YOU Belong in STEM: Advancing Federal Policy at the U.S. Department of Education

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Accessibility
YOU Belong in STEM:
Advancing Federal Policy at the U.S. Department of Education

Doctor of Education Leadership (Ed.L.D.)
Capstone

Submitted by
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To the Harvard Graduate School of Education in partial fulfillment of the requirements for the degree of Doctor of Education Leadership

May 2023
Dedication

To my parents, thank you for your sacrifices, prayers, and love.
We made it – from Newburg to Harvard!
Acknowledgements

To my advisor and committee chair Marty West, thank you for always giving me what I needed, when I needed it. Your calming presence and consistent support has truly been a highlight for me in this experience.

Paul Reville, working with you and learning from you has been incredibly joyous, informative, and fulfilling. I can speak more confidently about ed policy because of your mentorship. Thank you for believing in me.

Joaquin Tamayo, I’m glad you took a chance on a stranger! Thank you for the life lessons over margaritas and tacos. Your vision and policy acumen are unmatched. You taught me that with passion, perseverance, and an open plan, nearly anything is possible.

Dep Sec, thank you for modeling what it means to live a purpose-filled life. You inspire me to seek out the beauty and synchronicity in all that surrounds us.

Team ODS, I’m grateful we experienced the *STEM RAVE* together! I want to specifically acknowledge Sarah Schultz, Monica Logothetis, and Ashley Huderson: From colleagues to friends! You are my people.

Deborah Jewell-Sherman, thank you for speaking my name into a room full of opportunities and for your consistent encouragement to pray and pay it forward.

Gislaine Ngounou, thank you for always bursting with love and encouragement. In every interaction with you, I leave feeling seen and cared for.

My sister friend Simone Wright, thank you for always holding my hand, making sure I eat, and cheering me on. You got me through this program, and especially this year.

To my family, I am so grateful for incredible souls who push me to be my best self. I want to shout out my brother Midion Smith, my parents Faye and Smitty, and my grandparents, both here and in heaven, for serving as some of my biggest supporters.

I have an extraordinary set of friends who inspire me, ground me, and keep me laughing. I am lucky to derive my values of love and optimism through the dazzling light of my friendships.

C11: We started on Zoom, now we’re here. I could fill pages about each of you. What an experience. I’m proud of us.
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Abstract

The U.S. Department of Education (ED) is a service agency whose mission is to promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access. The COVID-19 pandemic brought a national focus on educational recovery and acceleration efforts, and ED faced a unique opportunity to promote a whole child education system that prioritized relationships, academic rigor, and student engagement.

This capstone examines my 10-month residency at the U.S. Department of Education in the Office of the Deputy Secretary, where I worked on a policy initiative on belonging in STEM (science, technology, engineering, and math). To inform my approach, I cite data from practitioners and policymakers on the essential role of belonging in STEM education. I also draw from research on policy creation and maintenance. I analyze my leadership experience through two frameworks: John W. Kingdon’s revised Garbage Can Model of how problems, proposals, and politics interact to set policy agendas; and Mark H. Moore’s Strategic Triangle Model describing how authorizing environments, public value, and operational capabilities serve as enabling conditions that keep policy agendas alive.

The findings from this capstone indicate that ED will benefit from active collaboration with other agencies and organizations to maximize resources and mobilize partners to address complex inequities in STEM education. At the sector level, my results suggest that system leaders ought to elevate the criticality of belonging to ensure that the needs of students and educators are prioritized to create conditions for student success. Addressing these focal areas will position ED and the system to implement and scale equitable, high-quality STEM education for all students.
Introduction

The whole process is crisis. This system responds to crisis. It’s the only thing that it does respond to. That’s what politics is all about. In the American system, you have to get hit on the side of the head before you do something (Kingdon, 2011, p. 95).

The COVID-19 pandemic exposed a global education crisis. As the pandemic disrupted educational systems, headlines about school closings, historic declines in student achievement, and leadership voids dominated the news. In the United States, coronavirus concerns turned a spotlight on generational inequalities in access and excellence that had long plagued the public education system. Education leaders from cradle to career agreed the unprecedented crisis was also an unmistakable opportunity to tackle intractable problems. Advocates, thought leaders, politicians, and practitioners rallied to the adage, “Never let a good crisis go to waste.”

My 15-year history working in high-needs schools was similarly tested, as the pandemic required navigating unchartered territory. Until then, I had experience in the classroom, district, and state levels. As I witnessed education leaders across the country grapple with the tension of safety, science, and unknowns, I was drawn to a different part of the educational ecosystem—the federal space—to work to understand how the government’s crisis response would create meaningful change. I had much to learn. Even with a career in education, my notions of how federal education policy is enacted were vague. Additionally, I was curious what impact I could make in the federal space during a time that demanded system-level leadership.

In this capstone, I share lessons learned about federal policymaking from my experience working on a U.S. Department of Education initiative on belonging in STEM (science, technology, engineering, and math). First, I share context on my residency site and the problem of practice that I explored during my tenure. Next, I outline the research and resources that informed my thinking and action. I consider the federal government’s role in education and the
tools it uses to successfully promote policy. I then highlight salient elements of my strategic project and analyze my work through two frameworks. I conclude with reflections on the implications of elevating belonging in STEM via lessons for myself, the residency site, and the education sector.

The official mission of the U.S. Department of Education (ED) is to promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access (U.S. Department of Education, 2021, para. 11-12). The Department carries out its mission in two notable ways.

First, the Department plays a leadership role in the ongoing national dialogue over how to improve academic results for all students. This involves activities such as raising awareness of the education challenges confronting the nation, disseminating the latest discoveries on what works in teaching and learning, and helping communities work through solutions to confront educational issues (U.S. Department of Education, 2021, para. 11). As an entity that is national in scope and a substantial funder of research and development activities, the Department is well-positioned to convene stakeholders, provide technical assistance to state and local providers, amplify urgent and important messaging, contribute guidance to the field, and distribute dollars in service of student achievement.

Second, the Department pursues its twin goals of access and excellence by providing protections for students and administering programs that cover every area of education and range from early childhood education through higher education. The Department enforces laws related to students’ civil rights and privacy protections to promote transparency and accountability across the nation’s education institutions. It also disperses and manages federal funds for education activities.
The onset of the COVID-19 pandemic spurred a dramatic upheaval in the education sector as stakeholders grappled with sudden school closures, patchy reopening processes, and global fears of an uncertain future. According to Surgeon General Vivek Murthy, “The COVID-19 pandemic further altered [young people’s] experiences at home, school, and in the community, and the effect on their mental health has been devastating. The future wellbeing of our country depends on how we support and invest in the next generation” (HHS Press Office, 2021, para. 3). In response, the Biden-Harris Administration committed at the start of the 2021-2022 school year to “helping every school safely open for full-time, in-person instruction; accelerating academic achievement; and building school communities where all students feel they belong” (The White House, 2021a, para. 1). Congress passed three relief bills to the tune of $263 billion to stabilize education budgets and encourage states and local districts to safely reopen schools for in-person learning during the pandemic. The last bill, the American Rescue Plan Elementary and Secondary School Emergency Relief (ARP ESSER), consisted of $122 billion distributed to all 50 states, Washington, DC, and Puerto Rico, and was the largest single federal investment in primary and secondary education (U.S. Department of Education, 2022a, para. 1). The infusion of historic federal funding supported districts to re-engage students impacted by the pandemic and address inequities exacerbated by COVID-19.

The pandemic response also created a policy window for the Department to advance its broader agenda to reimagine a student-first education system built around students’ interests, needs, and abilities. A policy window is a short timeframe when the political stars are aligned to generate action on a particular initiative. In a January 2022 speech, Education Secretary Miguel Cardona described his vision to directly address opportunity and achievement gaps in education. His departmental priorities included investments to improve students’ social-emotional
wellbeing: “It's time to reimagine holistic supports for every student, every day, and reimagine
schools and school systems designed to meet the needs of our learners” (U.S. Department of
Education, 2022b). On her speaking circuit, Deputy Secretary of Education Cindy Marten asserts
that equity means “giving every child what they need, when they need it, in the way they need
it.” To create more equitable schools, she insists that we attend to the whole child—“to know
every child by name, by strength, and by need” in everything that we do (STEMconnector,
2022). ED leadership emphasized the importance of addressing the academic, social, emotional,
and mental health needs of students.

Problem of Practice

Given the national focus on educational recovery and acceleration efforts in the wake of
the pandemic, ED faced a unique opportunity to promote a whole child education system that
prioritized relationships, academic rigor, and student engagement (Science of Learning and
Development Alliance, 2022). Throughout the 2022-2023 school year, ED launched a suite of
initiatives to reimagine public education through the administration’s education priorities. The
Department had a public responsibility to demonstrate that the infusion of unprecedented levels
of federal funding for school districts was integral for recovery and redesign.

Time was of the essence: When I arrived in June 2022, districts had approximately two
years remaining to obligate billions in federal relief dollars before the September 2024 deadline
(Worley & Palmer, 2021, para. 2). Deputy Secretary Marten often mused that the decisions made
over those two years would impact public education for the following two decades. She used a
countdown app on her phone to serve as a constant reminder of the remaining days for impactful
leadership. The urgency of the moment was frequently discussed. When November 2022
midterm elections resulted in Republican leadership in the House of Representatives, colleagues
started hushed conversations about the potential of Congressional hearings to inquire about use
of pandemic relief funds. Meanwhile, districts were desperate for models of how to effectively spend unprecedented amounts of money in a compressed period. Local education agencies needed guidance, politicians would soon demand answers, and an electorate recently attuned to the plight of pandemic-affected public education was eager for reassurance and leadership—especially once the 2022 National Assessment of Educational Progress (NAEP) Mathematics and Reading results definitively showed reading and mathematics scores declined during the COVID-19 pandemic (National Center for Education Statistics, 2022). The Department had to respond to these interlacing pressures and demonstrate tangible progress.

Secretary Cardona responded by uplifting the importance of increasing equity and access for all students. His “Raise the Bar: Lead the World” initiative detailed the Department’s call to action with a laser-like focus on achieving academic excellence, improving learning conditions, and creating pathways for global competitiveness (U.S. Department of Education, 2023). To operationalize this vision, the Secretary and Deputy Secretary elevated a handful of signature initiatives to meet the field’s academic recovery needs. As one example of this effort, YOU Belong in STEM addressed implementing and scaling equitable, high-quality STEM education for all students.

STEM is under the purview of Deputy Secretary Marten, who manages the Department’s PK-12 portfolio. STEM activities are spread across multiple departments, including the offices that lead policy development; career, technical, and adult education; special education and rehabilitative services; and English language acquisition, to name a few. Additionally, the Department awards a diverse set of discretionary grants that support STEM—in 2020, the funding was over $570 million (U.S. Department of Education, n.d.). There are also STEM
activities in federal agencies outside of ED that contribute to a national strategy to strengthen STEM education.

**Figure 1**

*Education Priorities and Initiatives*

Figure 1 locates YOU Belong in STEM within the Biden-Harris administration’s broader education policy agenda. The initiative supports the Secretary’s priority to improve outcomes for all students. It is also a manifestation of the Deputy Secretary’s emphasis on *educating the whole child*, meaning addressing students’ social and emotional needs as a conduit to academic excellence. The initiative has a simple message: All students, no matter their background, deserve a world-class education in STEM to prepare them and the country for the future. Its specific goals are to ensure rigorous and joyful learning experiences; support STEM educators to join, stay, and develop within the field; and encourage investments in STEM education. Through this initiative, ED partners with states, districts, agencies, organizations, and communities across the country to deliver quality STEM education. The Department exercises multiple policy levers, or tools at its disposal, to influence change and advance the initiative: convening stakeholders,
amplifying messages, building capacity within the field, and establishing partnerships to develop solutions.

