

# The Gateway to Technology and Engineering Program @Scale Final Report Narrative

## Grant Period

Year Three: February 16, 2015- February 15, 2016

## I. Basic Information

Program: *Gateway to Technology and Engineering*

Project Manager: Yvonne M. Spicer, Ed.D, Vice President, Advocacy and Educational Partnerships, National Center for Technological Literacy

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## II. Goals & Objectives

Each of the Request for Proposals (RFP's) to receive a grant award under the @Scale Initiative targeted one or two goals of the state STEM Plan. In this section, we are interested to learn about your project's success in achieving those goals. (Note that under STEM Plan 2.0, the STEM goals have been renumbered. See footnote below.<sup>1</sup>) Please provide information about the following:

<sup>1</sup> Massachusetts STEM Goals per STEM Plan 2.0:

1. Increase student interest in STEM areas.

**Objective 1 – Increase the number of Massachusetts school districts addressing high-quality standards-based curriculum and assessment in STEM education**

- **Gateway District Summer Institutes:** *Gateway* addresses this objective is a series of intensive, three-day institutes during which school-district teams of 3-5 participants (representing administration and K-12 teachers) participate in a collaborative district-wide planning process for implementing technology/engineering content in their districts. Tools developed by the NCTL include a *Gateway Implementation Rubric*® which helps participants assess their specific needs and develop a *Gateway District Action Plan*®.
- **Gateway In-District Visits/Case Studies:** The *Gateway* project staff will **conduct visits to school districts** during the academic year to provide technical support and collect data on the school districts' progress in implementing their action plans and evaluation.
- **Gateway Progress Sessions:** We will host full-day meetings during the fall and spring school semesters to review progress, provide updates on standards and assessments, conduct small group discussions with affinity groups (i.e.; elementary, middle, and high school teachers and administrators) and offer presentations on topics such as evaluating student work, standards implementation, and MCAS assessment in science & technology/engineering.

2. Increase student achievement among all PreK–12 students in order to prepare graduates to be civically and college and/or career ready. (Note: This goal combines the former goals 2 & 3.)

3. Increase the percentage of skilled educators who teach PreK–16 STEM.

**Support for the 100 existing districts**

- **Gateway Seminar Sessions:** To provide opportunities for school district leaders to refine their skills and content knowledge, we will offer four seminars annually on topics such as: (i) Technology and Engineering: Aligning to Classroom Practice; (ii) Project Based Learning vs. Problem-Based Learning; (iii) Learning Progressions of Technology/Engineering; and (iv) Demystifying STEM Integration. In Year 1 these seminars (2-3 hour sessions) will be offered to alumni districts.
- **Gateway Annual Symposia:** Gateway staff will host an annual event to showcase district successes and share best practices while building a cohesive professional learning community among district teams. We will hold



a symposium showcasing select districts' progress, guest speakers, PowerPoint and video presentations from Gateway district teams, and a networking reception engaging all our Massachusetts districts.

- Gateway Website/Discussion Board: An updated and enhanced Gateway website/discussion board will provide interactive media and communication between Gateway teams and staff. The site will feature a section highlighting current news about STEM competitions, grant funding opportunities, upcoming STEM professional development, and general news articles pertaining to engineering and technology policy and education.

4. Increase the percent of students completing post-secondary degrees or certificates in STEM subjects.

5. STEM degrees and certificate attainment will be aligned with corresponding opportunity in STEM-related fields to match the state's workforce needs for a STEM talent pipeline.

- List the major state STEM goals of your project and anticipated outcomes.

What statements, if any, can you make regarding increases in the number /percentage of your target audience(s)? In the summer of 2015, we added three new Massachusetts public school districts into *the Gateway Project*, Billerica, Franklin, and Melrose. These new cohorts are an addition of 14 educators representing 14,488 students. This represents an increase of 4.3% students being instructed by educators who have attend the Gateway Project from 2014 to 2015

- Has your project addressed or advanced any of the other state STEM goals? If so, which ones and how?

