UMASS DONAHUE INSTITUTE • APPLIED RESEARCH & PROGRAM EVALUATION

STEM Starter Academy Annual Evaluation Report January 2015

Prepared for the Massachusetts Department of Higher Education

Acknowledgements

The UMass Donahue Institute extends its sincere appreciation to the many people who supported and collaborated with us on this evaluation. In particular, we want to thank personnel from the Massachusetts Department of Higher Education and all fifteen community colleges from around the state who have supported this project.

STEM Starter Academy
Annual Evaluation Report, January 2015

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Report Information
This report was prepared by the UMass Donahue Institute, the project evaluator, under contract with the Massachusetts Department of Higher Education.

About the Donahue Institute
The University of Massachusetts Donahue Institute (UMDI) is the public service, outreach, and economic development unit of the University of Massachusetts President's Office. Established in 1971, the Institute strives to connect the Commonwealth with the resources of the University through services that combine theory and innovation with public and private sector applications.

UMDI's Applied Research and Program Evaluation group specializes in applied social science research, including program evaluation, survey research, policy research, and needs assessment. The group has designed and implemented research and evaluation projects for diverse programs and clients in the areas of education, human services, economic development, and organizational development.

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Executive Summary

The Massachusetts Department of Higher Education awarded STEM Starter Academy (SSA) grants to each of the fifteen community colleges in Massachusetts for FY14. The SSA initiative is intended to support community colleges' efforts to inform, engage, recruit, retain and graduate significantly more students and enhance their success in STEM pathway programs leading to job placements or college transfer. An additional priority for the initiative is for campuses to identify student support service and activity gaps and/or capacity building opportunities that can be addressed through replication of currently available programs or through collaboration across campuses, supported by grant funding.

DHE offered a request for proposals to each of Massachusetts' fifteen community colleges in fall 2013. The community colleges subsequently collaborated to submit a joint proposal for funding. DHE approved the joint proposal and awarded each campus funds for FY14 to support SSA activities. The initial disbursement of funds occurred in January 2014, and the original deadline for expending FY14 funds (June 30, 2014) was subsequently extended to December 31, 2014. For simplicity, the time period from January 2014 the end of December 2014 is referred to as Year 1 of the SSA initiative.[1]

The UMass Donahue Institute (UMDI) is conducting the evaluation of the SSA initiative. The Year 1 evaluation of SSA had multiple purposes: (1) to provide formative feedback to DHE and to the community colleges relevant to grant activities; (2) to provide preliminary summative feedback by collecting and summarizing baseline data on SSA participants and their performance (e.g., number of students served, number of students retained); and (3) to provide technical assistance to support DHE's efforts to implement the initiative.

A primary goal of this report is to facilitate learning for DHE, the SSA sites, and other relevant stakeholders about the larger context of SSA implementation, statewide. Programs and activities at SSA sites are diverse, and UMDI's primary role is to evaluate the SSA initiative as a whole. To that end, the executive summary provides brief summative information about SSA participation and outcomes and brief formative information about grant activities at the fifteen community colleges.

Participation and Preliminary Outcomes

In total, campuses reported having served 3,657 primary SSA participants and 9,948 secondary SSA participants during Year 1.[2] Primary SSA participants are community college students who participate in SSA grant funded programs, events, or activities. Secondary participants are individuals who are not currently enrolled at a community college and participate in SSA grant funded programs, events, or activities. Table 1 below summarizes SSA participation by term.

[1] Year 2 SSA activities began in July 2014, so there is some overlap between Year 1 and Year 2. Data collected during the fall of 2014 are summarized in this report, but are not fully analyzed. Analysis of data collected during fall 2014 will continue during Year 2, and a complete analysis will be included in the Year 2 report.
[2] Totals do not account for possible duplicates.

Table 1: SSA Participants by Term, 2014		
Term	Primary Participants	Secondary Participants
Spring	448	5,662
Summer	786	2,545
Fall	2,423	1,741
Total	**3,657**	**9,948**

Six campuses had primary participants during spring 2014. Table 2 provides an incomplete and preliminary summary of outcomes for those students. Preliminary data suggest that of the 448 primary participants from spring 2014, 154 (34%) were retained by their original community college for the fall term, 19 (4%) completed their program of study or graduated, and 19 (4%) transferred to another public college or university in Massachusetts. HEIRS data are pending for several institutions, and information from other key databases (including the National Student Clearinghouse Database, which provides enrollment and program completion information for nearly all public and private institutions of higher education in the country) are not yet available. UMDI anticipates that reported retention, transfer, and program completion rates will rise, but it is not yet possible to determine. Similarly, it is not yet possible to determine if students who are not accounted for in preliminary analyses are dropouts, because dropout status cannot be accurately determined until the final FY15 HEIRS data are reviewed. No data are yet available to determine outcomes for summer and fall SSA primary participants.

Table 2: Preliminary Outcomes for Spring Primary Participants					
Community College)	Primary Participants (Spring 2014)	Retained Students	Completed or Graduated Students	Transfer Students (to MA public)	Students of Indeterminate Status
Bristol	13	7	0	0	6
Middlesex	101	65	17	2	17
Mt. Wachusett	236	81	0	3	152
Northern Essex	2	1	1	0	0
Quinsigamond	79	0	1	13	65
Roxbury	17	0	0	1	16
Total	**448 (100%)**	**154 (34.4%)**	**19 (4.2%)**	**19 (4.2%)**	**256 (57.1%)**

Promising Practices in STEM Starter Academy Implementation

SSA implementation at every site included practices recommended by the literature on STEM student success in community colleges.[3] The most common practices across sites included those that contribute to recruitment, retention, and completion. SSA sites increased students' access to information about STEM academic and career pathways; enhanced student support through financial assistance, academic tutoring and advising, college success skills instruction, and peer relationship building; engaged students with contextualized, experiential, modularized, or accelerated curricula; and integrated instruction and student

[3] To read about the research on these practices, please see Appendix L, "STEM Starter Academy: Promising Practices for STEM Programs in Community Colleges."

support by engaging faculty in SSA implementation and encouraging collaboration across disciplines and divisions.

Year 1 Successes, Challenges, and Future Considerations

Sites' reflections on successes, challenge, and lessons learned during Year 1 provide a foundation for supporting Year 2 implementation of SSA activities. Over the course of Year 1, common themes emerged from the sites as successes, challenges, and future considerations. Recruitment and internal collaboration were cross-cutting themes, related to both successes and challenges at many sites. Sites found that building and leveraging relationships both externally (e.g. with local high schools) and internally (e.g. between SSA staff and admissions office staff) contributed to recruiting success. Internal collaboration across disciplines and divisions was also cited as a success beyond recruitment—helping SSA sites to retain students with networks of support that were integrated across the campus.

Building and navigating internal and external relationships also posed difficulties for many sites—primarily in terms of creating competing demands on limited time and resources—which often translated into recruiting challenges. In general the compressed timeline of the Year 1 implementation was a challenge mentioned, and met, by every site. Misalignment between budget timelines and academic timelines also posed challenges. Sites had varying degrees of success in integrating SSA activities with other state- and campus-level STEM initiatives. Building off of these experiences in Year 1, sites planned new recruitment strategies for Year 2, especially starting both relationship building and information dissemination earlier. These plans were framed by the impacts of the reduction in state funds for Year 2 SSA activities.