ED is a service agency, and the reach and success of every initiative depends on stakeholder engagement. ED works with a variety of organizations including local and state education agencies, nonprofits, philanthropies, higher education institutions, and industry and/or interest focused groups. STEM stakeholders are broadly defined as individuals and organizations with a stated interest and investment in strengthening STEM education. My interactions with these voices from the field include a broad coalition of advocates ranging from high school students to NASA administrators. The stakeholder interests converge on STEM-focused themes of PK-12 academics, college and career preparation, global competitiveness, teacher pipeline, innovation, and underrepresented populations. Energizing these stakeholders furthers ED’s mission because they operate as conduits of information. They share feedback from the field, serve as consultants, and disseminate the Department’s priorities and offerings. When the field is informed and engaged, the Department uses the open channels to deliver on its mission and positively impact student outcomes.

The problem of practice that I addressed during my residency was to effectively use the policy window amplified by the field’s demands for a comprehensive response to the pandemic to promote equity-focused STEM practices. Through the Department’s focus on whole child education, I sought to elevate the importance of belonging in STEM as an essential element in a reimagined educational system where all students have opportunities to engage in rigorous learning experiences.

Strategic Project
During residency, I worked in the Office of Deputy Secretary Cindy Marten (ODS) and reported to Joaquin Tamayo, the Deputy Secretary’s chief of staff. Joaquin has extensive experience delivering federal policy agendas—for instance, he helped launch a national chronic absenteeism initiative as part of the Obama administration’s My Brother’s Keeper program. The Deputy Secretary and chief of staff led the ODS STEM team—which included a core group of advisors, a STEM fellow, and me. As the initiative grew, we added more members from ODS and tapped other ED colleagues to provide additional capacity. At its height, around December 2022, the ODS STEM team included nearly 20 staff members across different teams.

My charge was to build off the foundational work that began in the fall of 2021 (approximately nine months prior to my residency start) and support the strategic planning and execution of the signature YOU Belong in STEM initiative. After consulting with leadership, I learned that a significant portion of my strategic project would involve leading a national conference. Fundamentally, I recognized that success in my residency site hinged on understanding the conditions that enabled policy initiatives to flourish. I spent my time at ED exploring the following questions: How is federal policy created? How will I transfer federal policy into meaningful action? I sought to use my burgeoning knowledge to propel the departmental STEM priority and produce impactful deliverables that would live beyond my tenure. This capstone describes my contributions to the development of the STEM initiative within the Department of Education. Next, I describe the sources of research and knowledge that influenced my strategic project.
Review of Knowledge for Action

This Review of Knowledge for Action pulls from various bodies of work that collectively inform my understanding of the enabling conditions that shape my strategic project. First, I outline the federal government’s role in education to demonstrate the bounds within which it directly influences education policy. Next, I describe two frameworks that inform my understanding of the formation and maintenance of federal policy. One framework illustrates the policy creation process and the other reveals the combination of elements that determines project success in the public sector. Then I narrow my scope and share research related to my specific strategic project, with relevant headlines on belonging, STEM, and the importance of their integration for long-term benefit. The last part details my theory of action where I list the specific inputs informed by these bodies of work that I used to generate systemic impact.

The Federal Government’s Role in Education

The federal government’s role in education is determined by the Constitution, which notably makes no mention of education. The 10th Amendment declares powers not authorized at the federal level to be reserved to the states (U.S. Const. amend. X), thus the country’s 100,000 public schools are largely managed and funded by states and local municipalities (Pelsue, 2017, para. 2). However, the Elementary and Secondary Education Act of 1965 (ESEA) set the foundation for the modern federal role in education by enabling conditional federal funding for schools serving high-needs students. The continual reauthorization of ESEA provides the government with a clear mechanism to hold schools accountable for student progress through disbursing or withholding federal funding (Laws, 2019, para. 3).

The federal government is constrained by its limited capacity to influence and/or direct implementation of funds. While the federal government allocates funding and provides
expenditure guidance, states ultimately determine how the funds are used. Over 90% of education revenue typically derives from state and local funding sources, compared to the relatively small federal share of elementary and secondary public school dollars (National Center for Education Statistics, 2022). Furthermore, the federal role in education has evolved to fill gaps in state and local support to serve special populations or address critical national needs (U.S. Department of Education, 2021). A seismic event like the COVID-19 pandemic triggers public demand for increased governmental activism through federal relief funds. Emergency allocations to stabilize schools provide state and local education agencies with latitude to employ a broad range of activities in pursuit of recovery. The ensuing dilemma is to use a limited set of federal resources to demonstrate a nationwide return on investment on the effective use of funds during a critical moment in the country’s educational history. While the federal government is constrained in its ability to apply funds, it does use its power in strategic ways to exert policy influence.

The federal government relies on a suite of levers to directly influence state and local education systems. In addition to serving as a source of funding and accountability for students’ academic achievement and civil rights protections, it advances educational policy via convening, amplification, capacity building, and partnerships (Figure 2). The federal government convenes stakeholders to encourage future collaboration and solution development. Bringing people together is a powerful lever to activate involvement and create coalitions (Kanter, 2011). Through amplification, departmental leaders use public platforms to influence the public’s views (Bill of Rights Institute, 2009). The federal government provides technical assistance to build the capacity of organizations and individuals, which includes promoting research and supporting policy implementation (Frank Porter Graham Research Institute, 2014, pp. 1-6). Finally, the
federal government also develops partnerships with different actors to help scale an issue’s national profile and generate action toward shared goals (IDA Science and Technology Policy Institute, 2019, pp. 1-53).

**Figure 2**

*Select ED Policy Levers*

Every presidential administration has a fresh yet finite opportunity to shape education policy. Over the past 20 years, presidents promoted education reform agendas partially in response to the seminal 1983 Reagan-administration report *A Nation at Risk*, which described America’s “mediocre educational performance” and spurred decades of student achievement reform strategies in pursuit of global competitiveness (The National Commission on Excellence in Education, 1983, pp. 1-48). President Bill Clinton signed the Goals 2000: Educate America Act to set goals and establish a nationwide standards-based framework (Clinton Digital Library, n.d.). This legislation prefaced the No Child Left Behind Act (NCLB), signed into effect by President George W. Bush, which increased the federal role in holding schools accountable for students’ academic success. NCLB mandated measurable student progress and placed a special
focus on the achievement of historically underperforming groups (Klein, 2015, para. 6). President Barack Obama further expanded the federal government’s role in education with waivers and grants via the competitive Race to the Top program, which enticed states to adopt systemic initiatives such as the Common Core learning standards (Wong, 2020, para. 2). In the second half of his presidency, however, Obama signed into law The Every Student Succeeds Act, which replaced NCLB. The law reduced the federal footprint, extended more flexibility to states, and required transparency for parents and communities (Office of Elementary and Secondary Education, 2020, para. 1). Furthermore, President Donald Trump weakened federal oversight, specifically through the enforcement of civil rights in schools, and he promoted increased state and local involvement to direct school success (Wong, 2020, para. 3). President Biden’s education legacy would be inextricably linked to academic recovery in the wake of the pandemic, the correlated decisions and efforts that led to innovation or stagnation, and financial improvement and stabilization during a time of extreme stress for the education sector.

The opportunity to improve educational outcomes severely impacted by the pandemic complements ongoing efforts to modernize education and prepare students for an evolving and competitive workforce. STEM is an established priority across the Department, the White House, and other federal agencies. The Committee on STEM Education (CoSTEM) reviews the efficacy of STEM education programs, investments, and activities in federal agencies and develops and implements a cross-agency STEM education strategic plan. The 2018-2023 Federal STEM Action Plan lists ED alongside the Department of Defense, the Department of Labor, the National Science Foundation, and dozens of other agencies with a shared interest in STEM education programs, investments, and activities (The Committee on STEM Education, 2018, pp. 1-48). In 2021, ED joined the National Space Council, which advises the President on the
formulation and implementation of space policy and strategy (The White House, n.d., para. 1). In the same year, the National Strategy on Gender Equity and Equality highlighted STEM education as a pathway to expand access, innovation, and entrepreneurship within STEM fields. In August 2022, Congress passed the CHIPS and Science Act, a bipartisan bill to revitalize and accelerate the industries of the future. The law provides billions of dollars to ensure America remains scientifically and technologically competitive and includes provisions to increase access to and diversify STEM education and workforce for underrepresented groups (The White House, 2022a, para. 19-20). Four months later, the White House Office of Science and Technology Policy released a national call to action for a concerted effort to address persistent inequalities within science, technology, engineering, math, and medicine (The White House, 2022b). The cross-agency investments in research, programs, and funding collectively position STEM as a national policy agenda item.

Creating a Policy Agenda

To effectively push forward a policy agenda, one must understand how ideas translate into policy. Many factors must combine for topics such as whole child development and STEM to be featured as departmental agenda items. I reference John W. Kingdon’s (2011) research on public policy creation to understand why some ideas become agenda items and why others fizzle out. Kingdon defines the agenda as “The list of subjects or problems to which governmental officials, and people outside of government closely associated with those officials, are paying some serious attention at any given time.” (p. 3). Agendas are influenced by problems that place pressure on the system. Often a crisis or predominant event indicates a problem that needs to be addressed. Crises are focusing events that capture the attention of governmental officials and push open policy windows (pp. 166-168). Governmental agendas are also influenced by policy
proposals generated by specialists who accumulate knowledge, educate others, and suggest solutions. The education process can be laborious and lengthy. One bureaucrat interviewed by Kingdon estimated that the lead time for educating people was approximately two to six years (p. 129). Finally, politics also impact agenda setting. Election results, administration changes, and swings in national mood all influence politicians and what they decide to promote.

Organizational structure affects how policies are created. The federal government is an “organized anarchy,” defined by Cohen, March, and Olsen (1972) as “a collection of choices looking for problems, issues and feelings looking for decision situations in which they might be aired, solutions looking for issues to which they might be the answer, and decision makers looking for work” (as cited in Kingdon, 2011, p. 85). The chaotic reality of the organization is characterized by a loose compilation of ideas rather than a coherent structure. Whereas an organization following a logical decision structure may approach problem solving through first defining the problem, then identifying goals, followed by developing and executing an action plan, and finally iterating on progress, the organized anarchy problem-solving process is more fluid. When an opportunity to decide, or a choice opportunity arises, various problems, solutions, and politics are dumped into a “garbage can” of options. The Garbage Can Model of Organizational Choice (Figure 3) symbolizes the messiness of agenda making. Kingdon identifies three process streams in the federal government that flow into the garbage can: problems, policies (solutions), and politics (p. 87).

The separate streams are influenced by participants on the inside and outside of government. The President, presidential staff, and political appointees such as cabinet officials have prominent roles in agenda setting. Interest groups, academics, and researchers exemplify participants without formal government positions who use open channels of communication to
float ideas and information to impact agenda setting and implementation. Policy entrepreneurs, people who invest in promoting their problems or proposals, are responsible for coupling problems and solutions to politics and have powerful effects on policy agendas (p. 20).

**Figure 3**

*Garbage Can Model*

![Garbage Can Model Diagram](image)

*Note.* Revised version of Cohen-March-Olsen garbage can model of organizational choice. Own work.

**Keeping Policy Alive**

Once an agenda item is established, it needs enabling conditions to stay alive. Mark H. Moore’s strategic triangle framework (Figure 4) outlines how an agenda item’s success is tied to the value it brings. Moore’s framework pulls from the idea that the success of private companies is understood through their shareholder value; the success of public enterprises is defined analogously by their public value. Overall value is determined by assigning equal emphasis to substance (public value), politics (legitimacy and support), and organizational implementation (operational capabilities) (Moore, 1995, p. 74). *Public value* is established by considering
philosophical and legal analyses of social justice, fundamental fairness, and individual rights to determine the weight or worthiness of a project. *Legitimacy and support* are determined by exploring the values and interests that are at stake that influence an initiative’s political sustainability. Finally, understanding *operational capabilities* delves into what is known about the ways and rates in which organizations are responsive and flexible in relation to their activities (p. 73).

