities. The knowledge base for education, built on the science of learning and development, has evolved considerably in the last 2 decades, as the new tools of neuroscience have made it clear how brain architecture develops; how important aspects of the environment—including cultural contexts—are for learning; and how interconnected the social, emotional, physical, and academic elements of development are.

These new insights are relevant both to the education of children and youth and to the education of adults, including teachers—and imply important changes in how both schools and educator preparation programs are designed to support learning most productively. Taking account of such advances in knowledge is something that professions explicitly commit to do. Expert professions are rooted in at least three commitments:

1. To act in the best interests of the client
2. To identify, master, and continue to advance a shared body of knowledge that is used to make decisions that further the client's welfare
3. To develop shared standards of practice that evolve as knowledge evolves in the profession

This report identifies design principles for teacher preparation built on recent syntheses of this emerging research and on the wisdom of practice that is found in many leading-edge preparation programs. It is intended to inform ongoing efforts by individual programs to strengthen the ways in which they prepare candidates for teaching and efforts by accrediting bodies and licensing agencies to frame the expectations for teacher preparation. Further, these principles provide the foundation for a related set of principles for leader preparation so that teachers can be supported by system leaders who understand how to develop organizational settings that enable successful practices.

This report follows on the heels of a companion effort by a body of researchers and practitioners to define design principles for schools that seek to enact insights from the science of learning and development. That report is titled *Design Principles for Schools: Putting the Science of Learning and Development Into Action* and begins with the following preface:

> Imagine a world in which every child's life is a succession of positive opportunities for development—opportunities through which a child can come to know who they are and discover the wide range of possibilities for what they can become. Imagine different types of learning settings in which those kinds of opportunities are also intentionally built and optimized, regardless of where a child lives or attends school. Imagine, too, that educators can identify each child's talents, interests, and aspirations and align them with learning opportunities designed to promote them and build on them to create new competencies.
>
> This is not the world in which we currently live, but it is one that we can now begin to create. Building on new knowledge from the science of learning and development, coupled with a commitment to advancing equity for all students, schools and community partners can bring these opportunities to bear for every child.
>
> The need is great. ... During the pandemic, the dramatic inequalities in the conditions of living in America have been exposed, along with the dramatic inequalities in the conditions of learning in America.
>
> For the past century, the U.S. education system has primarily focused on the delivery of subject matter content—especially in math and English language arts—using approaches that presume a bell curve of student ability, with instruction targeted to a mythical "average student." It is a system that was not designed to unlock the potential in each and every child or to develop the whole child across the multiple domains of development. The resulting structures and practices in many schools are not adaptable to the variation in how different students learn. They do not use differentiated and personalized approaches, and they are not attuned to the development of deeper learning skills or to the habits and mindsets that support the creativity and resilience demanded in the 21st century.
>
> In addition, the U.S. education system was not designed for equity; it was designed for inequitable access to rich learning opportunities, which has disadvantaged marginalized groups based on race, income, gender, language, and culture. Indeed, it was designed to select and sort, rather than to develop potential, and—through segregation, unequal school funding, and tracking systems—institutionalized racism and classism are baked into the design of the system itself. This system reinforces beliefs about who has potential and who is worthy of opportunity that we now know are false, harmful, and discriminatory on both scientific and moral grounds. Such beliefs risk squandering the potential of millions of students each year, and growing inequality in our society.

This report is devoted to the development of educators who deeply understand how to support the full range of child development and learning in cultural contexts—and who are prepared to create a path to more equitable and empowering learning for each and every child.

Executive Summary

Over the last several decades, we have learned a great deal about how people learn and develop from research in neuroscience; the developmental and learning sciences; and fields like anthropology, sociology, and social psychology. This report identifies design principles for teacher preparation built on recent syntheses of this emerging research and on the wisdom of practice that is found in many leading-edge preparation programs. It is intended to inform ongoing efforts by individual programs to strengthen the ways in which they prepare candidates for teaching and efforts by accrediting bodies and licensing agencies to frame the expectations for teacher preparation. Further, these principles provide the foundation for a related set of principles for leader preparation so that teachers' efforts can be supported by principals and other system leaders who understand how to develop organizational settings that enable successful practice.

This report follows on the heels of a companion effort by a body of researchers and practitioners to define design principles for schools that seek to enact insights from the science of learning and development (SoLD). These Guiding Principles for Equitable Whole-Child Design are:

- positive developmental relationships that support children's attachment to caring adults and a supportive peer community, as well as their own growth and development;
- environments filled with safety and belonging, which are not only physically safe, offering consistent norms and routines, but also emotionally and identity safe so that all children know they are a valued part of the school community;
- rich learning experiences that support deep knowledge through authentic activities that build on prior knowledge and cultural contexts, enabling children to work collaboratively with peers to develop transferable knowledge and higher-order thinking skills;
- development of skills, habits, and mindsets that foster social, emotional, and cognitive capacities in support of personal and interpersonal awareness and skills, including cultural competence, as well as mindsets that support perseverance, resilience, and a community orientation that responds to the needs of others and contributes to their success; and
- integrated support systems that have readily available academic, physical and health, and social service supports that remove obstacles to learning and support thriving.

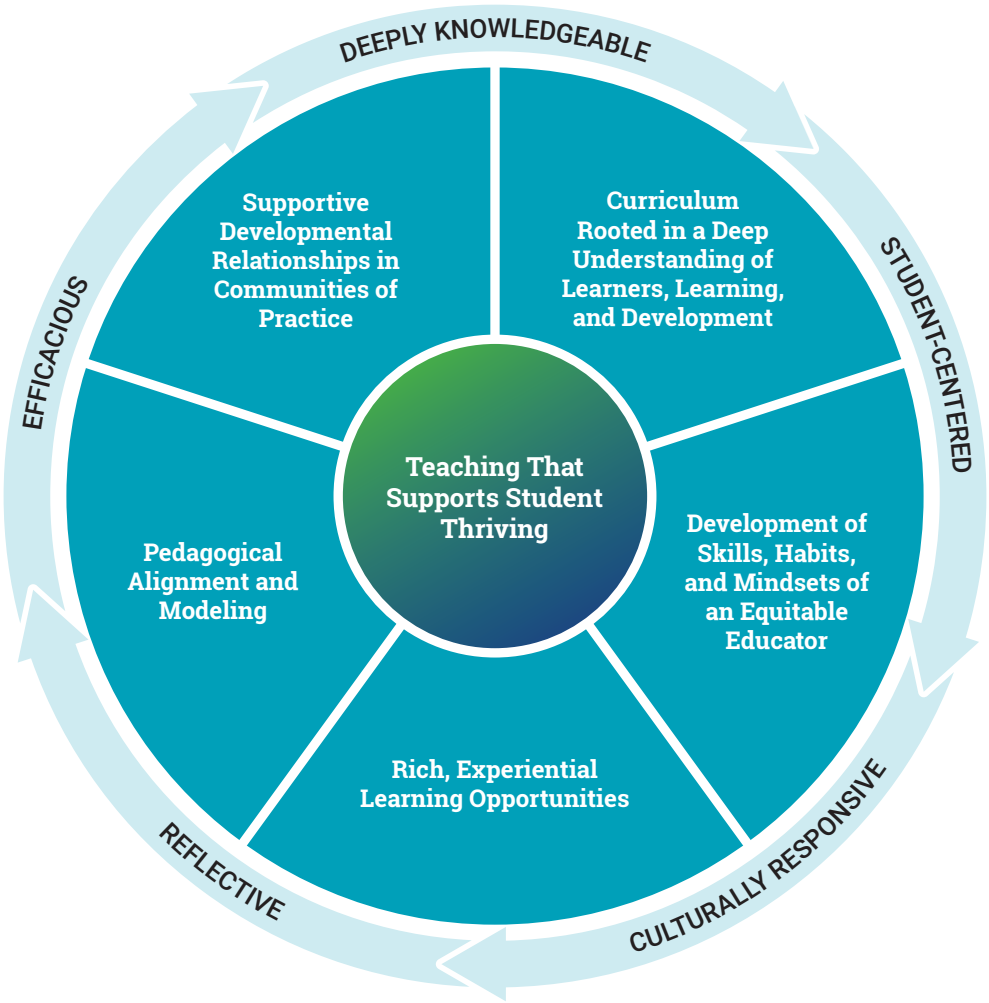
The above principles for school design have direct implications for how teaching and learning must be reimagined. Transformations in teaching practice are needed to ensure that children experience the secure relationships, skillful teaching, robust curriculum practices, appropriate and relevant assessments, and personalized supports that will enable them to have healthy development and successful lives inside and outside of schools and classrooms. This report tackles the topic of how educators need to be prepared to engage in this type of transformative teaching. The Guiding Principles for Enacting SoLD-Aligned Teacher Preparation serve to make explicit the content, pedagogy, organization, processes, and norms of teacher preparation programs aligned with the science of learning and development.

Guiding Principles for Enacting SoLD-Aligned Teacher Preparation

The organizing framework to guide transformation of teacher preparation programs is reflected in the elements shown in Figure ES.1 and include:

- curriculum rooted in a deep understanding of learners, learning, and development;
- development of skills, habits, and mindsets of an equitable educator;
- rich, experiential learning opportunities;
- pedagogical alignment and modeling; and
- supportive developmental relationships in communities of practice.

Figure ES.1. Guiding Principles for Enacting SoLD-Aligned Teacher Preparation



Source: Learning Policy Institute & EdPrepLab. (2024).

Below we provide a brief summary of each of the Guiding Principles for Enacting SoLD-Aligned Teacher Preparation associated with research from developmental and learning science.

Curriculum Rooted in a Deep Understanding of Learners, Learning, and Development

A curriculum rooted in a deep understanding of learners, learning, and development is the most important foundation teacher preparation programs can offer to ensure that teacher candidates have the knowledge and skills to teach and support children well. Also, preparation programs should be attuned to these tenets of learning and development when considering how they are developing learning environments for their aspiring teachers.

Educator preparation programs (EPPs) should be designed to prepare educators who can effectively address the complex ways in which children learn and develop. Programs should model learning that is rooted in culture, experience, and relationships and should equip educators with the understanding of the interrelated conditions necessary for optimal brain development in children and adolescents. This includes a curriculum that connects subject matter with strategies for an asset-based approach to learning about students' backgrounds, families, and communities. Programs should prepare educators who evaluate, modify, and adapt curricular materials for individual students and create assessment experiences that allow students to learn deeply, engaging in inquiry that is relevant to their lives.

Development of Skills, Habits, and Mindsets of an Equitable Educator

Students learn best when they can connect what happens in school to their cultural contexts and experiences; when their teachers see their families and communities as assets and are responsive to their strengths and needs; and when their environment affirms and supports their identities, reinforcing their sense of value and belonging.

Thus, EPPs must be designed to develop educators with mindsets that support all students well and equitably. Program faculty should model empathy, demonstrate social and emotional learning and cultural competence, and prepare educators to use restorative practices. This includes supporting and strengthening teacher candidates' understanding of how to create environments of trust and belonging and build partnerships with families, community members, and other educators while centering children's learning needs. Programs should prepare educators who understand how contextual realities impact the experiences of their students, their understanding of themselves, and their perceptions of social identities so educators understand how to negotiate school policies toward equitable ends.

Rich, Experiential Learning Opportunities

All learners—including prospective teachers and their students—actively construct knowledge and pursue meaning based on their experiences, relationships, and social contexts. EPPs should be designed to immerse teacher candidates in active and compelling learning opportunities that are paired with authentic and performance-based assessments. Programs should coordinate coursework and fieldwork to provide a full range of adult learning experiences as part of their scope and sequence, including practice, feedback, skill development, growth in understanding, and expansion of capacity for adaptive expertise. This includes pedagogical activities that promote inquiry and cycles of reflection and the use of strategies that support purposeful analysis of teaching, learning, and reasoning through complex practice situations.

Programs should be designed to help teacher candidates deeply examine student learning for different students in different contexts and student learning in relation to instruction; plan curriculum with students' learning goals and trajectories in mind; incorporate strategies that build on funds of knowledge and are supportive for individual learners; build tasks that are motivating and well scaffolded; and use a repertoire of teaching strategies that can build understanding by enabling discussion, application, practice, feedback, and opportunities to revise.

Pedagogical Alignment and Modeling

A critical program strategy for enabling teacher candidates to learn sophisticated approaches to teaching is pedagogical alignment in both coursework and clinical work around a coherent vision of whole child development, learning, and teaching. In both their coursework and clinical work settings, new teachers should experience the very kinds of teaching strategies they are expected to develop for their pupils. In subject areas, this may focus on the modes of inquiry in the disciplines—for example, approaches to scientific inquiry, historical or social science research, mathematical modeling, literary analysis or close reading, writing processes, and so on. In more cross-cutting areas like classroom management, this may focus on strategies like community circles, design of classroom responsibilities, and restorative practices that are used in both coursework and clinical site contexts so that candidates experience and see how they can create a strong learning community that functions to create membership, shared norms, and positive supports for behavior.

EPPs should model a developmental approach to learning and development where instructors, supervisors, and cooperating teachers enact and unpack approaches they expect teacher candidates to use in practice. This includes the integration of theory and practice around SoLD-aligned principles, which will shape preparation programs and clinical experience and is made possible by close partnerships between programs, schools, and districts. Programs should prepare educators who focus on whole child development and who understand how to implement holistic models of learning into their teaching.

Supportive Developmental Relationships in Communities of Practice

Teacher candidates can benefit from professional learning communities within their university classrooms, within their clinical placement schools, and within disciplinary and professional groups. These communities can be designed and nurtured to provide supportive environments that allow candidates to productively engage with real problems of practice as they promote active, interactive, constructive, and iterative learning. In such settings, the social aspects of learning come to the fore, as does the active, and shared, construction of knowledge and understanding. Preparation programs should draw in particular upon research that describes learning in professional communities to consciously create, model, and help teacher candidates learn to engage productively in these communities and with experienced and expert leaders and colleagues so that they are surrounded with examples and supports for participation, problem-solving, and the work of teaching.

EPPs should be designed with structures that attend to the social aspects of learning and give time and space to the development of professional communities of practice that promote active, interactive, constructive, and iterative learning. Programs should have strong, reciprocal relationships with PreK–12 schools and model how to create authentic, trusting learning communities that are expansive and inclusive. This includes program structures such as teacher residencies, cohorts, and clinical teaching

teams that are organized to create opportunities where educators observe one another, share practices, develop plans together, and solve problems collectively. Programs should prepare educators who seek to engage with collaborative communities of practice in the pursuit of developing and employing effective teaching practices that result in deep learning for all students.

Conclusion

Teachers commonly enter the profession with the hope and intention of helping young people reach their potential. The extent to which they can do this often provides intrinsic satisfaction and motivation to remain committed to their careers and to high-quality instruction. Preparation programs can contribute to these desired outcomes by preparing candidates to create the outcomes that students and families deserve and that most teachers desire. These design principles can become the foundation for a new approach to learning as preparation programs integrate and implement the conditions teachers need to support whole child education by creating equitable classrooms that promote the optimal development of each child.

Design Principles for Teacher Preparation

Over the last several decades, we have learned a great deal about how people learn and develop from research in neuroscience; the developmental and learning sciences; and fields like anthropology, sociology, and social psychology. Recent syntheses of this research and its implications for educational practice, published in a series of articles in *Applied Developmental Science*,[1] as well as recent syntheses of advances in the learning sciences,[2] have pointed to important transformations in teaching practice needed to ensure that children experience the secure relationships, skillful teaching, robust curriculum practices, appropriate and relevant assessments, and personalized supports that will enable healthy development and successful lives inside and outside of schools and classrooms.

Among the understandings that have emerged are the following:

- **The brain and development are malleable.** The brain grows and changes throughout life in response to experiences and relationships. The nature of these experiences and relationships matters greatly for development. The brain develops most fully when children and youth feel emotionally and physically safe; when they feel connected, supported, engaged, and challenged; and when they have rich opportunities to learn, with materials and experiences that allow them to explore the world around them.
- **Variability in human development is the norm, not the exception.** The pace and profile of each child's development are unique. Because each child's experiences create a unique trajectory for growth, there are multiple pathways—and no one best pathway—to effective learning. The mythical "average" represents almost no one, and standardized pacing with a single way to learn misses most children's needs.
- **Human relationships catalyze healthy development and learning.** Supportive, responsive relationships with caring adults are essential for children's healthy development and learning. When adults have the awareness, empathy, and cultural competence to appreciate and understand children's experiences, needs, and communication, they can promote the development of positive behaviors and confidence to support learning and buffer the negative effects of adversity.
- **Learning is social, emotional, and cognitive.** Positive relationships, including trust in the teacher, and positive emotions, such as interest and excitement, open the mind to learning. Negative emotions such as fear of failure, anxiety, and self-doubt reduce the capacity of the brain to process information and learn. Learning is shaped both by intrapersonal awareness, including the ability to manage stress and direct energy in productive ways, and by interpersonal skills, including the ability to interact positively with others, resolve conflicts, and work in teams. These skills can be taught and learned over time and across contexts.
- **People actively construct knowledge based on their experiences, relationships, and social contexts.** People dynamically shape their own learning. Children connect new information to what they already know in order to learn. This process works best when students engage in active, hands-on learning and when they can connect new knowledge to personally relevant topics and lived experiences, with opportunities to practice, receive feedback, and revise work toward growing competence. Knowledge acquisition is supported in contexts that recognize the diverse and varied strengths of learners and use nonpunitive assessments to help students and educators alike improve.

- **Adversity affects learning—and the way schools respond matters.** Each year in the United States, about 46% of all children are exposed to violence, crime, abuse, or psychological trauma, as well as homelessness and food insecurity.[3] These adverse childhood experiences can create toxic stress that affects attention, engagement, learning, and behavior. Poverty and racism, together and separately, make chronic stress and adversity more likely and can create generational trauma. Schools can buffer the effects of trauma by deepening educators' understandings of adversity, creating environments that are personally attentive and culturally responsive, facilitating supportive adult–child relationships that extend over time, teaching social and emotional skills, and offering integrated student supports that remove obstacles to learning and offer healing-centered engagement.[4] Schools can also be designed to provide communitywide supports that mitigate adverse environmental conditions beyond the school walls that impact children.

The knowledge that we now have causes us to affirm many principles of developmentally appropriate practice that were uncovered more than a century ago while simultaneously requiring us to challenge assumptions that drove the design of 20th-century schools and still live at the core of contemporary instructional practice and school organization. This newer knowledge unseats old assumptions that intelligence is genetically determined and fixed at birth, that school opportunities are appropriately allocated based on tests that rank children in terms of their differential "potential," that learning follows a uniform trajectory and is best accomplished by using a standardized curriculum that transmits ordered information, and that punishment effectively guides behavior.

In addition to new knowledge of how children develop, it is important to consider the kind of learning in which today's young people need to engage—and hence the kind of learning that educator preparation programs also need to be able to support. In a context where knowledge is rapidly expanding and technologies and societies are rapidly changing, children need well-developed analytical thinking and problem-solving skills; the capacity to find, evaluate, synthesize, sort, transfer, and apply knowledge to novel situations; interpersonal skills that allow them to work with others and engage effectively in cross-cultural contexts; self-directional abilities that allow them to manage their own work and complex projects; abilities to find resources and use tools competently, including a wide range of technology tools; the capacities to build deeper knowledge and understanding about themselves and others and to communicate effectively in many ways across varied discourses; and the disposition and skills for lifelong individual and collaborative learning. Developing these kinds of skills requires a different kind of teaching and learning from prior eras when learning was conceptualized as the acquisition of facts and teaching was viewed as the transmission of information to be taken in and used "as is."

The National Research Council's review,[5] for example, indicates that these higher-order thinking and performance skills are best developed through inquiry and investigation, application of knowledge to new situations and problems, production of ideas and solutions, and collaborative problem-solving. These tasks, in turn, require:

- strong self-regulation, executive functioning, and metacognitive skills;
- resourcefulness, perseverance, and resilience in the face of obstacles and uncertainty;
- the ability to learn independently; and
- curiosity, inventiveness, and creativity.

Students need opportunities to set goals and assess their own work and that of their peers so that they become increasingly self-aware, independent learners. To become productive citizens within and beyond the school, students also need positive mindsets about self, their developing identities, and school, along with social awareness and responsibility.[6] The needed transformations—from assembly-line school designs; standardized, transmission-oriented teaching practices; norm-referenced testing; and exclusionary discipline to supportive communities that enable personalized attention to the fuller development of human potential—create a tall order for educators.

To accomplish these goals, educators need not only deep knowledge of how children develop and learn within social contexts and content areas but also skills and dispositions to transform that knowledge into humanizing and restorative practices in classrooms and schools. To be used effectively, this knowledge must be more than theoretical. It should be grounded in experience acquired in contexts for clinical practice that instantiate these principles. In many places, supporting this change means that preparation programs will need to take responsibility for finding, developing, and creating school environments that do not currently exist—as they do at Alverno College, as described in Preparing Students for 21st-Century Skills.