Year 1 Grant Activities at Community Colleges: Formative information

There were many similarities and differences in sites' strategies for recruiting, retaining, and supporting students. Some of these differences reflect the varied circumstances in which each site is embedded—from the colleges' existing programmatic strengths to the particular needs of their target populations—and some differences simply reflect alternative means to similar ends. As the initiative and the evaluation continue, and student-level data become available, these differences will offer opportunities for the sites to learn from each other and to refine their programs.

Spring 2014. Most sites engaged in startup activities in the spring, hiring staff, convening advisory committees, and developing outreach materials. They also began recruitment activities, including disseminating materials, visiting high schools, hosting open-houses, hosting or visiting career fairs, and offering hands-on workshops. Most sites involved faculty in outreach and recruiting activities and many included career exploration activities as part of their recruitment strategies—primarily hosting guest speakers from the community college, alumni, or industry.

The most common target of recruitment and outreach efforts was high school seniors. Many sites also recruited high school freshmen, sophomores, and juniors, and current community college students. Many sites reported efforts to recruit underrepresented or non-traditional students through a variety of methods including reaching out to schools in underserved communities and partnering with community-based organizations.

Most sites developed or revised curricula during the spring for their upcoming summer programs. These efforts typically involved contextualizing math or college skills curricula for STEM disciplines. Some sites also redesigned or developed new STEM courses, several through cross-disciplinary faculty collaboration. A few sites funded curricular alignment with K-12 institutions.

Summer 2014. Summer activities were a key part of every site's SSA implementation, though there were many variations in goal, size, and structure of summer offerings. At almost every site, SSA activities aimed to promote STEM career and program interest, build college readiness, and accelerate academic progress. Many sites hosted summer bridge or academy programs that combined all three of these elements. Several sites used SSA funding to support multiple summer activities that each included one or two of these elements.

Most sites incorporated collaborative learning strategies into their summer programs. Half of the sites offered STEM coursework, many in math remediation. After math, engineering was the most common discipline, followed (in descending order) by computer science, biotechnology, laboratory and life sciences, manufacturing, robotics, environmental science, and clinical or health sciences.

Nearly all sites offered students financial support for summer participation and a few offered stipends or other completion incentives. Sites also worked to enhance student support services through discipline-specific advising, tutoring (peer and professional), or mentoring. About half of sites required students to participate in some student support services. Most sites reported activities designed to build student-peer and student-faculty relationships.

Curriculum revision or development, either for developmental math or other STEM courses, was among the SSA summer activities at many sites. About a third of sites reported collaborative course design by interdisciplinary faculty. Half of the sites used SSA funds to enhance infrastructure, including building or upgrading math, computer, or science labs and equipment.

***Summer Site Visits*.** UMDI evaluators visited five of the fifteen STEM Starter Academy sites in July and August of 2014. In broad strokes, SSA implementation at these five sites had common features—all sites offered some variant of a free summer bridge program with academic support, career and academic pathway exploration, college success skills training, and completion incentives. In the details of these features and others, however, SSA implementation at the five sites differed considerably.[4] These differences started with the length and number of programs offered at each site. Summer bridge programs ranged from two to eleven weeks in length and from half days to full days. At four sites, the summer bridge program was just one of two or more SSA-supported activities offered over the summer.

Aside from length, the features of summer bridge programs varied in their content, modality, and combination. Every site offered some college-credit coursework. At four sites, these were full-credit science courses, while at one site the course was a one-credit course on scientific thinking. Likewise, college success skills training was part of every program, but the way it was incorporated varied across sites. Two sites combined STEM-contextualized college success skills credit-bearing courses with college-credit science classes and math coursework. A third site combined a non-contextualized one-credit college success course with a college-credit science class but without math coursework. The remaining two sites included college success skills as part of non-credit enrichment activities incorporated into the summer bridge. Academic support was provided at every site, often with tutors, teaching assistants, or peer mentors embedded in classrooms. Two sites mandated "study hall" time.

Site visits also revealed a few other variations on common practices related to completion incentives, advising, and math remediation. Every site offered students some sort of completion incentive, but these incentives varied in amount and in type. All sites offered students some kind of career and academic advising, but the division of labor among individual advisors varied across sites from career-specific

[4] Some details of this variation can be seen in the survey data (See Table 10 and Table 11 for summaries).

counselors to more generalized "coaching," to advisors with specific career and academic advising roles. Finally, all but one site offered some form of math remediation over the summer, but the implementation varied both in terms of how math was integrated into the summer program and also in the curriculum and pedagogical techniques used for teaching it.

Fall 2014. Fall data collection activities fell into Year 1 and Year 2. In this report we offer only a brief summary of data collected during the fall. A complete analysis of data collected during the fall will be included in the Year 2 report. Preliminary analysis suggests that engagement and participation in SSA activities has increased. Sites included a description of fall activities and Year 2 plans in their Annual Site Reports.

Strategic Considerations

- The scope, content, and scale of SSA programs and activities at sites were extremely varied in Year 1. To facilitate distillation of learning across sites, DHE might consider 1) encouraging sites to formalize or further develop their own internal evaluation practice, and 2) facilitating the development of uniform evaluation practices across sites.
    - For example: Site administrators found reporting the former SSA status (as a secondary participant) of current primary participants difficult because this data had not been uniformly collected. Anticipating such a data request, sites could collect self-report data from students who apply to SSA programs (e.g. using checkboxes that indicate how a student heard about SSA that would indicate whether or not that student participated in an SSA activity as a secondary participant).
- DHE may wish to further specify the intended participants in SSA interventions. SSA administrators expressed some confusion over which populations DHE would prefer SSA programs to serve. Some specific questions included whether or not to focus recruitment on dual-enrollment students (who are often higher-achieving), students with high math aptitude and low STEM awareness, or students with high STEM awareness and low math aptitude.
- DHE may wish to consider additional strategies to facilitate cross-campus collaboration. Site staff and administrators value these collaborations, but have little time to lead them. Administrators at one site felt that productive collaboration between community colleges on the Transformation Agenda grant had been facilitated by having a "pivot point" in the form of a coordinator from the Massachusetts Community College Executive Office.

Introduction

The Massachusetts Department of Higher Education (DHE) awarded STEM Starter Academy (SSA) grants to each of the fifteen community colleges in Massachusetts for FY14. The SSA initiative is intended to support community college campuses efforts to inform, engage, recruit, retain, and graduate significantly more students and enhance their success in STEM pathway programs leading to job placements or college transfer. An additional priority for the initiative is for campuses to identify student support service and activity gaps and/or capacity building opportunities that can be addressed through replication of currently available programs or through collaboration across campuses, supported by grant funding.

DHE offered a request for proposals to each of Massachusetts' fifteen community colleges in fall 2013. The community colleges subsequently collaborated to submit a joint proposal for funding. DHE approved the joint proposal and awarded each campus funds for FY14 to support SSA activities. The initial disbursement of funds did not occur until January 2014, and the original deadline for expending FY 14 funds (August 31, 2014) was subsequently extended to December 31, 2014. For simplicity, the time period from January 2014 the end of December 2014 is referred to as Year 1 of the SSA initiative.[5]

The UMass Donahue Institute (UMDI) is conducting the evaluation of the SSA initiative. The Year 1 evaluation of SSA had multiple purposes: 1) to provide formative feedback to DHE and to the community colleges relevant to grant activities; 2) to provide preliminary summative feedback by collecting and summarizing baseline data on SSA participants and their performance (e.g., number of students served, number of students retained); and, 3) to provide technical assistance to support DHE's efforts to implement the initiative.