**Figure 4**

*Mark Moore's Strategic Triangle*

![Mark Moore's Strategic Triangle](image)


Moore suggests that work worth pursuing in the public sector demonstrates public value, is feasible to complete (i.e., capacity exists to execute the proposed work), and has support from key stakeholders (Moore, 1995, p. 71). This framework is useful to interpret my contributions in the Department as an example of governmental activities that reflect the interests of the people, or in my case, the interests of STEM stakeholders. Conversations with my supervisor about the challenge and opportunity to create sustainable policy centered on the exact questions within the
The Kingdon and Moore frameworks complement each other and support my understanding of federal policy through my strategic project. Both frameworks outline core conditions for moving public policy, and they illuminate different aspects of the work—how to set the agenda and how to move the agenda forward. I was charged with advancing the Department of Education’s policy agenda that integrated belonging and STEM.

**On Belonging**

Belonging is a basic human need. Research shows that disconnection from others is considered a toxic social environmental factor (Cohen, 2022). Throughout human history, belonging was an evolutionary necessity as people had to work together to survive and overcome physical threats in dangerous environments. When people chronically experience real or perceived isolation, the genes responsible for bodily inflammation turn on and prepare the body for physical wounding. Even now, our DNA has been shaped to anticipate that when we feel we are alone, we are in mortal danger (Keen, 2022).

A sense of belonging in school refers to students’ sense of being accepted, valued, included, and encouraged by teachers and peers and of believing oneself to be an important part of the life of the classroom (Goodenow, 1993). Sense of belonging is one of the most important activators of a student’s engagement in learning. The energy for learning originates from forming social connection with others. Students who report a greater sense of belonging at school tend to display higher academic motivation and achievement (Goodenow & Grady, 1993).

When students have experiences of closeness, consistency, and trust, the hormone oxytocin is released, which has the power to regulate emotional responses and pro-social
behaviors, including processing of bonding cues and positive communication (Osher et al., 2020; Edutopia, 2019). Oxytocin plays an important role in establishing and maintaining relationships and generates a positive feedback loop where the more students engage in feel-good behaviors, the more oxytocin is released (Owens, 2021, para. 7). Pamela Cantor, Ph.D., Founder and Senior Science Advisor of Turnaround for Children, notes that relationship building as a method to increase a student’s sense of belonging is about youth experiencing trust strong enough to release the hormone oxytocin. When students perceive they are in a safe setting, they are more likely to take academic risks and engage in higher order thinking skills (Osher et al., 2020). Brain science shows that neural tissues change in response to environment, experiences, and relationships. The brain needs safety and warmth to maintain a state of positive emotion, which is ideal for learning (Edutopia, 2019).

The Science of Learning and Development

The science of learning and development is an iterative, cross-disciplinary body of knowledge based in research and practice that describes how young people learn and develop (American Institutes for Research, 2022, para. 1). The Science of Learning and Development (SoLD) Alliance is a partnership of system leaders, policymakers, and school designers as well as organizational experts in the fields of learning, youth development, and health and wellness. The SoLD Alliance compiles and disseminates research on the science of learning and development to define the core components they believe are essential for young people to learn, develop, and thrive. These components are positive developmental relationships; environments filled with safety and belonging; rich learning experiences; development of critical skills, mindsets, and habits; and integrated support systems (Figure 5).
The SoLD guiding principles for success are centered in creating spaces where students of all backgrounds feel safe, affirmed, and a sense of belonging where they have opportunities to build meaningful relationships with others (Learning Policy Institute, 2022). Students’ learning conditions have profound impact on student learning, and in many systems around the globe, are inadequate: The Organization for Economic Cooperation and Development (OECD) reports a considerable number of students do not feel socially connected at school. For instance, on average across 38 OECD member countries, about one in four students disagreed that they make friends easily at school; about one in five students feels like an outsider at school; and about one in six feels lonely at school (OECD, 2019, p. 132).

Due to their dynamic and interactive environments, schools are prime settings for children to form developmental relationships because they can be intentionally designed and organized to foster connections between students, their teachers, and peers. Ideally, conditions
for positive developmental relationships and additional aspects of whole child design are present so that students direct their cognitive and emotional energy toward learning, instead of navigating challenging environments (Osher et al., 2020).

**Belonging and The Future of STEM Education**

A significant body of research describes how fostering a sense of belonging is key for a diverse undergraduate population of STEM majors to succeed (Perez, 2020, para. 8). Belonging in STEM starts early in school with students’ exposure to quality teaching, relevant and engaging material, and teachers’ mindsets about students’ ability to achieve (UNESCO, 2017, pp. 11-12). When students do not have a strong sense of belonging and lack access to quality STEM experiences, the effects are far-reaching. By the time they reach higher education levels of study, women represent only 35% of all students enrolled in STEM-related fields. In 2020, women were underrepresented among degree recipients at all degree levels in physical and earth sciences, mathematics and computer sciences, and engineering. People with a disability and veterans also face barriers to participate in STEM education and occupations. In 2021, 9% of the population had one or more disabilities, yet 3% of those who work in STEM occupations identified as a person with disability. When combined, Hispanics, Blacks, and American Indians or Alaska Natives made up 31% of the total population and 24% of STEM workers in 2021. (National Center for Science and Engineering Statistics (NCSES), 2023, pp. 1-76).

Research shows that underrepresented groups greatly benefit from supportive learning environments that enhance their positive STEM identities, or their sense of competence and belonging within STEM (UNESCO, 2017, pp. 11-12). There is a readily apparent inspiration gap for many young people who have not been exposed to the excitement and possibilities of STEM and who have not had an opportunity to see themselves or people who look like them excel in
STEM environments. The combination of high-quality STEM work, exposure, and engagement are essential to foster belonging.

In 2021, the STEM teacher-focused nonprofit 100K in 10 gathered personal accounts from approximately 600 student storytellers of how belonging in STEM manifested in their own lives. Their stories were shared through the unCommission initiative, which revealed three important insights:

1. Young people have not given up; they’re fired up and want to make a difference with STEM.
2. It is critically important for young people to feel a sense of belonging in STEM.
3. Teachers are the most powerful force for fostering belonging in STEM.

Incredibly, 94% of storytellers cited feelings of belonging or nonbelonging as impactful to their STEM experiences. And 68% of the time when storytellers reported a shift toward belonging, a teacher facilitated the change. Stories revealed a positive correlation between students feeling a sense of belonging and pursuing STEM coursework in high school and college and, ultimately, entering a STEM career (The unCommission, 2022). Their experiences demonstrate the tangible impacts of belonging in the learning conditions that support students to pursue STEM majors and careers. Expanding access to historically underrepresented groups in STEM—such as girls, students of color, and neurodivergent students, provides opportunity for the STEM ecosystem to place greater emphasis on creating spaces of belonging.

In 2020, The National Science Foundation (NSF) released a report that captured the challenges and opportunities facing the future of STEM education. NSF surveyed experts (including students) who agreed that the demands of globalization and innovation require creative approaches to ensure all learners access foundational STEM knowledge (A
Subcommittee of the Advisory Committee of the Education and Human Resources Directorate, 2020, pp. 1-36). Currently, many Americans enter the workforce lacking a basic understanding of STEM concepts. Additionally, women, people with disabilities, and people of color are underrepresented in the STEM workforce. Armed with this knowledge, the country has an opportunity to provide access to rigorous, joyful, inspiring, and engaging STEM learning experiences to create and sustain an American workforce with foundational STEM skills. The future of STEM education ensures learners from all backgrounds are prepared with the knowledge to embrace and excel in STEM careers (27).

**Theory of Action**

When I entered the Department of Education, my learning aspirations were to understand policy creation in a time of pandemic recovery and acceleration and ensure that my contributions at the federal level would translate into meaningful action. I inherited facilitating a convening on STEM education as an essential strategy to deploy, and I used additional approaches to propel the initiative forward. In sum, I set out to decipher how policy agendas were set and decode how to keep policies alive while I executed a strategic project to elevate belonging in STEM as a departmental imperative. My theory of action was:

*If I design and implement a national convening that galvanizes the field,*

*And I promote belonging in STEM as a relevant policy priority,*

*And I work closely with key stakeholders to engage their networks,*

*Then I will advance the strategic direction of the Department’s STEM efforts to meet the most pressing needs of students and educators…*

*So that ED helps to implement and scale equitable, high-quality STEM education for all students.*
Description of the Strategic Project

Launching YOU Belong in STEM

The YOU Belong in STEM initiative consisted of multiple elements, including a series of school visits and speaking engagements leading up to the conference that provided a platform to share messaging and generate excitement (U.S. Department of Education, 2022c). Developing the STEM initiative required using a specific set of policy levers at the Department’s disposal—convening, amplification, capacity building, and partnerships (Figure 6). The levers represented how to operationalize keeping the STEM policy agenda alive. My largest contribution was through convening, as I managed a national conference in December 2022.

With support from the ED STEM team, I contributed to the initiative by:

- Leading the planning and implementation of a national coordinating conference to inform, inspire, and activate STEM practitioners, advocates, and funders around the Department’s goals (convening).
- Writing speeches for the Deputy Secretary and creating material for the team to publicly disseminate initiative information (amplification).
- Participating in policy conversations to elucidate research on belonging and disparities in STEM classrooms and careers; providing STEM commitment guidance; delivering regional technical assistance (capacity building).
- Collaborating with mission-aligned organizations to design learning experiences and elevate their work (partnerships).
The success of the initiative also depended on work that started in the months prior to my arrival:

- The Deputy Secretary facilitated a series of STEM roundtables with representatives from nonprofits, corporations, universities, and local education agencies to solicit feedback on the most pressing STEM challenges that the Department should consider to create an action plan (convening; partnerships).

- ED’s STEM team translated the roundtable suggestions into a comprehensive action plan with proposed strategies, metrics, and goals geared toward achieving access and equity in STEM (capacity building).

- The Deputy Secretary and her chief of staff determined that launching a public-facing initiative would positively signal the Department’s commitment to STEM education. The Deputy Secretary prepared to tour the country to elevate examples of STEM-focused school
sites that spent their relief funds on academic recovery, acceleration, and learning 
(amplification).

- The STEM team created a Dear Colleague Letter for state and district leaders outlining how federal education funds could be used to enhance STEM teaching and learning 
(amplification).

- The Deputy Secretary’s team explored research on belonging as part of a national inquiry into the need to reimagine pandemic-informed education based on student and practitioner experience (capacity building).

Secretary Cardona and Deputy Secretary Marten supported the initiative, as it provided an opportunity to highlight effective uses of federal relief dollars and aligned with addressing opportunity and achievement gaps. With their backing, the STEM tour included a series of stops to test messaging and a formal kickoff of the YOU Belong in STEM initiative at an industry event in October 2022. While the initiative was primarily externally facing, there was also an internal objective to clearly highlight the Department’s commitment to STEM work. The initiative outlined the Department’s STEM goals, influenced by multiple rounds of feedback from informal partners representing local education agencies, nonprofits, corporations, and philanthropies. Roundtable stakeholder conversations noted belonging as an accelerant in STEM education. The STEM launch culminated in a December 2022 convening that was designed to inspire stakeholders to internalize and commit to advancing three goals:

1. Ensure all students in Pre-K-higher education have access to and benefit from rigorous, relevant, and joyful STEM learning;

2. Support STEM educators by strengthening opportunities to join, grow, and stay in the STEM teaching field; and
3. Encourage education and youth-serving systems to invest American Rescue Plan and other federal, state, and local funds in STEM.

While not explicitly named, belonging flowed into each of the goals. Research showed that authentic learning experiences enabled students to develop strong STEM identities and influenced their interest in pursuing and persisting in STEM. Belonging mattered for educators as well, as dissatisfaction with take-home pay, working conditions, and development opportunities exacerbated pipeline challenges in hard-to-staff STEM roles (McMurdock, 2022, para. 19). Funding partnerships, pathways, and programs would expand opportunities for impactful STEM activities that focused on the needs of students and educators. The goals mapped onto departmental priorities, such as ensuring the recent infusion of federal dollars were directed toward achieving academic excellence and improving learning conditions.

Conference participants would create specific commitments aligned to the action plan goals, gain a deeper understanding of how belonging intersects with STEM, and develop connections to a diverse set of stakeholders working toward a future that prioritized STEM learning. The launch of YOU Belong in STEM featured a collection of strategic activities aligned to some of the Department’s key levers for change—convening, amplification, capacity building, and partnerships.