The project has focused on Goal 1 and Goal 3 and based on our research through the Donahue Institute the impact has encouraging.

### **III. Implementation and Scale**

- We are interested in learning about the success that your project has had this year.

- Please describe the successes that you have had in implementing your project via @Scale funding.

The 2015 institutes in July and August 2015 welcomed three new Massachusetts public school districts: Billerica, Franklin and Melrose and support the outreach to the 100+ existing districts (e.g. workshops).

***Gateway Project has now impacted 49% of all Massachusetts K-12 students.***

#### **Mashpee: Accomplishments since attending Gateway Project (2014)**

- Hosted a District-Wide STEM Professional Development (STEM in the classroom)
- District-Wide Staff meeting (Demystifying STEM)
- Team members attended the Center for the Advancement of STEM Education at Brightwater State University to learn about elementary engineering, Biomimicry and green chemistry
- Sharing of suggestions with administration on how to rearrange schedules so that early elementary students K-2 can have STEM every day for a trimester instead of once during a 6 day rotation
- Offered an after school "STEAM Squad" Enrichment course which culminated in the building of a cardboard arcade based on "Cain's Arcade". This was a video shown at the Gateway Summer Institute which fosters student creativity and has become a world-wide movement.
- "Tech Tuesdays." for people to learn how to incorporate technology in their lessons
- STEM events scheduled:
  - Team member attended PTC STEM Certificate Program
  - MiniMaker Space Plans for middle school
  - Middle and high school girls attended "Girls in STEM" Summit at Regis College, Weston, MA on April 10, 2015

**New courses and/or afterschool clubs:**





- Robotics/Engineering Club for 7th and 8th Graders Thursday Afternoons
- STEM Camp Summer 2015
- Hired a new Technology/Engineering Teacher 7-12 (Robotics/Electronics/Computer Science and Tech. Eng)
  
- After school enrichment: STEAM Squad...based off of EiE grant for elementary grades 3-5
- PK-2 STEM Special program

### **Community Partnerships**

- Cape Cod Community College Articulation Agreement (Drafting) for high school students to receive college credit and/or to provide a formalized pathway for student transfer
- iRobot field trip and mentoring of robotics students at the middle school grade level
- Hydroid Tour
- PTC-Creo Parametric 3.0 Academy Champion Award
- Joint Army Base: Entomologist visit to 4th grade classroom
- SenCorpWhite Manufacturing (biomedical industry) – sponsorship for middle and high school robotics teams
- HBRACC Construction (Home Builders & Remodelers Association of Cape Cod) - job shadowing and internships for high school students
- School to Career opportunities - job shadowing and internships (Oceaneering, Veterinarians, Healthcare, Hospitality)
- Credit for Life Fair High School Community Partnership
- The United States Coast Guard “Crewmates and Classmates” STEM centered outreach program for Grades 1 and 2.

### **Billerica (2015): Accomplishments since attending Gateway Project**

Applied for grants to fund STEM education within the district

- Mass Life Science Center Equipment Grant
- Toshiba America Grant
- American Chemical Society Grant
- National Heart Association Grant
- STEM AP Access Grant
- NASA Grant
- Exxon Mobil Grant
- BAE Systems Grant

### **Community Partnerships**

Sponsors  
for Robotics

- FLIR Systems (designs, develops, manufactures, markets, and distributes thermal imaging systems, visible-light imaging systems, locator systems, measurement and diagnostic systems, and advanced threat detection systems)
- Analog Devices
- Raytheon
- EMS Serono – gives money/donates equipment and sends scientists to present to molecular bio. class
  
- Cabot – donated money for AP chemistry class



### Workshop Presentation

In order to build content knowledge with districts from previous years, we hosted a workshop for previous Gateway school districts in Bourne, Massachusetts. The Innovation Studio housed in Bourne High School has devoted 4,000 square feet of space for students to explore project based learning in their school district. The space is facilitated by Amy Fish and includes everything from green screens to 3D printer and woodworking to electronics. In the Innovation Studio, on Tuesday, December 1, 2015 Amy Fish presented a workshop for five past Gateway districts, (Bourne, Carver, Dennis Yarmouth, Falmouth, and Mashpee,) and one potential Gateway district (Sandwich), which included administrators, middle and elementary school teachers. The workshop at Bourne's Innovation student met several of the STEM goals. It worked to increase the percentage of skilled educators. It also enhanced educators understanding of STEM related fields and therefore better aligning classroom practices with workforce needs.