Preparing Students for 21st-Century Skills

Lily, a teacher candidate at Alverno College, is a student teacher at Walker Elementary School, which is located in a former factory town outside of Milwaukee, where more than half of the students at the school qualify for free or reduced-price lunch. The student-centered, technology-rich school features multi-age elementary classes with multiple teachers that span multiple classrooms. Walls have been removed from many classrooms to make them open and collaborative. In Lily's classroom of 60 students (taught by Lily and her two mentor teachers), she is engaging 20 4th-graders—each with a computer tablet in hand—in a social and collaborative math lesson.

Lily supports her students' growth as mathematical thinkers by helping them see how quantitative thinking can solve a real-world technology problem. Because her students frequently use technology, Lily focuses the lesson on a common mathematical question for tablet users. Lily explains to her students who are seated together cross-legged in a circle, "Mrs. Lily is out of storage on her iPad. She needs to delete 157 MB to upload her newest lesson on problem-solving." She makes the problem concrete by using a box with pictures, a lesson planning book, a video, and papers to ensure that students understand what "storage" means when talking about technology. She explains that on her iPad, a picture uses 10 MB, an old lesson uses 47 MB, a video uses 171 MB, and a Google Doc uses 5 MB. Her framing also demonstrates the relevance of the lesson to the students' lives.

Lily provides a framework known as CUBE to help her students read the instructions actively:

C = circle numbers that are important to a problem
U = underline the question
B = box math words
E = evaluate

Lily has her students engage with one another to share and combine their ideas and strategies for solving the iPad storage problem. The students first work in pairs to read the question on their iPad, using the CUBE strategy and their cursors to circle, underline, and box words, and then evaluate the question after they are done reading. After a few minutes, Lily calls the class back together by saying, "Students, turn your apples up" (this refers to the glowing apples on the back of their iPads). The students place their tablets on the floor with the screens facing down so they are not distracted. Lily begins by asking the students what they know about Lily's iPad:

"It's full!" one student exclaims.

Another calls out, "You need to delete 157 MB."

Students continue to share the key numbers, questions, and mathematical concepts in the question. As the students share, Lily synthesizes their insights by drawing a visual representation of the problem on the board, drawing her iPad with an arrow pointing from a drawing of her lesson planning notebook to the iPad, and then an arrow pointing away from her iPad to all the things she could remove, such as a video file, a picture, or old lessons. She then divides the class into groups of four so that students of different skill levels can work on the problem together, combining their knowledge and strategies as they use their iPads to record their solutions in a shared Google Doc.

Before students split into their groups, Lily asks, "What does it mean to work in a group? What is one thing we need to do when we're in a group?"

"Be collaborative," Emma eagerly shares.

Lily inquires, "What does 'collaborative' mean?" Emma explains, "Be quiet and respectful to others."

Dylan, who is sitting next to Emma, adds, "Just what Emma said, but collaborative is also involving everyone and not leaving anyone out."

Lily concludes, "And making sure that everyone has a chance to add their thinking." Lily continues, "You will all be responsible for your own thinking because in a Google Doc, when you share it, I can see who did the adding of information. You are all responsible for the thinking of the group. You have the remainder of time today to work on this. The goal is that tomorrow you will present your solution to the group because not everyone is going to solve it the same way."

As students work together, they take charge of the assignment. Throughout the lesson, Lily makes sure that all students have an opportunity to make valuable contributions to classmates' work and have their work appreciated by others. She explains that there are multiple ways that groups can solve the problem, emphasizing the importance of the problem-solving process.

She scaffolds her students' learning with questions that enable them to think more deeply about math. She also uses technology artfully as a scaffold for investigation, concept attainment, individual and collaborative sense-making, and community building. She ensures that when students work with others, they can safely watch and learn how other people become successful. In addition, well-designed tasks for peer interaction offer a variety of subtasks and paths to success, so they stand a good chance of accommodating students' differences.

After the lesson, Lily notes that collaborative teaching and learning is a core strategy that she and her mentor teachers use with their shared group of students. She also experiences collaborative learning in the courses her professors teach. In a recent survey, 100% of Alverno teacher candidates said that they often experienced collaborative learning in their college coursework, and all responded that they felt prepared to "set norms for building a productive classroom community."

Source: Darling-Hammond, L., Oakes, J., Wojcikiewicz, S. K., Hyler, M. E., Guha, R., Podolsky, A., Kini, T., Cook-Harvey, C., Mercer, C., & Harrell, A. (2019). *Preparing teachers for deeper learning*. Harvard Education Press. pp. 243–244.

As the *Design Principles for Schools* notes, to fully support each child's development and the kind of learning that cultivates the critical thinking, problem-solving, and collaboration skills needed in today's society, classroom practices and school designs will need to enable:

- positive developmental relationships that support children's attachment to caring adults and a supportive peer community, as well as their own growth and development;
- environments filled with safety and belonging, which are not only physically safe, offering consistent norms and routines, but also emotionally and "identity safe"[7] so that all children know they are a valued part of the school community;
- rich learning experiences that support deep knowledge through authentic activities that build on prior knowledge and cultural contexts, enabling children to work collaboratively with peers to develop transferable knowledge and higher-order thinking skills;
- development of skills, habits, and mindsets that foster social, emotional, and cognitive capacities in support of personal and interpersonal awareness and skills, including cultural competence, as well as mindsets that support perseverance, resilience, and a community orientation that responds to the needs of others and contributes to their success; and
- integrated support systems that provide readily available academic, physical and health, and social service supports that remove obstacles to learning and support thriving.[8]

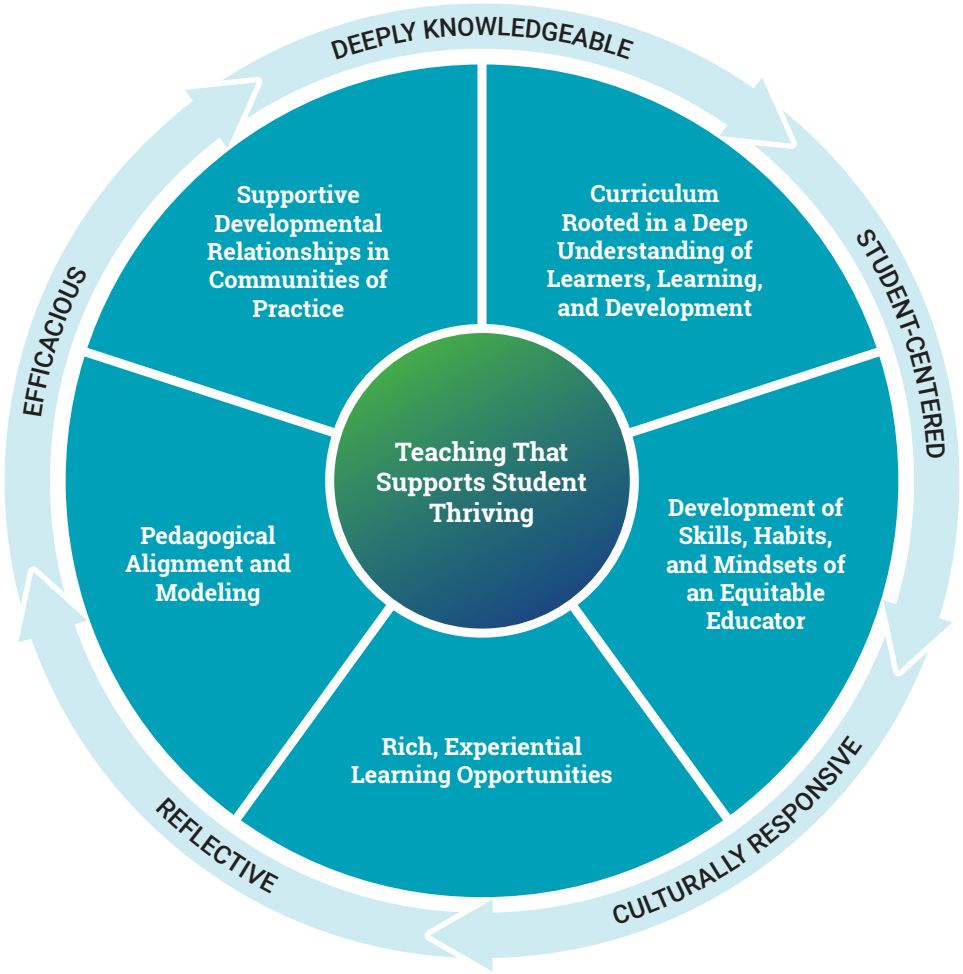
Building on the growing knowledge of development and learning, and of successful practices in educator preparation,[9] we outline in this report a set of design principles for preparing educators to enact the science of learning and development (SoLD). In other words, these principles are rooted in both theory and practice, created through the application of research findings to educator preparation program design and the concurrent compilation of real-world illustrations of these findings from educator preparation programs that exemplify SoLD-aligned structures and practices. These principles include both the "what" of teacher preparation—the content educators need to learn about children and how to support their development and learning—and the "how"—the strategies for educator learning that can produce deep understanding; useful skills; and the capacity to reflect, learn, and continue to improve.

These design principles are:

- curriculum rooted in a deep understanding of learners, learning, and development;
- development of skills, habits, and mindsets of an equitable educator;
- rich, experiential learning opportunities;
- pedagogical alignment and modeling; and
- supportive developmental relationships in communities of practice.

These elements enable teachers to enact the design principles for equitable whole child school design. (See Figure 1.)

Figure 1. Guiding Principles for Enacting SoLD-Aligned Teacher Preparation



Note: SoLD = science of learning and development.
Source: Learning Policy Institute & EdPrepLab. (2024).

All of the elements of whole child school design require educators to have a deep understanding of learners, learning, and development that undergirds their development of curriculum and classroom practices focused on positive relationships and rich learning experiences. Doing this work in ways that succeed with diverse learners also requires the skills, habits, and mindsets of an equitable educator. To develop these understandings and skills, teachers need to learn, as students do, through a set of rich learning experiences that model—and support reflection on—practices through pedagogical alignment in both university classrooms and clinical placements. Finally, all of this learning is strengthened for teachers, as it is for the students, when they have supportive developmental relationships in a community of learners.

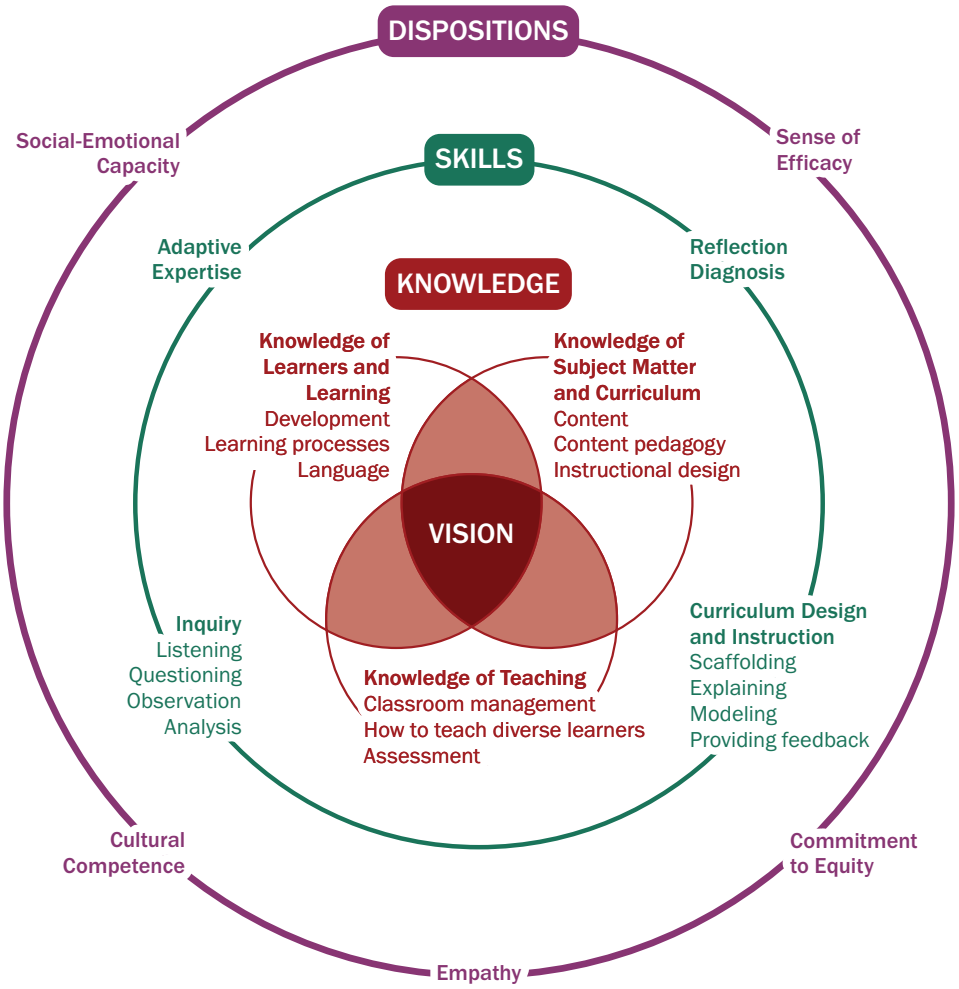
To create the conditions in which children and adolescents can thrive, educators need both to learn about the underlying theory that motivates the need for these conditions and to acquire the skills that allow them to create such conditions. Furthermore, they need to experience such conditions themselves in their

own learning processes. Therefore, the principles are grounded in a conception of teachers' knowledge, skills, and dispositions and centered around a vision for practice that is built on:

- knowledge of learners and how they learn and develop within social contexts;
- an understanding of the subject matter and curriculum to be taught in light of the social purposes of education; and
- an understanding of teaching in light of the content and learners to be taught, as informed by assessment and supported by productive classroom environments.

This knowledge is joined with skills of curriculum design and instruction, inquiry, reflection, and diagnosis to produce the adaptive expertise that enables teachers to make the connections between children and content necessary for learning. And these are further enacted through dispositions and attitudes that support teacher empathy, social-emotional capacity, cultural competence, and a commitment to equity that teachers need to nurture the optimal development of each child. (See Figure 2.)

Figure 2. The "What" of Teacher Education



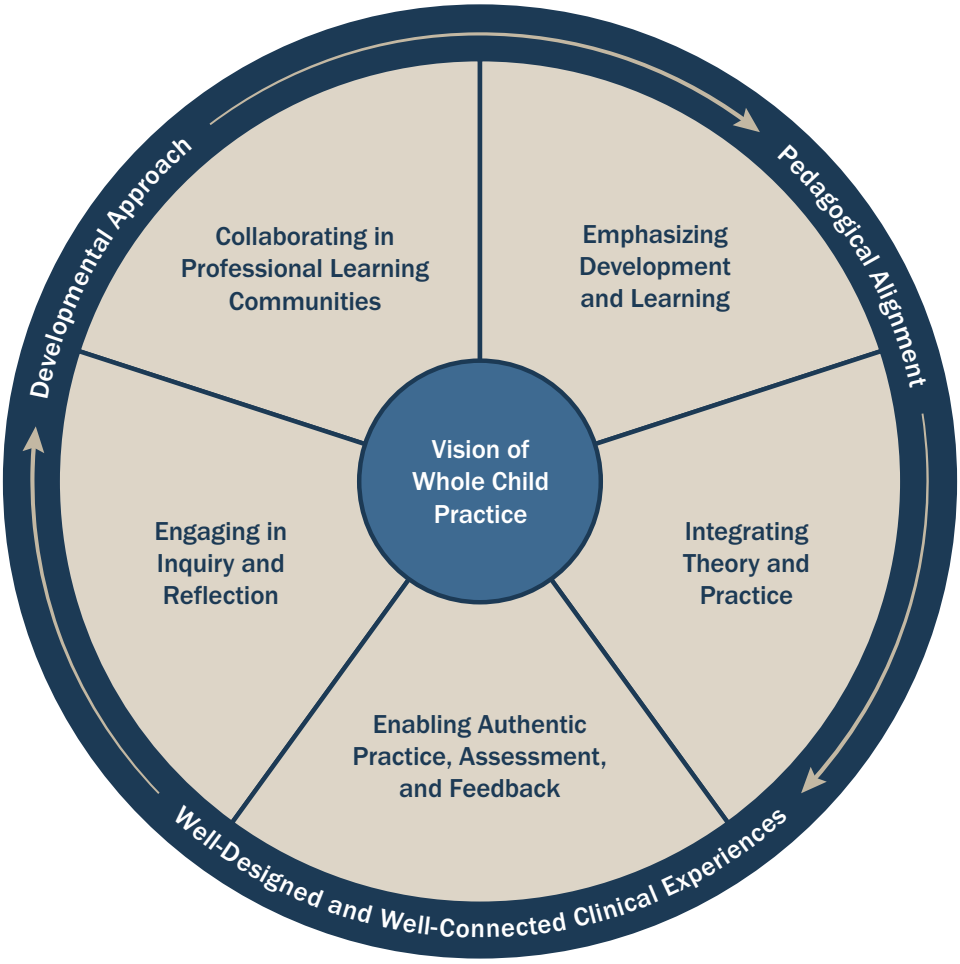
Source: Darling-Hammond, L., Flook, L., Schachner, A., & Wojcikiewicz, S. (with Cantor, P., & Osher, D.). (2022). *Educator learning to enact the science of learning and development*. Learning Policy Institute.

Research on effective preparation suggests that there are also strategies that can make a strong difference in the capacities of educators to build this set of knowledge, skills, and dispositions that support a vision of practice that centers the whole child.

As shown in Figure 3, these strategies include:

- anchoring candidate learning in the study of human development and learning;
- integrating theory and practice;
- providing opportunities for authentic practice, assessment, feedback, and reflection;
- engaging in inquiry and reflection; and
- collaborating in professional learning communities.

Figure 3. The "How" of Teacher Education



Source: Darling-Hammond, L., Flook, L., Schachner, A., & Wojcikiewicz, S. (with Cantor, P., & Osher, D.). (2022). *Educator learning to enact the science of learning and development*. Learning Policy Institute.

Powerful learning for educators can unfold when these practices are embedded in a developmental approach to learning to teach that is pedagogically aligned. This allows teachers to see and experience the practices they are learning to use and engage in metacognitive activities that allow them to reflect on the connection between what they have learned and how they see it being enacted. Such an approach supports prospective teachers not only with well-designed coursework but also with well-designed and well-connected clinical work that is joined through the reflective processes that faculty, cooperating teachers, and supervisors create in multiple settings.

Finally, it is important to acknowledge not only the content and practices of SoLD-aligned teacher preparation but also the support systems and resources that enable this kind of preparation. Research on the kinds of systems in place for programs that are succeeding in this kind of preparation identifies the importance of (1) well-established values that are infused in a program's culture, structures, and practices; (2) leadership that prioritizes teacher preparation; (3) dedicated resources of both time and money that sustain collaborative relationships among program faculty and school partners that model and teach deeper learning practices; and (4) partnerships with K–12 systems and schools that create opportunities and spaces for shared and mutually beneficial work.[10]

Close attention to supports and resources is beyond the scope of this report, but they are critically important considerations in implementing the design principles described. While these design principles are not explicitly aligned with any particular type of educator preparation pathway, they do describe a comprehensive program that is clinically intensive and coherent. Such models are typically time- and resource-intensive, as is any effort at significant institutional change. Because we hope for wide and successful adoption of these design principles, we encourage our colleagues to approach the task with a full awareness of the challenge the principles represent to the status quo and the ongoing commitment they will demand from programs and educators.

Curriculum Rooted in a Deep Understanding of Learners, Learning, and Development

What the Science Says

Children's development and learning are shaped by dynamic interactions among the environmental factors, relationships, and learning opportunities they experience, both in and out of school, along with physical, psychological, cognitive, social, and emotional processes that influence one another—both biologically and functionally—as they enable or undermine learning. Although our society and our schools often compartmentalize these developmental processes and treat them as distinct from one another—and treat children as distinct from the many contexts they experience—the science of learning and development (SoLD) demonstrates how tightly interrelated they are and how they jointly produce the outcomes for which educators are responsible.

These experiences—grounded in place, space, and the multiple communities a person interacts with (family, friends, neighborhood, church, school, and others)—form the cultural contexts within which each person encounters the world. Since learning is a process of drawing connections between what we know and what we are discovering, these cultural contexts provide the foundation for learning and identity development.

As a function of experiences, the brain and human capacities grow over the entire developmental continuum, and across the developmental spectrum (physical, cognitive, affective), in interactive ways. What happens in one domain influences what happens in others. For example, emotions can trigger or block learning. Emotions and social contexts shape neural connections, which contribute to attention, concentration, memory, knowledge transfer, and application. When educators understand how developmental processes unfold over time and interact in different contexts, they can create more supportive designs for learning environments. Pedagogies and practices that center the whole child support learning and development.