Evaluation Questions

The process and outcome evaluation questions below offer a framework for understanding the line of inquiry that guided UMDI's evaluation of SSA activities during Year 1. These evaluation questions were developed during fall 2014, after spring and summer data were collected. Year 2 evaluation activities will more explicitly link data collection, analysis, and reporting efforts to these questions. The evaluation questions established in this document reflect our current understanding of program implementation and available data, as well as our continued responsive development of the evaluation design.

Process Evaluation Questions

P1. What are the major challenges to and facilitators of successful program implementation encountered by grantees? What midcourse corrections and attempts to overcome challenges have been undertaken? What additional steps are planned?

P2. What are the major challenges to and facilitators of providing program support and facilitation encountered by DHE? How have challenges been overcome and midcourse corrections undertaken? What additional steps are planned?

P3. How do key project stakeholders rate and explain the quality, relevance, and effectiveness of major program components and services?

[5] Year 2 SSA activities began in July 2014, so there is some overlap between Year 1 and Year 2. Data collected during the fall of 2014 are summarized in this report, but are not fully analyzed. Analysis of data collected during fall 2014 will continue during Year 2, and a complete analysis will be included in the Year 2 report.

P4. What infrastructure, systems, and processes were put in place to aid program sustainability during and beyond the award period? What are the greatest challenges and barriers to creating sustainability? In what ways have STEM Starter Academy grantees integrated their programs with other STEM pipeline development and support efforts? How have grantees shared lessons learned and emerging best practices with others?

Outcome Evaluation Questions

O1. What progress is being made toward the goals of informing, recruiting, retaining, and graduating/completing more students from STEM pathway programs?

O2. Who is participating in SSA activities? Do observed changes differ across student characteristics such as gender and race/ethnicity?

O3. To what extent are observed changes in student outcomes attributable to program activities (including combinations of program activities) versus contextual variables or non-SSA interventions?

O4. What differences in program features, implementation, and contextual variables can be identified across programs whose progress or outcomes differ substantially?

Methods

This report includes information collected through the following nine data collection and technical assistance activities.

Interviews - Spring

UMDI conducted one-hour telephone interviews with one to two individuals at each site from mid-March to mid-April 2014, typically with the individuals responsible for overseeing the project at their site. Interviewees included college administrators, SSA coordinators (both faculty and staff), and institutional research personnel. The interview protocol was developed in conjunction with DHE and focused on program start-up, awareness, outreach, and recruiting activities, and programmatic plans for the summer (see Appendix A for complete protocol). At the time of the interviews, most sites were primarily focused on recruiting and planning for summer programs. Interviews were digitally recorded, with permission, summarized, and analyzed in NVivo10. A detailed report on the findings from these interviews is in Appendix B.

Selected Site Visits - Summer

UMDI team members conducted site visits at five SSA grantee sites in July and August 2014 (Bristol, Holyoke, Middlesex, Quinsigamond, and Springfield Technical). At each visit (which lasted on average about four hours), evaluators observed program activities, conducted focus groups with a subset of SSA participants, and interviewed program staff (usually a program coordinator and an administrator). Site visit data collection instruments (interview, focus group, and observation protocols) were developed in collaboration with DHE and prompted descriptions of and reflections on summer SSA programs and activities (see Appendix C, D, and E for protocols).

Limited resources circumscribed the scope of data collection, and UMDI evaluators selected sites with the aim of capturing diverse program structures and features, and geographic variation. Site selection criteria included the length of the summer program and the length of the day, the type of curriculum used, the advising model, types of support services and enrichment activities, and any features that were unique to a particular institution. Using data collected from spring interviews, the evaluation team identified topics of interest across multiple sites and selected sites whose programs were likely to illustrate those areas of interest.

Site administrators were invited to propose schedules for the evaluators' visits. UMDI requested that the agenda include a 30-minute focus group with SSA students, brief interviews with one to two key SSA program staff, and time to observe SSA activities. When requesting the visit, UMDI staff included a list of potential activities to observe at the site based on the spring interviews, but allowed sites to finalize the observation agenda.

Evaluators drafted field notes from the observations following each visit. Interviews and focus groups were digitally recorded, with permission. Recordings were later transcribed. Observation notes were added to interview data to create site summary files, which were then analyzed in NVivo10.

Online Survey

UMDI created a survey designed to capture descriptive data about SSA implementation, and reflections on successes, challenges, and lessons learned. UMDI administered the survey online in September 2014.The survey investigated grantees' experiences through two time periods: spring and summer 2014.

The instrument was developed in collaboration with DHE and employed a mix of closed-ended response questions and open-ended, short answer items (a copy is available in Appendix F). Closed-ended questions addressed sites' activities, documenting activities that had occurred and were planned. SSA activities often overlapped with other STEM-focused activities at the colleges and the closed-ended items on the survey provided an opportunity for sites to indicate the occurrence of synergistic activities that were not funded through SSA. Short-answer items were crafted to explore successes, challenges, and lessons learned. Activities were grouped into the following topic areas: outreach and recruitment, academic programs and curriculum development, and physical and financial resources.

Fourteen of the fifteen community colleges responded to the survey. Eleven sites answered the survey comprehensively and three sites provided more limited answers. Analysis of survey response was conducted using SPSS, NVivo, and Excel. This document provides a snapshot of survey responses.

Supplemental Student Data Requests

In the spring, summer, and fall of 2014, UMDI collected a small amount of data about SSA participants from all grantees through a supplemental student data request, submitted through DHE. Each collection was in two parts: one for primary participants and one for secondary participants. Primary participants were defined as community college students who participate in STEM Starter Academy grant–funded programs, events, or activities (i.e., participants who have an ID number assigned by the college). Secondary participants were defined as individuals who are not currently enrolled at a community college and participate in STEM Starter Academy grant–funded programs, events, or activities (i.e., participants who do not have an ID number assigned by the college).

Collection instruments were designed in consultation with DHE and can be found in Appendix G. Data about secondary participants was collected in the aggregate. The instrument collected a count of SSA events and participants at those events. Individual identifying information was collected for primary participants. The collection included information identifying the student (student identification number), school, and term, as well as indicators of each participants receipt of SSA-funded financial support, targeted support (such as tutoring or peer mentoring), and counseling about STEM pathways and careers. The summer and fall primary participant collection also asked if the participant had been previously reported as a secondary participant (acknowledging that this would necessarily sometimes be an educated guess on the part of administrators). Primary participant data was submitted directly to DHE. UMDI worked with DHE to access de-identified primary participant data that had been aligned with the HEIRS outcome and enrollment data that is regularly submitted to DHE by each college.

Interviews and Site Visits - Fall

As part of its Year 2 evaluation activities, UMDI will visit or conduct interviews with all 15 sites during fall 2014 and winter 2015. UMDI completed interviews with nine sites and visited four sites in November and December 2014. Highlights of these data are included in this report. They are preliminary. A more thorough analysis will be completed in Year 2.

The interview protocol, used with SSA staff on phone interviews and during site visits, was developed in collaboration with DHE (see complete protocol in Appendix H). The interviews documented fall SSA activities and explored reflections on SSA implementation to date. Interviews also targeted grantees' plans for program sustainability and next steps. Interviews were typically conducted with both the primary SSA administrator and the SSA coordinator.