The Fall Progress was held on Wednesday, October 17, 2015, the goal was to give teams sufficient time to get back to school, and start implementing their strategic action plans. Communication between Gateway staff and district leadership teams continued by way of emails, phone calls, and postings on the Gateway dedicated site. All districts site visits by Gateway staff November 2015-January 2016 to evaluate progress, address challenges as well as celebrate successes. (See attached Schedule).

A final Spring Progress session will be held on Wednesday, April 6, 2016 for all Massachusetts districts. The goal of the day was to address the progress of the districts, and contingency planning for the upcoming year and beyond to further implement technology and engineering.

- Did you incur any unforeseen obstacles? If so, what did you do to overcome them?
- If you have not met your implementation goals, what can we do to support you? We have met our goals for this grant project. We only hope to expand our reach through additional funding.
- Have you retained implementation sites from previous years and, if so, how? (From where do the funding and resources come?) Prior cohort groups are invited to our bi-annual Symposium. These are district from Cohort 2005-2015 that are invited. We have also been able to stay in contact via email and our on-line dedicated site for Gateway participants. Limited staffing and resources does not currently afford additional progress sessions and or site visits.

### IV. Scale

Please list the targets from your proposal which you have successfully met for scaling your project. The targets from the proposal included the ***recruitment of 5-7 new districts is anticipated with the additional funds for this one year award. The goal is to support approximately 40 new educators in Gateway that has the potential of impacting districts serving 10-25K students.***

If you had specific geographic areas or sites where you were unable to successfully scale, please share the difficulty you encountered. Were you able to modify your plans to meet comparable targets? We targeted the western part of Massachusetts but were able to recruit one district from the Western area Pittsfield. To actually conduct an institute we need a minimum of (4) four districts to make it viable, hence we fell short of our goal to have 5-7 new public school districts. We are continuing to brainstorm with our western MA STEM pipeline colleagues on effective strategies to recruit and garner participation in the Western part of the state. We are actively recruiting to host an institute at MCLA for summer 2016. We have even targeted a scholarship for 1-2 underserved districts (e.g. Holyoke, Springfield or Chicopee).

- Describe and quantify additional scaling opportunities that have arisen as a result of your implementation projects. Have you received requests to expand your project or to bring it to a new site?



July 2015 we offered our third Gateway Institute in New Hampshire, we welcomed Hollis, Laconia and Lincoln-Woodstock school administrative units. Collectively, these districts represent southern New Hampshire and the North Country. We are having an impact in New Hampshire in our third year of outreach (See Map of NH Gateway). We are looking to build partnerships with the universities and community colleges to be host sites for Gateway Institutes (e.g. Keene State & Lakes Region Community College).

- Assuming you receive additional @Scale funding, please describe your future scaling plans.

According to the study completed on Gateway June 2014, districts had greater success implementing their plan of action when there was ongoing support. This finding supports the recommendation for additional follow-up Gateway programming after the district team's first full year of implementation. This continued professional development and support will help district teams build on their initial enthusiasm, expand their initial K-12 district team, focus on leveraging and sustaining key stakeholder support, and develop strategies to overcome obstacles they have encountered over their first year or two of implementation.

