



Blueprint for the Federal Role in Advancing Early Learning Research & Development



Melissa Gedney, John Sessler

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Overview

Early learning research and development (R&D) is essential to understand how to best prepare children to thrive in an ever-changing world; however, too often the youngest learners and their caregivers are left out of the education R&D system. Given the well-established evidence that early investments yield higher returns than those made later in life,¹ focusing R&D dollars on the needs of early learners is a strong bet.

R&D investment in early childhood is critical and urgent. The United States lags behind peer nations in early childhood investment.² As AI reshapes learning and work, the competencies rising in importance (e.g., collaboration, communication, content knowledge, critical thinking, creative innovation, and confidence)³ are most effectively cultivated in the early years. Durable skills have always mattered; in the age of AI, they matter even more. Investments in the early years have never been more vital for the future of our nation.

To inform this blueprint, the Alliance for Learning Innovation interviewed 25 professionals across early learning, representing practitioners, policymakers, industry leaders, academics, and education experts, to better understand how to develop the federal early learning R&D infrastructure. This report maps the functions outlined in the [Blueprint for the Future of the Federal Role in K-12 Research and Development](#), which was informed by 150 bipartisan and cross-sector participants representing diverse perspectives in education research, innovation, and policy. Throughout these recommendations, special attention was made to consider the many spaces, places, and people that intersect with a child's early development and make this landscape distinct from the traditional K-12 space.

While there is significant alignment with the recommendations from the K-12 blueprint, this early learning blueprint considers the unique needs of the youngest learners with an emphasis on supporting R&D that facilitates developmental relationships.

Throughout this blueprint, we address the uniqueness of the early learning space and the importance of developing a rigorous understanding and commitment to continuous improvement for the programs, policies, and products that impact a child's learning trajectories. While echoing the K-12 blueprint's question of, **"What works, for whom, and under which circumstances?"**⁴, we propose the addition of the question from the Fred Rogers Institute, **"How does this [program, policy, or product] encourage, enrich, and empower the human interactions around the children, caregivers, and teachers?"**⁵ While this question is critical to all phases of a child's development, it serves as a reminder that human connection remains a key part of our society's commitment to this sensitive time in a child's development.

¹ The Heckman Equation. (n.d.). The Heckman Equation. <https://heckmanequation.org/>

² Organisation for Economic Co-operation and Development. (2021). *Education at a glance 2021: OECD indicators*. OECD Publishing. <https://doi.org/10.1787/b35a14e5-en>

³ Nesbitt, K. T., Blinkoff, E., Golinkoff, R. M., & Hirsh-Pasek, K. (2023). Making schools work: An equation for active playful learning. *Theory Into Practice*, 62(2), 141–154. <https://doi.org/10.1080/00405841.2023.2202136>

⁴ Alliance for Learning Innovation. (2025). *Blueprint for the Future of the Federal Role in K-12 Education R&D*. <https://www.alicoalition.org/publications/blueprint-for-the-future-of-education-rd/>

⁵ Li, J., & Winters, D. (2019).

We acknowledge that early childhood is influenced by a wide range of factors outside of a traditional learning environment. When considering how to improve educational outcomes for young learners, it is also critical to acknowledge the well-being of the adults shaping the early childhood experience. Research and development on policies and practices that aim to relieve stressors for families and educators is worth attention and could have powerful impacts on academic outcomes. The scope of these interventions will not be fully captured in this report alone, but remain important considerations to the future development and sustainability of this field.

As articulated in ALI's blueprint, the federal government plays an essential role in:

1. Investing in Research and Innovation
2. Empowering State and Local Leaders to Innovate and Improve
3. Collecting and Analyzing Meaningful Data

In early childhood R&D, the federal government has an opportunity to address specific needs of the early childhood landscape by investing in research and development to ensure all adults and systems are set up to help children thrive. In particular, federal policymakers should:

1. Invest in Early Learning R&D that Addresses the Unique Needs of Children, Families, and Educators
2. Advance Intergenerational Policies Through a Family Support R&D Agenda
3. Expand Public-Private Partnerships to Accelerate the Pace and Impact of Innovation
4. Establish a National Early Learning R&D Hub for Excellence, Quality, and Innovation
5. Establish a National Framework for Responsible AI in Early Learning