**Convening**

As the leader of the YOU Belong in STEM National Coordinating Conference, held at the Department of Education headquarters in Washington, DC (see Appendix A), I was charged to curate a high-quality experience featuring belonging research, personal stories, and examples from the field. While I started supporting STEM efforts at the beginning of my residency, Joaquin and I agreed in mid-October that I would formally manage the conference. We decided
to invest energy and resources in a convening to directly influence and inspire stakeholders to galvanize around the urgency and opportunity to improve students’ outcomes through strengthening STEM education. My first order of business was to backwards plan from the conference date to identify the key actions that would lead us to success. I had to establish who was working with me, clearly define the purpose of the event, identify meaningful content, and determine an invite list that would represent the diverse STEM ecosystem.

I moved quickly to activate a team to support with the myriad of tasks to complete within the compressed timeframe. Since the conference reflected one of the Deputy Secretary’s signature initiatives, Joaquin provided me access to multiple staff on and beyond our immediate team to support project execution. At its peak, I led an ad-hoc group of approximately 12 team members to support content design, speaker engagement, communications, and logistics. My colleagues had background expertise in STEM programming, cross-functional initiatives and special projects, operations, public relations, and youth development.

Through leading weekly meetings with this STEM team, I aimed to give individuals ownership of specific tasks and keep everyone apprised of forward movement to inspire a sense of collective impact. I also modeled trust-building behavior in 1:1 conversations where I shared gratitude for their assistance, expressed my trust in their leadership, and asked what information they needed from me to do their work well. I made it known that everyone had a valuable role and was needed for a successful launch. Since this was a time-bound project and everyone volunteered their time, I incorporated appreciation during team meetings to maintain positive energy and instill belonging. My goal was to create a candid, collegial working environment.

I engaged the STEM team to co-define the purpose of the event, including the vision, mission, and goals. I was determined to take time on the front end to ensure the team was aligned
on the essential elements of our major leadership task. I encouraged extensive line edits to the
language I drafted describing the conference and its goals. Through this process, we changed the
order of the goals and concretized belonging as a foundational element in our messaging. These
details mattered because once we shared our materials publicly, we would need to be prepared
with a clear rationale. I leaned heavily on the STEM team as a brain trust to support my thinking.
I wanted collective confidence in our messaging since we planned to apply lessons from this
experience to future gatherings where STEM stakeholders would reunite regularly to track
progress toward commitments and goals. Our inputs set the foundation for sustained work.

As part of the planning process, Joaquin and I participated in weekly design sessions with
Talia Milgrom-Elcott, Founder and Executive Director of STEM nonprofit Beyond 100K.
Talia’s expertise included activating the STEM ecosystem to engage in shared problem-solving,
and she led a diverse network that supported the core elements of our initiative. Together, we
brainstormed how to generate ongoing action by encouraging organizations to create
commitments related to the goals. I was eager for feedback on content design and borrowed
heavily from Beyond 100K’s shared resources on how to inspire continual engagement. The
Department’s limited resources necessitated collaboration with on-the-ground partners like
Beyond 100K to expand our organizational capability to execute the work. Our goal was to
create a powerful experience that would “have lift” long after it was over. We determined if
organizations publicly shared commitments, they would be activated to continue their work,
share progress, and inspire others to act.

Planning a convening to “galvanize the field” was a daunting task. I relied on three truths
to guide my actions. First, I knew the conference theme and goals were developed from the
STEM stakeholder series that identified the highest leverage areas for the Department to
influence. Additionally, I believed in and relied on the power of partners like Beyond 100K to provide frank feedback and insight into the state of the STEM ecosystem. Finally, I directly engaged in conversations with dozens of stakeholders to learn about their barriers, listen to their visions, and invite them into the Department’s network to engage with a broad audience. Thus, I internalized my responsibility to elevate the experiences of people advancing work in belonging and STEM.

Once I was clear on sources of information and the purpose of the event, a large portion of my time was dedicated to confirming the content: identifying keynote speakers and breakout presenters, considering adult learning experiences, and ensuring the three STEM goals were featured throughout the event. I also thought critically about who would be in the room. We aimed for a diverse cross-section of representation from students, educators, administrators, PK-12, higher education, nonprofit, corporate, philanthropy, and government.

With capacity capped at 200 and no deep prior knowledge in this space, I solicited input from several trusted advisors who helped to identify targeted organizations and individuals. First, I asked team members who worked on the STEM portfolio prior to my arrival to share lists of invitees. I also identified the stakeholder organizations that gave input for our action plan and goal-setting process. I created a feedback loop with internal colleagues and the STEM stakeholder group to ensure my invite list decisions were representative of organizations that would be compelled to lead the STEM goals. Meanwhile, we held ongoing meetings with organizations to inform them of the Department’s STEM work, and some of the presenter invites came from these conversations. We wanted to lean into spaces with positive energy and forward movement for STEM education. We intentionally invited early adopters who would be able to
Amplification

One of the strongest methods to promote our belonging in STEM initiative was through deliberate messaging. The Deputy Secretary delivered public speeches every week to a diverse constituency at the federal, state, and local level. Twice weekly, the ODS team met to discuss incoming requests for the Deputy Secretary to provide remarks for events as varied as internal team retreats to national conferences with audience counts in the hundreds. In the weekly meetings, we collectively determined the scope and level of staff support, which included
researching and writing remarks, collaborating with event leads, and staffing the Deputy Secretary at events. Alongside multiple team members, I drafted remarks for the Deputy Secretary for policy speeches, and as I directly supported the STEM portfolio, I was given the responsibility to create or edit talking points for the Deputy Secretary’s STEM-related speeches. My general contributions to speechwriting included editing for alignment between the Department’s messaging and the goals of the event, ensuring flow between key ideas, and ensuring the content was framed in the Deputy Secretary’s voice with space for sharing personal connections to the topics.

One of my first staffing assignments was to accompany the Deputy Secretary to the Johnson Space Center in Houston, Texas for the National Space Council meeting. The National Space Council is the White House policy council responsible for the formulation and implementation of space policy and strategy (The White House, n.d., para 1). The September 2022 meeting included a session on STEM and the Workforce, where the Deputy Secretary shared a brief overview of how the Department’s priorities intersected with the Space Council’s intention to inspire the next generation to study STEM, prepare students post-high school, and employ students in STEM and space professions after graduation (The White House, 2021b, pp. 1-7). The Deputy Secretary and I traveled to Houston for two days to attend the meeting. I led on-the-ground logistics, ensured she was prepared with talking points, and captured notes for team learning. Vice President Kamala Harris chaired the meeting and tasked ED with creating a plan for a permanent STEM office. The task bestowed by the Vice President signaled a high level of White House interest in ED’s STEM leadership. When the Deputy Secretary spoke to the Department’s commitment to STEM during a high-profile meeting, it created visibility into STEM as a priority. Months later, I participated in an interest meeting with the organization
Women in Aerospace, and they shared excitement to co-sponsor events with the Department. They first considered a partnership based on our presence and comments at the Space Council meeting.

Advancing STEM with external audiences was contingent upon amplifying messaging internally as well. Our STEM team intentionally informed colleagues within the Department and across other agencies about the initiative. We joined cross-functional meetings, held briefings, and shared planning updates to increase the likelihood that others would also prioritize the initiative in their conversations. We worked to widen our net of internal allies to advance the conversation about STEM generally and to connect our focus on belonging with the larger priority of student wellbeing and recovery.

Amplification furthered our objective to encourage organizations to resource STEM education with specific attention to belonging. It provided the opportunity to inspire and attract stakeholders to promote STEM through conversation, speeches, public appearances, and site visits that exemplified the ethos of our initiative.

**Capacity Building**

I defined capacity building as gathering and disseminating resources to invite and incite action. Joaquin shared a series of science of learning and development resources with me to inform my onboarding experience. He and the Deputy Secretary led ODS to approach work from a whole child design perspective, informed by brain science that detailed how students interpreted their environments as conducive for learning. In October 2022, I joined a learning session by Dr. Pamela Cantor, whose research on the study of learning and human development describes how science informs the design of equitable education systems (Science of Learning and Development Alliance, 2023, para. 2). Between reviewing the science of learning and
development data and participating in the briefing from Dr. Cantor, I built my knowledge base of
the challenge and opportunity for science to inform school and system design. This information
allowed me to thoughtfully engage stakeholders in subsequent conversations and presentations
about the importance of whole child design principles as an imperative for innovating education.
I also translated key research points into talking points for the Deputy Secretary. The Department
benefitted from our team’s clarity on belonging research. We were able to take a set of
information and confidently share it with stakeholders, who were in turn inspired and encouraged
to support the Department’s priorities.

One capacity building measure I used was to demonstrate how to create commitments
related to the Department’s STEM goals. Through multiple touchpoints with stakeholders
leading up to the coordinating conference, the ED STEM team encouraged convening
participants to advance the federal initiative through local commitments, or public declarations
of how they would support rigorous, relevant, and joyful STEM education, the recruitment and
retention of STEM educators, and financial investments in STEM. I co-facilitated a webinar
geared toward conference participants and shared widely with stakeholders interested in learning
how to create commitments. I shared commitment guidance in a proactive effort to inform and
activate the field of how to amplify the Department’s goals through their current work. During
the webinar, we highlighted representatives from the federal, nonprofit, and corporate spaces to
share how their priorities related to guiding principles such as ensuring equity and belonging and
having measurable impact. Additionally, we solicited example commitments from organizations
that were ready to share their work publicly (Figure 8). Through the webinar and sample
commitments, my team and I set up organizations to extend the Department’s capacity to elevate
local work on a national platform. The commitments enhance ED’s belonging in STEM mission
because they demonstrate stakeholders’ response to take bold action toward breaking down long-standing barriers for student success in the STEM field.

Figure 8

*YOU Belong in STEM Commitment Guidance*

Another way that I built capacity for the Department was to translate our national convening into an accessible, regional experience. One of the purposes of the conference was to generate action on the STEM goals, which would ideally be locally led. Shortly after the convening, leaders from the Center for Empathy and Social Justice in Human Health at The
University of California San Diego (UCSD) engaged us about the possibility of establishing a regional YOU Belong in STEM hub. They were compelled by the STEM and wellbeing focus of our convening and shared an interest in piloting a summit for their own stakeholders. I co-designed the YOU Belong in STEM: San Diego Mini-Summit with a planned launch four months after the original convening. My colleague and I drafted a toolkit of resources for future regional planners which included guiding principles to establish a summit and resources to access federal funding. The guiding principles encouraged planners to create adult STEM learning experiences tightly linked to the science of learning and development, such as instituting integrated support systems with local stakeholders, creating environments filled with safety and belonging for a diverse set of participants, and providing rich learning experiences and knowledge development to creatively address shared, local challenges. The co-planning and toolkit development expanded the Department’s ability to provide resources and activate progress within interested communities.

**Partnerships**

The Department does not have authority to dictate how its policies are implemented, so it uses partnerships as a primary lever to expand its reach and increase the boots on the ground to move the needle forward on STEM. I spent a significant portion of my residency in partnership-building mode to establish relationships with external STEM advocates. Joaquin brought me into multiple meetings to listen and learn from representative groups that would be most interested in the Department’s STEM initiative so that we left informed of each other’s priorities through the frame of the YOU Belong in STEM goals. The partnership conversations served a secondary purpose to provide us with a short list of organizations to consider as presenters for the convening.
In late fall, leaders of New Mexico State University (NMSU) requested an audience with the Deputy Secretary to discuss their efforts to reshape STEM education in New Mexico. Joaquin and I took the meeting on her behalf and learned about their plans for a new community-based career program that would address the STEM workforce pipeline challenge. I started a series of follow-up interactions with NMSU and invited them to present their plans and findings at our December STEM convening. We were able to find common purpose and, at the convening, NMSU delivered a powerful session on the role of Hispanic-serving institutions in advancing STEM education through social mobility. This example of stakeholder engagement is representative of how most facilitators ultimately presented at the conference—starting with exploratory conversations and our willingness to learn how their work responded to community-based needs.