A curriculum rooted in a deep understanding of learners, learning, and development is the most important foundation teacher preparation programs can offer to ensure that teacher candidates have the knowledge and skills to teach and support children well. Also, preparation programs should be attuned to these tenets of learning and development when considering how they are developing learning environments for aspiring teachers.

Overview

Programs should be designed to prepare educators who can effectively address the complex ways in which children learn and develop. This includes knowledge of all aspects of child and adolescent development, including brain development; pedagogical content knowledge and pedagogical learner knowledge; and language development (including academic language). These understandings will help candidates use inquiry- and asset-based approaches

Programs should be designed to prepare educators who can effectively address the complex ways in which children learn and develop.

to learn about students' backgrounds and experiences and enable them to create curriculum and assessments that allow students to learn deeply and authentically with a sense of agency and purpose that enhances their motivation.

Preparation programs should include knowledge about neurodiversity and the ability to evaluate, modify, and adapt curricular materials for individual students to build on their strengths and address their specific needs. Programs should model learning that is rooted in culture, experience, and relationships and should equip educators with an understanding of the conditions necessary for optimal learning in children and adolescents. This includes curriculum that connects subject matter with strategies for an asset-based approach to learning about students' backgrounds, families, and community. This knowledge helps build aspiring teachers' adaptive expertise, which allows them to consciously integrate different areas of knowledge and skills to make sound decisions in the complex swirl of classroom life.

What Teachers and Teacher Educators Can Do

There was a time when learning to teach often meant learning a set of techniques for presenting content to students in a relatively standardized fashion; testing how much they learned; assigning grades; and determining where they would be placed in the next grade, course, or tracking system. The idea that teaching should support a complex set of developmental processes or address the ways in which children learn—including the ways in which children learn differently as a function of their funds of knowledge[11] and prior experiences—was not central to most schooling or to teacher education.

Now we know that to teach children most effectively, teachers need to understand the learning process as it unfolds in sociocultural contexts, since all learning is rooted in culture and experience and involves people's abilities to connect what they already know to what they are seeking to understand.

Because brain architecture continually develops as a function of experiences, relationships, and contexts, teachers can benefit from understanding the kinds of experiences that matter. These include opportunities for exploration and inquiry in supportive environments that offer frameworks or schema that help children see patterns and connections among the things they are learning. Rich language experiences both build neural connections and help students develop their thinking and ideas. Other symbol systems—such as math, music, and art—also develop brain capacity in distinctive ways.[12]

In addition, it is important for teachers to understand how contexts and relationships, including teacher behaviors and practices, influence brain development, both positively—when children are in calm, predictable, and trustworthy environments that offer supportive relationships—and negatively, when children experience anxiety, trauma, or distress. Neural networks are supported by good nutrition, physical activity, green spaces, and mindfulness, and they are undermined by physical deprivation or threats, as well as by psychological threats. Understanding the conditions for optimal brain development and functioning can help teachers create a productive classroom environment. Understanding how trauma can disrupt attention and behavior can help educators offer the responsive relationships, spaces for calming, opportunities to learn social and emotional skills, and access to mental health and other supports that can heal the effects of trauma and prevent the kinds of punitive, exclusionary school responses that can exacerbate trauma.[13]

Teachers need to understand child and adolescent development, along with developmental processes, in all the domains of development—social, emotional, cognitive, academic, physical, and moral. Teachers also need to understand sociological and cultural factors and processes that affect what students think and do. They should have strategies to learn about children as individuals, as members of families and communities, and as learners. Having such strategies can enable them to plan comprehensively for supporting development in all the domains. One example of an approach used in Towson University's teacher education program to build such integrative lessons is shown in the section that describes the principle about Development of Skills, Habits, and Mindsets of an Equitable Educator.

The "pedagogical learner knowledge"[14] that teachers need includes an asset-based approach to learning about students' backgrounds and experiences, which in turn relies on teachers' understanding of and reflective practice about their own positionality and potential biases so that they can deepen their capacity to see children fully and engage with them responsively. A key aspect of this knowledge is an appreciation for cultural resources and funds of knowledge that teachers can draw upon in developing curriculum and learning experiences. The text box Developing Teachers' Knowledge of Learners explains how teacher candidates at Vanderbilt University are supported in learning to understand individual learners, recognize their competence, and build on their learning processes.

Developing Teachers' Knowledge of Learners

As Vanderbilt faculty engage teacher candidates, they commonly use video analysis. In the following examples, faculty explain the use of videos as a means to help teachers see and support their learners more fully and reflect on their own actions in that regard.

Example 1: Recognizing Students' Competence

Early on in our practicum courses, we have teacher candidates work in one-on-one conversations with students to start practicing how they listen to students and to open up space for students to share their thinking. In their first literacy block practicum, candidates tutor students in reading. Part of the goal in this practicum is to shift their thinking away from teachers doing all the intellectual work and students getting everything delivered toward allowing students to do the heavy intellectual lifting. Throughout the semester, the teacher candidates analyze their videos of these tutoring conversations. The teacher candidates reflect using prompts that help them shift their gaze toward the work the student is doing (rather than the teacher).

At the end of the semester, the candidates complete a summative reflection using an "I used to think. … Now I think. …" prompt. One candidate said, "Many of the difficulties I faced revolved around which one of us [me or the student] was doing the intellectual work of reading. By giving John the answer or asking loaded questions as I did in the video, John was able to breeze through reading without having internalized or reflected deeply upon the text." This kind of video analysis helps the candidates shift away from teacher-centered learning toward allowing students to show their competence and have more agency. When we're looking at disruption, we're looking at trying to get teacher candidates to surface their beliefs, misconceptions, and mindsets about students that will inform what they do in practice.

Example 2: Building a Repertoire by Making Space for Students' Sense-Making Resources

This example is from a secondary math teacher candidate's classroom. At this stage, the teacher candidates gather a clip of their own teaching, and then they ask, "What is the thing that I want my peers to help me think about? What am I curious about in my practice?" Peter poses these questions: "What is the balance of what information I should give students so that they can discover and have ownership of other information? And how am I executing that?"

These questions acknowledge that there will be direct instruction at times *and* productive struggle at times, and they work in tandem for the benefit of the student. It's like giving a student tools and materials to build something versus asking them to build something and asking them to find their own tools, too.

Peter is working on building his repertoire of practice. He is a multilingual speaker and is able to support his emergent bilingual speakers. While we live in a state that has an English-as-primary-instruction directive, one of the ways that we're thinking about how our teacher candidates engage and disrupt this kind of policy is to allow their students the opportunity to engage in multilingual learning if it supports their sense-making and productive struggle. What we see in Peter's video and in his analysis is that he has moved beyond noticing student competence and is now building his instructional repertoire to make space to leverage students' cultural and linguistic resources as productive resources for math sense-making.

Source: Hundley, M., Palmeri, A., Hostetler, A. L., Johnson, H. J., Dunleavy, T., & Self, E. (2018). A thing to be learned: Developmental trajectories, disciplinary practices, and sites of practice in novice teacher learning. In D. Polly, M. Putnam, T. M. Petty, & A. J. Good (Eds.), *Handbook of research on professional development for quality teaching and learning*. IGI Global. pp. 153–180.

This knowledge of learners, learning, and developmental processes also undergirds the pedagogical content knowledge[15] teachers use to design curriculum, representations, tasks, and ongoing formative assessments. Pedagogical content knowledge connects teachers' understanding of subject matter with what they know about how children learn generally and what they know about the specific children they are teaching: their funds of knowledge, prior experience, and ongoing engagement. This knowledge of subject matter should be deep and flexible enough to ensure that teachers understand the core concepts ("big ideas") and modes of inquiry in the disciplines they teach so that they can create useful schema, representations, and examples appropriate to both the demands of the subject matter and the experiences of their students. It should also help teachers develop a logical sequence of concepts or topics that will naturally help students scaffold their learning of the content, as well as understand where there may be gaps to be filled in children's learning processes. This knowledge allows them to "bring the child to the curriculum and the curriculum to the child,"[16] differentiate instruction, and assess and support progress for each learner.

Teachers' knowledge of technology tools to support learning is now a key factor in enabling student inquiry, communication of ideas, opportunities for practice, and representations of their work and learning in multiple formats. The pace of technological advancement continues to accelerate, and so it is all the more important that students' knowledge and understanding of technology come in the form of the flexible, transferrable, conceptual learning that is the goal of educators prepared via these principles.

For teacher educators and teacher candidates, knowledge of or about technology must be joined to pedagogical knowledge about how to effectively use technology, just as knowledge of content is married to an understanding of pedagogy.

Technological pedagogical content knowledge (TPACK)[17] is an important analogue to pedagogical content knowledge, as it helps teachers develop deep understanding of effective strategies that allow them to make judgments about how to use technology in their own contexts, with their own students, to foster meaningful learning.[18] Technological literacy, in this sense, means "becoming a sensitive and critical user of [technological] media," including an awareness of the potential for unintended consequences and knowledge of a set of strategies for enabling students to master, rather than being mastered by, technologies they will need to use as tools for ongoing learning.[19] Teacher educators should consider how they integrate technology into preparation programs in light of these goals.[20]

Developing pedagogical content knowledge requires strong connections between clinical experiences and coursework, coupled with a shared focus among the program or course instructor, cooperating teacher, and preservice student teacher on pedagogies that focus on understanding students' thinking and building on their ideas. This includes building both student skills and teacher candidate skills through critical, reflective activity, as the vignette in Developing Pedagogical Content Knowledge illustrates.

Developing Pedagogical Content Knowledge

Sandra, a student in Stanford's Teacher Education Program (STEP), gathers with her classmates to watch video clips of young learners engaged in collaborative math work. Some of these clips were collected by the students in their classroom placements; others have been brought in by the instructor. As they watch, they reflect and discuss what they notice students doing to move forward in their collaborative work, what math ideas are at play, and what strategies students use. The conversation leads to a discussion about a variety of student assets and serves as practice in noticing and naming assets and understandings as part of building content pedagogy while also challenging deficit notions. Sandra takes these ideas with her into her 3rd-grade placement the next day. She and her cooperating teacher have been working with students through a unit on place value that centers group work and have been reflecting on talk moves that elicit student ideas. Today Sandra is excited to continue practicing those moves during small-group discussions, attending to and naming students' efforts with the same asset lens.

In today's lesson, students work on the following problem: "My mom has 20 packs of 10 Halloween pencils and 4 loose ones. How many Halloween pencils does she have? How do you know?" As the students explore place value ideas in their groups, Sandra joins a student partnership that has built two 10-sticks. She elicits their thinking with a series of questions, supporting her students in making their thinking visible.

She notices that the students have a strong grasp that one stick represents 10 pencils and that two sticks would thereby be 20 pencils, and she revoices this idea to the students, confirming and validating their thinking. She then prompts them to show her the model they have created and connect that model back to the task. These moves help the students realize that their model of the

two sticks of 10 cubes doesn't match the story, and Sandra nudges them to develop a new strategy. After some discussion, the partners agree to continue building 10-sticks until they reach 20 sticks of 10 cubes.

Sandra shares this experience in her math education class, as well as with her cooperating teacher during their regular debrief. Through connections between clinical experiences and coursework, coupled with a shared focus on pedagogies that support understanding students and building on their ideas, Sandra develops both pedagogical content knowledge and pedagogical learner knowledge that enable her to develop and practice the skills and dispositions of an equitable, responsive educator.

Source: Provided by Jennifer Langer-Osana, Stanford University. (2023).

Part of this knowledge base is an understanding of language development. This includes an understanding of building blocks for language and literacy development—including the ways in which children develop language through interaction, rather than just listening to language or watching others,[21] and the comprehensive approach to literacy development that has emerged from recent research.[22] It includes the development of language proficiency for those whose first language is English and those for whom it is not. Given evidence that multilingualism benefits cognitive development and literacy development, this knowledge base of language development also includes the preservation and use of the native language to the greatest extent possible,[23] which can occur both in contexts offering dual language immersion and in those where the first language is a springboard for learning English. In addition to the development of language and literacy skills that are central to early education, teachers need to know how to help students develop language skills of reading, writing, listening, and speaking for academic purposes. This area includes the academic language they need to do work in school (e.g., discipline-specific vocabulary and concepts) and the ways that language is used in different genres (e.g., in textbooks, essays, lab reports, or classroom discussions). These academic language needs should be addressed in ways that continue to respect and sustain students' familial and cultural communication modes.

These understandings help teachers create curriculum and assessment experiences that allow students to learn deeply and authentically, engaging in inquiry that is relevant to their lives and demonstrating their learning in multiple ways that allow them to produce analyses, solutions, and a range of products that are meaningful to them and others, including members of their families and communities. Teachers' understanding of assessment of, for, and as learning will help them both design useful analyses of learning that are educative in and of themselves—including well-scaffolded projects and performance tasks—and assess learning along the way.

The sense of agency and purpose that accompanies such authentic tasks enhances student motivation. Meanwhile, the use of well-designed rubrics can support self- and peer assessment as well as teachers' feedback and ongoing instruction informed by their analysis of student work. Such tools can also support students' efforts to revise their work, which can enable them to develop greater competence and a growth mindset.[24]

Because children's lives are complex and the domains of development interact, teachers must be able to figure out the social, emotional, and cognitive supports students may need to advance their academic progress, sometimes emphasizing efforts in one domain in order to enable progress in another (for example, addressing emotional concerns or working on executive function strategies that are needed to engage more productively in instruction).

These decisions are benefited by knowledge about neurodiversity, which enables greater understanding of the distinctive ways in which people process different kinds of stimuli, experiences, and information, thereby helping teachers consider the multiple modes of representation and expression that can help children learn. Planning instruction that appropriately incorporates Universal Designs for Learning and that offers students the right kinds and amounts of challenge to stretch their capacities and learning is made possible by this kind of knowledge, along with the skills to evaluate, modify, and adapt curriculum materials for specific students to meet their needs and build on their strengths.

These kinds of decisions are grounded in the adaptive expertise teachers develop as they consciously integrate different areas of knowledge and skill to make sound decisions in the complex swirl of classroom life. This kind of expertise, building on the knowledge of child development, learning, curriculum, and assessment described in this section, is illustrated in the vignette in Preparation for Developmentally Grounded Curriculum and Instruction, about the classroom of a Bank Street College of Education cooperating teacher. The vignette reflects the coherent vision of practice that informs the college's coordinated coursework and clinical work.

Preparation for Developmentally Grounded Curriculum and Instruction

Ted Pollen, a graduate of Bank Street College of Education, is now a cooperating teacher at Midtown West School in New York City—a Bank Street partner school staffed largely by Bank Street graduates. As an African American teacher and mentor who moved into teaching from his former career as a dancer, Pollen brings many important experiences and perspectives to the faculty. Because he works closely with the college, his student teachers' clinical experiences reflect what they are learning in their coursework at Bank Street, which occurs simultaneously with and is augmented by supervisory group meetings that offer additional opportunities for processing what is being learned.

In Pollen's 4th-grade classroom, a racially diverse group of 27 students is deeply engaged in a math inquiry focused on understanding the concepts of range, mean, median, and mode. Some students are seated around tables, while others are in pairs or trios on the rug in the classroom meeting area.

While some teachers might introduce the three terms with definitions and rules for calculating them and give students a worksheet of problems to solve, Pollen's class has been conducting a study that provides them with the data they are now analyzing. Earlier in the week, they measured and recorded the height of everyone in their classroom and all the children in one of the kindergarten classrooms who are their "reading buddies." Each student then figured out how to display the data distributions with bar graphs they constructed individually so they could figure out the range, mean, median, and mode for each class and compare them. Working in teams, students use various tools, such as manipulatives and calculators, as they advise and query one another about what to do.

Pollen and his two student teachers move unobtrusively among groups, watching the process and occasionally asking questions to help move students to the next level of understanding. It's clear that he is thinking about students' zones of proximal development as he chooses his questions. Pollen says to one group, "Think about your design. What's the best way of displaying the data so you can make an actual comparison?" He asks another group, "Can someone give me the range for kindergarten? Our range? Are there any outliers?" This led to a realization that there was little overlap between the two groups, but there were a few relatively short 4th-graders and one very tall kindergartner. A student says proudly, pointing to that data point, "That's my reading buddy!"

In yet another group, Pollen remarks to one of the boys, "You're having the same problem that she's having," pointing to a tablemate to encourage the two of them to work together. They begin counting and calculating to solve the problem jointly. Pollen never gives away the answer, but he assists the problem-solving process with questions that carefully scaffold student understanding. In their groups, students engage in vigorous debates about the answers, explaining their reasoning to one another, recounting their data, marshaling evidence, and demonstrating their solutions in different ways. Pollen does not attempt to adjudicate the disputes or provide the right answer. He allows the groups to work through the problem.

Pollen watches over a student with autism who is doing her work with a one-on-one aide. The student sings to herself periodically while she is doing the work but continues to make progress. In the hubbub of the classroom, her singing is not a distraction to the others, as they all focus intently on communicating to find solutions to this highly motivating puzzle. Every single student has made significant progress in developing a deep understanding of these key statistical concepts that often elude much older students.

Around the hardworking groups of children, student work covers the walls: A classroom constitution that was collectively developed and signed by each student and teacher is displayed, along with a "Problem Parking Lot" with sticky notes listing various problems and questions the class has agreed to return to trying to solve. Especially prominent is student work on recent projects, such as their accounts of the lives of enslaved people in New Amsterdam and New York between 1621 and 1680, along with fractions posters illustrating various problems they have tackled and solved, including how they have split submarine sandwiches among various odd numbers of people.

On the back shelves, one set of tubs offers manipulatives for math. Another set of tubs includes books labeled by type, all connected to current topics of study. Authors studied by the class each merit a tub, as do biographies about prominent African Americans and other individuals, books about slavery, Pollen's favorite books, and more. Handmade globes and a timeline string with chronological date cards of important events hang from the ceiling. The meeting area in front of a whiteboard is covered with a rug that shows a map of the world.

Also on the wall are many posters reminding students about their routines. One summarizes the rules for "Book Club." Another asks, "What is figurative language?" and explains that figurative language is "when words mean something other than their literal meaning." The poster defines what most people would think of as high school terms—simile, metaphor, hyperbole, personification, alliteration, onomatopoeia, idiom, allusion, and oxymoron—and offers concrete examples of each.

Other posters developed by students and the teacher include "Writing workshop conferencing protocol," "Poetry guidelines," "Persuasive essays," "Jobs in a reading conference" (enumerated for both the student and the teacher), and "Elements of a news magazine article." These posters are often in the students' own words, codifying their learning so they can share it and go back to it as needed. Another poster enumerates "What we know about maps," while still another describes "Multiplying 2-digit by 1-digit numbers: the traditional algorithm."

Invisible in this moment are the school supports that make this productive hubbub possible: free breakfasts for all children; free transportation for children who live in temporary housing; a Family Center that offers educational workshops, cultural connections, and family support services; extended after-school time and services; and twice-annual student–family–teacher conferences. Also operating behind the scenes is a set of children's rights that include: "I have a right to be happy and to be treated with compassion in this school"; "I have a right to be myself in this school. This means that no one will treat me unfairly"; and "I have the right to be safe in this school." Community building and conflict resolution are explicit schoolwide efforts. Although the school is overcrowded, it is welcoming in every respect.

Source: Darling-Hammond, L., Oakes, J., Wojcikiewicz, S. K., Hyler, M. E., Guha, R., Podolsky, A., Kini, T., Cook-Harvey, C., Mercer, C., & Harrell, A. (2019). *Preparing teachers for deeper learning*. Harvard Education Press. pp. 157–158.

This short vignette illustrates teaching grounded in a developmental framework that cultivates strong, trusting relationships; collaboration in the learning process; connections to prior experience; a content-rich curriculum that promotes inquiry interspersed with explicit instruction where appropriate; and support for individualized learning strategies as well as collective learning.

For student teachers in this classroom, all the components of the teaching knowledge base come together and are highlighted in the discussions they have with Pollen and their supervisor. Authentic and engaging inquiries with real-world connections like the task Pollen chose—measuring and comparing the heights of children of different ages in two classrooms—motivate student effort and engagement. Students' work is supported through teacher scaffolding and a wide range of tools that allow for personalized learning and student agency. Other scaffolds—like the charts reminding students of their learning processes and key concepts—support self-regulation and strategic learning while reducing cognitive load in order to facilitate higher-order thinking and performance skills. These scaffolds also enable student self-assessment, as well as peer and teacher feedback that is part of an ongoing formative assessment process. Routines for reflection on and revision of work support the development of metacognition and a growth mindset. Meanwhile, students' identities as competent writers, scientists, and mathematicians are also reinforced, as their work dominates the walls of the classroom and is the focus of the learning process. Culturally connected curriculum units and materials foster students' sense of inclusion, and a wide array of school supports reinforce that inclusion by addressing student and family needs while incorporating families as partners in the educational process.