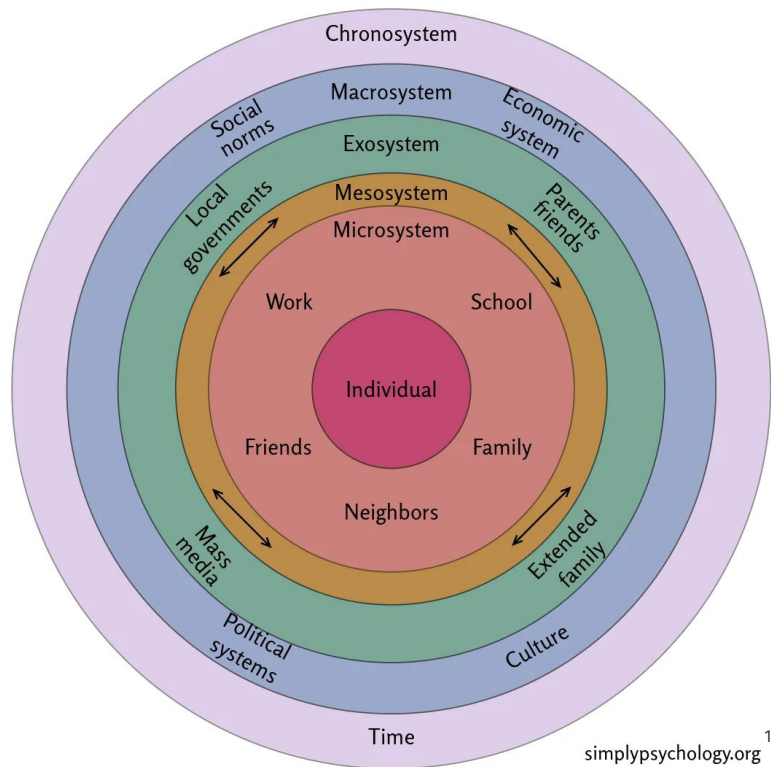
Uniqueness of the Early Childhood Space

Decades of research have proven that the early years of a child's life are when the most intense and influential neurological construction occurs. In the first few years, about 1 million new neural connections are formed every second⁶. Responsive, "serve and return" interactions between children and adults provide a sturdy foundation for learning and social and emotional growth.⁷ These interactions occur across a child's in-home and out-of-home learning environments.

⁶ Center on the Developing Child at Harvard University, "Brain Architecture," accessed January 10, 2026, <https://developingchild.harvard.edu/key-concept/brain-architecture/>

⁷ Center on the Developing Child at Harvard University, "Serve and Return," accessed January 10, 2026, <https://developingchild.harvard.edu/key-concept/serve-and-return/>

The landscape of out-of-home early learning in the United States is highly varied. About 12.5 million U.S. children up to age 5 (who aren't in kindergarten) are reported to be in non-parental care at least one day a week,⁸ with settings ranging from public school programs, center-based programs, home-based programs, and the care of family, friends, and neighbors. As noted by the American Academy of Pediatrics, "All of a child's early experiences, whether at home, in child care, or in other preschool settings, are educational."⁹ Uri Bronfenbrenner's Bioecological Model of Human Development offers a helpful and widely accepted frame for the idea that absolutely everything that surrounds a child—from their interactions at home to the greater political, environmental, and economic landscapes in which their families sit—has great implications for the learning and development that child will experience.¹⁰



Philip A. Fisher, PhD & Joan Lombardi, PhD of Stanford University have expanded upon this model for children growing up today in the United States to take into account four key domains that also impact a child's experience in our modern era: (1) the persistence of poverty and increasing inequalities in early childhood, (2) the demand for quality child care, (3) environmental conditions brought on by the changing climate, and (4) the rise of the machines: digital technology and early childhood.

⁸ Centers for Disease Control and Prevention. (2025, March 13). About early care and education (ECE), accessed February 10, 2026. <https://www.cdc.gov/early-care-education/about/index.html>

⁹ 1. P. Gail Williams and Marc Alan Lerner, "School Readiness," *Pediatrics* 144, no. 2 (August 2019): e20191766, <https://doi.org/10.1542/peds.2019-1766>.

