EDC Education
Development
Center

Office of Science and Technology Policy— State-Federal STEM Summit

Executive Summary

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Background

On June 25 and 26, 2018, 211 STEM education leaders, 176 of whom were representatives from the 50 states, the District of Columbia, Puerto Rico, the U.S. Virgin Islands, Guam, the Northern Mariana Islands, and several tribal territories[1], gathered in Washington, D.C. for the first State-Federal STEM Summit. On Day 2 of the Summit, these representatives from the K–16 education, business, and policy sectors met at the National Science Foundation to share their individual viewpoints[2] on the impact of the 2013-2018 Federal 5-Year STEM Education Strategic Plan and priorities for the future Plan.[3] These reflections are intended to inform the direction of the 2018–2023 STEM Education Strategic Plan.

With that purpose in mind, three substantive discussions were held on June 26 to address the following over-arching questions:

1. What was the impact of the past (2013–2018) Federal Five-Year STEM Education Strategic Plan on states' STEM programs and policies?

2. What are the emergent trends and priorities of the STEM Community, and how might they factor in to the prospective 2018–2023 Federal Five-Year STEM Education Strategic Plan?

3. What is the federal role and responsibility in supporting states' STEM education programs and policies?

In this report, we describe the Summit's proceedings and findings for each of the three discussion questions. For each question, we introduce the purpose of the discussion[4], present the major findings drawn from the data, and provide a detailed description of the themes and patterns that emerged. We close the report with a discussion of our concluding observations. The content of the conversations occasionally overlapped. For example participants talked about the federal role in supporting states' STEM education programs (Question 3) during their discussion about the STEM Aspirations (Question 2). In those cases, for ease of the reader in making sense of the findings, we report the results with the appropriate question topic. Our methodology for analyzing the data harvested from each discussion and the facilitator focus groups is discussed in Appendices C, D, and E for Discussion Questions 1, 2, and 3, respectively.

> **DISCUSSION OF QUESTION 1**
>
> **What was the impact of the past (2013–2018) federal five-year STEM education strategic plan on states' STEM programs and policies?**

The purpose of this discussion was to increase understanding of whether and to what degree participants were aware of the prior Strategic Plan and their perceptions of its impact. This

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1   For the purposes of this report, the word "state" should be understood to include states, commonwealths, territories, tribal communities, and all other relevant areas and jurisdictions.
2   This entire activity was managed consistent with the Federal Advisory Committee Act, 5 U.S.C. App., as amended. Only individual views were sought from the attendees.
3   For a detailed count of Summit participants by region and STEM leadership role, see Table 5 and Table 6 in Appendix B.
4   See the Facilitator Guide in Appendix C for a comprehensive description of the discussions' format and structure.

information will help the framers of the new Plan increase its relevance to a broad audience and ensure that it is better publicized. What were the Plan's successes, and how can they be amplified? What were its weaknesses, and how can they be avoided or overcome? Sixty minutes were allotted for this discussion: 5 minutes for introductions, 40 minutes to discuss Question 1, and 15 minutes for reflection and synthesis.

RESULTS OF QUESTION 1 DISCUSSION

Two key findings emerged from this discussion. We present these findings below, followed by a detailed description of the themes with illustrative quotes drawn from the data.

Note: In addition to responding to the guiding questions about the impact of the previous Plan, participants also commented on how it could be improved and the role of the Federal Government in that process. Because these ideas are more closely related to the third discussion question, they are included in the Key Findings section for Discussion Question 3.

Key Findings

- The majority of Summit participants had little or no awareness of the prior Strategic Plan. The few who did may have had roles that included state or national policy responsibilities, engagement in pursuit of federal funding, and/or location in an urban versus a rural setting.

- The prior Plan appeared to serve as a vehicle for providing general policy direction that facilitated statewide conversations, influenced states' STEM plans, or informed the development of programs or initiatives. Upon reflection during the Summit, some attendees could retrospectively see the connection between the prior Plan's goals and the direction of STEM programs in their states.

