# DIGITS Annual Report

## 2014 – 2015 Program Year

DIGITS is a sixth-grade STEM education/awareness program that pairs STEM professionals with sixth-grade classes throughout the state to increase students' interest in math and science subjects and careers. Volunteers deliver messages about the importance of math and science, engage students in STEM related hands-on activities, talk about their own career paths, and motivate students to consider a STEM career. As a follow-up to the volunteer's visit, DIGITS provides an Online Teacher Resource Package (OTRP), a portfolio of STEM activities, multi-media content, websites, and resources that teachers are using to supplement classroom instruction throughout the school year. Created by leading Massachusetts science and technology associations, DIGITS has completed its sixth year of implementation in schools across the Commonwealth.

This program year was challenging on two fronts – the overwhelming snowfalls during the winter months and the difficulty in securing funding. The frequent snowstorms resulted in a smaller number of schools and students participating. And, the funding challenges have led us to a difficult decision point. **Due to a lack of sufficient funding, we are suspending program operations after this sixth program year. DIGITS will not be implemented during the 2015-2016 academic year or in the foreseeable future. However, the Online Teacher Resource Package, located on the DIGITS website, will continue to be accessible to teachers until June 2016.** We wish to express our sincere appreciation for all the interest, support, and involvement from public schools, corporations, funders, and other constituents who have enabled us to make a significant impact on 79,271 sixth graders over the past half dozen years.

This annual report highlights the program's activities and accomplishments during the sixth year of implementation and documents the impact of the program on students, teachers, and volunteers.

**HIGHLIGHTS**

**For the 2014-2015 Program Year**

- Statistically significant increases in students' understanding the connection between math/science and the world around them
- Statistically significant increases in reports that students plan to take higher-level math
- 100% of teachers reported that they would recommend DIGITS' volunteer visits to others
- 97% of volunteers said they were able to involve the teacher in the DIGITS classroom experience

**For the last Six Program Years**

- The independent evaluator has documented that students show an increased interest in math and science and greater knowledge of STEM careers – as a result of the program.
- The evaluator reports that teachers are incorporating DIGITS messages into their ongoing teaching.
- Half of all eligible schools in the state (public schools with a sixth grade) have participated at least once in the program over the last six years.
- Half of all participating companies over the last six years have provided employees more

# DIGITS Facts and Figures: A Statistical Profile

## STATS FOR ACADEMIC YEAR 2014-2015

**Schools**

12,141 students participated in DIGITS – 17% of all the sixth graders in the state
In 101 schools located in 62 cities and towns
60% of schools participated more than one year; 36% hosted program 4-6 years
68% of schools were Title 1 schools with a high percentage of at-risk students

**Volunteers**

165 volunteers visited classrooms across the state from a total of 59 companies
Averaged 74 students per volunteer
48% participated in the program more than one year; 15% participated 4-6 years

**Volunteer Demographics**

44% Female
19% Minority
53% Have advanced degrees
47% Under the age of 40
10% Speak another language

**Volunteer-STEM Sector**

44% - IT
25% - Life Sciences
10% - Manufacturing
5% - Engineering
16% - Energy, State agencies, Other

## STATS FOR ALL SIX YEARS – 2009-2015

79,271 students participated in the program
In 322 schools in 173 cities and towns
54% of schools participated more than one year; 18% of schools participated 4-6 years
58% of schools in the last five years were Title I schools

868 volunteers visited classrooms across the state from a total of 137 companies, state and federal agencies, universities and other organizations that enabled their employees to volunteer
Averaged 91 students per volunteer
12% of participating STEM professionals volunteered two or more years
3% of participating STEM professionals volunteered 4-6 years

Average of 44% female volunteers
Average of 23% minority volunteers
Average of 51% with advanced degrees
Average of 46% of volunteers under the age of 40
Average of 18% of volunteers speak another language

50% - IT
20% - Life Sciences
10% - Manufacturing
8% - Engineering
12% - Energy, State/Federal, Other

# Key Findings and Accomplishments

## 1. Evaluation Highlights: Positive Evaluations from Students, Teachers, Volunteers

The findings, collected and analyzed by the independent evaluator, Dr. Diane Schilder of Evaluation Analysis Solutions, Inc. focused on the impact of the project on students, teachers, and volunteers. Evaluation methodologies included matched, pre and post surveys of students as well as online surveys completed by both teachers and volunteers. Dr. Schilder also prepared an additional online questionnaire, administered late in the school year, to determine the use and value of the Online Teacher Resource Package. Dr. Schilder and project leaders consulted over the calendar year to examine evaluation issues.