The developmental needs of students and the demands of the curriculum for deep understanding are brought together in curriculum planning, which is shared with Pollen's student teachers in his classroom and in the courses they are taking at Bank Street. The planning for the math lesson takes into account how to engender the kind of mathematical reasoning required for a robust understanding of central

tendency and variation—the fundamental underpinning of mean, median, and mode. The planning also considers students' individual strengths, needs, and modes of working as the teachers codesign the groups students work in, shape the questions they pose to individuals, and decide on follow-up learning activities. Pollen explains this thinking to his student teachers throughout the year, and the student teachers are increasingly able to contribute ideas.

In addition to planning with their cooperating teacher, candidates develop their skills as they learn to plan curriculum throughout their courses, considering how to plan around student strengths and needs and differentiate as appropriate to accomplish their curriculum goals. As candidates create their own curriculum units based on the local context and their students, they learn to improve their instruction as they gather information from their observations and analysis during the lessons they test out in their fieldwork placement. Throughout the assignment, candidates receive feedback, review models of curriculum, and make multiple revisions to refine their curriculum. This iterative lesson planning assignment requires teachers to build on the experience of their students based on careful observation and analysis and then reflect on the effectiveness of their lesson for individual students in order to improve it for future students.

Development of Skills, Habits, and Mindsets of an Equitable Educator

What the Science Says

Because learning and development are relational and highly context sensitive, it is important that all students experience environments of trust and belonging. Warm, caring, supportive teacher–student relationships are linked to better school performance and engagement, greater emotional regulation, social competence, and willingness to take on challenges.[25] Strong relationships have biological as well as affective significance. Brain architecture is developed by the presence of warm, consistent, attuned relationships; positive experiences; and positive perceptions of these experiences.[26] Such relationships help develop the emotional, social, behavioral, and cognitive competencies that are foundational to learning.

Children's ability to learn and take risks is enhanced when they feel emotionally and psychologically safe; it is undermined when they feel threatened. A meta-analysis of 99 studies found that the affective quality of teacher–student relationships was significantly related to student engagement and achievement. Students often placed at risk in school and society—children of color, those from low-income families, and those with learning differences—were harmed most by negative teacher affect and benefited most from positive relationships with teachers.[27]

Students learn best when they can connect what happens in school to their cultural contexts and experiences, when their teachers see their families and communities as assets and are responsive to their strengths and needs, and when their environment is identity safe, reinforcing their sense of value and belonging. This is especially important given the societal and school-based challenges many children, especially those living in adverse conditions, experience. For all these reasons, and because children develop through individual trajectories shaped by their unique traits and experiences, teachers need to know students well to create productive learning opportunities. Building highly favorable conditions into the environments in which children grow and learn—including trust, connections to children and families, and supports—improves equity of experience and opportunity. All of these understandings are key to the development of the knowledge, skills, and dispositions of equitable educators.

Overview

Teachers have the ability to powerfully shape students' experiences and learning in their classrooms. Preparation programs have the responsibility to ensure that new teachers are equipped with the mindsets, skills, and knowledge to do so as equitable educators. This responsibility includes providing opportunities for teacher candidates to learn to:

- develop self-awareness and inquiry skills to guide continuous learning, including learning about children and their experiences, strengths, and needs and how to build on those strengths and meet those needs;
- develop mindsets and key dispositions, including empathy; social, emotional, and cognitive skills that support learning; cultural competence; and the ability to support children's healthy identity development;

- develop the skills to create classroom communities that honor all learners, where students learn and construct meaning together, with responsive and supportive connections fostering students' trust, sense of belonging, and positive identities;
- develop the pedagogical knowledge and skills to create and scaffold rich, meaningful tasks that are accessible to students and implemented in ways that support the development of a growth mindset, perseverance, resilience, and problem-solving abilities;
- understand the national, local, historical, economic, and political contexts of schooling; their impact on students' experiences and learning; and how they are manifested in schools and classrooms; and
- build strong partnerships with families, communities, and other educators in order to teach from an asset-based, culturally responsive stance.

These kinds of knowledge, skills, and dispositions build the foundation on which teachers learn to translate knowledge of students' lives, experiences, and prior learning into curricula that support high-leverage learning.

What Teachers and Teacher Educators Can Do

Because learning is relational, it is paramount that teachers develop the mindsets to support all students well and equitably. These mindsets start with an authentic curiosity about oneself and others, as well as a positive disposition about learning and equity that supports compassion; care; an acknowledgment that everyone holds evolving beliefs and biases that influence decision-making; and an acceptance and honoring of students' backgrounds, experiences, and social identities. They also include dispositions and skills for engaging in trauma-informed and healing-oriented practices for students who face adversity.

Because learning is relational, it is paramount that teachers develop the mindsets to support all students well and equitably.

Equitable educators cultivate dispositions within themselves and their students that include empathy; social, emotional, and cognitive skills that support learning; cultural competence; and healthy identity development, as well as personal and professional identities rooted in these capacities. Among the cognitive skills they support are those productive for learning, such as executive function and growth mindset, as well as the problem-solving, perseverance, and resilience that enable children and adults to function in the face of daily challenges.

Developing Social and Emotional Learning

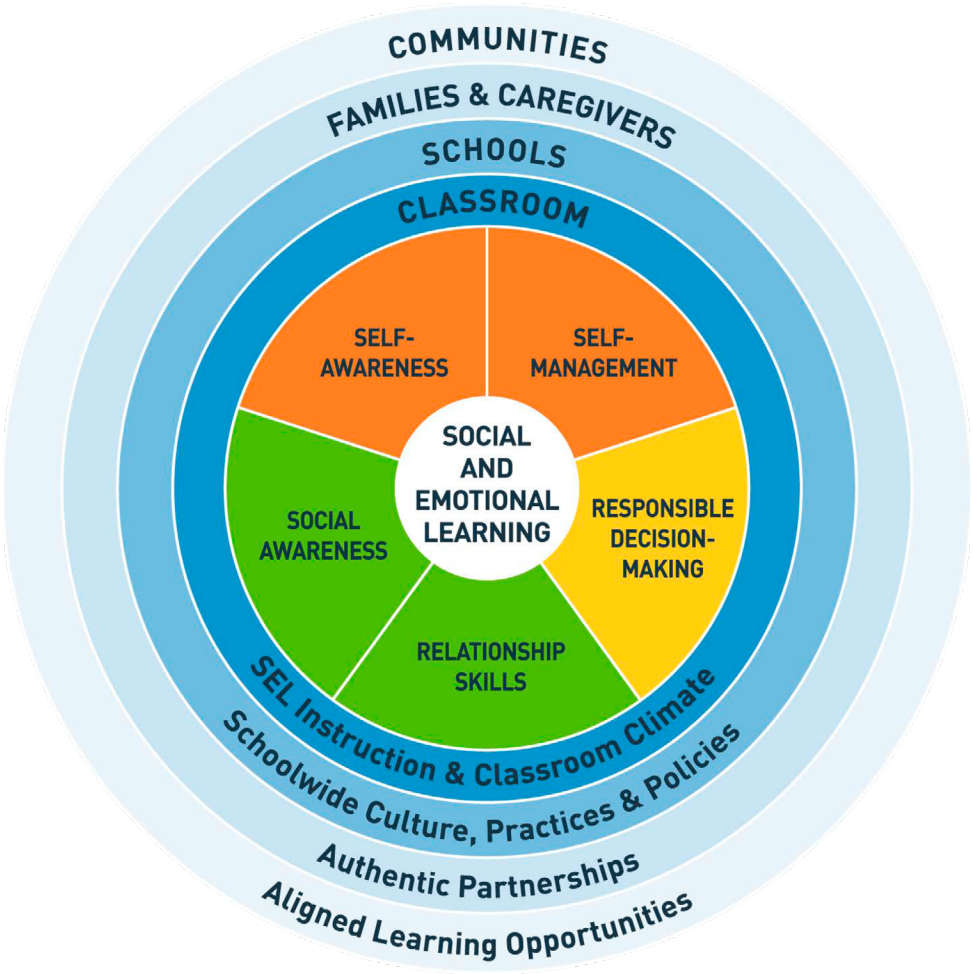
Educators informed about the potential that culturally responsive forms of social and emotional learning can provide are at an advantage when trying to develop meaningful relationships with their students. The fundamentals of social and emotional learning begin with the importance of helping students:

- become aware of their emotions,
- learn how to manage their emotions,

- interact well with others,
- understand how their behavior affects and is affected by others,
- set goals both personally and academically, and
- make appropriate decisions that help them succeed.

Working on students' ability to cooperate with peers and the people who surround them also enhances their ability to empathize with others and advocate for themselves and enhances their readiness to learn in school and beyond. One example of this may be seen in the Collaborative for Academic, Social, and Emotional Learning (CASEL) wheel (see Figure 4), which suggests how to develop SEL in the following contexts: classroom, school, family, and community.

Figure 4. Interactive CASEL Wheel



Source: CASEL. (2020). *What is the CASEL Framework?*

Cognitive skills such as problem-solving, perspective taking, and executive function interact with *emotional skills* such as emotion recognition, empathy, and emotion regulation, and with *social skills*, including cooperation, helping, and communication.[28]

These skills are developed not only through specific lessons or programs but also through a set of reinforcing practices infused throughout the school day and in all parts of the environment. For example, teachers who can construct authentic tasks that feature strong scaffolding and well-supported collaboration develop social and emotional skills that can also support motivation and achievement. If they incorporate well-designed self- and peer assessment practices focused on meaningful feedback and opportunities for revision, they can also help students develop a sense of efficacy and confidence, leading to increased competence and a growth mindset. These in turn support problem-solving and resilience.[29] This is equally true within teacher education itself, where instructors and mentors need to model and enable social and emotional learning for prospective teachers through all aspects of the program. Teachers should also learn how to support the varying needs of students who have had different kinds of home and schooling experiences, including some who have experienced traumatic events that impact their learning, creating an even greater need for particular social, emotional, and cognitive supports. The vignette in Social and Emotional Learning for Teachers of Multilingual Learners provides a glimpse of how these skills can be taught in an educator preparation classroom with these kinds of considerations in mind.

Social and Emotional Learning for Teachers of Multilingual Learners

At Towson University in Maryland, preservice teachers gather in class to practice and develop their own social and emotional skills. Their instructor starts class by having them focus on their breathing, concentrating on the positivity that each of them brings to the class. She then reminds them that this simple practice can help multilingual learners start class in a more focused manner. She gives insight into how some multilingual learners might be estranged from family, have other issues related to being in a new environment, or find themselves frustrated while learning a new language in addition to adjusting to a new culture.

She shares how students might get teased for mispronouncing words or how they might be missing their friends. She says, “There are so many factors that go into what a child brings to class. One of your main goals should be to try and connect with them so that you can promote learning by building on students’ strengths using social and emotional learning and asset-based instruction to help them be successful.”

She next has the teachers search on their phones for a country they would like to move to where English is not the primary language so they can reflect on the obstacles they might face in a new environment. She asks, “What kinds of emotions are generated by thinking about all that is involved with moving?” This sparks a rich discussion in the class, where the future educators talk about how they are fearful of having to find a job in a new location where people do not speak English, find a home, and make new friends, all while being homesick.

The instructor then says, “Imagine you are going through all of that and, at the same time, the pandemic hits. All of those factors together would be stressful for anyone, no matter how prepared they might be. As a result, students and families in general can benefit from building their social and emotional skills, yet multilingual learners might have a greater need to access these skills. To be equitable educators, we should reflect on our individual students’ needs and strengths to ensure that we are supporting them to succeed.”

Source: Provided by Gilda Martinez-Alba, Towson University. (2023).

Preparation programs can also help candidates think of their own well-being and can introduce activities that help them focus on their own social and emotional learning, such as pausing to stretch to refocus in class, doing guided meditation, reading materials that focus on emotions to open the door to conversations related to how to work through different feelings, and making time with themselves as well as their students for goal setting and self-care.

Constructing Community That Enables Positive Relationships

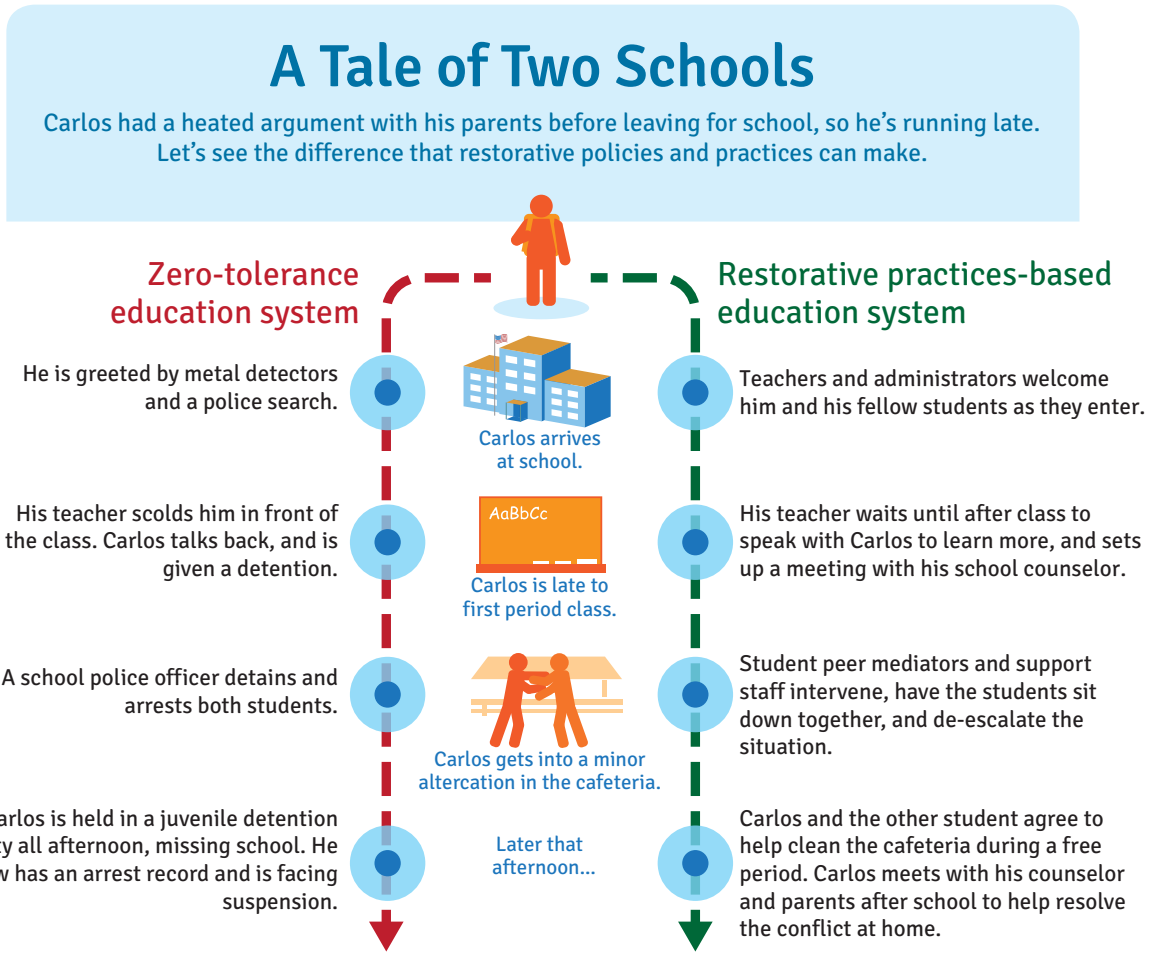
Preparation programs also need to support teacher candidates to develop the skills to create classroom communities that honor all learners, helping children negotiate relationships with peers and adults with care and respect. This includes learning to use restorative practices to support inclusion and community building; support classroom learning environments; and replace punitive, coercive, and exclusionary disciplinary approaches with proactive development of community caring, coping mechanisms, and conflict resolution skills that help students develop empathy for one another and an understanding of their own behavior. Such practices result in fewer and less racially disparate suspensions and expulsions, fewer disciplinary referrals, improved school climate, higher-quality teacher–student relationships, and improved academic achievement across elementary and secondary classrooms.[30] Restorative approaches are also grounded in ameliorating long-standing inequities in schools and society by building safe, inclusive learning environments where consistent, caring relationships can thrive and every young person is valued and affirmed.[31]

The illustration in Figure 5 provides two very different scenarios that show how restorative policies can make a difference in outcomes for students.[32] Teaching how to implement and advocate for this approach by modeling it for and with future teachers, which enables them to experience it for themselves, is important.

The following reflection from a teacher's observation of restorative justice practices for the first time illustrates the power of the approach:

> I was invited to an elementary school that had implemented restorative justice practices starting with their kindergarten class, and each year they added in more grades until they finally had all grades using it. As a result, the principal of the school welcomed educators to come and observe it in action. When I observed students in 3rd grade, they were clearly very familiar with the process. I was immediately fascinated by how well the students were able to sit in a circle and express their feelings. It reminded me of group therapy, except that this was taking place in the classroom. In one classroom I observed, students sat in a restorative circle and tossed around a ball to share how they were feeling that morning. They added why they were feeling that way as well. When one student shared how they were sad because they didn't get along with their sibling that morning, the other students chimed in to give advice on how to work through it once they got home. The teacher also added to the conversation. In another classroom, I noticed students sitting in a circle were discussing a conflict a few students had encountered at recess. They talked through the issue with their teacher's guidance. I had never seen such deep conversations in a classroom to work through issues that were not related to content objectives, yet had they not worked through these issues, the students would have likely not been able to focus on the lesson. I was later informed that the middle school across the street from them was now starting the same process grade by grade. This is amazing! I can't wait to try it with my students in the future.[33]

Figure 5. A Tale of Two Schools Infographic



Source: Schott Foundation for Public Education. (2014). *Restorative practices: Fostering healthy relationships and promoting positive discipline in schools.*

Checking Bias and Developing Empathy

Strongly related to teachers' development of capacities like social-emotional competencies and empathy are the beliefs they carry and how those beliefs influence their views of students and student learning. Teachers' perceptions of students shape expectations that often predict student achievement apart from prior ability. While most teachers enter the profession with a passion for fostering children's learning, growth, and development, implicit and unconscious biases can play a role in how they interact with their students. Thus, educators need to learn how to proactively cultivate positive and affirming attitudes and understand the dynamics of implicit and attributional biases in order to create culturally sensitive and identity-safe environments.[34] The dispositions to do this, as well as the knowledge and skills, can be taught.

Helping Teachers Develop Empathy

Empathy reduces bias, and it can be learned. In one study, for example, middle school math teachers who were provided an empathy-enhancing experience improved their relationships with students and dramatically reduced their use of exclusionary discipline. These teachers read articles that explained how students' feelings and experiences can cause them to behave; the articles encouraged teachers to maintain good relationships with students, even in the face of conflict. The teachers were asked to reflect on and write about how they could understand students' experiences and sustain positive relationships even when challenges arise and how they show respect to their students. Compared with teachers who were asked to simply read and write about technology use in the classroom, the first group of teachers significantly reduced their use of exclusionary discipline in the classroom and strengthened their relationships with students. Another study found that when teachers and students completed a survey that identified their commonalities, knowledge of those connections improved their relationships. Students earned higher grades when teachers learned about their similarities to those students, with the effects most pronounced for Black and Latino/a students, closing the achievement gap in grades between these student groups and White students by over 60%.

Sources: Okonofua, J. A., & Eberhardt, J. L. (2015). Two strikes: Race and the disciplining of young students. *Psychological Science*, *26*(5), 617–624; Gehlbach, H., Brinkworth, M. E., King, A. M., Hsu, L. M., McIntyre, J., & Rogers, T. (2016). Creating birds of similar feathers: Leveraging similarity to improve teacher–student relationships and academic achievement. *Journal of Educational Psychology*, *108*(3), 342–352.

Reflective educators can seek information and help students solve problems when challenges emerge—which contributes not only to motivation but also to an asset-based orientation toward families, communities, and students. Educators can also focus on their own role in creating conditions conducive to learning in both their classrooms and the school as a whole. Schools can trigger rather than ameliorate social identity threats that undermine students' confidence and performance when they group or track students in ways that convey messages about perceived ability, deliver stereotypical messages associated with group status, or emphasize ability rather than effort (e.g., "innate intelligence" vs. "hard work") in their judgments about students and their attributions of causes of success.[35]

Understanding and Addressing Inequality

Being able to develop the skills and dispositions of an equitable educator requires that teachers understand the historical, social, economic, and political contexts of the United States as well as the more localized communities in which they teach. Further, it is important that they understand how these contextual realities interact and directly impact the experiences of students, their understanding of themselves, their perceptions of their social identities, and their learning. Some of this learning may come from reading scholars whose social and historical research raises consciousness and awareness.[36] More of it may come from direct, guided inquiry into both school settings and community settings in which candidates are placed.[37]

Preparation programs need to help teacher candidates develop an understanding of equity issues and dilemmas that arise in classrooms and schools. An important part of teacher preparation is helping candidates build a commitment to engage—and a skill set to tackle—hard questions and situations that involve issues such as race, class, and power. Both teacher educators and candidates should seek to understand how these issues impact their understanding of themselves, their positionality, their understanding of privilege and how that has affected their experiences, and how these understandings influence their views of students' ability and learning. This understanding and skill set—often developed through autobiographical inquiry into experiences of privilege, discrimination, and inequality[38]—can help facilitate the acknowledgment and reduction of bias and create more equitable teaching practices and learning environments. A result of such preparation is using this lens to critically analyze curriculum choices. Table 1 provides an example of a practical scaffolding tool to learn these skills.