Leading up to the conference, I participated in weekly design meetings with Joaquin and Talia Milgrom-Elcott from Beyond 100K. We explored a series of questions: What purpose will the convening serve? What is the benefit for the participants and for the STEM ecosystem? What is the change we hope to ignite? We wanted the conference to respond to people’s need to connect coming out of the pandemic. We planned to model belongingness in our structure. We also wanted the experience to generate action. Participants would leave with specific commitments aligned to ED’s STEM goals, an enhanced understanding of how belonging impacts STEM learning and development, and a deeper connection to the YOU Belong in STEM mission. Ultimately, we hoped elevating commitments would inspire participants to mobilize for collective action toward increasing access to rigorous, relevant, and joyful STEM learning, supporting STEM educators, and making strategic investments in STEM. Through these discussions, we identified two signature elements of the convening: storytelling and
commitments. We realized one of the most persuasive ways to connect the science of belonging to the long-term success in STEM was to elevate people to give voice to these abstract concepts through their personal stories. Commitments served as a call to action for individuals and organizations to involve themselves in the movement to prioritize STEM education. Partnerships were key to execution. They proved critical to increasing my own contextual understanding of the work, and they were the pathway to simultaneously elevate champions and widely share the initiative.

Evidence

The theme of belonging in STEM resonated deeply with a broad audience. For months, I listened to researchers, executive directors, college presidents, and various leaders share personal stories of how they struggled to experience a sense of belonging in STEM. After the Deputy Secretary announced the initiative, our STEM email account was inundated with hundreds of messages from individuals and organizations describing how they felt inspired by the theme and wanted to learn how to best engage moving forward. Our stakeholder groups shared their excitement to see the Department of Education take a critical stance to uplift STEM and belonging as a priority.

As I operationalized the YOU Belong in STEM initiative, I considered the following questions derived from my theory of action as indicators of success: (1) Did I implement a convening that reflects the interests of STEM stakeholders? (2) Did my contributions ensure that belonging in STEM remained a viable policy agenda item? (3) Did I enable STEM stakeholders to advance the initiative’s goals within their spheres of influence? And (4) Did I advance the Department’s STEM work? I completed the following activities and deliverables (Table 1) that serve as evidence of implementing my theory of action.
### Table 1

**Evidence of Progress for Theory of Action**

<table>
<thead>
<tr>
<th>If I design and implement a national convening that galvanizes the field...</th>
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</thead>
<tbody>
<tr>
<td><strong>Evident Progress</strong></td>
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<tr>
<td>Did I implement a convening that reflects the interests of STEM stakeholders?</td>
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</table>

**And I promote belonging in STEM as a viable policy priority...**

<table>
<thead>
<tr>
<th>Did my contributions ensure that belonging in STEM remained a viable policy agenda item?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• I developed internal and external communication collateral (e.g., STEM action plan, briefing documents, talking points for speeches)</td>
</tr>
<tr>
<td>• We integrated YOU Belong in STEM into the Department’s “Raise the Bar: Lead the World” initiative to address the holistic experiences of students and educators</td>
</tr>
<tr>
<td>• I co-planned a multi-day STEM site visit to Georgia as part of the Department’s Raise the Bar, Lead the World national tour</td>
</tr>
</tbody>
</table>

**And I work closely with key stakeholders to engage their networks...**

<table>
<thead>
<tr>
<th>Did I enable STEM stakeholders to advance the initiative’s goals within their spheres of influence?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• I collaborated regularly with a diverse set of 50+ STEM stakeholders including representatives from nonprofits (e.g., CEOs), universities (e.g., Vice Presidents), and federal agencies (e.g., agency administrators) to integrate their work within the initiative</td>
</tr>
<tr>
<td>• We received 60+ support videos from women in STEM congressional leaders, educators, advocates, and students, all detailing their personal experiences with belonging in STEM</td>
</tr>
<tr>
<td>• I co-designed the YOU Belong in STEM regional summit series—a replicable program piloted in San Diego, CA</td>
</tr>
<tr>
<td>• ED’s STEM work was featured in <em>Forbes, Education Week, The Education Trust,</em> and <em>The 74,</em> as well as showcased on 35+ STEM industry websites</td>
</tr>
</tbody>
</table>

**Then I will advance the strategic direction of the Department’s STEM efforts to meet the most pressing needs of students and educators...**

<table>
<thead>
<tr>
<th>So that ED helps to implement and scale equitable, high-quality STEM education for all students.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did I advance the Department’s STEM work?</td>
</tr>
<tr>
<td>• I designed and co-facilitated a virtual learning experience describing the Department’s guidance for creating actionable STEM commitments, which resulted in over 260 initial commitment submissions</td>
</tr>
<tr>
<td>• These organizations, including 100+ with a national presence, shared specific STEM commitments to serve nearly 30,000 students, over 16,000 teachers, and contribute $17.5 million to further excellent and equitable STEM education for all students. Specifically:</td>
</tr>
<tr>
<td>o 77% of organizations committed to serving students, 48% committed to serving teachers, and 2% committed funding</td>
</tr>
<tr>
<td>o 31% of organizations intend to focus specifically on serving students of color, and 23% of organizations intend to focus specifically on serving women and girls</td>
</tr>
<tr>
<td>o 56% of commitments came from NGOs, 17% came from schools, 16% came from companies, 9% came from individuals, and 3% came from government entities</td>
</tr>
</tbody>
</table>
I have evident progress indicators that I implemented a convening that reflects the interests of STEM stakeholders. I created a convening that was inclusive of many experiences, and through our guest speakers and facilitators, we highlighted the expertise of students, teachers, researchers, innovators, entrepreneurs, education and university leaders, business leaders, federal STEM policymakers, and more. Our main event and multiple breakout sessions were standing room only. I received approving feedback for my contributions to translate months of investment into a formal, public initiative (See Appendix B). The day after the event, my supervisor shared this reflection:

Yesterday was ED and the federal government at its best – please never forget that. That energy you saw and felt in the room, the sense of generosity and appreciation… that doesn’t just happen, as I know you know…When you have a good idea and vision that meets as precisely as possible what the field wants and needs, then you have a chance to do something big and important, though it’s only a chance. To take that chance and turn it into something beautiful and worthwhile, you have to put in the real work, like we did on STEM for 14 months, and bring people along, and then you can create magic. (J.R. Tamayo, personal communication, December 8, 2022)

Participants expressed deep appreciation for the Department’s stated commitment to STEM. One participant compared the event to a family reunion, noting their gratitude for the opportunity to connect with acquaintances, exchange work updates, and collaborate live with like-minded advocates. All the survey respondents replied that the conference was a valuable use of their time and energy and agreed that the conference met its intended outcomes. Here is a snapshot of their responses:
• After attending the conference, I understand the importance of helping every student feel that they have a place in STEM.

• I appreciated the clarity of the overarching goal as well as the opportunity to connect with like-minded people and organizations.

• I left more informed, inspired, and with some better ideas for how my org can contribute to this space.

• The presentation…was exceptionally helpful in understanding the bridge between belonging, [social emotional learning], and STEM learning.

• Attending this conference was inspiring, joyful, and reinvigorating.

**I have emerging progress indicators that my contributions ensured belonging in STEM remained a viable policy agenda item.** My goal within this strand of the theory of action was to keep the initiative alive. My contributions changed over the course of residency, which reflected the variable and unpredictable nature of policy development. Initially, I collaborated with team members to refine the vision, goals, and key points to clearly convey the initiative. Then I contributed to framing the external message—for instance, I co-wrote the Deputy Secretary’s comments for an education podcast highlighting YOU Belong in STEM.

One of the challenges to increase capacity through knowledge building is we did not establish a baseline from which to compare our progress of increased understanding and adaptation of the importance of belonging. For instance, we could not definitively answer the question: To what degree did opinions change on the importance of belonging and its relationship to STEM? Interim internal progress indicators included the degree of acceptance or pushback that we received from individual colleagues with whom we shared initiative updates.
With our external audience, we relied on anecdotal feedback on the degree to which the topic of belonging was relevant for their work.

Toward the end of residency, our team conjoined the STEM portfolio to the Secretary’s “Raise the Bar: Lead the World” call to action to replicate and scale effective practices across the country. Under this initiative, I co-planned the Deputy Secretary’s two-day engagement to Georgia, featuring a STEM-focused school visit and a Georgia education roundtable with local STEM and education leaders. I consider these examples emerging indicators because success will be reflected in the continued evolution of the initiative. Additionally, activation at the local level will indicate the public value the initiative has for the people on the ground working every day to achieve equitable outcomes in STEM.

I have evident progress indicators that I enabled STEM stakeholders to advance the initiative’s goals within their spheres of influence. The purpose of this strand was to disseminate information, inspire engagement, and activate initiative ownership beyond the Department. My collaborative conversations with representatives from various parts of the STEM ecosystem resulted in us featuring their learnings and best practices on a national platform. Around the time of the convening, STEM industry organizations promoted the initiative on their social media channels, activating their networks to get involved, and a handful of national media sites published affirming articles about the new initiative.

The most powerful demonstrations of impact were personal anecdotes in support of YOU Belong in STEM. We received videos from multiple Women in STEM congressional members, many of whom were STEM barrier breakers in prior careers. STEMconnector, a DC-based organization focused on building and diversifying the STEM workforce, activated their network to generate over 50 support videos from students, educators, and advocates working in the STEM
industry. One of the conference participants, a 25-year STEM educator, wrote the Deputy Secretary that the convening was “the single most moving experience in my educational career” (see Appendix C). She also noted “the industry needed to hear [messaging on belonging in STEM] and step up to be part of the solution if they want future workers” (M.P., personal communication, December 8, 2022). The teacher shared that she was going to advocate for the mission with her district leaders and ended with a personal commitment to ensure her students know they belong in STEM.

After the conference, I participated in conversations with organizations that wanted to further engage with the initiative, including a STEM coalition in San Diego, CA. They were eager to pilot a regional YOU Belong in STEM summit, where local stakeholders would collaborate on goals that aligned with the Department and with the needs within their community. I worked with Joaquin and our STEM fellow to document this process and create a template for regional summits, which would make the gospel of YOU Belong in STEM accessible across the country. We increased the capacity of the Department by providing a roadmap for regions to tap into their local stakeholder groups to prioritize our stated goals for STEM education.

I have emerging progress indicators that I advanced the Department’s STEM work.

The most useful evidence for this indicator is in the form of voluntary commitments that organizations made in response to the Department’s call to prioritize rigorous and relevant STEM learning, recruit and retain STEM educators, and make strategic and sufficient financial investments in STEM. We initially set a goal to receive 35 goal-aligned commitments prior to the convening, and we received nearly 100. We more than doubled that number shortly thereafter. Organizations that expressed interest in joining the movement ranged from local
grassroots efforts to national initiatives. In practical terms, the initial benefits of joining the movement meant organizations that made commitments were listed on the Department’s website dedicated to the initiative. These organizations were also shortlisted for subsequent STEM engagement opportunities. For example, a few months after the convening, the Department, the White House, and NASA opened conversations about collaborating on a space professional development series for teachers. ED turned to the commitment list to determine an initial set of organizations with aligned work that could be solicited to join the effort. These collaboration opportunities raised the profile of STEM organizations and ensured the Department remained connected to the field. Continued progress within this strand includes increasing the number of commitments and progress monitoring commitment outcomes to demonstrate impact.

I believe my contributions planted seeds for ongoing work. I was able to make significant progress within my theory of action by standing up a meaningful STEM convening with national reach. As a signature policy agenda item, YOU Belong in STEM must continue to evolve for survival. The ultimate marker of impact is the results from the organizational commitments, which will translate to outcomes for students and educators. Next, I share insight into why I believe I achieved these specific results.

Analysis

My supervisor and I frequently discussed how to maximize our privilege and opportunity to create useful and lasting policy. The progress on my strategic project reflects two sets of enabling conditions—one for how a policy agenda is established, and the other for how it is maintained. The establishing conditions generally occurred prior to my arrival, and the maintenance conditions intersected with my leadership moves during residency. I used the Kingdon Garbage Can framework featuring a mix of problems, solutions, and politics as a
searchlight to focus on the interactive forces that drive the agenda-setting process. Searchlights highlight distant objects, and Kingdon’s framework reminds me of important contributions that pre-dated my arrival and the many conditions beyond my reach that influence agenda-setting. Additionally, I employed Moore’s Strategic Triangle framework on the necessary balance of political feasibility, public value, and operational capability as a flashlight to help me see the aspects of policy implementation that were within my locus of control. The far/near frames are neither perfectly aligned nor mutually exclusive, but they organized my thinking around my two entry questions of wondering how federal policy is created and how my individual contributions could deliver meaningful impact. In the next section, I start with Kingdon and analyze my evidence of progress through the lens of each framework.