Five sites were selected for fall visits. In order to minimize the evaluation burden, UMDI did not revisit sites that had been visited over the summer. UMDI used data from the spring interviews and fall surveys to identify—from among the ten remaining sites—five that would reflect diverse program features, especially with regard to fall activities. Geographic variation was used as a tie-breaker criterion. Originally, Berkshire, Bunker Hill, Massasoit, MassBay, and Roxbury Community Colleges were selected for site visits. Scheduling conflicts precluded UMDI from visiting one of the sites in the fall, so that visit was postponed until winter 2015.

As with the summer site visits, UMDI evaluators visited each campus for up to four hours and invited sites to propose an agenda for the visit. UMDI requested that the visit include a focus group with SSA students, an interview with key SSA program staff, and an opportunity to observe SSA activities. At each of the four sites that were visited, the UMDI evaluator interviewed the primary SSA administrator and SSA coordinator using the same protocol that was used in phone interviews (Appendix H). All but one visit included a student focus group. Observed SSA activities included courses, cohort/STEM club activities, and one SSA open house event (see observation and focus group protocols in Appendices I and J).

Interview with DHE

On January 7, 2015, the UMDI project manager conducted a 1-hour telephone interview with the DHE Associate Commissioner who directs the STEM Starter Academy Initiative (hereafter, "the director"). The purpose of the interview was to explore the director's perspectives on the first year of SSA implementation and implications for Year 2. More specifically, the interview was organized as follows: successes, challenges, emerging best practices, other reflections, and next steps (complete protocol in Appendix K). The interview was audio-recorded with the director's permission. A member of the UMDI team listened to the recording and prepared a draft summary of key points. That draft was reviewed and revised by UMDI team members.

Document Review

Throughout Year 1, UMDI evaluators provided technical assistance to DHE in the form of document review. Preparation of the document, "STEM Starter Academy: Promising Practices for STEM Programs in Community Colleges," required extensive review of existing sources (Appendix L). In addition UMDI evaluators reviewed the community colleges' joint proposal in response to the SSA Request for Proposals, the Year 1 Site Reports submitted by grantees, and other documents as requested by DHE.

Observation of Technical Assistance Meeting

DHE convened a technical assistance meeting for SSA grantees on June 25, 2014. The UMDI project manager attended the meeting as an observer. UMDI also generated data collection instruments and collected and summarized grantee feedback about the meeting (Appendix M).

Observation of Monthly Grantee Phone Meetings

DHE hosted monthly phone meetings with SSA grantee representatives. UMDI evaluators attended each call as observers and generated notes from each meeting for DHE to share with grantees (Appendix N).

Findings

The findings in this section are drawn from the multiple sources of data that were collected by UMDI during Year 1 of SSA implementation. These data sources are described in the methods section above. Findings from these data sources have been integrated here to present a clearer picture of SSA implementation as a whole. Periodically, references to appendices have been provided where more detailed information from each of these data sources can be found.

The findings are organized as follows: The first section provides an overview of student participation and preliminary outcome data from Year 1; the second section summarizes promising practices implemented through SSA across sites; the third section presents cross-site themes related to success, challenges, and future considerations; the fourth section details the activities implemented at SSA sites in Year1, including descriptions of the five sites visited by UMDI evaluators in summer 2014; the fifth section highlights a few student experiences with the initiative; the sixth section includes preliminary highlights from data collected in fall 2014; and finally, the seventh section includes findings from UMDI's interview with the DHE associate commissioner responsible for SSA.

Participation and Outcomes

Participation

A summary of student participation in SSA is provided below. Several tables providing further detail regarding SSA participation are included in Appendix O.

Table 3 includes a summary of primary and secondary participation by term and across terms for Year 1. Primary participants are community college students who participate in STEM Starter Academy grant funded programs, events, or activities. Secondary participants are individuals who are not currently enrolled at a community college and participate in STEM Starter Academy grant funded programs, events, or activities. In total, campuses reported having served 3,657 primary SSA participants and 9,948 secondary SSA participants during Year 1.[6]

Table 3: SSA Participants by Term, 2014

Term	Primary Participants	Secondary Participants
Spring	448	5,662
Summer	786	2,545
Fall	2,423	1,741
Total	**3,657**	**9,948**

Table 4 summarizes the number of primary participants by term, and the number of primary participants who received services falling into three basic categories. During spring, summer, and fall, a total of 2,135 students received direct financial support from the SSA grant; 2,353 students received extra or targeted supports; and 1,473 students received STEM pathways and/or STEM career counseling.

[6] Totals do not account for possible duplicates.

Table 4: Primary Participants' Service Description by Term, 2014				
Term	Number of primary participants	Number of primary participants who received direct (SSA grant subsidized) financial support	Number of primary participants who received extra or targeted supports	Number of primary participants who received targeted STEM pathway and/or STEM career counseling
Spring	448	111	103	101
Summer	786	758	548	505
Fall	2,423	1,266	1,702	867
Total	**3,657**	**2,135**	**2,353**	**1,473**

Table 5 summarizes the number of secondary participants by term, as well as the number of events and activities that were facilitated by campuses for secondary participants. Across all terms, 9,948 students participated in secondary activities, and a total of 278 events and activities were held. A more thorough description of these events and activities is included later in the finding section of this report.

Table 5: Secondary Participant and Event Count by Term, 2014		
Term	Secondary Participants	Number of events and activities
Spring	5,662	173
Summer	2,545	49
Fall	1,741	56
Total	**9,948**	**278**

In the summer and fall supplemental student data collections, campuses were asked to indicate which primary participants had previously been reported as secondary participants. In total, 148 students who were previously reported as secondary participants were later reported as primary participants. It is important to note that it was not possible for campuses to collect identifying information for all secondary participants, so this total is likely an underestimate.

Table 6 includes a summary of race and ethnicity for all primary participants by term. Across all terms, 38.9% of primary participants were White, 14.7% were Hispanic or Latino, and 12.6% were Black or African American. Race and ethnicity were unknown for a quarter of all primary participants (24.7%).

Table 6: Primary Participant Race and Ethnicity by Term, 2014				
Race/Ethnicity	Spring	Summer	Fall	Total (%)
American Indian or Alaska Native	1	2	10	13 (0.0%)
Asian	22	35	90	147 (4.0%)
Asian or Pacific Islander	1	0	1	2 (0.0%)
Black or African American	26	93	343	462 (12.6%)
Cape Verdean	3	5	67	75 (2.1%)
Hispanic or Latino (of any Race)	66	113	359	538 (14.7%)
Native Hawaiian or other Pacific Islander	1	0	3	4 (0.0%)
Non-resident Alien	3	4	10	17 (0.5%)
Race and Ethnicity Unknown	143	171	589	903 (24.7%)
Two or more races	7	18	50	75 (2.1%)
White	176	345	902	1,423 (38.9%)
Total	**448**	**786**	**2,423**	**3,657 (100%)**

Table 7 includes a summary of primary participants' gender by term. Across all terms, 41.1% of primary participants were female and 38.0% were male, and gender data were not available for 20.9% of participants. This is the result of incomplete data.

Table 7: Primary Participant Gender by Term, 2014				
Gender	Spring	Summer	Fall	Total (%)
Female	179	326	998	1,503 (41.1%)
Male	139	311	941	1,391 (38.0%)
No Data	130	149	484	763 (20.9%)

Table 8 below summarizes the number of fall SSA participants who were enrolled at each institution. Across all campuses, 979 primary participants were newly enrolled during the fall term, and 708 students were continuing from a previous term. No data were available for 736 students. This is the result of incomplete data.