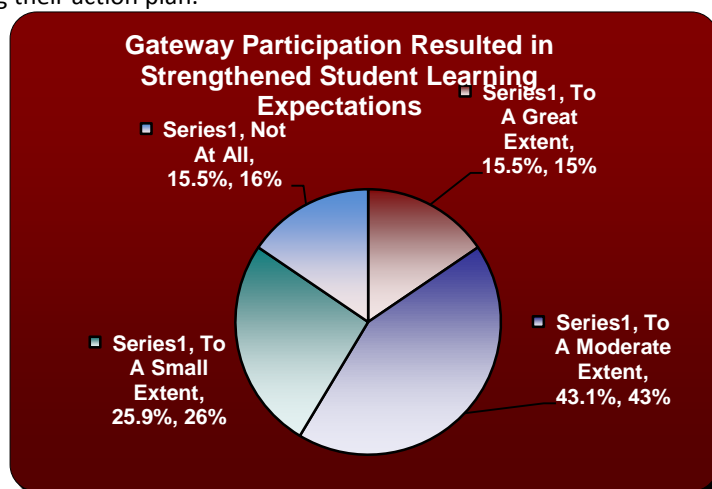
Depending on funding, our immediate goal/need is to hire a 1.0 FTE additional Teacher Educator to support the instruction/training of 8-10 new districts/year and support direct outreach to existing districts in a geographical region (e.g. Eastern Region-inside Rt. 128). The goal is to offer that on-going relevant professional development beyond the first year which would include workshops and or site consultations.

An innovative idea is to offer an institute for a large Gateway City. For example, large urban cities like Boston or Springfield could benefit from a targeted institute focused on their feeder pattern schools elementary- high school. We have reached nearly 100 school districts with the Gateway program in MA, that is significant but there is still much work to be done. (See Attached Map of Gateway communities)

#### **V. Outputs, Outcomes & Evaluation**

@Scale is a state initiative, supported by the Governor's STEM Advisory Council, to focus public and private resources in support of an integrated portfolio of education enhancement projects aligned to achieve the goals of the Commonwealth's STEM plan. Bearing this essential premise in mind:

- Describe significant results and key outcomes, including major findings, developments, or conclusions (both positive and negative), in achieving your goals. What would you attribute as influencing factors for these outcomes? Our final research report (June 2014) findings validate the impact of the Gateway Project has on school district practice, collaboration and student impact.
- Quantify the number of students, teachers and/or workers impacted by your scale-up project. To what degree has your program achieved its targeted outcomes?
- According to the data collected: Strengthened Expectations for Student Learning in Technology and Engineering Education** - 74% of respondents currently implementing their T&E action plan reported that participation in Gateway Project resulted in strengthening student learning expectations in technology and engineering education to a great or moderate extent compared with 30% of respondents who are not currently implementing their action plan.





Participants were asked to reflect on how they think participation in Gateway will impact student interest in technology and engineering. Participants reflected on the increased knowledge and enthusiasm of teachers translating into additional exposure, opportunities, and interest for their students. A few excerpts from participants' responses:

*The more opportunities and activities we provide for our students in STEM, the more engaged they will become and hopefully want to pursue this area.*

*Exposure to students from pre-K on up with hopefully demystify and take the fear out of engineering as an intimidating course of study.*

*Knowing of new resources and information from the Gateway Project to bring into the classroom and to students will increase interest.*

*School wide initiatives like Engineering Day may persuade young students to pursue a future in these areas. Also, the more teachers become excited and passionate about this curriculum, the more likely it is to rub off on students.*

*Improving student excitement and interest in STEAM through engaging lessons and courses and enthusiastic teachers.*

*Already see students wanting to participate in the after school projects. The use of EiE materials will be helpful and continue the spark.*

*I am extremely hopeful more students will become aware of and interested in Technology and Engineering topics. I believe if we continue to follow our action plan and provide after school activities, we will reach a substantial amount of students.*

Finally this summary of student impact gives us insight as to the effectiveness of the program but also the potential it can have going forward. This finding highlights a general trend of increased / improved T&E related programmatic, education, and student related outcomes regardless of whether districts continued to implement T&E action plan developed during participation at Gateway Project between 1 – 3 years ago.

Describe in detail the tools used to measure the impacts of your program. Explain your confidence in each tool's efficacy and reliability to assess program outcomes. How are you assessing the outcomes of your project within the context of the goals of @Scale? Did you incorporate formative evaluation findings into your project? What best practices have you learned and incorporated? (Please provide copies of your surveys and other evaluation tools. Please also provide the associated summative data.)