The Problem

The pandemic was a unifying crisis that opened a policy window for the Department to enact an action-oriented, future-focused agenda. Disparities in STEM and in public education more broadly had existed for generations. The modern education reform movement was in its third decade, with mixed to disappointing results from the original chosen strategies spurred by the 1983 report *A Nation at Risk*. The unprecedented breadth of school closings and ensuing concern over years of lost learning shocked the public education and political systems to action. For the Biden-Harris administration, the first priority was to reopen schools. The second priority was to deliver billions in federal aid to support recovery. The final priority, which overlapped during my residency term, was to prove the value of the historic investments.
The Politics

In 2020 and 2021, Congress passed three federal stimulus bills that provided nearly $279 billion in relief aid to elementary, secondary, and higher education institutions (National Conference of State Legislatures, 2022). When many school buildings were closed, public opinion was mixed about the risks of students returning in person, and there was a prevailing sentiment that learning remotely was challenging for students and their caregivers (Reilly, 2020, para. 11). Additionally, since historically underserved communities were further marginalized during the pandemic, there was an urgent push from parents, politicians, researchers, and practitioners to use the crisis as an opportunity to redesign a more equitable system that would directly address student wellness among many priorities and would finally work for all students (St. George et al., 2021). During this time, the presidential administration changed, and the onus shifted to the current Department of Education to deliver on the promise of reimagining education such that the financial investments addressed disrupted learning needs and brought the educational system out of crisis. The confluence of these events marked the opening of a new policy window.

Additionally, the politics of whole child learning was largely contained to policy spaces where researchers, education advocacy groups, and state and local education agencies commonly described scientifically backed, beneficial connections between implementing a whole child approach and improving academic achievement (Cormer & Darling-Hammond, 2019). Engaging the whole child was often connected to promoting social and emotional learning (SEL), since teaching noncognitive skills like problem solving and critical thinking were important for students’ development. Whereas the concept of whole child education enjoyed a low profile, recently SEL emerged as a lightning rod in the battles over what should be taught in schools.
Right-wing protesters generated headlines and connected SEL to critical race theory (CRT)—a legal framework not explicitly taught in PK-12 schools that described racism as systematic and pervasive in society. Some conservative pushback on SEL argued that teachers were indoctrinating students and too focused on identity, which emphasized difference and seeded racial division and hate (Anderson, 2022).

The fervor to define and disentangle CRT and SEL is ongoing but so far mostly leaves whole child learning out of the spotlight. As the political debates continue, ED focuses on highlighting successes in improvement and innovation that exemplify the positive impacts of investing in whole child and whole educator supports. It uses its policy levers to influence the narrative of what it means to support students academically and emotionally to move out of the pandemic and into a new chapter of American education.

The Solution

The Department of Education needed to quickly produce viable ideas to recover from the effects of the pandemic. Belonging in STEM emerged as an enticing policy proposal in part because the Deputy Secretary was a wellness advocate and her chief of staff was familiar with the design principles of the science of learning and development, which included belonging as an essential element that influenced student success. Belonging in STEM survived on the short list of agenda ideas partly because it was discussed in multiple senior leadership meetings and thus demonstrated staying power. In addition, several organizations across government and STEM industry were motivated and armed with data to establish STEM as a national priority.
The Garbage Can

Problems, policies (solutions), and politics are the combined ingredients that fertilize policy agendas. Through my residency experience, I learned that it was less important where an idea got started than that it did. In the beginning, I chased the where question, which did not lend itself to satisfactory answers because I could not identify a particular pattern of origin. Therefore, I searched for meaning in our established practices. For instance, we spent significant time in weekly meetings sharing upcoming events and seeking clarity on initiative alignment. The meetings I attended were usually structured for participants to listen and learn updates. At first, I understood the meetings as a simple communication mechanism. However, I came to realize the deeper purpose and structure of these meetings was to actively generate and explore the garbage can elements. The consistent introduction of new proposals provided insight into potential paths forward. Initiative updates signaled the level of strength and energy behind budding agenda items. I watched my colleagues internalize these data points and combine them with their knowledge of the politics and the problem to generate momentum and bring an idea to policy fruition.

Next, I analyze my strategic project through the lens of Mark H. Moore’s Strategic Triangle Framework.

Is This Idea Politically Feasible?

Given the operating structures at ED, which favored hierarchy, internal buy-in, and responsiveness to the field, we knew our ideas had to resonate with people who held power to advocate or antagonize. I observed and engaged in multiple strategies to generate legitimacy and support. Fortunately, I worked within a clear authorizing environment, with key leaders such as the Deputy Secretary and her chief of staff fully endorsing my project and my role. I received
explicit support from Joaquin as he brokered internal and external conversations about the initiative, pursued field experts on STEM and belonging to present at the convening, and ensured the Deputy Secretary was briefed on progress so she could elevate the work in senior cabinet meetings. The explicit support from the top allowed me to focus on executing instead of internal politicking.

Additionally, the Deputy Secretary and Joaquin shared a desire to pursue policy backed by research, thus they invited leaders of the nonprofits Turnaround for Children and Beyond 100K to speak directly with senior ED audiences about the impact of their research on conditions for student success and belonging in STEM. Inviting experts to present their findings based in student experiences and outcomes enabled us to influence the mental models of ED senior leaders by establishing belonging as an imperative for long-term success. This strategy addressed the “so what” question of why YOU Belong in STEM should be a priority among a cacophony of competing priorities.

Furthermore, I collaborated with internal teams to create convening content, tap into their subject expertise, and include them in the planning process. I engaged colleagues in the Office of Educational Technology, the Office of Career, Technical, and Adult Education, the Office of Special Education and Rehabilitative Services, and the Grants Policy Office. The theme of belonging held significance across multiple teams tasked with cultivating diverse and thriving schools and an engaged workforce. The initiative served as a reminder that, without conditions for belonging, students would be less likely to succeed in PK-12, higher education, and career. Once we aligned on a shared vision, colleagues provided suggestions for attendees and presenters, and the majority of targeted offices agreed to lead a convening session. This joint effort ensured our initiative was topical across the Department, provided the Deputy Secretary’s
team with opportunities to celebrate synergistic efforts, and bounded our success pursuing excellence in belonging in STEM through multiple pathways.

Another step to generate legitimacy and support was more subtle: To provide colleagues with consistent, incremental updates on the initiative so it remained on their minds. During weekly policy meetings, leaders of each team shared the comings and goings of their team leader as well as status updates on policy proposals, grant opportunities, webinars, etc. Even when the convening was in its infancy stage, my supervisor and I would always share tidbits of news—the date was set; the themes were created; we were deep in planning process, etc. These quick updates showcased the initiative’s staying power and kept our audience informed of its progression. When it was time for me to reach out to colleagues and ask for facilitation support, they were already familiar with the initiative and primed to understand that the Deputy Secretary was moving the agenda item forward. Regular touchpoints with ED staff established internal buy-in for the initiative to gain legitimacy and rise from an idea to a policy agenda item.

**Is This Idea Valuable?**

The public value of my strategic project was determined by how people external to the organization received and promoted the initiative. Two events seeded public value prior to my entry. First, the Deputy Secretary’s roundtables with STEM representatives directly solicited themes that were most urgent for the Department to consider in action planning. Second, the responses from those conversations were translated into a STEM action plan, which included convening STEM stakeholders as a key strategy for conversation and activation. The Department actively sought input and created a corresponding proposal for action.

The engagement we received surrounding the initiative as a whole and the convening demonstrated the public value of our work. Originally, we intended to engage “the field” —a
comprehensive and broad set of stakeholders including everyone working to improve the public education system. In reality, the largest concentration of stakeholders we activated was already working within the STEM ecosystem. As we sought advice and tested messaging, we tapped the actors most likely to promote our work by nature of their organizational mission alignment. We did not need to convince this group of the value of STEM and belonging—they operated with this frame daily. I believe my engagement as a representative of the Department of Education demonstrated the symbiotic nature of public value. The positive response to the convening and hundreds of commitments inclusive of grassroots nonprofits to national corporations showed enthusiasm for the Department’s leadership in STEM.

The STEM stakeholders were waiting for us. On more than one occasion, a call would start with “We’re so glad you all [ED] are finally taking this on.” I routinely left meetings gifted with more resources to review than I provided. When the Department of Education declared belonging in STEM as a signature priority, we provided the authorizing environment for related organizations to organize their networks and funders. The backing of the Department added legitimacy to their work. Put simply, our initiative provided them public value. In turn, we utilized examples of their excitement and engagement, including presenting at the conference, creating commitments, and featuring the initiative on their social media channels, as evidence of public value. This cyclical energy fed conversations about translating the initiative launch moment into a legacy movement.

Is This Idea Operationally Feasible?

The Department of Education is uniquely positioned to convene stakeholders from all corners of the STEM and education ecosystem. The question of operational feasibility leads me to zoom in on the conference component of the initiative. Hosting a conference to formally
launch YOU Belong in STEM was a strategic decision to use an effective policy lever to galvanize stakeholders around our goals. I planned and executed the event from October through December, which was possible because my supervisor moved barriers and my colleagues managed various aspects of the project. Joaquin ensured I had adequate resources to complete the task: He initiated conversations with external stakeholders to explore their levels of interest; he tapped colleagues to support the effort as the date moved closer; and he persuaded and informed internal leaders to move from a place of un-initiation to alignment. Colleagues supported with logistics, commitments, and messaging. We all operated with an understanding of the symbolic meaning of the conference: The first major STEM convening held at the Department in over a decade had to set a high-quality bar. Joaquin encouraged me to operate with the mindset that creating a meaningful event within a finite timeframe with limited resources was fully possible. My challenge and opportunity were to press forward. I learned that a healthy level of relentlessness was needed to push the initiative to fruition.

I will now consider some of my successes, challenges, and remaining wonderings related to the goals of each strand of my strategic project.

**If I Design and Implement a National Convening that Galvanizes the Field…**

We delivered a successful convening for the participants and, based on feedback, I am confident that the attendees had meaningful experiences. Additionally, a subset of organizations continues to proactively keep the Department informed of their activities and commitment progress. This evidence of impact is due to our work to create a conference that spoke to people’s *hearts* through stories of (not) belonging in STEM and *minds* through belonging and student success research.
Another reason for the convening’s success was related to timing. We had enough distance from the eye of the pandemic for a significant portion of people to feel comfortable again to gather in public places. After nearly three years of limited and online connection, the audience that routinely advocated for hands-on, minds-on learning for students was eager for their own live learning experience.

When I originally conceived of “galvanizing the field,” I included everyone—all the policymakers, practitioners, PK-12 and postsecondary education and industry leaders, etc. As I continued working, my focus narrowed to the STEM ecosystem. One of the internal objectives for the convening was to give participants a sense of the network and provide a space where mission-aligned people could interact with each other. While any organization was invited to make commitments, the ones that were well-resourced, well-connected, or whose work directly related to the goals were most likely to provide clear, specific statements. In truth, we successfully targeted many STEM aficionados to test our messaging, invite to the convening, and energize to move the work forward. I feel confident this was the right decision, as multiple STEM leaders described the network as “loose” and in need of inspiration after years of disconnection.