CONCLUDING THOUGHTS

Although few attendees knew about the prior Strategic Plan, their understanding of it grew throughout the day, as did their appreciation for the many ways in which it could support their work at the state level. Attendees provided varied suggestions for how the next Plan could be improved and the explicit role it could play in influencing STEM education policy and programs, as well as public perception of the importance of STEM learning.

DISCUSSION OF QUESTION 2

What are the emergent trends and priorities of the STEM Community, and how might they factor in to the prospective 2018–2023 Federal Five-Year STEM Education Strategic Plan?

The introduction to Question 2 emphasized that this was the central discussion of the Summit and will be essential for informing the priorities in the next plan; the goal was to understand the high-frequency priorities of the states and territories and to hear opinions on the list of goals

for the new STEM Education Strategic Plan. Ninety minutes were allotted for this discussion: 5 minutes for introductions, 20 minutes for state teams to identify their top three Aspirations and their number-one priority, 20 minutes for state teams to share their lists and answer questions (see below), 30 minutes for whole-table discussion, and 15 minutes for reflection and synthesis.

All participants were provided with the following list of "10 STEM Aspirations" identified by Office of Science and Technology Policy leaders after listening sessions with individuals and groups from across the STEM stakeholder community in the months leading up to the Summit:

10 STEM Aspirations

1	Expand partnerships of educational entities and employers through:
1a	Work-based learning opportunities, including pre-apprenticeships, apprenticeships, internships, and job shadows
1b	Partnerships that support re-skilling and upskilling of the under-employed, retirees, etc.
1c	Expanding industry-recognized credentialing for STEM education programs
1d	Offering Teachers-in-Workplace experiences
1e	School+Workplace collaborations at the K–12, certification/credentialing, two-year, four-year, and graduate levels
2	Foster STEM ecosystems that unite all stakeholders across communities and regions
3	Advance innovation and entrepreneurship education through approaches such as business start-up incubators
4	Promote the use of digital platforms for teaching and learning
5	Weave computational thinking principles universally across grade levels and school subjects
6	Promote digital literacy and fluency and cyber-safety practices
7	Increase diversity and inclusion of all Americans in STEM programs
8	Support the contextual integration of the mathematical sciences across grades and subjects
9	Usher a new era of transdisciplinary, or convergent, study across STEM (and beyond)
10	Erase artificial boundaries between traditional college-preparatory and career technical education and between formal and informal learning

Following a process of individual state team-work and whole table discussions, each team considered the highest-priority STEM Aspirations, a rationale for why these and not others, and an offer to articulate any that were missing with an explanation for why they should be included.

RESULTS OF QUESTION 2 DISCUSSION

Several key findings emerged from the discussion of high-priority STEM Aspirations. These are presented below, followed by the detailed results of our analysis of the relationships between the Aspirations, and areas for improvement in STEM education that the Strategic Plan can address.

Key Findings

- Whether looking at individual states' rankings, table rankings, or facilitator reflections and focus group notes, there was consistency in individual attendee opinion regarding the four Aspirations that were considered to be of the highest priority:

  - **Aspiration 1:** Expand partnerships between educational entities and employers

  - **Aspiration 2:** Foster STEM ecosystems that unite all stakeholders across communities and states

  - **Aspiration 7:** Increase diversity and inclusion of all Americans in STEM programs

  - **Aspiration 10:** Erase artificial boundaries between different STEM education and career pathways

  It is notable that these four Aspirations highlight the need to reduce perceived fragmentation and isolated efforts in STEM education, and to promote greater cooperation, communication, inclusion, and integration of stakeholders and learners in order to drive real and lasting improvement.

- Attendees did not see the Aspirations as separate and distinct, but as inter-related and inter-dependent. Many groups suggested ways to combine and/or group them in order to reflect broader goals.

- Participants highlighted 11 features of the STEM education system that the next Strategic Plan should help states address. These features fell into three categories: STEM teaching, system capacity, and policy drivers. Increasing equity and diversity (a policy driver) and providing teachers with needed supports (system capacity) were viewed by the majority of attendees as the two most critical areas for improvement, followed by starting students' STEM education early and improving assessment approaches (both system capacity).