**Rubric:** Each school district team will complete yearly pre- and post-self-assessments to measure implementation progress, utilizing a rubric developed by the Gateway project. The rubric has been utilized successfully since 2005. It assesses the level of implementation in six component areas: (1) development and implementation of an action plan; (2) support of implementation by local district school leaders; (3) collection and use of data to characterize engineering and technology education in the district; (4) implementation of professional development; (5) district-wide implementation of engineering/technology education in classrooms; and (6) local community support of implementation. To corroborate the district self-report ratings on rubric dimensions and further document the implementation of the model, yearly interviews will be held with a sample of participating districts' key informants.

**MCAS Data:** Science, Technology/Engineering and Mathematics MCAS state assessment scores at Grade 5 and Grade 8 from participating districts will also be analyzed. Should future funding be secured beyond this request, comparisons



would be made within cohort districts longitudinally, and between/among cohorts such that subsequent cohorts act as control groups.

**Formative Evaluation Measures:** Participant satisfaction feedback data were collected at the close of each professional development institute component through focus groups and/or surveys. These data will be used to provide formative feedback to *Gateway* project personnel.

#### **VI. Budget and Plans for Program Sustainability**

Please account for your grant expenses to date by filling out Form 1A. In the comments box, explain any unusual or unexpected costs or activity. Also use the comments box to inform us on your plans for any unused grant funds whether those plans are to return the funds or to use them for unfinished work or planned activity. Within your report narrative, please tell us the following:

- Describe how the @Scale funds have been used to advance your project.  
The funds have been used to support the salary and benefits of Gateway staff to serve the program. In particular, the direct outreach through site visits, support for the development and delivery of workshops, summer institutes and progress sessions. In addition, funds have been used to support the consultant Regional Leaders who also co-facilitate workshops as well as conduct workshops and informational sessions.
- Describe any plans you have for sustaining your current work and for funding further expansion of your program. Do you anticipate receiving other funding or support?

The goal would be to offer content specific workshops that were highlighted as a need in the final evaluation report of districts. Districts felt having ongoing support and encouragement helped them stay focused on their action plans and implementation strategies. We plan to sustain the program through a combination of fee for service workshops and /or museum and grant funds.

**Prior Data Analysis by District –).** In cohort 2014-15 nearly 75% are still implementing their action plans, moreover they are seeking strategies to build capacity as compared with 57% participating three years ago (cohort 2011-2012), and 43% participating four years ago (cohort 2010-2011).