And I Promote Belonging in STEM as a Relevant Policy Priority…

It is strange to take credit for advancing a policy agenda item when one of my core arguments is that many complex factors are responsible for any given idea to transform into an agenda. However, Kingdon’s research specifies that policy entrepreneurs influence significant movement as they constantly work to plant ideas and fertilize soil to bring ideas to fruition. The STEM team identified belonging as a precondition for learning and student success, engaged belonging experts, and ultimately provided a whole child approach to reimagining a student-first
education system. We also used the Department’s unique position as a national convenor and mobilizer to broadly encourage action to facilitate belonging in STEM. Our initiative grew and survived because we had the right mix of elements and because we were open to flowing with the policy. When we envisioned the YOU Belong in STEM launch, we decided on a series of stops for stump speeches, a convening for an official kick off, and appearances at STEM conferences. The last goal was only partially realized, and instead, we created a national call to action for STEM commitments, we planned a scalable YOU Belong in STEM regional series, and we integrated STEM into the Secretary’s priorities. These opportunities emerged as we gained clarity into successful avenues to generate interest and involvement in the work. My role was to stay the course and ensure we were fully prepared and actively engaging in all these opportunities.

And I Work Closely with Key Stakeholders to Engage Their Networks…

Through Joaquin’s modeling, I learned that taking as many external meetings as possible presented three benefits. First, it provided an opportunity for us to share and test messaging around departmental priorities; second, it gave us an opportunity to learn the pain points and focus areas of stakeholders in the field; and lastly, it created space to identify shared values and opportunities for collaboration.

We formally and informally partnered with multiple organizations to contribute to a national dialogue about belonging in STEM. Joaquin impressed upon me the importance of taking every offer to learn from local and national organizations because they provided a forum to share our priorities and identify opportunities for collaboration. I spent a sizeable portion of each week joining calls with stakeholders who were external to our team to learn about their work and identify alignment. I quickly surmised that building this rolodex was one of the ways
my supervisor moved policy—he took calls, listened, offered suggestions, and scheduled follow-up conversations. This way, great ideas simmered until a serendipitous opportunity revealed it was time to quickly turn up the heat and move forward. By then, relationships and context were established and the “one day” conversations transformed into immediate collaborations.

Directly collaborating with stakeholders was joyful and energizing because I learned from leaders why they loved STEM and were fired up about increasing access and equity for all students. I was new to the STEM ecosystem and therefore relied on introductions from our partners and colleagues to identify our target audiences. Often, we moved so quickly that we did not allow substantial time to consider the impact that engaging a select group would have on stakeholders who were missing. In one feedback conversation with STEM roundtable participants, one woman noted that our outreach list for the convening was missing key STEM organizations designed to elevate people of color. We were grateful for her critical feedback and adjusted the list. My observation is we often pursued breadth to engage the groups with the broadest reach. Like every organization, the Department has capacity limitations. My wondering is how we can become even more strategic in subsequent rounds of engagement with STEM stakeholders in the spirit of providing access and opportunity for all organizations that wish to participate.

Then I Will Advance the Department’s STEM Efforts to Ensure High-Quality STEM Education for All Students

Ideally, all interested organizations will assert that joining YOU Belong in STEM is an accessible experience. With this vision in mind, once we identified STEM commitments as a “think global, act local” strategy to keep the belonging in STEM community connected and
future focused, I worked with a colleague to create and share guidance for organizations on how to develop viable commitments. This technical assistance provided examples of a range of activities that organizations could commit to within their spheres of influence.

Even with the outpouring of commitments, I wonder if it will be sufficient to inspire people to work differently for better educational results. For all my efforts, I wonder if delivering a convening and corresponding activities are technical responses to an entrenched problem, which explores what it will take to advance STEM education in America. I am hopeful that pursuing goals within organizational commitments is one method to scaling transformational STEM education practices.

Revisiting My Theory of Action

I spent my time at the Department of Education figuring out the enabling conditions to create policy, the enabling conditions to maintain policy, and the optional levers the Department uses to keep the policy agenda alive. If I were to rewind the clock, I would likely emphasize a more explicit focus on the most effective levers for policy advancement. My original theory of action corresponds with three out of the four high-leverage policy levers for YOU Belong in STEM: convening, amplification, and partnerships. In the revised version, I would add in capacity building to emphasize the importance of establishing structures for execution:

If I design and implement a national convening that galvanizes the field, (convening)
And I promote belonging in STEM as a relevant policy priority, (amplification)
And I work closely with key stakeholders to engage their networks, (partnerships)
And I plan for internal and external resourcing, (capacity building)
Then I will advance the strategic direction of the Department’s STEM efforts to meet the most pressing needs of students and educators...
So that ED helps to implement and scale equitable, high-quality STEM education for all students.
I use the term capacity building to describe the necessity of internal organization to support externally facing work. It includes considering organizational feasibility in terms of people resources (e.g., adding team members), structural resources (e.g., project design) and strategic resources (e.g., anticipating needs from stakeholders). The collection of people, structures, and strategy play important roles in building capacity to advance policy. If ED were to simply offer suggestions to stakeholders in the field and not provide a blueprint or guidance for execution, it would not engender much uptake because people would crave clarity and connection. My work with UCSD exemplified how capacity building supports policy advancement. Our STEM team provided the technical assistance that the site needed to pilot the YOU Belong in STEM Mini-Summit experience. We co-designed multiple aspects of the event, including the run-of-show, featured panel, and breakout sessions. This level of support will not be necessary for successive regions because our toolkit for regional summits will feature our learning process and templates. However, without providing a high level of capacity in the beginning, we would not be able to inspire people to commit their time and convene others for a greater cause.

Next, I share a summary of my overall learnings through my implications for myself, the Department of Education, and the education sector.

**Implications for Self**

While I intended to enter the U.S. Department of Education and learn how to create federal policy, I have since realized that creation is only the first step. To keep agenda items alive, policymakers constantly scan for opportunity because problems, policies (solutions) and politics creep up in inconsistent ways. The mercurial nature of policy creation demands a high level of comfort working in a constantly shifting environment. I have a healthy appreciation for predictability, and I was surprised at the amount of ambiguity that existed at the federal level.
Specifically, I’m referring to the lack of explicit strategic plans on the initiatives that I supported. I learned this was not a sign of not planning, but a sign of openness. I also learned the importance of not overplanning—spending less time predicting the future and more time engaged in the moment to exploit unanticipated opportunities (Moore, 1995, p. 239). I could not micromanage my way through complexity and uncertainty.

**I leave ED with a deeper appreciation to explore the potentiality of ideas.** After the convening, I spent the next two months revisiting and revising our STEM action plan, while the team moved on and embarked on an eight-state tour touting the Secretary’s academic priorities. My behind-the-scenes work was in service of readying for the next chance for STEM to be in the spotlight. Approximately six weeks after the conference, interested stakeholders in San Diego reached out to discuss planning a regional YOU Belong in STEM summit. We did not plan for regional summits in our original visioning process, yet we jumped at the opportunity to create a scalable and locally relevant experience. This ebb and flow of work differs greatly from my standard backwards planning approach to tick off established tasks within an action plan. I did not expect that a residency in the federal government would lead me to reflect on the benefits of constantly exploring potential ideas, and I was surprised to learn that working in a highly regulated place still has space for dream opportunities. When I opened myself to possibilities, I experienced the value of creating spaciousness at work.

I learned that the ideas that survive are not necessarily the best or most innovative solutions, but rather those that are packaged well and coupled with other surviving ideas. I’ve grown to appreciate the importance of influencing people’s mental models about the work. I tend to think that the quality of my work should speak for itself but working in an area where you must prove the worth of your idea and then maintain the idea is a different type of responsibility.
Now I know that, as my supervisor once said, “Framing is everything.” How an idea enters the arena is critical to its likelihood of support and uptake, which are two ultimate symbols of longevity and success. A great idea with no support goes nowhere.

Finally, I realized through hearing the experiences of others that I, too, have a STEM story to share. I have several STEM memories that I only fully recalled at the end of this residency experience. For instance, I attended a summer science camp at Morehouse College as a middle school student; and as a high schooler, I attended an engineering summer experience at Rensselaer Polytechnic Institute. Both experiences were specifically geared toward underrepresented students in STEM—to get them interested in the field. I remember that one of my favorite high school classes was biology, in part because of the number of animal dissections that we performed. On the other hand, I recall withdrawing from a math class in college because I could not grasp the concepts even after maximizing office hours. As an elementary teacher, I often taught science through original songs, especially when I taught about the weather or life cycles. I remember my trepidation at signing up for beginner and intermediate statistics classes as a master’s student, since my previous completed math class was in high school. My stories of success and failure are intimately related to my sense of belonging in each space. I realized that the concept of YOU Belong in STEM is not only for people deep into STEM careers. I did not even think to share my own journey with my team because I narrowly defined what it meant to belong in the STEM space. I’m leaving thinking about the importance of digging into my personal connections to the work. I didn’t share because I didn’t push myself to honestly examine all the personal connections I had—and I tend to overly focus on completing the work at hand. There’s also room to make the work personal. It doesn’t just matter because it must get done; pushing for more access or opportunity has life-altering affects. Because somebody
believed in the importance of access and STEM, I had exposure opportunities at a young age. Subconsciously, I was able to channel my understanding of its importance into my work as a resident.

**Implications for Site**

Strengthening American education cannot be solved by the work of one lone federal agency. **ED must embrace a whole of government approach**, defined as “a comprehensive way to assemble resources and expertise from multiple agencies and groups to address problems with interrelated social, economic, and political causes. The approach plays to comparative advantage and maximizes resources” (Worzala et al., 2017, pp. 1-28). The Department’s comparative advantages are embodied in its major levers of convening, amplification, capacity building, and partnerships. When ED adopts a whole of government approach, it can activate problem solvers to address complex problems. Working directly with agencies like NASA enables ED to mobilize influential actors and scale ideas across the country. The Secretary and Deputy Secretary often speak about the importance of creating a globally competitive workforce, which opens opportunities to directly engage agencies like the Department of Labor, the Department of Commerce, and the Department of Defense. Policymakers can uplift specialized initiatives through strategic alliances and connect the work to presidential priorities. Department leaders can prioritize building communications infrastructure that will increase coordination across agencies. Policy entrepreneurs need more opportunities to engage with their counterparts to ensure their collective efforts create a force multiplier effect.

In addition to STEM, I also supported the National Partnership for Student Success (NPSS) initiative, which grew out of President Biden’s call for increased student supports through roles such as mentors and tutors. This initiative is sponsored by ED, AmeriCorps, select
nonprofit leads, and the White House. NPSS benefits from AmeriCorps data, nonprofit technical assistance, White House legitimacy, and ED’s policy leadership. Multi-group collaboration is a key part of the operating model that ensures the initiative’s survival. This type of a model could be useful for STEM because ED’s joint efforts with other organizations will increase the initiative’s likelihood to endure.

ED must apply lessons from the research on belonging to strategically use its policy levers to maximize the crisis opportunity. We know that creating environments where students feel safe, supported, and seen will positively impact their engagement with rigorous content and engender a strong sense of belonging. ED has indirect access to classrooms across the country and must create conditions for collective learning and development through continuously celebrating promising practices. Elevation examples include school visits, invites to participate in communities of practice, and opportunities to share lessons in federal briefings. Leaders want to use the crisis opportunity to blend and braid unprecedented resources and deepen their impact. When the Department amplifies local strategies to learn from and emulate, communities perceive that they are accepted and their work valued; they swell with pride at the honor of being featured, and they are encouraged to stay the course and continue investing in strategies that work. Their example inspires other communities to persevere.

Research demonstrates that an integral part of students’ sense of belonging is the extent to which they can build trusted relationships with others. When the Department works closely with mission-aligned organizations and individuals to highlight innovative practices, deepen connections, and share resources, it establishes a shared foundation to build ideas and take risks. Additionally, relationship building allows the Department to craft policies rooted in problems and politics that are informed by communities. The Department’s response to the charge to
increase equity and access to educational experiences will accelerate with the currency of relationships. Rather than focus on short-term, event-based transactions, long-term, impactful work will require departmental staff, especially political staffers who transition with each administration, to treat relationships as an essential element to policymaking that is most potent when cultivated over time.