Table 1 presents the final synthesis of endorsements for the top four STEM Aspirations by region, in order to more easily identify any meaningful regional patterns.[5,6]

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5   For ease of display and understanding, the jurisdictions are grouped by U.S. census region. The jurisdictions included in each region are provided in Table 7 in Appendix B.
6   For the final synthesis of votes for all 10 aspirations, see Table 8 in Appendix B.

Table 1. State votes for the top STEM education Aspirations by region and overall

	Region									
	Northeast		**Midwest**		**South**		**West**		**All States**	
	States in Region									
	9		12		19		15		55	
	Total Vote Count and % of Regional Votes									
Aspiration	**Total**	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**	**TOTAL**	**%**
1	7	78%	7	58%	13	68%	7	47%	34	62%
2	5	56%	9	75%	16	84%	6	40%	36	65%
7	6	67%	6	50%	9	47%	7	47%	28	51%
10	7	78%	9	75%	11	58%	8	53%	35	64%

As described in Appendix E, individuals at tables discussed and ranked the ten Aspirations differently, with some explicitly ranking their first, second, and third highest priority, and others identifying Aspirations more generally as of high importance or priority. Because individuals used different metrics and methods for ranking their highest priority Aspirations, the numeric totals in Table 1 provide a *general* indication of participants' priorities, rather than precise aggregate rankings based on a uniform scale. It is therefore difficult to state with confidence, for example, that based on data from participants' stickies and facilitator reflections, Aspiration 2 (identified by 36 states as a priority) ranked higher than Aspiration 10 (identified by 35 states as a priority). Instead, data from both the participants and facilitators, as summarized in Table 1, suggest that Aspirations 1, 2, 7, and 10 consistently and categorically were identified as higher in priority than the other Aspirations.

Concluding thoughts

Summit participants engaged in the discussion about the Aspirations with energy and commitment. They took seriously the charge to identify the top STEM priorities that the Plan should address, and in addition highlighted existing areas for improvement that will impact states' ability to realize the Aspirations they identified. Taken together, the four high priority Aspirations and the four areas for improvement offer the authors of the Strategic Plan clear guidance from the field regarding how the Plan should be oriented if it is to advance the capacities of states to improve STEM education.

DISCUSSION OF QUESTION 3

What is the federal role and responsibility in supporting States' STEM education programs and policies?

The purpose of this discussion was to gather participants' views about the federal government's role and responsibility in helping regions succeed in strengthening STEM education. In particular, what, beyond money, should the Federal Government do to help their STEM efforts? Participants were encouraged to think broadly—beyond funding. For example, should the government do research on the STEM condition to inform state policies, create new federal policies that would support their state's STEM efforts, or use the federal megaphone to help make the STEM imperative more prominent, or would less intrusiveness by the federal government be more useful? Sixty minutes were allotted for this discussion: 5 minutes for introductions, 45 minutes to discuss Question 3, and 10 minutes for reflection and synthesis.

RESULTS OF QUESTION 3 DISCUSSION

The issue of what did not work well for the prior Plan, and what role the federal government could play in increasing its effectiveness and impact were discussed by participants throughout the day. Below we present the key findings that emerged from all three discussions on this topic, followed by a detailed description of the themes and illustrative quotes drawn from the data. In addition to referring to the participants' comments, we also refer to the facilitators' reflections because they shed an interpretive light on these ideas.

Key Findings

The key findings for this discussion relate to five action areas where systemic change is needed for successful implementation of STEM education policies and programs, and where the federal government has an opportunity and obligation to lead. These action areas are:

1. Promote and prioritize STEM

2. Increase access to and the flexibility of resources

3. Align resources and the Strategic Plan to measurable goals

4. Increase engagement and collaboration among STEM stakeholders

5. Address the tension between flexibility and uniformity of the Strategic Plan

Participants' views of the federal role with regard to each of these action areas are summarized below, followed by a detailed description of what participants believe the federal government can do to have a positive influence.