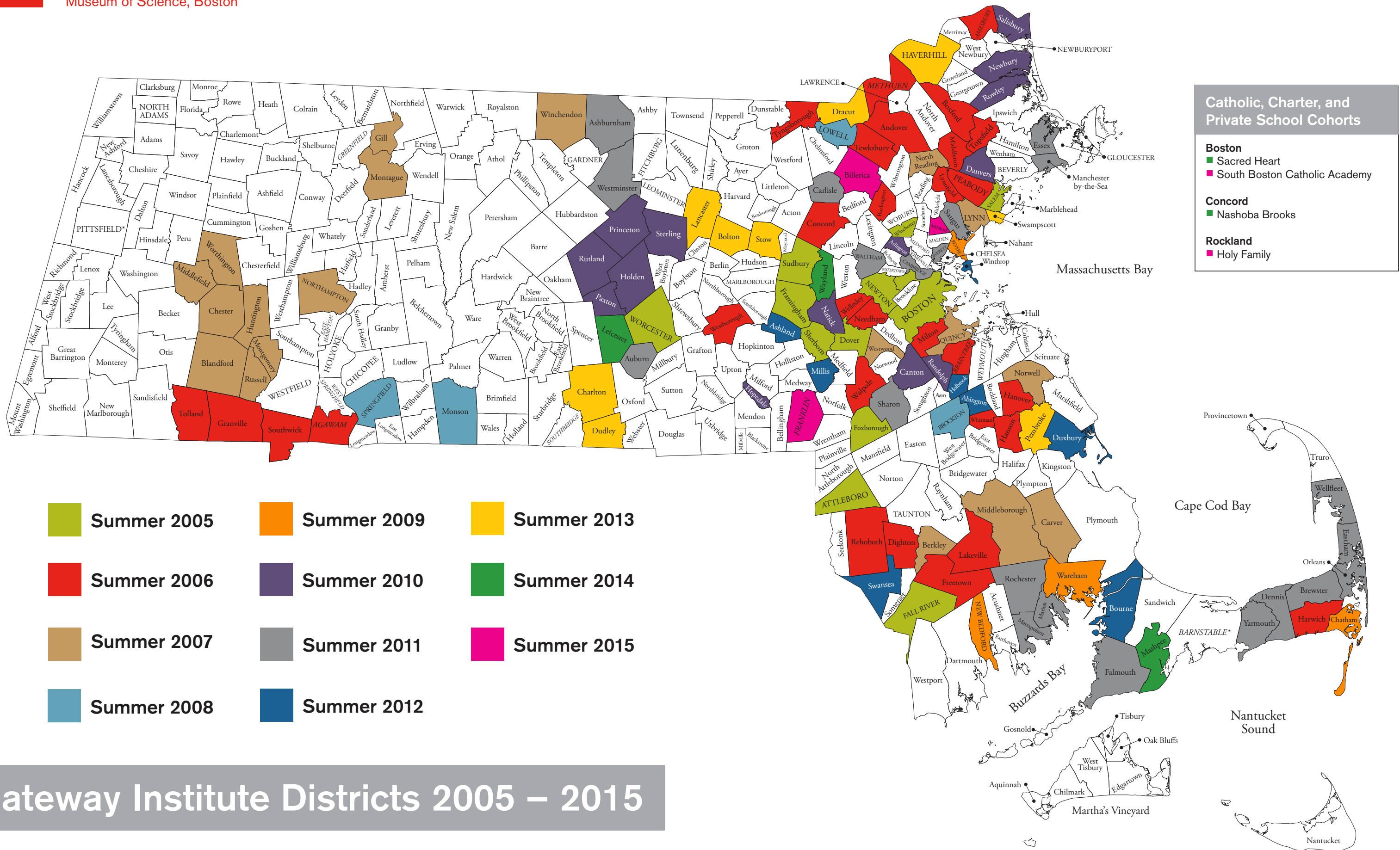
This finding supports the recommendation for additional, follow-up Gateway programming and support following the district team's first full year of implementation. This continued professional development and support will help district teams' to build on their initial enthusiasm, expand their initial K-12 district team, focus on leveraging and sustaining key stakeholder support, and develop strategies to overcome obstacles they have encountered over their first year or two of implementation.