**A. Important Student Outcomes**

Students had extremely positive feedback about the program. In total, 110 matched pre-post student surveys were evaluated. Students:

- Showed increased interest in STEM subjects and increased knowledge of STEM careers as a result of the program.
- Showed statistically significant increases in understanding that such terms as cancer research, cell phones, designing and building things are associated with STEM
- Showed statistically significant increases in reports that they plan to take higher-level math
- Showed significant increases in associating positive attributes to STEM careers
- 80% rated the overall quality of DIGITS as good or excellent

**B. Important Teacher Outcomes**

Teachers viewed the STEM Ambassador visits and the DIGITS materials very favorably. Most of the teachers participating in the program taught science. In total, 25 teachers responded to the survey.

- 100% wanted another STEM Ambassador in their classroom in the future
- 100% would recommend the program/volunteer visits to others
- 86% rated the overall DIGITS experience as good or excellent
- A number of teachers reported that they were eager to incorporate DIGITS messages in to their teaching and that they would like a stronger role in the program
- Many teachers who had participated previously reported that they had already incorporated DIGITS messages into their ongoing teaching.

**C. Important Online Teacher Resource Package (OTRP) Outcomes**

This was the third year that the Online Teacher Resource Package was broadly available to teachers who hosted a DIGITS volunteer. The teachers who accessed the OTRP had a very positive response to the portfolio of STEM materials and resources accessible from the DIGITS website. In total, 24 teachers responded to the OTRP survey.

- 91% of teachers said they planned to use or had used the OTRP
- 80% reported they had used or planned to use information in the OTRP to inform students about why STEM is important
- 75% reported they provided or planned to provide students with STEM-related resources from the OTRP
- 75% reported that the types of activities and the range of information about the activities was good or excellent

**D. Important STEM Ambassador Outcomes**

STEM Ambassadors had very positive and successful classroom experiences. In total, 55 volunteers responded to the survey – 33% of this year's STEM Ambassadors.

- 100% rated the quality of the training as very good or excellent
- 98% rated the DIGITS experience as good or excellent
- 97% were able to engage the teacher in implementing the program in the classroom
- 96% felt prepared for the DIGITS classroom experience
- 92% reported that the teachers were enthusiastic about the experience
- 88% participated in the Linked In group for Ambassadors

Volunteers were very enthusiastic about their participation in the DIGITS program and provided information about how they talked about their careers and sparked students' interest in STEM:

> *I brought images of cancer cells and a picture of the person from whom the first human cancer cells were derived, a picture of a medical scanner I use along with an example of an image I can generate to answer different questions.*
>
> *I showed several videos that explain what marine debris is. I also conducted an activity where students used a rubber band wrapped to their hand to simulate the entanglement of marine organisms in marine debris. And finally, I showed the students a seabird bolus from the Midway Atoll. The bolus is composed of materials that albatross chicks regurgitate because of their inability to digest the items. The sample I passed around has many pieces of plastic in it.*
>
> *I brought in blueprints and components; pictures of raw material, finished goods; pictures of machines and other technology found in manufacturing environments; pictures of components we manufacture and where they end up and/or are used in.*
>
> *I explained the basics of renewable energy and how new methods of energy production are researched. (I brought in) a flask and petri dish of our microorganism (which is) used to renewably produce fuels at my company.*
>
> *I showed off augmented reality on an iPad and showed models made on a 3D printer.*

## 2. Communications and Partnerships

Over the last 6 years, project leaders have provided quarterly reports and annual reports to sponsors, corporate partners, volunteers, teachers, and other constituencies to keep them up to date on how the program has progressed. Other communications activities include:

**A. Video**

DIGITS created a new 6 minute informational video, titled ***DIGITS by the Numbers***, to provide an overview of the impact of the program on students, teachers, and volunteers and underscore the program's importance in STEM education in Massachusetts. In addition to statistics on the program's reach and scale, the video contains clips of Congressman Joe Kennedy's visit to a Taunton school where he engaged students in DIGITS activities, photos and video of other memorable volunteer visits, and highlights of the program's achievements over the last six years. The YouTube video is accessible from the homepage of the DIGITS website.

**B. Volunteer Recognition**

In acknowledgement of our volunteers' service as STEM Ambassadors in 6th grade classrooms across the state, we implemented a **volunteer recognition program for 3, 4, and 5 year volunteers**. The recognition was designed to thank volunteers for their commitment to the program and to highlight their gift of time and energy in inspiring students with their own personal story and in delivering the DIGITS messages about the importance of math and science. A Certificate of Recognition and an accompanying note of thanks were sent to **46 volunteers from 28 companies** for their multiple years of service. Eight companies – **MathWorks, Takeda, EMC, IBM, Dassault Systemes, General Dynamics, Meditech,** and **Raytheon** – had multiple employees who were honored. A full listing of all the volunteers recognized was posted on the LinkedIn group for DIGITS volunteers and on the DIGITS website under the STEM Ambassadors tab http://digits.us.com/stem-ambassadors/.