Preparation programs need to help teacher candidates develop an understanding of equity issues and dilemmas that arise in classrooms and schools.

Table 1. Looking Critically at a Unit to Create a More Inclusive Curriculum Tool

Unit title:			
Questions to consider:	**Current state of the unit:**	**Changes needed:**	**Resources to support changes:**
Whose voices, perspectives, or experiences are heard in this unit? (This might be through texts, quotes, stories, examples, primary sources, video, social media, articles, etc.)			
Whose voices, perspectives, or experiences are centered in this unit?			
Whose voices, perspectives, or experiences are marginalized in this unit?			
Whose voices, perspectives, or experiences are missing from this unit?			
What identities are included in this unit? Consider all facets of identity: race, religion, gender, gender identity, ability, socioeconomic status, ethnicity, sexual orientation, family structure, language, citizenship, age, etc.			

Unit title:			
Questions to consider:	**Current state of the unit:**	**Changes needed:**	**Resources to support changes:**
What systems of power are shown through this unit?			
Who is shown to benefit from these systems of power? What benefits are shown/explained?			
Who is shown to be harmed by these systems of power? What consequences or forms of oppression are shown/explained?			
What examples are provided of people taking action or pushing back on systems of oppression or abuses of power? Who is centered in examples of resistance? Are the people taking action coming from WITHIN the oppressed groups or from OUTSIDE of the oppressed groups?			
How are groups of people shown in a variety of ways throughout this unit?			
What groups of people are shown making positive contributions to the world in this unit?			
How does this unit connect to the lives of students? What makes this unit relevant to students and to today's world?			
How does this unit invite students to take action against bias and injustice?			
How does this unit draw on experiences and knowledge of students?			
How does this unit provide opportunity for student-led inquiry?			
How does this unit honor multiple ways of knowing, multiple ways to access knowledge, and multiple ways to demonstrate knowledge?			

Source: Created by Jessica Lifshitz, Meadowbrook Elementary School in Northbrook, IL.. (2023).

When educators develop an understanding of how to critically examine curriculum and teaching practices and the ways these may inadvertently promote bias and marginalization, they move further toward eliminating inequity. This understanding is required of teacher education faculty as well as candidates if it is to be infused in the preparation program.

These dispositions are supported and strengthened when teachers organize and build partnerships with families, community members, and other educators around children's learning strengths and needs. This requires preparation programs to engage the local community in a collaborative community of practice that can support student learning and build teachers' knowledge and capacity to approach students, families, and communities from an asset-based orientation. Asset-based dispositions, mindsets, and practices highlight what students bring to the classroom that can be used to build learning opportunities, rather than focusing on students' perceived deficits. In order to engage productively in such communities of practice, teachers need to develop culturally sensitive, respectful, and opportunity-centered listening and questioning skills that enable them to learn about their students' lives and learning strategies in order to create more coherent, well-reinforced learning opportunities between home and school. These, in turn, can help create environments where students feel culturally respected and emotionally and intellectually safe. This type of shared learning can occur only when preparation programs have authentic, reciprocal relationships with partner districts, families, youth, and communities. (See also Supportive Developmental Relationships in Communities of Practice).

These skills, knowledge, and dispositions build the foundation on which preparation programs help candidates learn how to translate knowledge of students' lives, experiences, and prior learning into rich, relevant tasks with appropriate scaffolding and supports. To engage in this type of culturally responsive pedagogy, teacher candidates need to know how to surface and build on prior experience, understand how children are thinking, and construct tasks that are approachable and motivating. Using a "funds of knowledge" framework,[39] candidates can learn how to captivate children's interest and foster deep learning by linking experiences and skills from children's everyday lives and cultures to classroom instruction.[40]

Building on Students' Experiences and Connecting With Families

Teachers should think of their learning community as including students, families, community members, and other experts who have knowledge of students and their learning. Teacher candidates can benefit from learning how to access students' own views about their learning through conferencing, students' reflections on their work, exit tickets, group discussions, and other means.

Schools that create meaningful relationships with families and actively engage them in having a voice, programming, and the learning environment increase student achievement and create a positive culture. Teaching must be a collaborative endeavor that taps into the expertise of all members of a community.[41] Family and community members have expert knowledge of their children and lived experiences that teachers can learn about and use in their lesson planning and instruction.

Teacher candidates can develop an asset-based view of students and families by engaging with them in the context of community-based organizations and services in the place where they are student teaching. In some programs, candidates complete clinical placements in after-school or recreation programs in order to experience families and the community in a different way than school allows. Candidates can also hear from well-regarded community organizers and leaders of grassroots organizations who are trying to improve living conditions and spend time studying the local community. By studying the sociopolitical

histories of the neighborhoods in which they conduct their clinical placements, preservice teachers become familiar with community assets (e.g., churches, community-based organizations and activities) and challenges (e.g., environmental pollution that breeds health concerns) and learn to appreciate the resilience of those who live there. Preservice teachers can also learn ways to make the curriculum culturally relevant by connecting subject matter to community-based contexts and causes.

Likewise, teachers can offer family members tools and strategies to connect in-school learning to students' everyday learning and problem-solving at home in English and their native language—for example, sending home bilingual books or keeping in mind families' literacy and language proficiency levels.[42] The more candidates learn to support students' academic development outside of school, the more students can be ready to learn once at school.

One example of how to support students outside of school can be found in Art Backpack, a family–school–university intervention at Benjamin Franklin Elementary School in Newark, NJ.

Art Backpack Program: A Family–School–University Partnership

In this program, which is designed to increase children's educational success in and through the visual arts, students take home backpacks containing several activities that will help them develop their art-making and literacy skills. Parents, family members, and neighbors work with students to complete at-home art experiences by looking at art reproductions with their children, talking to their children about their responses to works by professional artists, asking children questions about the life and art of an artist, discussing the outcome of a story, listening to stories their children have written, examining and discussing comparisons of visual images with their children, asking their children to talk about a picture they made, and reading what their children have written in a community journal.

Montclair State University preservice teachers preview the activities of the Art Backpack with children before they take them home and review students' at-home art experiences when children return to school with their assigned backpacks. Led by Montclair Art and Design faculty member Dorothy Heard, preservice teachers reflect upon their teaching strategies and children's learning strategies and link both teaching and learning to theories and pedagogical practices. The art teacher at Benjamin Franklin Elementary School in Newark, NJ, a Montclair State graduate, supports and reinforces child and family at-home art, aesthetic, and creative thinking experiences through his ongoing curriculum and offers Art Backpack workshops to parents. Franklin Elementary's classroom teachers support and reinforce child and family at-home art, language arts, and critical thinking experiences through their ongoing curriculum activities, which include trips to the local museum. The school's principal helps supervise and monitor the project. Since the program's initiation to the school, students who participate in Art Backpack consistently score higher than their peers on standardized tests.

Source: Darling-Hammond, L., Oakes, J., Wojcikiewicz, S. K., Hyler, M. E., Guha, R., Podolsky, A., Kini, T., Cook-Harvey, C., Mercer, C., & Harrell, A. (2019). *Preparing teachers for deeper learning*. Harvard Education Press. p.188.

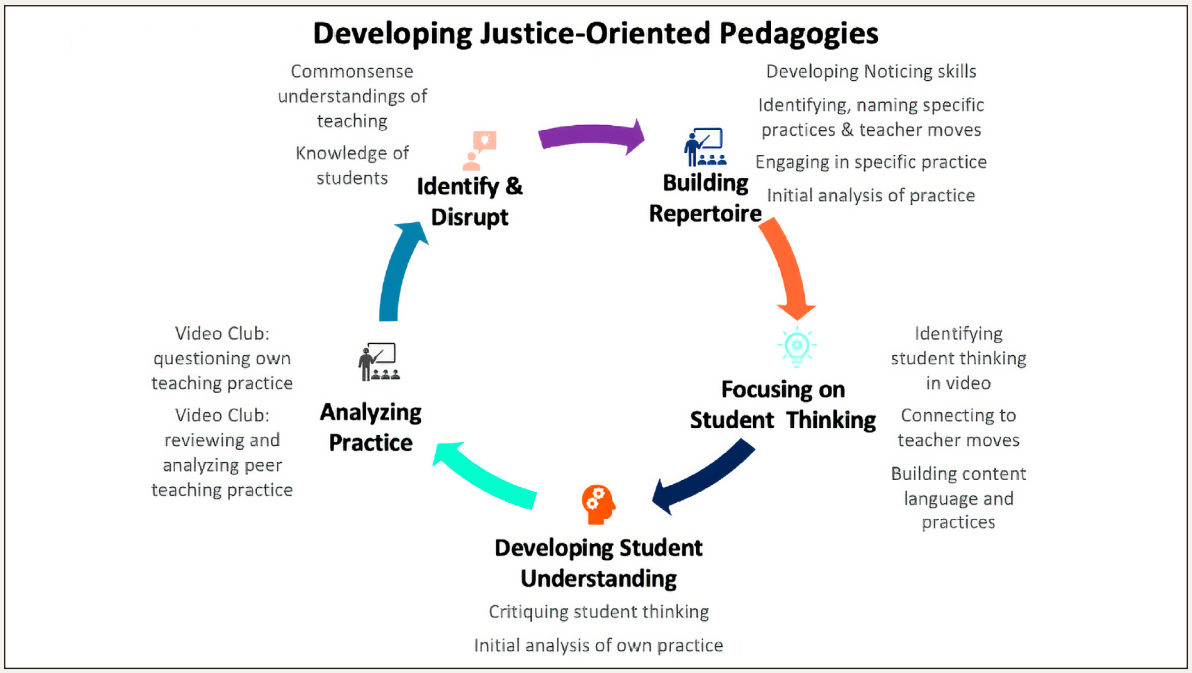
Finally, because inequities are often baked into school structures and systems, it is important for preparation programs to enable teachers to understand and negotiate more equitable school policies. Candidates need to be ready to think about, act on, and navigate within the sociopolitical contexts of schools to advocate for more just and equitable opportunities and outcomes for their students. In order to develop as equitable educators,

it is critical that teachers develop self-awareness and skills of inquiry to guide continuous learning. These skills will help teachers identify and eliminate inequity-creating and -sustaining routines and practices. The results of a set of equity-oriented inquiries that were intended to help candidates in one teacher education program develop these skills are described by Stanford University student teachers in *Learning to Teach for Social Justice*.[43] These inquiries can include reading case studies of the learning experiences of English learners, students with disabilities, and others who are often marginalized in school; shadowing a student through a full day of school to understand their experience; examining a school's allocation of curriculum opportunities across classrooms and tracks; interrogating cultural assumptions in both teacher education and student teaching classrooms; and reflecting on the results of lessons aiming to be culturally affirming.

The vignette in Student-Centered Inquiry and Reflection describes a student-centered inquiry process grounded in video analysis.

Student-Centered Inquiry and Reflection

At Vanderbilt University, video analysis across the teacher preparation program is used, in part, to develop justice-oriented pedagogies that disrupt existing inequities in schools by providing access and opportunities for students who have historically been marginalized. Analyzing video clips of teaching offers a way of centering teacher candidates' learning around video-based classroom evidence while also attending to the complexity of power and status differentials across PreK–12 classroom contexts. As the illustration below shows, the process begins with identifying and disrupting commonsense understandings of teaching and students, then moves on to learning to notice what teachers are doing as a basis for analyzing practice; learning to surface and identify student thinking and looking at one's own practice in relation to student learning; questioning one's own practice and offering insights into the practice of peers; and then further identifying and disrupting understandings of teaching and students that may perpetuate inequities.



Just as students need restorative circles to help them understand how to regulate their emotions and actions, preparation programs can use these kinds of self-analysis activities to help candidates unpack their journey toward becoming more equitable. For example, teacher candidates can be led through a series of self-reflective questions such as "Why did I say that comment to my students?" or "What am I doing to become a stronger educator?" or "How can I be more equitable with my students?" Society is constantly changing, which necessitates a continual examination of the world and how teaching and learning are impacted by the social, economic, political, and cultural contexts of the United States. Preparation programs can equip candidates to develop the skills to understand how these realities may impact students in new and evolving ways and adjust their teaching and learning supports in order to meet the challenges and embrace the opportunities of a changing world.

Source: Dunleavy, T., Hundley, M. K., Johnson, H. J., Palmeri, A., & Peter, J. (2020, February). *"I used to think. … Now I think. …": Using video clubs to blow up and disrupt teacher candidates' perceptions of what counts as student understanding.* Presentation at the annual conference of the American Association of Colleges of Teacher Education.

Rich, Experiential Learning Opportunities

What the Science Says

Children are natural learners and inherently seek to learn things that matter in their immediate, everyday world. To support children's learning, adults make connections between new situations and familiar ones, focus children's attention, structure experiences, and organize the information children receive while helping them develop strategies for intentional learning and problem-solving. The National Research Council's report *How People Learn* outlines three fundamental principles of learning that are particularly important for teaching:[44]

1. Students come to the classroom with prior knowledge and experiences that must be addressed if teaching is to be effective.
2. Students need to organize and use knowledge conceptually if they are to apply it beyond the classroom.
3. Students learn more effectively if they take a metacognitive approach that allows them to consciously assess and manage their own learning.

All learners—including prospective teachers and their students—actively construct knowledge and pursue meaning based on their experiences, relationships, and social contexts. Making these connections supports conceptual understanding and helps individuals sustain interest and effort. These processes work best when students actively engage with concepts and when they have multiple opportunities to connect the knowledge to personally relevant topics and lived experiences and apply it to joyful, compelling, authentic tasks designed to engage higher-order skills of analysis, synthesis, critical thinking, and problem-solving. This allows knowledge to be understood deeply enough to be recalled and used for other purposes in novel situations. Learning is stimulated by the effort to make connections and seek answers to things that matter and is shaped by the opportunities to explore actions and ideas, receive feedback from others and the environment, and continue to refine and practice with assistance until mastery is achieved. Finally, motivation and performance are shaped by the nature of learning tasks and contexts as well as students' beliefs about their own ability—including their views of whether intelligence is fixed or incremental and, hence, whether they have a growth mindset about how to persevere in the face of challenges or obstacles.

Overview

Programs should be designed to help teacher candidates deeply examine student learning for different students in different contexts and its relationship to instruction; to plan curriculum with students' learning goals and trajectories in mind; to incorporate strategies that build on funds of knowledge and are supportive for individual learners; to build tasks that are motivating and well scaffolded; and to use a repertoire of teaching strategies that can build understanding by enabling discussion, application, practice, feedback, and opportunities to revise.

Programs should also model a vision of learning and development through which instructors, supervisors, and cooperating teachers enact and unpack approaches they expect teacher candidates to use, including practice, feedback, skill development, growth in understanding, and expansion of capacity for adaptive expertise. Pedagogical activities should promote inquiry, design and implementation, and cycles of reflection. They should also support intentional learning and problem-solving, developed through purposeful analysis of complex practice situations. Through these experiences, programs can prepare educators to be lifelong learners who master a body of knowledge and who work with others to search for new answers when needed. Having a variety of candidate learning experiences is important for authentic engagement and can include case methods, action research, and practitioner inquiry tied to clinical experiences. As candidates grow in skill and understanding, this increases their motivation, efficacy, sense of purpose, and capacity for self-direction. Finally, rich learning experiences can be more deeply understood through authentic, performance-based assessments in which candidates connect theory and practice as they enact and analyze both individual instructional events and a full cycle of instruction, including student learning and its relationship to teaching.

What Teachers and Teacher Educators Can Do

Just as teachers must understand processes of learning and development, so too must those same processes shape the learning experiences of teacher candidates. Preparation programs should not only emphasize the knowledge, skills, and dispositions teacher candidates will need but also immerse them in rich, experiential learning opportunities within university classrooms and in authentic out-of-school contexts. Teaching is complex and demanding. Every day, teachers pursue a wide array of activities and goals, integrating knowledge of students, subject matter, and pedagogy while making frequent judgments on the fly. To prepare for this job, teacher candidates must learn to enact theory that is embedded in and inseparable from practice, using a range of techniques across a variety of circumstances to do so.[45] Additionally, they must act deliberately to transcend the constrained views of teaching they developed through their "apprenticeship of observation" as K–12 students themselves.[46]

> Rich, experiential learning is vital for the development of the identity and expertise of effective teachers.

Rich, experiential learning is vital for the development of the identity and expertise of effective teachers. The quality of these experiences is vital. Preservice programs should aim to create opportunities for joyful, compelling, and authentic learning. Such experiences enable candidates to create the same for their students later. They are also essential for the development of candidates' adaptive expertise that enables teachers to make in-the-moment judgments based on curriculum goals as well as knowledge of learners and their paths to learning.[47] Adaptive expertise prepares teachers to think pedagogically, plan based on students' prior experiences and needs, reason through dilemmas, and analyze student learning to develop appropriate curricula for diverse learners. Being an adaptive expert means more than mastering a body of knowledge; it means being a lifelong learner able to work with others to search for new answers when needed. Preparing adaptive experts who can effectively apply their knowledge in a variety of circumstances requires programs to teach their candidates the "why" and "when," not simply the "how to."

Structuring Experiential Learning

Providing candidates with a variety of learning experiences is important for the development of complex understanding that can be applied to future, novel circumstances, including with and through technology and in the context of rehearsals involving teacher educators and novice teachers.[48] Immersion in schools and communities that support the learning of effective and culturally competent practice contextualizes teaching and deepens understanding of the funds of knowledge available in families and communities. Many teacher candidates lack meaningful experiences in the racially, ethnically, culturally, and linguistically diverse communities in which they will teach, as do many teacher educators. Teacher educators and teacher candidates can learn to be culturally responsive and can expand their range of experiences by seeing students, families, and communities as a part of their learning communities, but this is just a beginning. Teacher educators must also model experience-based, culturally responsive, and sustaining teaching practices to support candidates' learning through experiences they can then transfer to their own classrooms and students.

The example in Teaching Language Through Applied Experience illustrates this point more fully. In Bank Street College of Education's "deeper learning laboratory," teacher candidates are always learning themselves within immersive experiences. At the same time, they are also researchers in the laboratory, investigating and analyzing the elements and conditions that support the acquisition of deeper learning competencies. The vignette shows how teacher candidates are learning pedagogical strategies for English learners through such an immersive experience. Candidates uncover these pedagogical strategies by experiencing what it might be like to be learners in a classroom taught in a non-native language—and by experiencing the teaching strategies that enable them to learn.

Teaching Language Through Applied Experience

At 8 p.m. on a Wednesday night, Luisa Costa is in the middle of teaching her course, Language Acquisition and Learning in a Linguistically Diverse Society. Despite the late hour, the room is overflowing with energy from the 23 racially diverse teacher candidates. One candidate is participating over video chat, with her classmates moving the computer with her face on it to different corners of the room during the engaging class. This is an accommodation notes that Luisa gladly makes for students to help them balance their personal and professional commitments. She understands her students' individual needs and adapts her practice to accommodate them, just as she encourages the teacher candidates to do for their students.

It is the second-to-last class of the semester, and Luisa is modeling a lesson that embodies effective instruction for all students, especially English learners. Luisa teaches the lesson in Spanish, even though many of her students speak only English. In this lesson, she wants to reinforce the pedagogies, dispositions, and mindsets the class has discussed throughout the semester. This is not the first time that Luisa has modeled a lesson for the teacher candidates using a language other than English. During the semester, she has given a model lesson in Farsi as well as Spanish. Luisa notes: "I put them in the shoes of the learner. We learn by doing." And by having students sit through a lesson in a non-native language, she says, "the students have to strategize the way students in their classrooms would strategize."

Luisa begins singing a catchy chant to the teacher candidates sitting in a circle, "*¿Cuál es tu fruta favorita? Mi fruta favorita es la banana, la banana.*" During the chant, she points to the phrases written in Spanish on the board, then points to the different fruit written in Spanish next to a picture of the fruit.

Luisa goes through the chant a few times, then welcomes the entire class to join, with all the students following her visual signals as she points to the phrases and pictures of fruit. Next, Luisa asks for volunteers to respond to the question. Some of the fluent Spanish speakers respond with their favorite fruit. Luisa makes a tally mark next to the image of one teacher candidate's favorite fruit on the board, *la manzana* (an apple).