Table 8: Primary SSA Participants, Fall 2014				
Institution (Community College)	Total number of enrolled students	Number of newly enrolled students	Number of continuing students	Number of students with no data
Berkshire	21	21	0	0
Bristol	59	29	22	8
Bunker Hill	40	23	17	0
Cape Cod	-	-	-	-
Greenfield	4	3	1	0
Holyoke	149	85	63	1
Mass Bay	374	154	215	5
Massasoit	643	425	173	45
Middlesex	172	44	121	7
Mt. Wachusett	337	14	9	314
North Shore	75	0	0	75
Northern Essex	233	157	72	4
Quinsigamond	265	0	0	265
Roxbury	7	0	0	7
Springfield Technical	44	24	15	5
Total	**2,423**	**979**	**708**	**736**

Preliminary Student Outcomes

Six campuses had primary participants during spring 2014. Table 9 provides an incomplete and preliminary summary of outcomes for those students. Preliminary data suggest that of the 448 primary participants from spring 2014, 154 (34%) were retained by their original community college, 19 (4%) completed their program of study or graduated, 19 (4%) transferred to another public college or university in Massachusetts. HEIRS data are pending for several institutions, and information from other key databases (including the National Student Clearinghouse Database, which provides enrollment and program completion information for nearly all public and private institutions of higher education in the country) are not yet available. UMDI anticipates that reported retention, transfer, and program completion rates will rise, but it is not yet possible to determine. Similarly, it is not yet possible to determine if students who are not accounted for in preliminary analyses are dropouts, because dropout status cannot be accurately determined until the final FY15 submission is considered. No data are yet available to determine outcomes for summer and fall SSA primary participants.

Table 9: Preliminary Outcomes for Spring Primary Participants					
Community College)	Primary Participants (Spring 2014)	Retained Students	Completed or Graduated Students	Transfer Students (to MA public)	Students of Indeterminate Status
Bristol	13	7	0	0	6
Middlesex	101	65	17	2	17
Mt. Wachusett	236	81	0	3	152
Northern Essex	2	1	1	0	0
Quinsigamond	79	0	1	13	65
Roxbury	17	0	0	1	16
Total	**448 (100%)**	**154 (34.4%)**	**19 (4.2%)**	**19 (4.2%)**	**256 (57.1%)**

Participation in developmental math is a common feature of SSA programming for several sites. Table 9 below provides a summary of primary participants enrolled in developmental math by site and term. The table shows that participation in developmental math for SSA participants increased from spring to fall. Because of the way HEIRS data are reported to DHE, summer enrollment data for some SSA participants was unavailable for this report. Consequently, summer participation in developmental math is likely underreported in the table below.

Table 9: Primary SSA Participants Enrolled in Developmental Math by Term, 2014			
Institution (Community College)	Number of primary participants enrolled in developmental math		
	Spring	Summer*	Fall
Berkshire	-	0	9
Bristol	10	34	19
Bunker Hill	-	0	40
Cape Cod	-	1	-
Greenfield	-	0	0
Holyoke	-	0	141
Mass Bay	-	0	211
Massasoit	-	0	571
Middlesex	8	1	3
Mt. Wachusett	7	2	0
North Shore	-	0	0
Northern Essex	0	0	228
Quinsigamond	5	0	0
Roxbury	0	0	0
Springfield Technical	-	0	2
Total	**22**	**38**	**1,224**

*Note: Enrollment information was not available for all students.

Summer enrollment figures are likely underreported.

Promising Practices in STEM Starter Academy Implementation

In their first year of implementation, SSA sites engaged in many practices that either reflect those identified in the literature on community college student success in STEM fields or seemed to the evaluators to hold promise for improving student recruitment, retention, or completion in STEM fields at community colleges.

SSA implementation at every site included some practices recommended by the literature on STEM student success in community colleges.[7] Many sites drew on their own past experience (or the experiences of other institutions) to identify these practices. When asked about best practices, many sites expressed an eagerness for the opportunity provided by the SSA initiative to learn from their own and other sites' experiences improving recruitment, retention, measurement, and program design issues such as cohort development. Details about the implementation of these practices are embedded throughout the findings section of this report and are outlined here only in brief.

SSA implementations at *most* sites included some of the following promising practices:

- Providing information about and exposure to STEM pathways – including connecting career possibilities to academic programs and emphasizing career prospects as a means of encouraging students to enroll in, persist in, and complete their programs.
- Offering financial support – including book vouchers, tuition and fee waivers, and stipends.
- Teaching college navigation and success skills – including time management, study skills, how to navigate college support services, and understanding the expectations for college life.
- Developing and revising curricula – increasing content relevance through contextualization, modularization, co-requisite remediation, and/or activity-based learning.
- Enhancing or expanding student support services – including extra tutoring, classroom-embedded support, intrusive advising, career counseling, and facilitated study opportunities.
- Using hands-on strategies such as workshops or demonstrations to recruit prospective students to SSA.
- Encouraging cohort interaction – increasing a sense of connection among a group of students.
- Engaging faculty in the initiative – including involvement in planning and design, recruitment, or advising and mentoring.
- Creating opportunities and incentives for faculty and staff to collaborate across disciplines and divisions.

SSA implementations at *many* sites included some of the following practices:

- Integrating instruction and student support services – e.g., embedding supports such as advising and study skills into academic courses.
- Clarifying criteria for progress and completion – including creating degree/transfer maps and guidelines and student course plans.
- Involving parents and families to facilitate recruitment and retention.

[7] To read about the research on these practices, please see Appendix L, "STEM Starter Academy: Promising Practices for STEM Programs in Community Colleges."

- Developing peer mentorship programs.
- Helping students prepare for placement testing.
- Adapting programs to meet the needs of working students.
- Incorporating technology to advise and support students – including using software to enhance advising / mentoring / career counseling, e-portfolios, video tutorials, and social media.
- Involving industry and alumni – including in mentorship, career exploration, and transfer opportunity programming.

SSA implementations at *a few* sites included some of the following practices:

- Building relationships between community colleges and high school faculty and staff – including curricular alignment to make it easier for high school students to move into STEM degree programs at community colleges.
- Facilitating research-like opportunities for students.
- Working with 4-year institutions on transfer alignment.
- Providing internship opportunities to STEM students.
- Fostering faculty-student relationships through opportunities for informal interactions.
- Involving current community college students in recruitment activities.
- Mandating some form of support service use.
- Offering financial literacy support.
- Creating physical study and support spaces for STEM students.
- Engaging community members in program design.
- Offering professional development for college faculty.
- Exposing students to role models from underrepresented groups.
- Incorporating a community service component into the summer bridge program to help students apply their classroom learning to real-life situations.

Successes, Challenges, and Future Considerations

Over the course of the first year, a few common themes emerged as successes, challenges, and future considerations across sites. Reflections on the successes and challenges of the first year by grantee staff, administrators, and students offer a record of lessons learned that forms a foundation for considerations in the second year of SSA implementation. Recruitment and internal collaboration were cross-cutting themes, related to both successes and challenges at many sites. The compressed timeline of the Year 1 implementation was a challenge mentioned, and met, by every site.