**C. LinkedIn Group for DIGITS Ambassadors**

The LinkedIn DIGITS volunteer community continued to serve as a valuable resource for volunteers and grew by more than 20% over the last year with the addition of new members. Data collected this year from volunteers by the evaluator indicated that nearly 88% reported that they accessed information from the LinkedIn group to help them prepare for their visits and one-third reported that they posted information themselves to help other STEM Ambassadors.

**D. Increased Visibility**

DIGITS STEM Ambassadors helped to generate positive press about the program by vocalizing their positive experiences in participating as volunteers. Two UMASS IT volunteers shared their volunteer stories in a system-wide online publication called *UMASSonthemove.net*. Their stories were used as part of the UMASS effort to help recruit volunteers for the program. Another volunteer recounted his positive experiences in a blog put out by his organization in support of STEM education. In addition, four DIGITS 5-year volunteers shared their thoughts and comments on why they have made such an ongoing commitment to the program as part of a blog post on the DIGITS blog http://digits.us.com/2015/01/digits-volunteers-are-empowered-by-their-ability-to-make-a-difference/ To further promote our corporate partners and sponsors, DIGITS' project leaders participated in the development of 2 breakout sessions for the statewide STEM Summit held on October 22, 2014 at the DCU Center in Worcester. Working with the Massachusetts Business Roundtable, we jointly selected 8 companies to talk about their workforce needs, their involvement in STEM activities, and their policy concerns. Six of the 8 companies on the panels were DIGITS partners, including **Dassault Systemes, EMC, General Dynamics, General Electric, MathWorks**, and **Verizon**.

DIGITS staff participated in six meetings/information briefings/volunteer fairs over the course of the last program year at **Broadcom, Holyoke Gas & Electric, Leica Biosystems, Novartis, Ocean Spray, and Takeda.** These appearances help in recruiting efforts and reinforce relationships with company partners and sponsors.

DIGITS also supported an NSF iTest grant to the TriTech Collaborative by providing computer science volunteers to summer camps for the Medford and Everett public schools.

**E. Corporate Partnerships**

Lead Sponsor MathWorks again combined their interest in and sponsorship of both DIGITS and the Museum of Science by underwriting field trips to the Museum of Science for deserving students. This year, approximately 350 students from two Lynn public schools visited the Museum. Special thanks to MathWorks for making this field trip possible.

**F. Focus on Gateway Cities**

Two of our funders – the **Broadcom Foundation** and **Move the World Foundation** – asked DIGITS to work with schools in the Gateway Cities. Gateway Cities are former industrial centers that are trying to become gateways to the next wave of state and regional economic development. Education is a key building block in that effort. Of the 26 Gateway Cities, DIGITS provided volunteers this year to 49 schools in 14 Gateway Cities, serving 4741 sixth graders. Over the last six years, DIGITS implemented programs in 24 of the 26 cities. Only two have never participated – Barnstable and Peabody. The following Gateway Cities have schools that participated in DIGITS this year: **Attleboro, Chelsea, Chicopee, Everett, Fitchburg, Haverhill, Holyoke, Lawrence, Lowell, Lynn, Pittsfield, Springfield, Taunton**, and **Worcester**.

## 3. Funding: Sponsors Support DIGITS

Originally funded by the Massachusetts Department of Higher Education STEM Pipeline Fund and the Massachusetts Technology Leadership Council, 2014-2015 DIGITS activities were supported by funding from 12 companies/foundations/state agencies. This funding made it possible to provide the program free to public schools over this past academic year. Sponsors include:

Lead Sponsor **MathWorks, Massachusetts Life Sciences Center, Meditech, Irene E. and George A. Davis Foundation, Mass Mutual, Takeda Pharmaceuticals, Society for Information Management, Berkshire Bank, Broadcom, Dassault Systemes, Move the World Foundation, and PTC.**