¹⁰ Bronfenbrenner, U., & Morris, P. A. (2006). The Bioecological Model of Human Development. In R. M. Lerner & W. Damon (Eds.), *Handbook of child psychology* (Vol. 1, pp. 793-828). Hoboken, NJ: John Wiley & Sons.

¹¹ Guy-Evans, O. (2025, May 6). *Bronfenbrenner's ecological systems theory*. *Simply Psychology*. <https://www.simplypsychology.org/bronfenbrenner.html>

They also identified a common mechanism of increasing unpredictability and uncertainty, in the context of a world with “events like global pandemics, geopolitical conflicts, extreme climate events, and even mass shootings” being more prevalent and disrupting many levels of the ecosystem around the child.¹²

No matter whether a child shows up in a district or private school classroom, every teacher will be tasked with supporting children shaped and influenced by different early learning experiences. **How can research and development (R&D) provide necessary support and solutions across this highly varied infrastructure to ensure all adults and systems have what they need to help children thrive?**

The federal government, through 1) Head Start’s view on “school readiness” and 2) the five domains of kindergarten readiness established by the National Education Goals Panel and integrated into the Head Start Early Learning Outcomes Framework, has indicated core priorities this paper will anchor on:

- “children are ready for school,
- families are ready to support their children's learning, and
- schools are ready for children.”¹³

In this report, we will refer to the entire ecosystem’s readiness as work in the service of **children being ready to learn**. To underscore, any understanding or definition of “school readiness” in policy or practice needs to take into account the full system being ready to receive children and their families with the wide range of experiences, backgrounds, and skills they bring to the first day of kindergarten.



¹² Fisher, P. A., & Lombardi, J. (2025). *The new ecology of early childhood: Revisiting Bronfenbrenner’s theory in the context of contemporary challenges and opportunities* (Working paper). Stanford Center on Early Childhood, Stanford University.

<https://earlychildhood.stanford.edu/sites/g/files/sbiybj27426/files/media/file/the-new-ecology-of-early-childhood-feb-26.pdf>

¹³ “Interactive Head Start Early Learning Outcomes Framework: Ages Birth to Five,” Head Start (U.S. Department of Health and Human Services), accessed June 10, 2025, <https://head-start.gov/interactive-head-start-early-learning-outcomes-framework-ages-birth-five>.

What is R&D in the Early Learning Space?

Leveraging the definition in ALI's K-12 Blueprint, "R&D is defined as applied research in real-education environments focused on developing, testing, evaluating, and improving innovative solutions—tools, products, features, systems, or policies—to our nation's most pressing education problems."¹⁴ Our interviewees emphasized that R&D in early childhood ideally looks like a continuous, participatory process of discovering, developing, and iterating on ideas to improve real outcomes for children. It is a bridge from insight to practice to policy, designed to inform what works, for whom, and under what conditions.

Additionally, we propose that any initiatives aiming to advance early learning R&D continually center the question from the Fred Rogers Institute: **"How does this [program, policy, or product] encourage, enrich, and empower the human interactions around the children, caregivers, and teachers?"** In our modern world, many distractions compete for the attention of young learners and the adults in their lives; focusing attention on questions centered on developmental relationships is an appropriate lens for this age band.

Why Early Childhood R&D?

The early childhood landscape is fragmented, with children participating and learning in a variety of different environments, including at home, FFN (family, friend, and neighbor) care, center- and community-based programs, and public and private PreK. Through research and development, we have come to understand that early childhood is a sensitive and impactful time in human development, and exposure to early learning programs is tied to later life and academic outcomes.

Investing in early childhood is also proven to be a smart investment in a strong society. The Heckman Curve, a finding from James Heckman at the University of Chicago, "demonstrates that the highest economic and social benefits come from early skill development. This investment leads to lifelong success, increased productivity, and reduced societal costs." Heckman's work sheds light on the rippling effects that investment (or lack thereof) in early learning can have on all of society, with programs targeted at the earliest years having measurable outcomes dating to post-school and career outcomes.¹⁵

In the absence of a national PreK program, a variety of early learning contexts and approaches have emerged across different states, warranting further investigation about what works, for whom, and under which conditions. The role that programs, policies, and products play in early learners' lives is critically important to understand, as this time represents the most sensitive period in child development.¹⁶

¹⁴ Alliance for Learning Innovation. (2025). *Blueprint for the Future of the Federal Role in K-12 Education R&D*.