Ensuring operational feasibility at ED is limited and yet ultimately impacts national policy design and execution because individual staffers mix elements for agenda creation and make deposits of their time and skill for agenda longevity. Cultivating belonging in any space requires intention, and Department leaders can explore creative ways to create structures to ensure adults direct their cognitive and emotional energy toward executing and iterating. We secured additional staffing for the YOU Belong in STEM conference by activating personal relationships and making specific asks of certain leaders. As a newer team member, I did not know the protocol to tap into a wider pool of support since my daily interactions were bounded by my portfolio. Cross-team meetings are traditionally used as opportunities to inform others about specific teams’ updates, yet leaders can elect to use the time in different ways. In the spirit of providing hands-on, minds-on learning, leaders could opt to share the complexity behind regular updates through problems of practice, opportunities for rapid prototyping, requests for temporary project support, and more. Building trust, relationships, and operational feasibility bolsters belonging and allows team members to demonstrate vulnerabilities and strengths that feed into a collective understanding and appreciation of the capacity of the team.

Convening is a powerful tool the Department has at its disposal to organize allies and catalyze impact at a systems level. ED should hold regular STEM convenings to allow participants to work collaboratively, determine their actionable steps, and celebrate progress.
STEM is a White House priority that enjoys bipartisan support and generates enormous interest in areas as diverse as defense, workforce development, and space. ED is positioned to play a leadership role in coordinating interested parties and instantiating belonging in STEM as a prerequisite to create ideal learning and working conditions. ED can convene allies to provide research on the importance of intentionally creating environments focused on belonging to support student engagement with rigorous and complex work. Every industry partner desperate for workers with STEM skills is looking for people with a strong background in STEM education. The pipeline to provide skilled workers backs into the PK-12 education system.

ED can also use convenings to encourage partners to take a systemic approach to building belonging. ED has the commitment model from the YOU Belong in STEM conference as a blueprint to identify work across the country that will directly impact STEM learning, educators, and investments. Hosting regular convenings on progress made on STEM commitments is one way to keep high levels of stakeholder engagement. Developing and measuring progress toward collective goals will create accountability cycles for organizations that are serious about enabling change.

The regional YOU Belong in STEM summits were designed to activate local and diverse STEM ecosystem stakeholders across communities and position select sites as models of addressing equity and belonging in STEM education. This franchise model of creating a mini summit based off the featured ED convening is an example of how the Department can ensure its messaging has national reach and builds a coalition of enthusiastic stakeholders willing to invest their resources to promote the Department’s priorities. Organizations are eager to use the Department’s platform to showcase their innovative practices and the Department should encourage peer-to-peer learning through facilitative gatherings. Additionally, the Department
should encourage local convenings to address community-based needs and resources. Local engagements should have Departmental alignment to support legitimacy and provide ED with opportunities to amplify field-based work.

**Implications for Sector**

As I learned through my residency experience, crises provide a clear problem to temporarily open policy windows. The backdrop for states, districts, and schools during this current period is the ticking clock toward September 2024, the final deadline to commit billions of emergency federal funds designed to address the educational impact of the COVID-19 pandemic. The infusion of financial relief is evidence of a coordinated crisis response, yet the one-time funds do not cover the pandemic’s ongoing and profound impact on student achievement and mental health. The sector must invest necessary resources to prevent a secondary crisis once federal funds disappear. Starting now, local education agencies need support to continue the effective programs and interventions that were designed to help students recover academically and emotionally from the effects of the pandemic. National and statewide organizations with coordinating and convening power should prioritize conversations among sector leaders about mitigating the effects of the fiscal cliff. Researchers can demonstrate the connection between practices that impact students’ wellbeing and success measures. Community and family-based advocates can lobby their elected officials to take note of the programs that best supported students during an unprecedented era in education. Philanthropists can invest in local education agencies at their points of need. State education agencies should encourage conversation and advocacy among their board members. Legislators and policymakers must demonstrate political courage to promote bold priorities rooted in crisis prevention.
The pandemic strained the country’s public education system and illuminated the necessity to stabilize education investments. Ultimately, resources should be reflected in state and mayoral budgets, which indicate regional commitments to adequately fund educational priorities. Investments need to be proportional to the size of the problem, and the sector has the responsibility to not let the impact of the pandemic fade into the background while a well-documented crisis of access and opportunity continues in the present.

The most profound part of my residency experience was the unifying element of belonging that touched every person connected with the YOU Belong in STEM initiative. Speaking with NASA administrators, students, CEOs, departmental staff, educators, and additional advocates with vested STEM interests confirmed for me that the need to belong is universal. Belonging is not a fuzzy feel-good term; it’s a research-backed concept with broad resonance because it reflects our biological human need for connection. The sector can elevate the criticality of belonging to ensure the needs of students and educators are an essential part of the conversation about creating conditions for student success. Focusing on belonging addresses educational issues as varied as teachers wanting to feel valued in the field through representation and students battling high levels of anxiety and depression. Research can easily expand beyond randomized control trials and white papers. The most impactful evidence of the importance of belonging originates from personal stories. Every corner of the education ecosystem can use their platforms to highlight belonging in STEM and influence public opinion. For example, university campuses are prime sites for collective action, since they bridge PK-12 and career, and represent a period when many students pursue STEM futures through coursework, research opportunities, and internships. Regardless of the medium or target audience, the sector should prioritize the importance of belonging.
Conclusion

I am thankful for the opportunity to work alongside thoughtful, creative, and inspirational public servants at the Department of Education. Working in the federal government this past year, I learned the importance of going with the flow, exploiting unanticipated opportunities, and the necessity of learning while doing.

I am excited to see the next level of YOU Belong in STEM unfold, as the Department is currently in conversation with organizations across the country interested in hosting regional summits. Building on the convening—unveiling commitment progress over the next two years—will reveal transformational supports and investments for students and educators across the nation.

Deputy Secretary Cindy Marten refers to students as “the boss in the room” because our best efforts and most strategic policy moves are ultimately in service of creating better learning conditions for students. We will know if our strivings are worthwhile when we listen directly to the boss. At the end of the convening, I thanked a young woman who missed her high school field trip to join us at the Department and share her personal story about her out of school time program. “I can take a field trip anytime,” she quipped. “Today, I get to talk about STEM. I have so much to say, and this is what I love doing. I’m happy I’m here. I belong here.”
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Appendix A

Program from the YOU Belong in STEM National Coordinating Conference
**DETAILED AGENDA**

### Breakout Session Part 1 (Continued)

**Room #101D**

**Promising Practices & A Look at High-Impact Math Tutoring in K-12 Education**
- **Moderator:** Katherine Bass, CEO, ACI Tutoring Corps
- **Panelists:**
  - Anurag Kalia, Pre-Service Educator and Tutor
  - Christopher Saci, Tutor and Mentor

This session will explore how students can benefit from high-impact tutoring programs, including their impact on student learning and confidence in math. The panelists will share their experiences with effective tutoring strategies.

**Room #107D**

**Supporting STEM Education through Small Business Innovation Research**
- **Moderator:** Mark DeL AUDIO, formerly Senior Advisor for Digital Media, White House Office of Science & Technology Policy
- **Panelists:**
  - Deanne Bell, Founder, Future Engineers
  - Jessica Dolan Harris, CEO, and Olivia Fidelman, Kaila Shmuel

The federal government supports STEM education through a variety of funding programs, including the cross-agency Small Business Innovation Research program. This panel will discuss how the program works and its impact on innovation in STEM education through interactive media.

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**DETAILED AGENDA**

### Breakout Session Part 1 (Continued)

**Room #101D**

**Who are Math People? (Continued)**
- **Facilitator:** Jayne Urbon, Ph.D., Education Projects Specialist, DoDEA

This session will continue the discussion on the importance of fostering a positive attitude towards math.

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### Breakout Session Part 2 (Continued)

**Room #107C**

**Who are Math People? (Continued)**
- **Facilitator:** Leticia Rios, Chief of Curriculum and Instruction, DoDEA

School systems are working to strengthen mathematics programs, and DoDEA is implementing new initiatives to support math education in schools. This session will focus on how to foster a love of math among students.
Appendix B

Supervisor Feedback RE: YOU Belong in STEM Conference

From: Tamayo, Joaquin
Sent: Thursday, December 8, 2022 8:04:29 AM
To: Smith, Mekka
Cc: Marten, Cindy
Subject: Reflections on a job well done

Dear Team ODS aka ED’s newest STEM superstars,

First, allow me to say right off that bat that this email will not be my final word about what this special group of humans has accomplished with our launch of YOU Belong in STEM. I, for one, am going to revel and bask in this glow for as long as I possibly can. Indeed, this oxytocin/dopamine trip is quite fantastic. This email is also inadequate to the scale of each of your accomplishments, so I look forward to continuing to shower the praise.

That said, I will take this opportunity to memorialize my deepest gratitude for you, your vision, the esprit de corps you helped to create, your tenacity, and your relentless effort to take the opportunity we had with STEM and then design and deliver an historic thunderclap that will resonate in ways that we can only begin to imagine. I have seen many a federal launch event, and what YOU did over the last weeks and months was and is truly exemplary. You did right by the Deputy Secretary, ED, the administration, and, most importantly, our educators, students, and their families.

Yesterday was ED and the federal government at its best – please never forget that. That energy you saw and felt in the room, the sense of generosity and appreciation that doesn’t just happen, as I know you know. BUT, it’s entirely possible to create, even with all of the challenges and hurdles we all had to confront head on for months. When you have a good idea and vision that meets as precisely as possible what the field wants and needs, then you have a chance to do something big and important, though it’s only a chance. To take that chance and turn it into something beautiful and worthwhile, you have to put in the real work, like we did on STEM for 14 months, and bring people along, and then you can create magic. And that’s what we did, together.

I will remember with deep fondness what this team did to make YOU Belong in STEM happen for the rest of my life, and it will inform the rest of my career. Thank you for coming together and helping each other shine and for revealing, as Pam Cantor likes to say, the unique genius that lives inside each and every one of us. You have set up ODS for continued success in elevating and advancing our STEM goals and so many other important things, and I will never forget it. Thank you for a job well done.

Yours always,

Joaquin
Appendix C

Feedback from a YOU Belong in STEM Conference Participant

From: Melissa P.
Sent: Thursday, December 8, 2022 9:52 AM
To: STEM <STEM@ed.gov>
Subject: Thank you for leading the mission!

Dear Deputy Secretary Marten,

Yesterday was the single most moving experience in my educational career. This year due to high stress (and not “belonging”), I had to make a big sacrifice for my classroom students and for my family and step out of the classroom and focus on the after school programs where my energy makes a difference. I tell my colleagues that I am not leaving my students nor them, I am just putting an oxygen mask on myself and analyzing the situation at hand.

As I told you at the end, my eyes were welled up and I was drawn to tears with fierce emotion and inspiration from all of the presenters. Your opening statement, ...“as professionals in education we follow a pedagogy based on research and scientific theory. We know what we are doing. We need to take action. We got this. Let’s go!” The first time I heard you speak in person was at ISS R&D this past summer and it was a powerful moment at the conference. The industry needed to hear this and step up to commit to be part of the solution if they want future workers.

Yesterday, Dr. Pam blew me away as well. It was the perfect piece to this day!! Scientific and medical based research is the most powerful tool we can share with others as we reimagine learning for the human race. It is the tool and instrument I speak from when telling my students they belong in my engineering classroom and they can achieve anything they want. I tell them about the power of their brain and training their muscles. I give them examples and have them demonstrate these effective strategies as they grasp the content in new and deeper ways. They hear from me that once they are in my classroom, they will have this class as a valuable part of their résumé as practical skill development and real world application. And further, all of my students will earn a glowing recommendation for college as long as they try hard in my class. I support my students past graduation and continue to work with them in college as they request.

Deputy Secretary Marten, you are the one that is leading this crisis and you have wrangled important leaders to help you mold our new educational theories and experiences into a testable form for research and progress. If you are interested in further discussions, I would be honored to be part of this. I have a broad range of experience in my 25 years of teaching STEM education and I am proud of the hurdles I have run over but I still have a lot to conquer. Thank you for keeping the education inspiration dream alive! I will be sharing this with anyone who will listen. I have already set up five appointments for this week with school leaders in and I had three phone calls last night. I commit personally to carry this torch forward with you and the league of fighters you called to duty yesterday for the future of our families and the human race.

#iwantmybootsonthemoon #moonstruckbySTEM #studentsaretheboss

Melissa P., M.Ed.