## 4. Participating Cities and Companies 2014 – 2015

**A. Cities and Towns** – (at least one school from the following cities/towns)

Adams, Arlington, Attleboro, Barre, Billerica, Bolton, Boston, Boxford, Braintree, Brookline, Charlton, Chatham, Chelmsford, Chelsea, Cheshire, Chicopee, Clarksburg, Dalton, Douglas, Dracut, Dudley, Duxbury, East Bridgewater, Everett, Fitchburg, Foxborough, Framingham, Gardner, Groveland, Halifax, Hamilton, Haverhill, Holden, Holyoke, Hopedale, Hudson, Kingston, Lancaster, Lawrence, Lee, Lowell, Lynn, Malden, Marlborough, Marshfield, Medford, Milford, Milton, North Adams, Pepperell, Pittsfield, Plympton, Sheffield, Somerset, Springfield, Swampscott, Taunton, Tewksbury, Webster, West Brookfield, Worcester,

**B. Companies/Organizations/State Agencies** (at least one volunteer from the following companies)

AbbVie Bioresearch Center, AccuRounds, Akamai Technologies, Applied Materials, Arup, Australis Aquaculture, Avaya, Baystate Health, Beckman Coulter Genomics, BEK Associates, Berkshire Medical Center, Boston Scientific, Broadcom Corporation, Court Square Group, COWI Marine NA, Dassault Systemes, EMC Corp, FloDesign, Forsyth Institute, General Dynamics, Genesis Rehabilitation, Genzyme, Google, Gulfstream Aerospace, Hasbro, HNTB, Holyoke Gas & Electric, IBM, Information Management & Analytics, Integrated Statistics, Jacobs Engineering Group, Joule Unlimited, Karl Storz Endoskopy, Keurig, Leica Biosystems, Lowell Observatory, Mass. Department of Environmental Protection, Mass. Green High Performance Computing Center, MathWorks, Meditech, National Oceanic and Atmospheric Administration, Novartis Institutes for Biomedical Research, Nuance Communications, Ocean Spray Cranberries, OvaScience, Parsons Brinckerhoff, Raytheon, Shire, Siemens, Takeda Pharmaceuticals, Tighe Bond, Trello, UMass ITS, Vantiv, Verizon, Vertex, Wright-Pierce, Year Up and 1 life sciences consultant.

## 5. Comments from Students and Volunteers

**Quotes from Students:**

*It gave me motivation to try and learn more science and math now that I know how much it will help.*

*I now understand that Math and Science (are) good to know.*

*When the DIGITS STEM Ambassador came, she told us how math and science can make earth a totally better place. We need science and math for many things and now I basically know why students need to take math and science. We all can make it a better place!*

*Before the STEM Ambassador came, I wasn't that interested in math but then he told me about how math can lead to science and I love science and by him explaining it, it made me more interested.*

*I learned that many jobs contain math and/or science so you have to be good at it.*

*I learned that water can make water taste better and that if you work at a water purifier place you have to clean out (stuff) from the water to make it cleaner. If you want to save the world or make the world a better place, don't litter.*

**Quotes from Ambassadors:**

*It was a good experience and I enjoyed seeing the classes react to what I was trying to express.*

*One teacher provided me with this feedback: "The kids really enjoyed it and are still talking about you. I'd love to have you come back every year to speak to our classes!"*

*The students thoroughly enjoyed the sticker activity. Students were very interested and kept asking questions about my job and the fish I work with.*

*It was a very good experience for me to learn how to brand myself with enthusiasm, concisely and in simple terms. The possibility that I may have inspired some of the students to follow a scientific career path is very satisfying.*

*I still smile about how excited the kids were and really felt that they got a good message about what it means to work hard (and how it) helps you get better jobs that you can enjoy when you are older. It has also made me want to do more outreach work with kids from mixed backgrounds who don't always have the opportunities.*

*It was interesting and fulfilling to engage your minds in creative activities and understand their thoughts about future and career.*

## 6. Acknowledgements

DIGITS is very grateful to our sponsors, partners, volunteers, principals, and teachers for their involvement in the success of the DIGITS program. Initially developed by a coalition of STEM trade associations – Mass Technology Leadership Council (MassTLC), Mass Network Communications Council (now a part of the Mass TLC), The Engineering Center, Mass Biotech Education Foundation, Mass Medical Device Council and the New England Clean Energy Council, DIGITS was created in 2008, with creative input from advertising agency Arnold Worldwide, and first implemented in classrooms around the state during the 2009-2010 academic year. The program is offered in partnership with the Mass. Department of Elementary and Secondary Education, Massachusetts Association of School Superintendents, Massachusetts Elementary School Principals Association, and Massachusetts Secondary Schools Administrators' Association.

The DIGITS Project is an independent project that is affiliated with The Engineering Center Education Trust (TECET), a 501c (3) organization dedicated to STEM education. We are very grateful to TECET which serves as the host organization and fiscal agent for the program.

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