<https://www.alicoalition.org/publications/bluepringrown-upst-for-the-future-of-education-rd/>

¹⁵ The Heckman Equation. (n.d.). The Heckman Equation. <https://heckmanequation.org/>

¹⁶ Center on the Developing Child at Harvard University. (n.d.). Brain architecture.

<https://developingchild.harvard.edu/key-concept/brain-architecture/>

Key Federal Policy Recommendations

To support the development of a more robust early learning R&D ecosystem, federal policymakers should take specific actions to provide necessary support and solutions across this highly varied infrastructure to ensure all adults and systems have what they need to help children thrive.

1

Invest in Early Learning R&D that Addresses the Unique Needs of Children, Families, and Educators

A sturdy early learning ecosystem must be founded on providing children and families with access to evidence-based programs that meet their needs and are led by trained caregivers and educators. The federal government is poised to bridge the critical gap between academic research and the implementation of scalable, evidence-based solutions for early learners and their educators. Private investors often decline to fund early learning initiatives due to the fragmented nature of the early learning ecosystem. Federal funding provides the necessary capital to spark breakthrough models, pedagogies, and technologies.



Federal Policy Recommendations:

- **The Department of Health and Human Services and the Department of Education should expand R&D resource allocation to impact learning environments that comprise the entire early learning ecosystem:**
 - Ensure federal funding reaches non-traditional R&D environments, like home-based and community-based early learning providers.
- **The Department of Education and Department of Health and Human Services should prioritize R&D that supports multilingual learners, learners with disabilities, children from low-income families, and learners in rural contexts to create a more ready, resilient, and evidence-based early learning system by:**
 - Investing in R&D initiatives that promote improved learning outcomes for children who have unique needs and provide state and local education leaders with technical assistance to support children and their families with unique needs.
 - Funding grants and programs that provide access to special education and related services for children with disabilities ages two through five (e.g., Early Intervention Program for Infants and Toddlers with Disabilities, Special Education Preschool Grants).
 - Funding programs and grants that empower state governments to leverage federal, state, and local early care and education investments (e.g., Childcare and Development Fund, Preschool Development Grant Birth through Five).
 - Funding grant programs that support innovations through multiple phases as they grow from ideas to scalable solutions that strengthen the entire early learning ecosystem (e.g., the Institute of Education Sciences' (IES) From Seedlings to Scale (S2S) program).
 - Connecting funding to research-backed practices that support developmental relationships around the child is likely to yield stronger outcomes.
- **The Department of Education should launch the next phase of Ready To Learn (RTL) grant program**
 - RTL funds the development of and access to educational children's media, digital games, and resources for caregivers that are rigorously researched, aligned to learning goals, and developmentally appropriate. As technology accelerates, supporting public institutions to lead outcomes-driven R&D specific to educational media plays an important role in driving the technology field toward centering children's well-being.

2

Advance Intergenerational Policies Through a Family Support R&D Agenda

Children's learning trajectories are inseparable from the conditions of adult caregivers and educators. Yet, R&D investments often isolate child outcomes from family systems. A two- and three-generation R&D agenda would align early learning with workforce, health, and family and community economic policy to maximize return on public investment. Early learning R&D should be anchored within a two- and three-generation policy framework that simultaneously supports children's development and the economic, mental, and relational well-being of parents, caregivers, and early childhood educators. An intergenerational approach recognizes that supporting adults is foundational to improving early learning outcomes and long-term societal returns, pedagogies, and technologies.