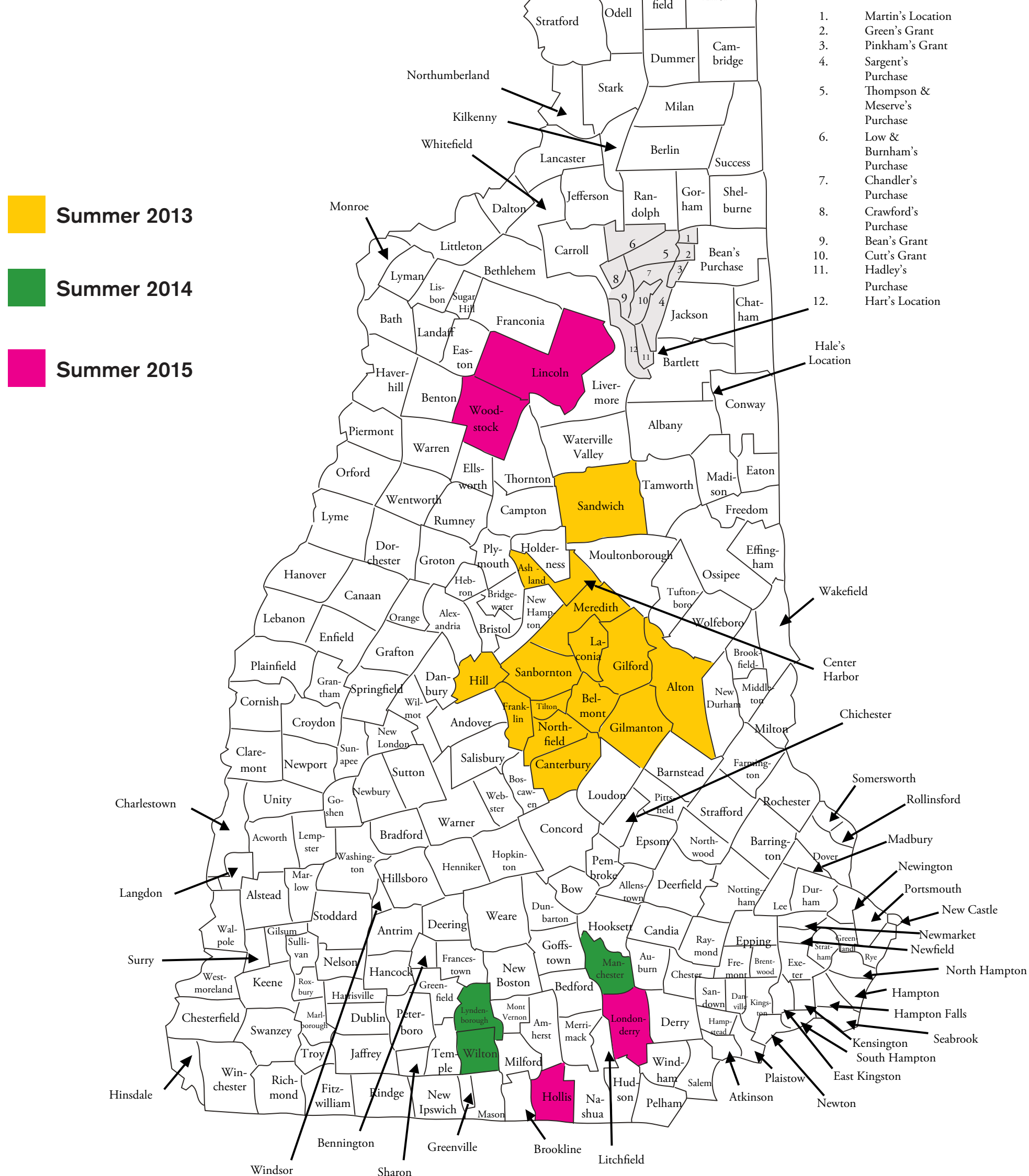


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# NH Gateway Institute Districts 2013 – 2015



@Scale 2015 (3214)			
Categories	Grant Funds Received		
	Grant Funds Received	Grant Funds Expended	Grant Funds Remaining
Total Salaries:	\$ 31,782	\$ 36,304	\$ (4,522)
Administrator	\$ -	\$ -	\$ -
Support Staff	\$ 31,782	\$ 36,304	\$ (4,522)
Other	\$ -	\$ -	\$ -
Fringe Benefits (25%)	\$ 7,945	\$ 9,076	\$ (1,131)
Contractual Services	\$ 3,000	\$ -	\$ 3,000
Travel/Transporation		\$ 74	\$ (74)
Total Supplies & Materials:	\$ -	\$ -	\$ -
Curriculum	\$ -		\$ -
Equipment	\$ -		\$ -
Other	\$ -	\$ -	\$ -
Training	\$ -		\$ -
Tuition & Stipends	\$ -		\$ -
Other	\$ 3,000	\$ -	\$ 3,000
Evaluation	\$ -	\$ -	\$ -
Indirect Costs (10% Max)	\$ 4,273	\$ 4,545	\$ (272)
<b>Total</b>	<b>\$ 50,000</b>	<b>\$ 50,000</b>	<b>\$ (0)</b>