Successes

Internal collaboration. Most SSA staff and administrators felt that they had good engagement from the college's faculty and support from higher-level administration. Many sites mentioned the positive collaboration fostered by SSA across divisions, between disciplines, and between administrative staff and faculty. Sites credited this collaboration as a facilitator of recruitment success, more engaging

curricula and classrooms, and more effective and responsive student support services. For example, at one site, science and math faculty collaborated to create a contextualized math cluster curriculum. Faculty enjoyed the rare opportunity for cross-disciplinary collaboration. Students reportedly benefitted from it as well, (e.g., they gained confidence by encountering the same problems in math and science classes).

Recruitment. Although many sites struggled with recruitment, several sites reported factors that facilitated successful recruitment.

- ***Creating and leveraging relationships***. Some sites felt that their successful recruitment was facilitated by creating and leveraging partnerships with local organizations, primarily high schools. This included using connections such as those established through career/vocational and technical education programs, offering a stipend to high school staff to act as SSA liaisons at their schools, and holding events such as breakfasts where community college staff and faculty could meet with local high school staff or area superintendents. One site, recruiting for an adult basic education SSA summer program, found that building a network of relationships with other ABE providers helped their recruiting process.
- ***Choosing an appropriate medium***. Several sites reported success with different advertising modalities. Some reported that in-person recruitment—where an SSA staff member or faculty representative visited local high schools—was the most successful. Others reported the success of direct outreach to parents through letters, email, and radio ads. One site had success with hiring current students to act as peer mentors to reach out to prospective SSA participants.
- ***Internal collaboration***. Partnerships between SSA staff/administrators and admissions offices were credited with recruitment success. SSA staff felt that their ability to advertise for SSA through events and channels established by admissions offices was particularly fruitful. One site offered STEM-specific professional development for support staff to enable them to better understand STEM-specific programmatic needs in recruiting. Several sites also noted the benefit of faculty engagement in recruitment—for example, in offering hands-on demonstrations or making recruitment visits—as a facilitator of recruitment success.

Performance or outcome. Many sites reported successes in terms of student performance and outcomes from their summer programs, including the results of formal course assessment and program completion rates as well as student feedback indicating gains in student confidence and overall positive program reviews.

Expanded capacity and flexible implementation. Many SSA administrators noted the importance of the grant's flexibility. Several sites were able to expand existing successful program elements with SSA funding, including student support services, curriculum development, professional development for faculty, student participation in research and conferences, and upgrading science lab infrastructure. Sites also reported that funding flexibility enabled them to try new promising practices. Many site administrators also welcomed the additional support and programmatic capacity provided by SSA-supported staff.

Student support services. Administrators and students noted that student support services were successfully expanded or enhanced with SSA support. Students felt that college success courses, mentorships, facilitated study groups and study halls, classroom-embedded support, coaches, and tutoring helped them adjust to college life, think about their future plans, and succeed in their courses.

Career exploration. Students and administrators at most sites noted the value of exposing students to different career ideas. Students appreciated being exposed to different fields and career possibilities, which they said sparked new ideas for them or helped them make better decisions.

Challenges

Timing. The most common challenge sites mentioned was the rapid turnaround from grant initiation to implementation, including a relatively late receipt of funding. Sites felt that this late start made planning and recruiting for the summer a challenge because of the short timeline, the busy mid-semester timing of grant initiation, and the reality that many potential recruits had already made commitments for the summer. The initially uncertain and brief timeline for the grant also made it difficult for some sites to attract qualified candidates to staff positions.

Recruitment. Nearly every site found recruitment to be a challenge, in part due to the timing issues just mentioned. Several sites commented that they had underestimated the time, effort, and resources required to successfully recruit participants. Many felt they had put in enormous efforts that yielded disappointing results. Several sites said they struggled to gain access to local high schools, whose staff felt overwhelmed with requests and who had no incentive to prioritize community colleges. Some sites struggled with internal communication that hindered recruitment efforts. These sites mentioned, for example, that staff and faculty either did not know about SSA or did not promote it for some other reason. Based on challenges in Year 1, sites planned to start recruitment earlier for Year 2, and many planned to expand the groups they targeted or admitted to their SSA programs.

Internal collaboration. Many sites noted coordination and collaboration challenges. Many of these challenges involved managing logistical details such as balancing faculty needs, students' schedules, and the limitations of available space. One site scheduled recruitment events during the period after finals and before summer session to ease scheduling constraints for lab space and faculty (although a drawback was that few current students were around). Challenges included navigating relationships with other campus offices and disciplines involved in similar activities or interested in similar resources (e.g., working with admissions). Collaborating across disciplines and divisions under tight timelines involved new learning that one site described as "challenging but positive." Several sites noted the challenge of coordinating several grants with overlapping demands, but one added, "It's a good problem to have."

Student maturity or motivation. Several sites struggled with students who either lacked maturity or motivation, primarily in terms of moving from a high school to a college mindset. A few sites had students whose parents made the decision for them to attend. These students did not seem as invested as others, and although they were the minority, their demeanor seemed to affect the overall tone of the programs they were in. Sites who worked with high school populations noted that these students (and sometimes their parents) needed more explicit orientation to appropriate college student behavior. Some students reported being distracted by peers who exhibited "high school" behaviors. One site planned to change their application procedures to better create a cohort of students with consistent intentions.

Future Considerations and Next Steps

The first year of SSA implementation offered many insights to SSA coordinators and administrators. Most of these bits of learning are embedded in the successes and challenges summarized above. A few themes emerged as sites offered their thoughts on Year 2.

Recruitment. Sites named many lessons learned from their Year 1 recruitment efforts. In addition to starting recruitment earlier, sites mentioned:

- Crafting a clearer message to high school students about the benefits of participating in the summer bridge program,
- Creating better information dissemination within their campus environment in order to increase potential referrals from other campus offices,
- Building relationships with high school staff, including more consistent communication procedures with high school principals,
- Making direct contact with students and parents (through mail and email),
- Closely monitoring recruitment in order to make mid-course corrections, and
- Accepting more students in anticipation of self-selection and attrition.

Length and intensity of program. Several sites felt uncertain about the length and intensity of their summer bridge programs. Staff at a couple of sites noted that the intensive weekly time commitment necessitated by the short program duration was difficult for students to fit into their schedules and also might not have allowed sufficient time for students to absorb new material. A counselor at one site was worried about student burn out. Coordinators at some sites thought they had potentially put too much content into their programs (e.g., too many courses) and planned to scale back.

Three sites had half-day programs, which saved money on food (with no need to provide students lunch) and fit more easily into students' schedules. However, to accommodate full-credit coursework on this half-day schedule, one site's program lasted 11 weeks (the longest of any SSA summer program). At another site, administrators accommodated a half day schedule by altering their original plan of including both math and science and allowed students to choose either a math or a science course. An administrator from that site said:

> As we started to put that [original schedule] together, [we realized] it [would be] a very long day, literally leaving no time almost to go home and recuperate before you come in and do it [again] the next day. So then it became, "Well, when are they going to actually have time to study?" So, that's when we moved to this "running everything in the morning" idea.

At another site, the administrator highlighted a tradeoff between the length of the program in weeks (offering one kind of challenge) and the length of the day (offering another challenge), especially when taking the course content into account:

> Eight weeks is a challenge and I don't know if we're going to be able to do it. But if you're talking about a pre-calculus course—how do you do that in four or five weeks? And there is a life out there, too, for these high school graduates. They don't want to sit in a class eight hours a day and I don't want them to. So, how do we balance that?