The class begins to chant the question again, with another teacher candidate volunteering an answer. Next, Luisa explains, in Spanish, that the teacher candidates need to ask each of their classmates for their favorite fruit. To help, Luisa gives each student a paper that lists the Spanish word for different types of fruit next to a picture of the fruit. The sheet also includes the Spanish question and response for those who need the additional assistance. The teacher candidates jump up from the circle and begin excitedly moving around the room, practicing their Spanish by asking each other for their favorite fruit, responding, and tallying the responses. Because this is an abbreviated lesson, Luisa calls the teacher candidates back to the circle after a few minutes. She asks them to share, in Spanish, the number of teacher candidates who listed each type of fruit as their favorite. *La banana* was the most popular fruit. Luisa concludes the class by asking, "*¿Cuál es le fruta favorita de la clase?*" The teacher candidates cheerfully respond, "*Le fruta favorita de la clase es la banana, la banana!*"

After the model lesson, Luisa asks the students to reflect on the lesson and their experience. One teacher candidate comments on the importance of "how you allow access to challenging content, regardless of the language diversity in the classroom, through the visible cues, charts, speaking slowly, repeating yourself or other comments that allow a child who might not have the language or skill to access the critical academic content." Another teacher candidate remarks, "Consistency and routine are useful supports for students—in all stages of language development—to independently navigate tasks at their own pace." Finally, another highlights the need to "meet students where they are and use what they do know to inform further learning and inquiry."

As Luisa reflects on the lesson after class:

> I model the lesson flow of how to start with the motivation, guided practice, independent practice—which doesn't necessarily mean independent practice; it could be in small groups or partnerships. One of my goals is for them to be able to teach using effective strategies. [The lesson on fruit] is simple but makes a point about lesson flow, which is the slow release of responsibility from the teacher to the student.

Luisa's class illustrates Bank Street's approach to providing experiences that put teacher candidates in the shoes of the learner. Bank Street values this kind of instruction based on the progressive education belief that individuals learn by doing, "when they are actively engaged with materials, ideas, and people."

Sources: Adapted from Darling-Hammond, L., Oakes, J., Wojcikiewicz, S. K., Hyler, M. E., Guha, R., Podolsky, A., Kini, T., Cook-Harvey, C., Mercer, C., & Harrell, A. (2019). *Preparing teachers for deeper learning*. Harvard Education Press. pp. 225–226; Bank Street College of Education. (2015). Bank Street College Graduate School of Education [School catalog].

For teacher candidates, experiential learning can mean taking on the student role. It also means practice in leading classrooms using the personalized, project-based pedagogies they have learned in their courses. Coordinated coursework and fieldwork are needed if programs are to provide such active learning opportunities for teacher candidates. Furthermore, programs must ensure that candidates have time and support to self-assess and reflect on the meaning and learnings from their experiences if these are to lead to flexible, transferrable understanding.

Designing Inquiry and Reflection

A full range of learning experiences—including practice, feedback, skill development, growth in understanding, and expansion of capacity for adaptive expertise—should be part of a scope and sequence for teacher preparation programs. Among the pedagogical activities embedded in this scope and sequence is teacher candidate inquiry, which adds richness to learning experiences through the deliberate development of flexible understanding. Cycles of reflection can be designed to help candidates consider teaching actions and their results in particular contexts. When deliberately constructed, such cycles—including opportunities for authentic practice, thoughtful feedback, and reflection—can accelerate learning. They create space to acknowledge successes and strengths while identifying areas for further learning. Such reflection can be structured in multiple ways, using analytical lenses offered by the science of learning and development (SoLD) or specific disciplines, or by focusing on enhancing clinical experiences through iterative practice and reflection cycles.

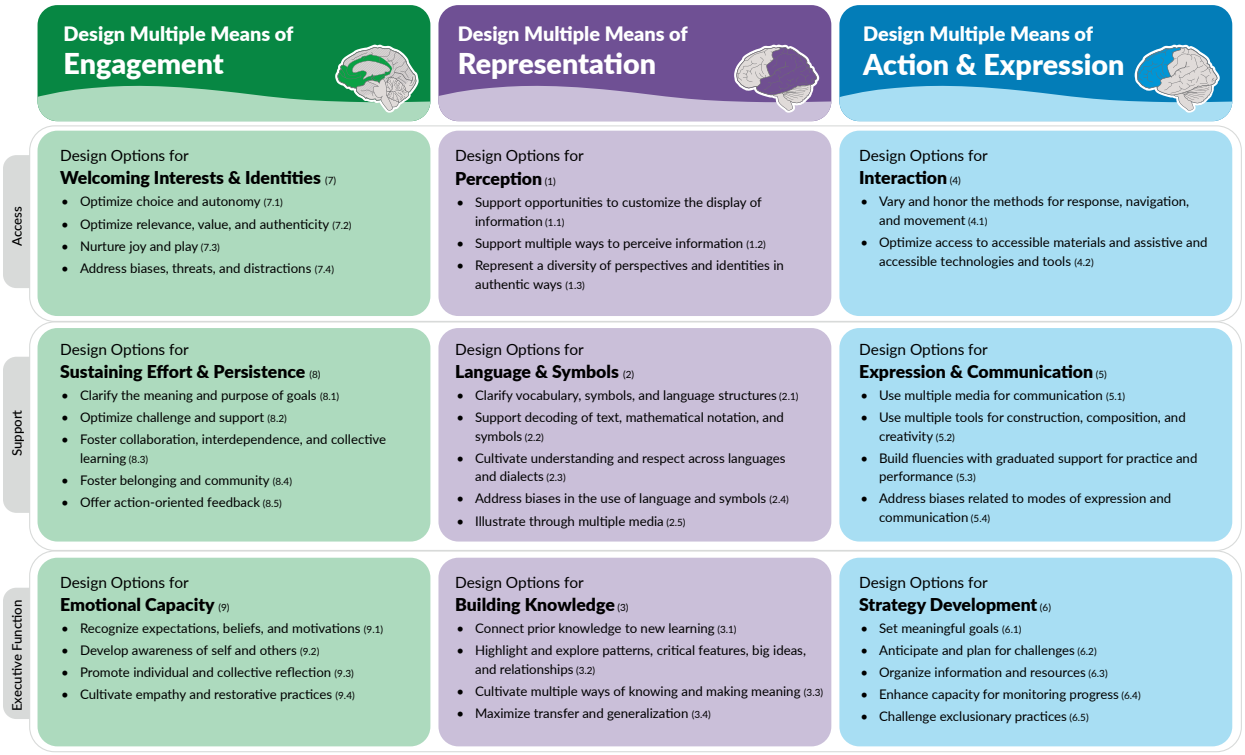
Teacher candidates engaging in self-reflection focused on providing rich experiences for their students can ask themselves, "How am I creating varied learning opportunities for growth based on my students' diverse interests, learning approaches, developed abilities, and cultural backgrounds?" In seeking to answer this question, candidates can take note of:

- the ways they are communicating information (e.g., dialogue, group discussions, books, magazines, websites, emails, texts, phone calls, PowerPoint presentations, blogs, video);
- how often they provide choices for students in terms of the content students want to learn and how they learn it (e.g., in person, online, individually, small groups, pairs); and
- what different assessments are used to demonstrate what students understand, learn, and can do.

Universal Design for Learning Guidelines[49] provide a structure for this kind of thinking about the strategies candidates use and the choices they provide. (See Figure 6.)

Case studies and action research are additional inquiry strategies that support purposeful analysis of teaching and learning and how to reason through complex practice situations. These strategies guide reflection and application, preparing candidates to learn about and from their students, plan for their students' strengths and needs, and ask productive questions when they encounter novel teaching challenges. These strategies also model inquiry-based approaches candidates can employ with their own students. Case methods provide a useful link between theory and practice, allowing for the exploration of dilemmas, the development of reasoning skills, and the construction of more complex understandings of learning and development.[50] Action research can support educators in developing an inquiry stance toward their work and a disposition toward reflective, analytic thinking along with the important skills of data collection, observation, analysis, and reflection.[51]

Figure 6. The Universal Design for Learning Guidelines



Source: CAST. (2024). *Universal design for learning guidelines 3.0*.

Action Research in Action

The Teaching for Learning II (Student Teaching Seminar) within the MAT program at Montclair State University is held at East Side High School in Newark, NJ. All of the teacher candidates are set to graduate in a month, and you can feel the anticipation in the room. As the teacher candidates file in for the class, Emily Klein, associate professor, comes in and moves the desks into groups where students can caucus together.

After giving candidates a few minutes to debrief with each other on their student teaching experiences, Emily transitions the class to working on their action research projects—a practice-focused research project they completed at their site placements. She asks the class to break up into content areas (math, English, social studies, science, and "specials") and to collaborate with each other to consider how to address their students' needs and improve instruction through their research findings. The questions Emily poses to teacher candidates to consider during the small group work include the following:

- How did your content area influence your action research projects? What do you notice about the role of content in your projects?
- What kinds of challenges did you encounter?
- How did you manage them?
- What are the next steps for how you use action research in your future work as a teacher?

Emily slowly makes her way around the room and listens to each group share out about their projects. She jumps in now and again to ask a critical question or push some thinking but generally allows the teacher candidates to guide their own work. One teacher candidate describes how he learned to implement a student checklist from his methods course into his classroom with his cooperative teacher as a result of his action research project. He then shares a student example with the checklist and explains how he used the checklist when grading the final draft of the student work, admitting the challenges he experienced in using a rubric for evaluation.

Within the English content group, one teacher candidate mentions the use of authentic assessment in the classroom through the use of a class president speech, autobiography, and advertisements using the concepts of ethos, pathos, and logos. All these assignments required her students to create products that were used outside of the classroom with outside audiences.

Within the same content group, a teacher candidate mentions that students' use of "slang" in writing is widespread within his classroom and has been difficult to curb in written assignments. Another candidate challenges his framing of the issue, suggesting, "It's not slang that is the problem; it's learning how to write formally, which is the responsibility of teachers [to teach]."

As teacher candidates continue to share with each other in their groups, Emily stops the class briefly and reminds them, "Your action research projects are about making your teaching practice transparent and being able to read the data and apply it to your classroom. Your work as a teacher will never be a controlled experiment."

Source: Darling-Hammond, L., Oakes, J., Wojcikiewicz, S. K., Hyler, M. E., Guha, R., Podolsky, A., Kini, T., Cook-Harvey, C., Mercer, C., & Harrell, A. (2019). *Preparing teachers for deeper learning*. Harvard Education Press. p.120.

Teacher preparation programs use action research, as shown in Action Research in Action, as well as case methods to build complex understanding of many situations, including how children learn language, how their learning differs, and how schools and communities are organized (or not well organized) to support children and families and with what consequences. As shown in the vignette, action research projects allow teacher candidates to ask burning questions, collect evidence to answer the questions, discuss the process and their observations, respond to feedback, revise, and improve their research projects. More importantly, they are also learning to improve their teaching practice. Such focused practitioner inquiry can also support the enactment of culturally responsive learning through authentic engagement with families and communities across in-school and out-of-school settings.[52]

As candidates grow in skill and understanding, their motivation, efficacy, sense of purpose, and capacity for self-direction also increase. These mindsets and attitudes should also be explicitly developed and supported. The knowledge, skills, and dispositions associated with teacher effectiveness are also associated with teachers' sense of efficacy.[53] Motivation and efficacy affect investment of effort, enthusiasm for teaching, and positive teacher–student relationships and are linked to improved motivation and achievement for PreK–12 students.[54] Reflective educators can also identify the appropriate locus of control when challenges emerge, which contributes not only to motivation but also to an asset-based orientation toward families, communities, and students and a focus on their own role in creating conditions conducive to learning.

Supporting Performance Through Assessment

Finally, it is important to pair rich learning experiences with authentic and performance-based assessments. Authentic assessments allow candidates to bring together theory and practice to demonstrate their learning, providing rich formative data for teacher educators to use in modifying and adapting candidate learning opportunities and experiences.

These include regular informal and formal evaluations of student teaching, demonstrations of skills, and culminating assessments such as capstone portfolios. Among capstone-type assessments are teacher performance assessments based on the compilation of evidence of a cycle of instruction. Assessments should be used as a mechanism to provide teachers with information about their own practices as much as they are used to evaluate and monitor student learning and development. Teacher performance assessments may include lesson and unit plans, classroom videos, evidence of student learning, and commentaries describing how instructional decisions were made. Assessments that help develop adaptive expertise emphasize evidence and reflection, as they define teaching effectiveness as responsive to students' distinctive backgrounds, experiences, and learning needs. Studies have found that these assessment processes are related to teacher effectiveness and stimulate teacher learning.[55] They can also help develop adaptive expertise by focusing teachers' attention on students' thinking and development, the relationship between teaching decisions and student learning, and the dispositions needed to help all students develop their full potential.

Pedagogical Alignment and Modeling

What the Science Says

The fundamental nature of learning and development does not change for adult learners. Experiences and relationships continue to be important; learning is still social, emotional, and cognitive; and learning continues to be a process of active construction of knowledge enabled by relevant, practical experiences supported by modeling and feedback. In addition, because all learners connect new information to prior knowledge through active knowledge construction, teachers have difficulty enacting pedagogical methods they have not had the opportunity to experience, and thus to know and understand in complex and meaningful ways. Therefore, for new teachers, learning *about* pedagogy derived from the science of learning and development also means learning *with* and *through* such pedagogy.

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It is vital that educator preparation provides teachers with opportunities to develop a deep personal understanding of the strategies they can use and rich models of practice on which to draw to align their teaching with the science of learning and development (SoLD). Developing this understanding requires new teachers to see and experience the very kinds of teaching strategies they are expected to develop for their pupils.

In addition, effective experiences are those made educative through guided reflection and processing of the meaning of the experience. Neuroscientists have demonstrated that the development of neural pathways is associated with exposure to and generation of language.[56] Like other students, teacher candidates sharpen their thinking as they converse about their reasoning and inquire into what they do not yet understand. When they can articulate concepts, use them in a task, see or hear other models of thinking, and get feedback, they learn more deeply. Similarly, learning is supported by techniques that lead to the elaboration of material, such as self-explanation, peer teaching, and representing information in multiple modalities. These techniques deepen conceptual understanding and strengthen mental models.

Overview

A critical program strategy for enabling teacher candidates to learn sophisticated approaches to teaching that extend beyond their previous school experience is pedagogical alignment in both coursework and clinical work around a coherent vision of whole child development, learning, and teaching. Educators' capacity to build a positive, collaborative culture focused on whole child development and learning is shaped by immersion in supportive contexts that illustrate all the aspects of whole child pedagogy. It also means learning with and through such pedagogy, the goal and the guide for teacher educators.

In less formal terms, "pedagogical alignment" means that teacher educators must "practice what they preach," with implications for programs and for teacher candidates. On the programmatic side, pedagogical alignment stands in contrast to long-established habits and institutional structures that

position preparation as a site of knowledge acquisition and classrooms as sites of knowledge application. SoLD-aligned preparation challenges these distinctions and replaces these partial learning models with holistic ones. For candidates, their long experience in schools that afforded an "apprenticeship of observation"[57] has generally produced conceptions about teaching that are partial and assumptions that are sometimes misaligned with the science of learning. These may need to be evaluated and reconsidered. This process, along with institutional structures and habits, makes pedagogical alignment and modeling a uniquely demanding principle for programs to implement. Among other things, it requires coherence around a vision of practice across the program—one that faculty both espouse and engage in—and continuous efforts to support program faculty and school mentors in practicing what they preach in concert.

Concentrated efforts are needed to create professional learning opportunities that can help educators develop the knowledge, skills, and dispositions to enact these insights. Integration of theory and practice around a SoLD-aligned vision, which is necessary for the development of adaptive expertise, is made possible by close partnerships between programs, schools, and districts. These efforts will be most successful if they engage educators in sustained, collegial efforts to experience and practice pedagogically aligned skills and strategies. This is particularly important in learning content-specific pedagogies that shape instruction in the disciplines—what it means to deeply understand concepts and engage in disciplinary practices in science, math, history, the social sciences, language and literature, or the arts.

In coursework and clinical work settings, instructors, supervisors, and cooperating teachers enact and unpack practices they expect candidates to use. They design tasks and processes for engaging them that are clear and support understanding, making their own thinking visible, guiding group processes and collaboration, and asking questions to solicit reflections. As they model good reasoning strategies, they support teacher candidates' ability to take up these strategies themselves.[58]

What Teachers and Teacher Educators Can Do

A critical program strategy for enabling candidates to learn sophisticated approaches to teaching is pedagogical alignment around a coherent vision of whole child development, learning, and teaching. In both their coursework and clinical work settings, new teachers should experience the very kinds of teaching strategies they are expected to develop for their pupils. In subject areas, strategies may focus on the modes of inquiry in the disciplines—for example, approaches to scientific inquiry, historical or social science research, mathematical modeling, literary analysis or close reading, writing processes, and so on. In more cross-cutting areas like classroom management, they may focus on strategies like community circles, design of classroom responsibilities, and restorative practices that are used in both coursework and clinical site contexts so that candidates experience and see how they can create a strong learning community that functions to create membership, shared norms, and positive supports for behavior.

Engaging in these kinds of experiences or seeing them implemented in a context where analysis and reflection help unpack the teaching and learning process can give candidates a deep personal understanding of the strategies they can use, along with rich models of practice on which to draw. They also make it possible for candidates to engage with approaches to teaching and learning that extend beyond their previous school experiences.[59]

The first part of this strategy consists of building a positive, collaborative culture focused on whole child development and learning through policies and practices that create pedagogical alignment between adult and PreK–12 student learning. The knowledge, skills, and dispositions that educators need to do their jobs well are tightly aligned to the capacities they are being asked to develop in their students: the ability to think critically and solve problems; to apply knowledge to novel situations; to engage and communicate well with others; and to manage their work effectively. Similarly, just as children's development and learning are shaped by interactions among the environmental factors, relationships, and learning opportunities they experience, so too is educators' capacity to use the principles of the science of learning and development in practice shaped by immersion in supportive contexts. Therefore, it can be said that learning about whole child pedagogy for deeper learning and equity also means learning with and through such pedagogy.

In other words, pedagogical alignment means that enactment of the science of learning and development in practice is both the goal and the guide for teacher educators. This alignment requires that the structures and practices of educator preparation programs are shaped by a coherent vision of learning and development for both children and adults. Furthermore, the coherence of this vision must extend not only across preparation programs but also into PreK–12 settings and even out-of-school learning opportunities. Such coherence is enabled by well-supported clinical experiences tightly linked to coursework and integrating theory and practice. It is also a developmental approach, based on adult learning theory, aimed at scaffolding teacher candidates, and is among the stages leading to adaptive expertise. Such progress includes acquiring professional knowledge through guided experience, reflective practice, and structured inquiry. It is important to note that the development of adaptive expertise, like child and adolescent development, is both nonlinear and iterative, so teacher candidates' learning will likely proceed in such a fashion.

Pedagogical Alignment in Action at Bank Street College

A fusion between theory and practice—through connected coursework and clinical work—aims to help teachers develop a vision for teaching as well as develop knowledge and skills. At Bank Street College of Education, a distinctive child-centered vision of teaching and learning is supported through a highly integrated process of learning to teach and is ever-present in how the faculty teach, just as it is in the formal curriculum that faculty seek to transmit. This "hidden curriculum" is, as veteran faculty member Barbara Biber explained, quite deliberate:

> We have assumed for many years that, beyond the structured curriculum that is provided, the students internalize the pervasive qualities of the learning environment we try to create for them, that the qualitative characteristics of their own teaching styles will reflect, later, the qualities of their own personal experience in learning to become teachers.

The belief that teachers must have opportunities to learn in the same ways they will someday be expected to teach develops a strong and distinctive practice, immediately visible the moment one enters a classroom or a school touched by Bank Street preparation. In the Bank Street School for Children, children are building with blocks, making books, designing architecture and science projects, arguing math, and collaborating with one another on a kaleidoscope of projects. In college classrooms, prospective teachers can also be seen making picture books for children and curriculum

books for teachers; experimenting with beans, sand, water, and other manipulatives for math and science; constructing museum and community trips for themselves and future students; and collaborating with one another on a variety of projects.

In Teaching Language Through Applied Experience, we saw how Luisa Costa taught teacher candidates how to support English learners by putting them in that role and modeling how to scaffold their learning. And in a vignette in the section Curriculum Rooted in a Deep Understanding of Learners, Learning, and Development, we met Jarod, a Bank Street student teacher who worked with Ted Pollen at Midtown West School in New York City.

While teaching with Pollen, Jarod was enrolled in Mathematics for Teachers in Diverse and Inclusive Educational Settings, where he was learning many of the practices he saw modeled in Pollen's classroom. Jarod noted that this course provided him with "easy prompts that you can make yourself do as a student teacher … constantly asking [students] why: Why do you think that? Why did you do that? Can you show me how that works? Can someone else repeat what that person just said? Did anyone do something different?"