- **Promote and prioritize STEM.** Participants agreed that our society—parents, educators, elected officials, education policymakers, and the business community—needs a better understanding of the value of STEM learning for students' future careers, adults' active citizenship, and our country's economic development. Participants called for a "culture change" whereby all stakeholders would value STEM and STEM education, and thereby

support the systems and safeguard the resources needed to provide high quality STEM education to all. The federal government has a critical role to play in advocating for STEM and unequivocally reinforcing the message of its importance and relevance to citizens' own lives and to our country's collective future.

- **Increase access to and the flexibility of resources.** There are a variety of sources of federal support for STEM programs but they can be very difficult to navigate and unresponsive to states' needs. Participants noted that the landscape of federal agencies' funding programs is incoherent overall, and programs that should be well coordinated are occasionally in conflict with one another. Participants called on the federal government to provide greater coordination, flexibility, and transparency in federal agencies' STEM funding.

- **Align resources and the Strategic Plan to measurable goals.** The Strategic Plan must be driven by a strong, clear vision for STEM education that is made concrete and actionable by a clear theory of action, a measurement and accountability function, and aligned with funding opportunities and systems. The federal government has a responsibility to define these national STEM goals, and provide resources and infrastructure that states will need to be successful.

- **Increase engagement and collaboration among STEM stakeholders.** The relevance of STEM education to a wide and varied group of stakeholders is notable, and the different perspectives they each bring to discussions of how to improve STEM education were seen as a strength. At the same time, participants observed that not all stakeholders are represented in policy discussions, and that stakeholder groups are not necessarily familiar with each other's needs or perspectives. The federal government has a leading role to play in ensuring that all stakeholder groups become and remain engaged in policy discussions and decision-making regarding STEM education. Greater communication and collaboration can extend to include federal and state agencies, as well.

- **Address the tension between flexibility and uniformity of the Strategic Plan.** Participants had mixed views about how flexible the Strategic Plan should be versus how uniformly it should be followed. Some participants described flexibility as allowing states to select from a "menu" of possible activities, programs, and policies. This approach would enable the Plan to be responsive to states' unique needs and conditions. At the same time, participants were concerned that it would also allow states to opt out of addressing high priority challenges, in particular, increasing equity and diversity. The federal government should be aware of this tension between flexibility and uniformity and seek an appropriate balance between them.

Concluding Observations

Fours observations emerged from the process of reviewing the data gathered from the Summit's conversations and recalling the experience of the Summit itself. These observations offer a context for considering the material contained in this report:

- Across individual states' rankings, table notes, and facilitator reflections and focus group notes, there was consistency in opinion regarding the four Aspirations that were considered to be of the highest priority. Similarly, participants identified four areas for improvement that will need to be addressed if the STEM Aspirations highlighted in the Plan are to be realized. Attendees did not see the Aspirations as separate and distinct, but as inter-related and inter-dependent.

- The energy and commitment among STEM Summit participants was very high, and the interest in sustaining this level of engagement and input was clear. Participants seemed to share the feeling that they were involved in an effort that could have real impact, and that they were part of a process that has the potential for making a real difference for STEM education. This is all the more remarkable considering that many were unaware of the prior Strategic Plan and were engaging in high level policy discussions for the first time. There is an opportunity now to continue to engage these state STEM leaders and to build on the energy and commitment that they so generously invested in the Summit. Indeed, there will likely be some disappointment if no attempt is made to continue their involvement.

- There is a clear role for federal involvement in advancing the purpose of the Strategic Plan through acknowledging and addressing the five action areas that participants highlighted. These challenges are enduring and require a concerted effort to influence. The federal government has an opportunity and the reach to make a difference, and Summit participants were clear about the importance of doing so.

- The conversations were constructive and productive, though participants brought to their table groups different perspectives, vocabulary, definitions of STEM, and other key concepts. One participant's note captured the need to address these differences if the potential power of the STEM Education Strategic Plan is to be realized: "The Plan can't be coherent if we aren't working from the same set of fundamentals."

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