Stipends and incentives. Many sites felt ambivalent about stipends and incentives and were interested in talking with other sites and revising their plans for incentives next year, especially considering reduced Year 2 budgets. For example, one administrator said, "You provide them with free classes, free lunch and a stipend—it's a lot. And I'm not completely sure, when it's that easy, when it's all just handed to them, if you have any greater success, any greater recruitment or retention than if you didn't do all that. And then you would have more money to do other things with." Another administrator worried that students motivated by the incentive to enroll might not persist, and that the program would need to provide "bigger and bigger carrots" to bring students in and keep them involved.

Reduced budgets. Sites' Year 2 budgets were reduced to half the size of the Year 1 budgets, due to statewide budget reductions announced in November 2014. As administrators considered SSA implementation in light of these financial restrictions, they considered eliminating or reducing stipends or enrollment incentives, reducing cohort size, shrinking the number of different programs funded by SSA, and supplementing SSA shortfalls with other grant funding. SSA staff and administrators ended Year 1 implementation grappling with this new financial reality.

Spring and Summer Activities

This section details the SSA activities implemented at grantee sites in Year 1. Data from the online survey, spring interviews, and summer site visits are incorporated to present a more complete picture. Activities are grouped by time period—spring and summer—which reflect community colleges' academic session divisions as well as distinct activity periods for STEM Starter Academy implementation.

The spring and summer sub-sections each begin with a table summarizing activities that sites indicated were funded partially or fully through the SSA award during that time period. This overview table is followed by more detailed information by topic area and time period, which typically includes a brief qualitative summary of survey and interview data on the topic and a table summarizing sites' closed-ended survey responses on that topic. Where available, figures provide information about which activities received SSA funding. Throughout this section, student quotes collected in focus groups are featured to illustrate student perspectives on the topics. The summer section ends with descriptive summaries of the five sites visited by UMDI.

Spring 2014 Activities: Awareness, Outreach, Recruiting, and Planning

In the spring, most SSA sites were simultaneously recruiting students, hiring staff, and developing programming. This section summarizes grantees' spring 2014 activities.

Activities funded partially or fully through SSA, by site, spring 2014. Table 10 summarizes sites' reported use of SSA funds during spring 2014. In the survey, sites were asked to identify activities they funded partially or fully through the SSA award from a list of options. Table 11 shows only spring activities funded through the SSA award. Sites may have had activities in these areas that were not funded through SSA.

Table 10: Activities Funded Partially or Fully Through SSA Award, by Site, Spring 2014

	Total sites	Berkshire	Bristol	Bunker Hill	Cape Cod	Greenfield	Holyoke	Mass Bay	Massasoit	Middlesex	Mt. Wachusett	North Shore	Northern Essex	Quinsigamond	STCC
1.1 Outreach to or Recruitment of:															
HS seniors	13	x	x		x	x	x	x	x	x	x	x	x	x	x
HS freshmen, sophomores, or juniors	7		x			x	x	x		x			x	x	
Elementary or middle school students	1							x							
Current, undeclared CC students	6					x		x		x	x	x		x	
Current CC students with developmental math placements	6					x		x			x	x	x	x	
Current CC students in STEM programs	7					x		x		x	x	x	x	x	
Families of prospective students	8	x	x		x	x			x	x		x			x
HS counselors, faculty or administrators	12	x	x		x	x	x	x	x	x	x		x	x	x
Adult learners	7		x				x	x		x	x	x		x	
Underrepresented groups	6	x					x	x		x	x				x
1.2 Outreach and Recruitment Materials															
Paper-based materials	12	x	x		x	x	x	x	x	x	x		x	x	x
Online materials	12	x			x	x	x	x	x	x	x	x	x	x	x
1.3 Outreach and Recruitment Events															
At your campus	12	x	x		x	x	x	x	x	x	x		x	x	x
At a high school	10	x	x		x	x		x	x		x		x	x	x
At other locations	5	x					x	x		x					x

Table 10: Activities Funded Partially or Fully Through SSA Award, by Site, Spring 2014															
	Total sites	Berkshire	Bristol	Bunker Hill	Cape Cod	Greenfield	Holyoke	Mass Bay	Massasoit	Middlesex	Mt. Wachusett	North Shore	Northern Essex	Quinsigamond	STCC
1.4 Other Activities															
Faculty involvement	7	x				x		x	x	x	x		x		
Current CC student involvement	4	x						x		x			x		
Hands-on STEM activities or demonstrations	7	x	x					x		x	x		x	x	
Enrollment support (e.g. help with financial aid, enrollment)	5	x					x	x		x					x
STEM program exploration majors fair	6		x			x	x	x		x	x				
Other	5	x					x	x		x	x				
1.5 Career Exploration Activities															
Speakers from industry or alumni	5							x		x	x		x	x	
Speakers from community college	5						x			x	x		x	x	
Field trips	2									x	x				
Other career exploration activities	2		x							x					
1.7 Academic Programs and Curriculum Development															
STEM dual enrollment courses	2		x											x	
STEM curriculum development/revision	6		x	x		x	x						x	x	
Curriculum alignment with K-12 institutions	3									x			x	x	
Curriculum alignment with 4-year institutions	1									x					
STEM credit courses (e.g., Intro to STEM, BIO101, CHEM101)	1		x												
STEM-based college success course	2		x										x		
Other	2						x	x							

Table 10: Activities Funded Partially or Fully Through SSA Award, by Site, Spring 2014															
	Total sites	Berkshire	Bristol	Bunker Hill	Cape Cod	Greenfield	Holyoke	Mass Bay	Massasoit	Middlesex	Mt. Wachusett	North Shore	Northern Essex	Quinsigamond	STCC
1.8 Mentoring, Advising, or Coaching															
Development or clarification of STEM pathways	5	x					x			x			x	x	
STEM discipline-specific advising	4		x							x	x		x		
Faculty advisors	3		x										x	x	
"Intrusive advising" (Please describe below)	4	x	x								x			x	
Transfer-specific advising/support	1												x		
STEM coaches (Please describe below)	1												x		
Peer mentoring or advising	2						x						x		
Career mentoring, advising, or coaching	6		x				x			x	x		x	x	
Advising software used	1													x	
Other	0														
1.9 Orientation, Tutoring, and Test Prep															
Student orientation with STEM enhancements	6	x				x		x	x	x			x		
Professional tutoring	5		x			x	x			x			x		
Peer tutoring	3						x			x			x		
Facilitated study groups	1												x		
Accuplacer testing	3	x	x										x		
Accuplacer test prep	0														
Other	0														

Table 10: Activities Funded Partially or Fully Through SSA Award, by Site, Spring 2014															
	Total sites	Berkshire	Bristol	Bunker Hill	Cape Cod	Greenfield	Holyoke	Mass Bay	Massasoit	Middlesex	Mt. Wachusett	North Shore	Northern Essex	Quinsigamond	STCC
1.10 Financial or Physical Resources															
Physical study space provided	2							x					x		
Financial support for books, supplies, etc.	4		x				x			x			x		
Financial assistance (including tuition or fee waivers or stipends)	3						x			x		x			
Enrollment incentives	3						x			x		x			
Other	0														
1.11 Planning, Professional Development, and Infrastructure Enhancements															
Development of lab or instructional space (including staffed study space)	4		x					x	x				x		
Hire SSA staff	10	x	x	x		x	x		x	x	x			x	x
Professional development for K-12 teachers	1												x		
Professional development for college faculty	4	x				x			x				x		
STEM or SSA advisory group convened	8	x				x		x	x	x	x			x	x
Obtain advising, career focus, simulation, or other software	2					x								x	
Other	1							x							

By mid-spring semester, all of the sites had begun their recruitment for SSA programming and were engaged with planning the details of their summer academies and bridge programs. Interviews revealed many broad areas of overlap in the colleges' planned strategies for recruiting, retaining, and supporting students as well as many differences in strategy at a more detailed level. Some of these differences reflect the varied circumstances in which each site is embedded—from the colleges' existing programmatic strengths to the particular needs of their target populations—and some differences simply reflect alternative means to similar ends. As the initiative and the evaluation continue and student-level data become available, these differences will offer opportunities for the sites to learn from each other and refine their programs.