Jarod described how he saw Pollen, his cooperating teacher, model this type of inquiry in his classroom. Through both his Bank Street math course and his cooperating teacher modeling inquiry-based instruction in math, Jarod was learning how to develop questions that guide students to direct their own math learning, as well as how to draw on Vygotsky's theory and support children's learning within their own different zones of proximal development as they collectively teach and learn. As Jarod learned to scaffold students' inquiry and thinking by asking questions, he was also learning how to interpret the answers he received from students in terms of their developing thoughts and understandings so he could figure out what they were ready to do next and what kinds of supports they might need.

Sources: Darling-Hammond, L., Oakes, J., Wojcikiewicz, S. K., Hyler, M. E., Guha, R., Podolsky, A., Kini, T., Cook-Harvey, C., Mercer, C., & Harrell, A. (2019). *Preparing teachers for deeper learning*. Harvard Education Press. p. 17; Biber, B. (1973, November 27). *What is Bank Street?* [Lecture at Bank Street College of Education Convocation luncheon]; Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. In M. Cole, V. John-Steiner, S. Scribner, & E. Souberman (Eds.). Harvard University Press.

In programs aligned to a coherent vision of learning and development as seen in Pedagogical Alignment in Action at Bank Street College, instructors, supervisors, and cooperating teachers enact and unpack practices they expect teacher candidates to use, including culturally responsive and empowering pedagogies, across courses and clinical settings. Enactment of practice is multifaceted and emphasizes engagement of candidates in the design, organization, implementation, and assessment of preparation program learning experiences. Teacher educators—instructors, mentors, and supervisors—in the university and at the school site model and name practices, explain why they are powerful, and indicate how they can be applied, making the implicit explicit so that candidates might gain understanding that they can transfer to their clinical experiences.[60] This level of pedagogical alignment requires extensive engagement in clinical practice that instantiates what educators need to learn. Candidates must have opportunities to observe and put enacted pedagogies into practice, then reflect on the results if they are to acquire a deep, flexible, firsthand understanding of learning and development.[61] These opportunities, combined with time and guidance for reflection, support teacher candidates' metacognition and progress toward adaptive expertise.[62]

Learning by Giving and Receiving Feedback

It is the last day of class in ED 225 Literacy in Early Childhood. In this course, candidates learn about emergent literacy, oral language, reading, writing, and literature. This course is the second of four field experiences for Alverno College undergraduate students. It is an opportunity for candidates to observe and practice literacy teaching in an elementary school setting.

Candidates practice making sound decisions, teaching literacy learning strategies, selecting appropriate materials, and designing developmentally appropriate learning activities and assessments.

Before the class begins, six students are gathered at the back of the room, sharing a potluck feast of Oreos, pepperoni pizza, cheesecake brownies, hummus and pita chips, pastries, and caffeine. They are about to celebrate their progress in teaching literacy, but first they will each share a 15-minute video of themselves teaching a literacy lesson in their field placement. Candidates observe themselves and each other, then give each other specific feedback based on the theories and pedagogies they learned in this class and in prior Alverno coursework and field experiences. As the syllabus describes, the goal of this activity is to "share and reflect on video clips to build a deeper understanding of effective literacy lessons in relation to student learning and theory."

The instructor prepared various materials to support the teacher candidates during this class. She has printed her PowerPoint slides for her students that include helpful notes such as Key Questions for Teaching and Learning: (1) What do we want our students to know and be able to do? (2) How do we know the effect of our program on student learning? (3) What can we do to facilitate learning?

The instructor's notes also outline a helpful approach to scaffolding:

Teacher	Student
I do ...	You watch
I do ...	You help
I help ...	You do
I watch ...	You do

The instructor provides many tools to support the candidates' learning during the video activity, including:

- A self-assessment framework.
- Criteria for evaluating candidates' fieldwork lessons, which is informed by the Wisconsin teaching standards and Alverno's educational standards.
- A rubric for evaluating candidates' self-assessments. For example, when looking at a candidate's performance at "observing the entire teaching performance" during a lesson, a beginning or emerging rating would be "identifies the strengths and weaknesses and provides accurate observations as evidence for strengths and weaknesses," whereas an advanced or distinctive rating would be "applies disciplinary concepts and frameworks to observations, showing creative judgment in their individual or combined use."
- Prompts or "thinking frames" for the candidates to help them give each other feedback that connects to theories about teaching and learning, such as "I noticed the student(s) when you [the teacher] . ... This reflects theory because ... ."

After the instructor begins class with a brief overview of the goals for the day, the six students split into groups of three, in separate classrooms. They spend 15 minutes observing one candidate's videotaped lesson and another 15 minutes giving the candidate feedback on her lesson. This feedback includes "Glows" (i.e., the effective teaching strategies that the candidate adopted in the video), "Evidence of Student Learning," and "Grows" (i.e., suggestions for changes). As the candidates review each other's videos, they notice tools and resources that the mentor teachers use in their classrooms. For example, in one video, a teacher illustrates a classroom management technique for getting students' attention—saying "one, two, three" and having the students clap. Through the videos, teacher candidates can observe multiple classrooms and multiple approaches to teaching literacy and organizing a classroom.

During one video, a candidate presents a vocabulary lesson that she used in her 1st-grade field placement. As the video plays, the candidate presenting the video acknowledges that the reading she selected for the lesson "is too complicated" because "the sentences are too long" for 1st-graders. The candidates provide each other feedback and note observations through the video clips. The instructor takes notes during the candidates' videos and discussions. She rarely joins the candidates' conversation and does so only to ask a clarifying question.

Source: Darling-Hammond, L., Oakes, J., Wojcikiewicz, S. K., Hyler, M. E., Guha, R., Podolsky, A., Kini, T., Cook-Harvey, C., Mercer, C., & Harrell, A. (2019). *Preparing teachers for deeper learning*. Harvard Education Press. pp. 132–133.

In the example in the previous vignette, the session allowed candidates to practice with and experience feedback strategies that they will be able to use in their own classrooms. Their instructor had designed a task that instantiated the practices and included each candidate in experiencing them, rather than just describing them in the abstract. Through the use of videos, the candidates were also enabled to see and analyze other classroom practices used by their colleagues, expanding their experiential learning opportunities.

By definition, the integration of theory and practice around a SoLD-aligned vision, which is necessary for the development of adaptive expertise, can shape educator preparation programs and clinical partnerships. This alignment is dependent upon intentional opportunities to connect learning across courses and clinical settings. These opportunities allow candidates to develop and apply knowledge in practice through observation and analysis of teaching and structured planning and implementation of instructional strategies. These opportunities are made possible by close partnerships between preparation programs and PreK–12 schools and districts. Beyond aligned commitments to a shared vision of practice, partnerships of this type are built upon programmatic structures such as sufficient professional development and time for university-based faculty, site supervisors, district and school administrators, and mentor teachers to collaboratively engage in such practice. This collaborative engagement is addressed in greater detail in the section Supportive Developmental Relationships in Communities of Practice.[63]

Supportive Developmental Relationships in Communities of Practice

What the Science Says

Learning is an active, interactive, constructive, and iterative process. Authentic, professional learning communities create opportunities for the interaction of people, problems, ideas, and tools. As noted earlier in this report, human relationships catalyze healthy development and learning. The brain grows and changes throughout life in response to experiences and relationships. The nature of these experiences and relationships matters greatly for learning and development. Optimal brain development is shaped by warm, consistent relationships; empathetic back-and-forth communications; and modeling of productive behaviors. In addition, learning is social, emotional, and cognitive. These understandings of learning and development should shape the strategies and contexts within which teacher candidates learn.[64]

Learning communities provide opportunities for collaboration with others, which expands the range of experiences each person can encounter. Supportive developmental relationships in communities of practice can optimize teacher candidate learning. They create connections and support learning as colleagues offer greater assistance, allowing each member to gain competence and agency. Developing community practices that strengthen a sense of shared mission is critical. In collaborative communities, members feel personally connected to one another and committed to each other's growth and learning.

Overview

Teacher candidates can benefit from professional learning communities within their university classrooms, within their clinical placement schools, and within disciplinary and professional groups. These communities can be designed and nurtured to provide supportive environments that allow candidates to productively engage with real problems of practice as they promote active, interactive, constructive, and iterative learning. In such settings, the social aspects of learning come to the fore, as does the active, and shared, construction of knowledge and understanding. Preparation programs should draw in particular upon research describing learning in professional communities to consciously create, model, and help teacher candidates learn to engage productively in these communities and with experienced and expert leaders and colleagues so that they are surrounded with examples and supports for participation, problem-solving, and the work of teaching.[65]

To do this, programs need strong, reciprocal relationships with PreK–12 schools that hold a common vision for practice featuring sharing, cocreation, and continuous improvement, enabling clinical placements that are consonant with the candidates' learning and aligned with program commitments. Engagement in shared research and reflection about practice is another way that communities of practice can learn together. Inquiry and research as a means to analyze practice helps teacher candidates understand the applications of research as well as the tools for

Programs need strong, reciprocal relationships with PreK–12 schools that hold a common vision for practice featuring sharing, cocreation, and continuous improvement.

research. Lesson study has been identified as one such way for teachers to learn with each other through community designs and efforts to improve practices. Engaging in this type of inquiry *collaboratively* not only expands candidates' thinking but also normalizes the practice of using a broader community in the pursuit of developing and employing effective teaching practices that result in deep learning for all students.

It is important to note that a "community" should be expansive and inclusive, incorporating the many members of the school community—faculty and staff in all parts of the school, families, and community organizations that may work with the school—and candidates should have experiences with all these elements of the community, not just a single cooperating teacher in a single classroom. Authentic learning communities require an acknowledgment of and reliance on the expertise that PreK–12 faculty and staff bring in supporting the growth and learning of new teachers, as well as the knowledge that families and communities possess.

Teacher preparation programs that work closely with families and communities understand the expertise that lives within the broader context of students' lived experiences and tap into that expertise through reciprocal relationships with families and close ties to community-based organizations. This facilitates candidate understanding of the whole child within the contexts closest to the child. These types of relationships are vital because learning within professional communities provides opportunities to learn from others' perspectives and expertise; mutual support; and modeling for leading an equity-centered, collaborative classroom.

Programs organized in cohorts with clinical placements in teaching teams can create professional communities in which teachers observe one another, share practices, develop plans together, and solve problems collectively. The teacher residency model (fashioned after medical residencies) is another structure that allows for this type of deep collaborative learning, which can include interacting with students, other prospective teachers, expert teachers, and the tools of teaching (e.g., lesson plans, assessments, technology).

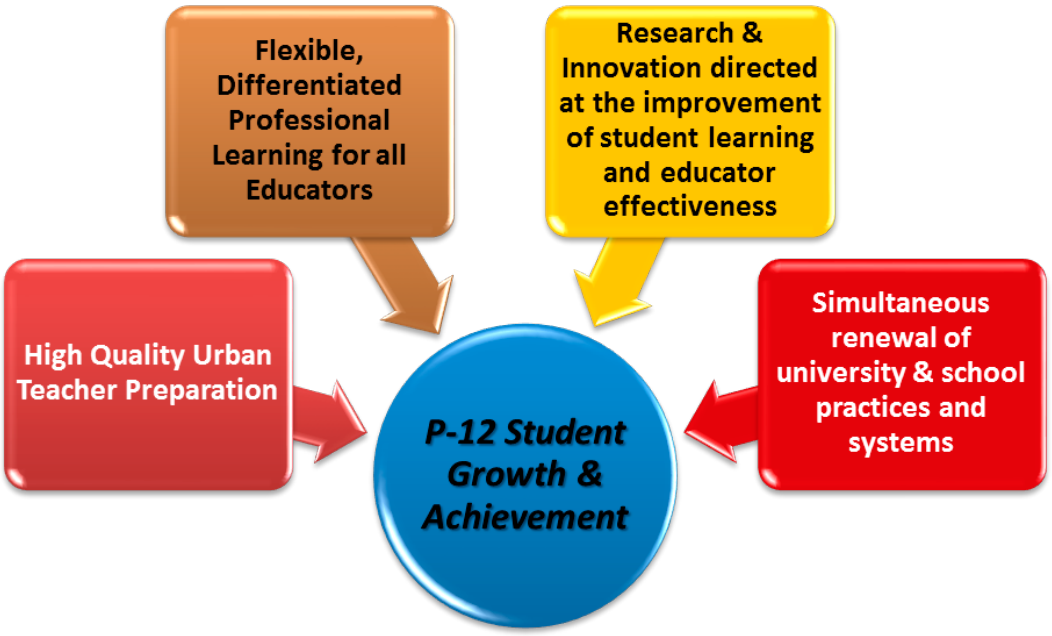
What Teachers and Teacher Educators Can Do

Learning is an active, interactive, constructive, and iterative process. It occurs through the interaction of people, problems, ideas, and tools as people get feedback based on their actions and about their ideas. Professional communities of practice empower developing teachers through mutual support, opportunities to learn from others' perspectives and expertise, and modeling for leading a collaborative classroom. These learning communities are strengthened when preparation programs have strong, reciprocal relationships with PreK–12 schools and their wider communities.

These close "whole school" partnerships create a broader professional learning community between the faculties of the educator preparation program (EPP) and the school that is focused on the collective development of teachers and teaching, as well as learning for adults and children alike. Ongoing consultation, collaboration, and feedback among faculty, mentors, and candidates support inquiry and growth for pre- and in-service teachers and teacher educators. Teacher preparation programs must create structures that give time and resources to develop these communities and employ practices that nurture relationships within collaborative learning spaces.

Such learning communities are more likely to be found as a part of professional development schools (PDS) partnerships, intended to create sites where best practices can be implemented, observed, and studied while providing opportunities for clinical learning for teacher candidates. The University of Colorado Denver (CU Denver) implements a contemporary version of this model of partnership, described in a program-generated resource shown in Figure 7. The CU Denver model is built on a vision of "simultaneous renewal," in which candidates, clinical teachers, site teams, and the broader school faculty engage in ongoing professional learning and jointly commit to improvement of practice in the school as well as the university.

Figure 7. University of Colorado Denver Partnership Framework



Source: Darling-Hammond, L., Oakes, J., Wojcikiewicz, S. K., Hyler, M. E., Guha, R., Podolsky, A., Kini, T., Cook-Harvey, C., Mercer, C., & Harrell, A. (2019). *Preparing teachers for deeper learning*. Harvard Education Press. p. 151.

When the PDS model is implemented in full, ongoing professional learning and improvement of practice, including collaborative inquiry and problem-solving, are part of the work of candidates, clinical teachers, university faculty, and school staff, providing opportunities for continuous improvement and renewal.

Strong school–university partnerships like this PDS model are critical to creating clinical placements that are consonant with the theoretical learning candidates are undertaking. They also help prevent disconnects between ideas about teaching and learning espoused in preparation programs and those practiced in PreK–12 classrooms. Within the context of these design principles, the PDS model, along with any similarly structured professional communities of practice that facilitate shared governance and mutually beneficial collaboration, functions to create the enabling conditions of SoLD-aligned educator preparation.[66]

Aligned commitments to an explicit vision of equity and social justice—combined with the developmental approach and with cycles of teaching, inquiry, and reflection—can enable teacher candidates to observe, practice, receive feedback, and continually grow toward that vision throughout the clinical experience. Sharing a vision requires multifaceted alignment between preparation programs, schools, and districts, including sharing, cocreation, and continuous improvement that flow in both directions between programs and their PreK–12 partners, allowing for alignment not only of structures but also of cultures.

All of these features can be seen in the example in the following text box about Hinkley High School, an urban professional development school partner with CU Denver that shares with the preparation program a commitment to deeper learning and equity.

A Professional Development School Partnership for Deeper Learning and Equity

At Hinkley High School, which serves a population of low-income students of color in a racially and economically isolated neighborhood in Denver, Principal Matthew Willis welcomes the opportunity to partner with the only local teacher preparation program he sees as sharing the school's vision of equity. He sees a double benefit to being a professional development school. He and his faculty get a "stream of people whom we get to train and expose" to Hinkley's approach to urban schooling; at the same time, he gets to "know and choose the best new teachers to stay at the school" from among the teacher candidates. The faculty see considerable benefit from having on-site support and professional development from their university partners, which serve to keep their values and concepts aligned and also contribute to the school's own improvement efforts.

Willis is also emphatic about deeper learning being collaborative and personalized to ensure cognitive engagement that leads to greater achievement and equity. University of Colorado Denver (CU Denver) faculty on-site and at the college campus support the whole-school approach his faculty have been developing. He notes:

> What you see will contrast with rows, teacher talking, students taking notes, sitting still. This school believes in rigor, relevance, relationships—with relationships being the key to the others. Relationships are what are worked on most, then how to leverage relationships to get depth of knowledge, rigor, and relevance. You will see norms of relational discourse, moving up cognitive levels, and using relationships to do that. Interactive, collaborative, independent work. Relationships is probably the number one value for instruction and classroom management. … All students are engaged, especially male students of color.

This expectation was visible on a spring afternoon when Maria Sanchez—a teaching candidate at CU Denver—was coteaching a diverse group of Hinkley High 10th-graders with her clinical teacher, Joan Simmons. During their 5-week unit on probability, Maria and Joan were helping students learn to "write and answer questions about the likelihood of an event" and "prove whether two events are independent, using the multiplication rule."

Eight boys and 11 girls sat in pre-assigned small groups of three and four, each with a data set and poster paper. As class began, students paired up and stood, swinging arms past each other to, in their teacher's words, "wake them up" after lunch. Then, as a preview of the small-group task they

would be doing, the teachers peppered the students with questions, using homey examples of two events that might or might not occur independently—such as being a girl and wearing sneakers—and having them generate ideas about how they could know whether two elements are independent of each other.

After a quick reminder about the roles they would play in their groups, the students went to work to make sense of the data in front of them and create at least five questions that could be asked and answered using that data set. Then, on their poster paper, they wrote at least two simple probabilities, two conditional probabilities, and a fifth probability of the group's choice. Each group also needed to prove whether the events in their given data sets were independent using the multiplication rule. The two teachers circulated, probing, answering questions with more questions, and giving hints—all of which scaffolded the groups' work.

As the students finished their posters, they moved casually into the wide and empty hallway outside the classroom and taped their posters to the wall, chattering about their own work and eagerly peering at what other groups had done. They did a "gallery walk," carrying calculators and graphic organizers to assist them as they wrote and answered questions on the posters and explained whether two events reported on the posters were independent. After the hallway activity, they returned to the classroom and engaged in a whole-group conversation about the experience—asking questions, reporting what they learned, and boasting about what they had accomplished.

Next, Maria and Joan debriefed the lesson, talking together as colleagues to explore whether their objectives had been achieved and, more specifically, whether the lesson engaged the students in deeper learning. Joan explained, "When students ask me a question, I try to go to the deepest level of understanding that I can. I avoid the easy answer—not wanting students to be told what to do and doing it—and move away from the procedural."

Maria observed with satisfaction that the lesson reflected their commitment to engaging students in thoughtful instructional conversations:

> We wanted to give students some private reasoning time (read this, make sense of it, see what you can do), then partner them up, give them time to talk, have them take on listener roles knowing what to listen for, switch and swap roles, then come together as a table to make sure that everyone's voice is heard. … [A] student who may not have generated such a response has access to mathematical reasoning of their peers. This doesn't happen very often in a math class.

In many ways, this math class defies commonly held stereotypes about instruction in urban schools like Hinkley High and the teaching and learning that go on inside them.

Conversational problem-posing and -solving were the dominant modes of instruction in this International Baccalaureate class, with question-asking, head-scratching, hypothesizing, and scribbling ideas on paper as the primary activities. Complex knowledge was constructed, and principles were applied. Students had multiple opportunities to display what they knew and were able to do. The atmosphere was friendly, noisy, and easy, but very much on task.

A letter that Hinkley sends to teacher candidates who are about to begin their clinical experiences at the school makes clear how seriously the school views its responsibility as a professional development school and just how much the Hinkley faculty see the CU Denver teacher candidates who are interning with them as full participants in a community of practice devoted to this quality of instruction and intensity of deliberation:

> We expect all interns to live "the life of a teacher" during internship days. As you take on more responsibility, it is expected that you arrive early or stay late enough to plan with your clinical teacher, make copies, and prepare the classroom for the lesson you are planning. All of our teachers at Hinkley work very closely in PLT [Professional Learning Team] groups with other teachers to plan and implement lessons. Our interns are expected to be an asset to the broader school community to support student success in as many ways as possible.
>
> At Hinkley and at other district schools, there is a strong emphasis on professional development and coaching for all teachers. Interns will fully participate in professional development opportunities (both in and out of the school building) … and parent–teacher conferences. We hope this experience prepares our candidates to see the teaching profession as a process of growth and learning, continuing long after the end of UCD enrollment.
>
> On a final and important note, in order to make growth during your internship, it is essential that you come to Hinkley with the attitude and initiative of an active learner. We are passionate about providing demanding and rigorous learning opportunities for our Hinkley High School students and protective of the Hinkley community.

Source: Darling-Hammond, L., Oakes, J., Wojcikiewicz, S. K., Hyler, M. E., Guha, R., Podolsky, A., Kini, T., Cook-Harvey, C., Mercer, C., & Harrell, A. (2019). *Preparing teachers for deeper learning*. Harvard Education Press. pp. 259–260.