Federal Policy Recommendations:

- **Given the interdisciplinary nature of early learning, agencies such as the Department of Education, Health and Human Services, Department of Labor, and National Science Foundation should fund R&D pilots that research:**
 - Early learning and workforce training
 - Consolidated family service supports
 - Childcare and parental mental health supports
 - Home visiting and group health/parenting approaches (e.g., Parents as Teachers)¹⁷
 - Economic mobility pathways for families
 - Family leave benefits and long-term child outcomes
 - Intergenerational approaches involving older adults, given an aging population, and the costs and benefits of those approaches
- **Congress should issue guidance for federally funded early learning R&D across agencies to examine the following areas on early learning outcomes:**
 - Impacts on parental (or primary caregiver) stress, stability, and time
 - Effects on caregiver-child interactions
- **Coordinate across the Department of Health and Human Services, Department of Education, Department of Labor, and Department of Housing and Urban Development to support cross-agency two- and three-generation initiatives that support children, families, and educators through interagency data-sharing agreements with shared outcomes**
- **Ensure family and intergenerational engagement programs are elevated from a feature to a core R&D priority within Notices of Funding Opportunities (NOFOs) from ACF's Child Care and Development Fund and 21st Century Community Learning Centers**

¹⁷ Parents as Teachers National Center, Inc. (n.d.). Evidence-based home visiting. <https://parentsasteachers.org/evidence-based-home-visiting/>

3

Expand Public-Private Partnerships to Accelerate the Pace and Impact of Innovation

Public funding alone cannot meet the scale or complexity of early childhood needs across the early learning ecosystem. As [ALI's K-12 Blueprint for Federal Education R&D](#) noted: "Industry, philanthropy, and the public sector all have a role to play in supporting K-12 education R&D. When they join forces, they can leverage their unique assets to accelerate the pace and impact of innovation." Public-private partnerships can unlock new resources and innovation.¹⁸ When these partnerships are designed thoughtfully, they align economic growth with children's developmental needs.

Federal Policy Recommendations:

- **Senior agency leaders should enlist philanthropy to co-invest alongside public dollars in early learning innovation through initiatives like a design challenge. Guidance for every initiative should ensure that quality, effectiveness, accountability, and child health, safety, and well-being remain central.**
- **The Department of Health and Human Services should fund R&D to evaluate effective financing solutions, laws, and pilots in the early learning field across states, focusing on:**
 - Accessibility and affordability of child care and early education opportunities
 - Workforce retention and productivity
 - Guidance for scaling solutions that address the affordability crisis (e.g., cost-sharing and Tri-Share models, employer-supported payroll taxes)

¹⁸ Alliance for Learning Innovation. (2025). *Blueprint for the Future of the Federal Role in K-12 Education R&D*. <https://www.alicoalition.org/publications/blueprint-for-the-future-of-education-rd/>

4

Establish a National Early Learning R&D Hub for Excellence, Quality, and Innovation

A National Early Learning R&D Hub would centralize existing federal infrastructure and powerfully build on the existing assets of the federal government. Head Start is uniquely positioned to host a national early learning R&D infrastructure. With decades of longitudinal data, deep community roots, and established research partnerships through ACF and OPRE, Head Start offers something no other system can: real-world, at-scale experimentation grounded in developmental relationships and children/families who are generally most underserved. Rather than treating Head Start as a compliance-based program, position Head Start as the nation's flagship R&D platform for early learning excellence to serve simultaneously as a service delivery system, innovation testbed, and knowledge mobilization hub. Head Start could be the premier early learning system for the nation, accelerating quality and innovation across the entire early childhood ecosystem by supporting the field's diverse providers and landscapes with proven, evidence-based best practices in early teaching and learning.

Federal Policy Recommendations:

- **Formally designate Head Start as a federal Early Learning R&D Hub, with dedicated funding for:**
 - Rapid-cycle innovation and improvement
 - Embedded research-practice partnerships, with emphasis on practitioner-led research questions
 - Testing and scaling of evidence-based program models, workforce models, and family engagement models
- **HHS should expand the research portfolio to include:**
 - Quality improvement science and not just impact evaluation
 - Early care and education workforce well-being and compensation pilots
 - Whole child outcomes connected to the larger learning ecosystem, including developmental relationships between grownups and children
 - Early Head Start program R&D
 - Technical assistance translating R&D to practice for early childhood education providers and grant recipients
 - Developmentally appropriate uses of technology and AI to support early learning educators and families
- **HHS should invest in knowledge mobilization infrastructure, enabling Head Start innovations to inform broader early care and education (ECE) systems nationwide.**

5

Establish a National Framework for Responsible AI in Early Learning

AI is rapidly entering education systems, often without sufficient evidence, guardrails, or developmental guidance, especially for children under the age of eight, whose learning and brain development depend on responsive, real-time human relationships. Without intentional leadership, early learning risks either harmful overexposure or blanket bans that forgo meaningful benefits. Done well, responsible AI can help early learning systems do what matters most: support the adults who support children.