Given the historical divisions between teacher preparation and practice and between institutions of higher education (IHEs) and PreK–12 education, the level of interconnectedness may require a reconsidering of long-familiar structures, practices, and roles to create authentic learning communities. This requires a shift in traditional hierarchies, in which higher education has been seen to hold "expertise" and PreK–12 partner districts are simply settings in which IHE-based teacher clinical preparation takes place. Instead, authentic, reciprocal learning communities require an acknowledgment and reliance on the expertise that PreK–12 faculty and staff bring in supporting the growth and learning of new teachers. PreK–12 partner districts and schools, along with their community partners, should be equal partners in conceptualizing, planning, and implementing preparation of new teachers.

Teacher residencies can also create these kinds of partnerships. Similar to medical residencies, teacher residency programs connect preparation programs with sites of practice that are meant to allow candidates to engage in state-of-the art practice, along with mutual improvement opportunities through research and development. The coursework and clinical curriculum are jointly developed and are interwoven to provide a powerful, coherent experience that connects mentor teachers and university faculty in a joint community of practice with the residents.

Residencies typically also provide aspiring teachers with the opportunity to earn a salary while they work alongside an expert educator for a year and take courses that lead to a teaching credential—and, often, a master's degree. With teacher residencies, in exchange for a salary or financial incentive, participants commit to teaching in the same district after their high-quality residency ends.

Because they are designed collaboratively with partner districts, teacher residencies are built from the ground up to address local needs and priorities. Locally tailored solutions include preparing teachers in specific shortage areas (such as math, science, or special education) and providing opportunities for residents to learn about and build relationships with the broader community. Residency programs often provide support into the first year or two of teachers' careers, bringing graduates together to build a community of practice across cohorts.[67] One example of such a residency, between Newark Public Schools and Montclair State University, is described in Authentic, Aligned Partnership.

Authentic, Aligned Partnership

One example of a well-developed teacher residency model is the partnership between Montclair State University and Newark Public Schools, which has had long-lasting impact on both the district and the university. In 2009, secondary education faculty working within the Urban Teacher Residency collaborated with the principal and leadership team at East Side High School in Newark, NJ, regarding becoming a site for math and science residents in the program. East Side's principal, Mario Santos, clearly articulated his vision that the school raise the standard of teacher quality across all content areas and advocated for a partnership with the school's math and science departments to begin the process. The goal of creating "models of teaching excellence" for the entire school was shared, and school and university faculty worked together to transform these departments.

University faculty became part of school-based committees, professional development, and events, while the administration, faculty, and staff of East Side High School became active participants in all aspects of the residency as well as other university-established entities, such as the Montclair State University Network for Educational Renewal. After more than 10 years, East Side High School and Montclair State University leaders and faculty continue to be involved in collaborative initiatives, including the university-led New Teacher Induction Program and Red Hawks Rising Teacher Academy/Dual Enrollment Project.

The school–university partnership between East Side High School and Montclair has focused on three areas: leadership development, mentor teacher development, and support to developing preservice teachers and novice teachers. East Side High School veteran teachers have become mentors for preservice teacher candidates; they also lead professional development sessions for the university's 3-year New Teacher Induction Program. Since 2010, East Side High School has hired Montclair State math and science graduates who have helped increase the numbers of students on the honor roll and inspired numerous graduates, especially young women, to enter STEM majors and fields. The inquiry approach to teaching that the preservice program promotes has influenced all teachers at East Side High School, and student achievement has substantially improved. The principal and the department chairs attribute that increase to the sustained presence of the preservice students, induction program, and university faculty in the schools and the impact of the practices and inquiries they bring with them.

Source: Lehren, M. J. (2020, Spring/Summer). A teacher like me. *Montclair* magazine.

Preservice programs organized in cohorts and clinical work within teaching teams create professional communities in which teachers can observe one another, share practices, develop plans together, and solve problems collectively. The cohort model can enable authentic professional collaboration for candidates and provide experience with building positive relationships and developing learning communities within their own classrooms. A cohort can act as a source of support for candidates learning to teach and developing adaptive expertise as they learn how to collaborate, communicate, integrate multiple perspectives, and give and receive feedback.

Cohort-based learning communities not only serve as an organizational structure to support the learning of teacher candidates but also, when expanded to include PreK–12 schools and educators, can enhance connections between preparation programs and district schools. As the experienced educators of preparation programs and partner schools interact with novice educators and teacher candidates, they provide guides and models of practice and also draw newer teachers, on the periphery of the profession, into more complex and embedded participation as educators.[68] Retreats for teacher candidates and mentor teachers prior to or as part of clinical placements can improve communication among teams. Interacting with students, other prospective teachers, and expert teachers and sharing the tools of teaching (e.g., lesson plans, assessments) allows novice teachers to access "experiences, practices, theories, and knowledge of the profession" that would otherwise be unattainable.[69] Furthermore, interaction within and among cohorts is important when candidates graduate. Continued engagement enhances novice teachers' development and contributes to new teacher retention when cohorts are able to evolve into professional networks.[70]

In communities of practice, teacher candidates access the opportunity to engage with real problems of practice they are facing in their clinical placements in a structured, supportive environment.[71] Deliberately constructed professional learning communities, including those that provide mentorship, can improve teacher practice and self-efficacy as well as school culture.[72] This collaborative problem-solving builds teachers' capacity to engage in productive struggle with one another and access different perspectives and contexts that will become a part of their permanent teaching repertoire and toolbox. These perspectives should include those of families and students, who are a part of the learning community that can reshape teachers' views of the world as well as their teaching practices, as this example from the San Francisco Teacher Residency (SFTR) Program illustrates (see Learning From Students About Their Realities).

In communities of practice, teacher candidates access the opportunity to engage with real problems of practice they are facing in their clinical placements in a structured, supportive environment.

Learning From Students About Their Realities

It's 1 p.m. on a Friday afternoon in late April. San Francisco Teacher Residency (SFTR) Program candidates have come from schools all over the city for their weekly 3-hour practicum seminar, which is held at San Francisco's African American Art and Culture Complex in the heart of one of the city's historically black neighborhoods.

Today, the 32 residents are joined by 10 11th-grade students from June Jordan School for Equity (JJSE), a small high school in San Francisco Unified School District and an SFTR teaching academy. The topic is "Supporting Undocumented Students," and today the traditional roles are flipped: Rather than residents teaching the students, the students are teaching the residents.

The students are all enrolled in the Peer Resources class at JJSE, a class devoted to building youth leadership skills. All are students of color. Earlier in the spring, they delivered this same lesson to the staff at their school as part of the school's professional development for its faculty. Here to support the students are their Peer Resources teacher; the Peer Resources executive director; and the principal of JJSE.

Roni, one of the JJSE students, begins the lesson by leading the residents and the other students through a 5-minute meditation. The residents are encouraged to leave their worries from the first part of the school day behind and to clear their minds so they can be fully present for this seminar. The room has visibly relaxed, and those present are fully focused when Roni brings everyone's attention back to the group after 5 minutes.

Wendy, one of the JJSE students, then begins the lesson by projecting the JJSE mission statement on the wall. Engaging the "class" of residents in the lesson, she asks a resident to read the mission statement and give a brief summary. Wendy then shares why she believes the school is not living up to its mission statement—which is preparing students for college as well as to be leaders prepared to work for a more equitable world—and frames the importance of the lesson today:

> We don't even know all of our students who are undocumented. They don't even have Social Security numbers. How can we get them to college if we don't even know them? And by the time they're seniors and they're going through the application process, and we find out they're undocumented, it might be too late to fight for DACA and AB 540.

The JJSE students model active and engaging pedagogy for the residents. For example, Javier leads the residents through a "forced choice" activity in which the residents must stand up and walk to the "Yes" or "No" side of the room depending on their answers to a series of questions. After each question, Javier calls on residents to explain their answers and engages them in a discussion. The first question is "Do you think undocumented students are willing to share their stories?" About half of the residents move to the "Yes" side of the room, the other half to the "No" side. As the discussion unfolds, one resident who answered "yes" says, "It's our job as teachers to know our students' stories as we build a relationship with them." A resident who answered "No" disagrees: "My students don't really talk about that kind of thing—it's the parents who have approached me." As the discussion unfolds, it becomes clear that residents' experiences talking to their students about their immigration status vary depending on whether they are in an elementary or high school setting.

Next, Joselin shares data from an action research survey the Peer Resources class conducted at their school. The students found that about 10% of the JJSE student population is undocumented, a number that came as a complete surprise to many JJSE staff and surprises the SFTR residents today. After sharing their data, Joselin engages the residents in a discussion, asking, "Have you encountered undocumented students at your school, and if so, how have you responded?"

One resident shares his concerns that in his 3rd-grade classroom, a couple of students had shared their undocumented status as part of a classroom community circle. He worries that his students' willingness to share that information so publicly at such a young age could cause them problems later on. Eliza, a JJSE student, shares the importance of strong communication with parents, as high school students may not share their immigration status because their parents have told them not to. Maria, another JJSE student, asks the residents to explain what they will do differently as a result of this seminar today, providing an explicit link for residents between their coursework and their teaching practice. One resident in a middle school placement shares:

> I always sort of thought they had a right for that [immigration status] to be private if they want it to be. … But now, from the data and what you guys are saying, my thinking is shifting. Maybe there's some way I can show the class that I'm an ally so that students have all the information they need to come talk to me. Maybe I could put up posters that show my students that. Maybe I can tell the class as a whole, or some other way to make my door more open to my students to come talk to me.

Another elementary resident shares how this data make her want to reach out and understand resources to which she can direct her undocumented students and their families. The data also reinforce the importance for her of building community. She had two students who came to talk to her about their immigration status, and she wants to keep this communication open. Other residents note that they now want to talk to their administrators about the school's protocol for supporting undocumented students. A resident in a 1st-grade class explains, "I'm taking away the importance of safety in our community. I want the parents of my students to feel safe in the community of our classroom."

Another resident says, "I think it's important that we know we're coming from a place of privilege. I don't have to worry about getting pulled over. If I want to get on a plane and fly to Mexico, I can do that." At that, Wendy, the student who had opened the lesson and earlier shared her personal story as the child of two undocumented parents and an undocumented older brother, responds with tears flowing down her face:

> I'm the youngest. My parents tell me that once I go to college, they're going to leave the U.S. because they're undocumented and go back to their country. … That is really hard for me. Once I go to college, I'm not going to have my parents there. Talking about privilege, take that into consideration, because not everyone can have their family and be with them.

Many eyes in the room are wet, and the room erupts in snaps of support for Wendy. The students end their presentation with some facts about DACA (Deferred Action for Childhood Arrivals), President Obama's executive order on immigration reform that provides a work permit and protection

from deportation to eligible youth. Yasmine, another JJSE student, anchors this content in her personal story of how she missed the DACA qualification deadline because she arrived in the United States 3 months too late and what this means for her college opportunities.

The nearly 2-hour presentation ends with the JJSE students leading a closing circle and providing an opportunity for reflection. One resident shares that "this PD [professional development] was way more engaging and powerful than other PDs I go to." Another resident encourages the high school students to connect with undocumented college students at the University of San Francisco who are organizing around similar issues.

In this example, the high school students, the residents, and the course instructors were all engaged in deeper learning for equity. By the end of this practicum session, the residents walked away with a more complete understanding of the number of undocumented students served in San Francisco Unified School District, the needs of these students, and what they can do as educators to support this group of students. Perhaps more important, the residents learned this content from high school students directly, expanding their notion of their learning community.

The lesson modeled for the residents the leadership roles that young people can take on when they have appropriate support and the knowledge and skills that students can build when engaged in this type of project-based learning. For the JJSE students, the act of teaching this seminar to the residents was a form of assessment in and of itself—a performance-based one. This lesson exemplifies how the program supports inquiry and reflection with community-building.

Source: Darling-Hammond, L., Oakes, J., Wojcikiewicz, S. K., Hyler, M. E., Guha, R., Podolsky, A., Kini, T., Cook-Harvey, C., Mercer, C., & Harrell, A. (2019). *Preparing teachers for deeper learning*. Harvard Education Press. pp. 285–287.

To overcome any lingering mistrust between schools, communities, and IHE teacher educators, it is vital to build trust and rapport among educators across these groups. Using the term "collaborative community of practice" signals that the partnership being called for is different from those that have dominated the field in the past. IHE-based preparation programs must acknowledge that many of the ways in which schools and communities have participated in teacher education partnerships in the past have been problematic and call for a shift in the epistemology that is often embedded in teacher education partnerships. The National Network for Educational Renewal, which supports many school partnerships, including the ones described earlier at the University of Colorado Denver and Montclair State University, is founded on the principle to improve "simultaneously the quality of education for thoughtful participation in a democracy and the quality of the preparation of educators."[73] To describe the partnership in this way means each member of the partnership has the authority and permission to hold the other accountable. In this way, the relationship is more than merely mutually beneficial. Each institution is invested in and committed to the other's success, and they show it through their actions.

Conclusion

The knowledge base for education has evolved considerably, as the new tools of neuroscience show how the brain develops and how environments interconnect with social, emotional, physical, and academic domains to influence learning and development. New insights into how people learn imply that important changes should be made in both schools and educator preparation programs to support whole child learning and development. To shift classrooms into learning environments that support the whole child, teachers themselves must learn their craft in preparation programs that attend to the science, structures, and practices that support deeper learning and equity.

In response, this guide incorporates the emerging research with the wisdom of practice found in exemplary preparation programs to create a set of design principles that enable programs to model SoLD-aligned approaches to teachers. Educating the whole child is possible when teachers understand the underlying theory of SoLD and develop skills that allow them to create conditions where children and adolescents can thrive. When teachers hold a deep understanding of learners, use this knowledge in their curriculum, and incorporate practices centered on positive relationships and rich learning experiences, classrooms can become vibrant, joyful environments. Successfully doing this work with diverse students also requires the skills, habits, and mindsets of an equitable educator, which are developed through authentic learning experiences that encourage reflection and pedagogical alignment between university classrooms and clinical placements. This learning for teachers is strengthened through supportive developmental relationships in communities of practice. While programs can prepare candidates through a SoLD-aligned approach, educators also need schools that are structured to support such teaching. Thus, these principles lay the groundwork for a related framework for leader preparation, designed to ensure that system leaders can support teachers by creating organizational environments that promote practices aligned with SoLD.

Teachers commonly enter the profession with the hope and intention of helping young people reach their potential. The extent to which they can do this often provides intrinsic satisfaction and motivation to remain committed to their careers and to high-quality instruction. Preparation programs can contribute to these desired outcomes by preparing candidates to create the outcomes that students and families deserve and that most teachers also want. These design principles can become the foundation for a new approach to learning as preparation programs integrate and implement the conditions teachers need to support whole child education by creating equitable classrooms that promote the optimal development of each child.

Appendix: Resources

Design Principles for Schools: Putting the Science of Learning and Development Into Practice

This set of interactive principles, developed by the Learning Policy Institute and Turnaround for Children under the auspices of the SoLD Alliance, serves as a blueprint for schools to create and sustain learning environments that yield healthy development, learning, and thriving for all students.

EdPrepLab Resource Library

The EdPrepLab Resource Library is a unique collection of artifacts, materials, and research that support educator preparation for whole child education, deeper learning, and equity, all grounded in the science of learning and development. This virtual repository hosts hundreds of resources, including articles, guides, podcasts, and videos, as well as curricular materials contributed by its university network members. The EdPrepLab Resource Library serves as a hub for practitioners, researchers, policymakers, and the broader community.

Educator Learning to Enact the Science of Learning and Development

This report synthesizes research on how to support educators in developing practices aligned with the science of learning and development in both preservice and in-service contexts. It addresses both the "what" of teacher and leader preparation—the content educators need to learn about children and how to support their development and learning—and the "how"—the strategies for educator learning that can produce deep understanding; useful skills; and the capacity to reflect, learn, and continue to improve.

Preparing Teachers for a Changing World

Drawing from research on effective teaching and learning, this book explores fundamental concepts and pedagogies that are essential for modern teacher education programs. Stemming from a commission supported by the National Academy of Education, *Preparing Teachers for a Changing World* outlines the research undergirding the design of a well-informed teacher education curriculum that aligns with current professional standards. Geared toward teacher educators, administrators, policymakers, and practitioners, the book offers insights on foundational teaching knowledge and strategies for successful classroom implementation.

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About the Authors

Linda Darling-Hammond is the President and CEO of the Learning Policy Institute (LPI). She is also the Charles E. Ducommun Professor of Education Emeritus at Stanford University, where she founded the Stanford Center for Opportunity Policy in Education and served as the faculty sponsor of the Stanford Teacher Education Program, which she helped to redesign. Darling-Hammond is Past President of the American Educational Research Association and recipient of its awards for Distinguished Contributions to Research, Lifetime Achievement, Public Service, and Research-to-Policy. She is also a member of the American Association of Arts and Sciences and the National Academy of Education. From 1994 to 2001, she was Executive Director of the National Commission on Teaching and America's Future, whose 1996 report *What Matters Most: Teaching for America's Future* was named one of the most influential reports affecting U.S. education in that decade. Among her more than 600 publications are several award-winning books on teacher education, including *Teaching as the Learning Profession*, *Powerful Teacher Education*, *Preparing Teachers for a Changing World*, and *Preparing Teachers for Deeper Learning*. In 2022, Darling-Hammond received the Yidan Prize for Education Research in recognition of her work that has shaped education policy and practice around the most equitable and effective ways to teach and learn.

Maria E. Hyler serves as the Director of LPI's Washington, DC office. She directs the EdPrepLab in partnership with Bank Street Graduate School of Education. EdPrepLab is a center on teacher and leader preparation for deeper learning and equity, working to transform educator preparation through the alignment of research, practice, and policy. Before taking her position at LPI, Hyler was an Assistant Professor of Teacher Preparation and Professional Development in the Department of Teaching and Learning, Policy and Leadership at the University of Maryland, College Park. She began her career teaching 10th- and 11th-graders in Belmont, CA, where she achieved National Board Certification in Adolescent Young Adult English Language Arts in 2000. That same year, she left her classroom to pursue her doctoral studies. Hyler received a PhD in Curriculum and Instruction from Stanford University, an MEd with a teaching credential from Harvard Graduate School of Education, and a dual degree in English and Africana Studies from Wellesley College.

Steve Wojcikiewicz is a Senior Researcher and Policy Advisor at LPI. He is a member of LPI's Educator Quality team. Wojcikiewicz is a coauthor of the book *Preparing Teachers for Deeper Learning* and of several case studies of educator preparation programs that are part of that project. His focus is on initiatives related to educator preparation research, practice, and policy, including the EdPrepLab, an initiative of LPI and the Bank Street Graduate School of Education focused on teacher and leader preparation for deeper learning and equity. Wojcikiewicz has 2 decades of experience in varied roles across the field of education. He started his career teaching high school social studies and band in Tulsa, OK, and has also worked as an experiential educator aboard sailing vessels around the country. After earning his doctoral degree, he served as an Assistant and Associate Professor of Teacher Education at Western Oregon University, followed by positions as Assistant Director of Educational Issues at the American Federation of Teachers in Washington, DC, and as Vice President of Policy for Deans for Impact in Austin, TX. Prior to joining LPI, he was the Director of the Pacific Alliance for Catholic Education and a

faculty member in the School of Education at the University of Portland in Oregon. Wojcikiewicz has a PhD in Educational Psychology and Educational Technology from Michigan State University, an MA in Teaching from the University of Portland, and a BA in History and Economics from the University of Notre Dame.

Joy Rushing is an EdPrepLab Researcher at LPI, where she also contributes to the Educator Quality team. In her role, she supports a variety of research and policy initiatives, concentrating on advancing EdPrepLab's objectives and impact. Prior to joining LPI, Rushing worked as an education research and policy consultant, specializing in school leadership research and project management. She also holds deep experience as a practitioner. Rushing began her career in the classroom, where she taught middle school English language arts and gifted education for more than a decade. Rushing holds a PhD in Educational Leadership: Administration and Supervision of Curriculum from Auburn University, an MAT in Middle School Education from Clemson University, and a BA in English Literature from the University of South Florida.

The Learning Policy Institute conducts and communicates independent, high-quality research to improve education policy and practice. Working with policymakers, researchers, educators, community groups, and others, the Institute seeks to advance evidence-based policies that support empowering and equitable learning for each and every child. Nonprofit and nonpartisan, the Institute connects policymakers and stakeholders at the local, state, and federal levels with the evidence, ideas, and actions needed to strengthen the education system from preschool through college and career readiness.

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EdPrepLab is an initiative of the Learning Policy Institute and Bank Street Graduate School of Education and aims to strengthen educator preparation by supporting learning and sharing research and practices among programs, school districts, and policymakers. EdPrepLab supports programs and informs policies that incorporate the science of learning and development to enable deeper learning and equity, working to expand these approaches nationally and internationally.

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