A federal role is essential to ensure that AI in early learning is relationship-centered, fairness-driven, and evidence-based, and that it supports educators, caregivers, and families rather than displacing them.

Federal policymakers should support and fund a framework and R&D agenda developed by early childhood experts that guides responsible, developmentally appropriate use of artificial intelligence in early learning. The framework and agenda should prioritize AI that supports adults and strengthens developmental relationships, rather than replacing human interaction.

AI will shape early learning, whether or not the field is ready. A proactive federal R&D strategy ensures AI becomes a tool for strengthening human connection, educator well-being, and impact—rather than accelerating fragmentation, surveillance, or developmental harm.



Federal Policy Recommendations:

- **Congress should authorize and fund a national early learning AI R&D agenda that:**
 - Distinguishes clearly between AI used by adults (educators, caregivers, home visitors) and AI directly experienced by children
 - Prioritizes AI tools that reduce adult administrative burdens, freeing time and attention for high-quality adult-child interactions
 - Designates and funds learning infrastructure on best practices from programs on professional learning and AI use
 - Examines the impact of AI exposure across early developmental stages (infants, toddlers, preschool, and early elementary)

- **Establish a Center for Responsible AI in Early Learning or a National Child-AI Safety Lab that could be housed at the National Science Foundation (NSF) or Institute of Education Services (IES), tasked with:**
 - Conducting and synthesizing research on AI's developmental impacts (school, and early elementary)
 - Developing age-banded guidance for policymakers, practitioners, and families
 - Creating ethical, privacy, and data governance standards specific to early childhood contexts
 - Translating research into plain-language tools and implementation guidance

- **Require federal funding to be directed to NSF (e.g., via the Discovery Research PreK-12 Program Resource Center on Transformative Education Research and Translation) or IES (e.g., via The Using Generative AI for Reading R&D Center) to:**
 - Explore how the technology strengthens developmental relationships
 - Include safeguards against surveillance, bias, data misuse, and over-automation
 - Ensure human judgment is not replaced in high-stakes decisions about children and families

- **A dedicated office within ACF should guide Head Start and early learning R&D hubs around AI research and use within early learning environments, enabling:**
 - Testing of developmentally appropriate AI supports for educators and home visitors
 - Evaluation of AI's role in family communication, multilingual support, and individualized learning without increasing screen time for young children

Next Steps

The Alliance for Learning Innovation will update this report based on feedback and publish a series of blog posts in order to provide more details about the specific policy recommendations in this paper. Follow along on LinkedIn (www.linkedin.com/company/alliance-for-learning-innovation/) and ALL's website (<https://www.alicoalition.org>). If you are interested in providing feedback or authoring a more detailed recommendation, please contact future@alicoalition.org.

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Kristen Valley, Boone Park Elementary School, Little Rock, Arkansas

Laura Patterson, Promise Venture Studio

Lisa Guernsey, New America

Medha Tare, Joan Ganz Cooney Center

Melissa Field, Promise Venture Studio

Michael Levine, Kapor Center

Michael Preston, Joan Ganz Cooney Center

Michelle Kang, National Association for the Education of Young Children (NAEYC)

Nermeen Dashoush, Boston University Wheelock College of Education & Human Development

Sara DeWitt, PBS KIDS

Ximena Dominguez, Digital Promise

Staff members of the United States Senate

This Blueprint was authored by Melissa Gedney and John Sessler, with editing and project oversight provided by Sara Schapiro, Executive Director, Megan Zabik, Policy and Programs Manager, and Melissa Moritz, Senior Advisor, at the Alliance for Learning Innovation.