In the survey, most sites reported funding outreach and recruiting activities in the spring. Most sites also used SSA funds to hire SSA staff and establish an advisory committee during this time. Fewer sites funded curriculum development, mentoring, or financial assistance. Northern Essex, Middlesex, and MassBay Community Colleges reported the greatest variety of activities funded through SSA. Bunker Hill, Cape Cod, and North Shore Community Colleges funded fewer types of activities with SSA funds than other sites. The sections that follow provide a cross-site summary and analysis by topic.

SSA outreach and recruitment activities, spring 2014. In the spring, most sites conducted activities on and off campus to recruit students for summer SSA activities and to increase awareness of STEM programs. Activities included open houses, career fairs, and hands-on workshops. Table 11 summarizes SSA outreach and recruitment activities reported by campuses in the survey.

Table 11: Outreach Activities, Frequency, Spring 2014

N=14	Count				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
Events					
At your campus	12	2			
At a high school	10		1	3	
At other locations	5			5	4
Materials					
Paper-based materials	12	1	1		
Online materials	12		1	1	
Activities					
Faculty involvement	7	4		3	
Enrollment support (e.g. help with financial aid, enrollment)	7	4		3	
Hands-on STEM activities or demonstrations	7	2	1	4	
STEM program fair	6	1	1	5	1
Other	5	3		3	3
Current CC student involvement	4	1	1	8	

All sites held events on campus. Many of these events included hands-on activities (e.g., a DNA sequencing activity at one school) and STEM career and majors information. At least one site included a financial literacy session. Twelve sites used SSA funding while two did not. In addition, ten sites held events at high schools and five sites held events at other locations such as adult education programs.

Most sites (12) used SSA funds to develop print and/or online materials to support their recruitment efforts. Most sites (11) involved faculty in outreach and recruiting activities. Fewer sites (5) used current community college students in outreach and recruitment. North Shore Community College reported that recruitment facilitated by peer mentors was particularly successful. Other outreach activities included

radio spots and other media advertising, outreach to adult education programs, and a STEM-related competition.

In interviews, sites reflected on the importance of two other recruitment strategies. Aside from more traditional recruiting events, visits, and letters, about half the sites reported engaging in relationship-building with high schools through other means. Several sites offered dual-enrollment courses. One site taught self-paced math courses at local high schools. Two sites held breakfast events, one site with area superintendents, and one with high school faculty and guidance counsellors. One other school sent letters from the college president to all area superintendents. Four sites facilitated collaboration between community college and high school faculty through professional development or curriculum alignment workshops.

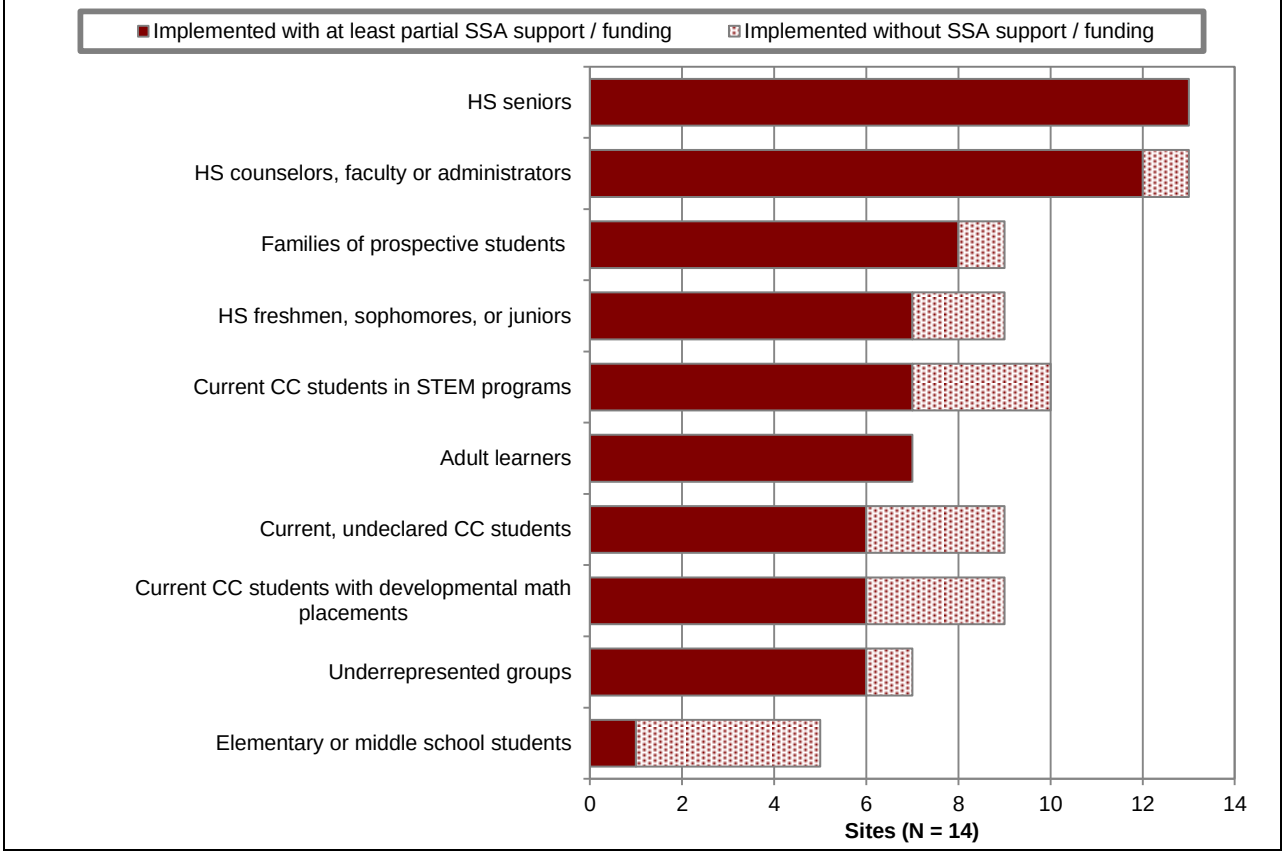
Targets of SSA recruitment and outreach efforts, spring 2014. Table 12 summarizes SSA outreach and recruitment audiences as reported in the survey. Figure 1 shows the number of sites targeting each audience group with and without SSA funding.

The most common targets of recruitment and outreach with SSA funds were high school seniors. Almost all sites (13) conducted outreach to high school seniors. The exception was Bunker Hill Community College, which targeted existing community college students. The second most common targets of recruitment and outreach were other high school audiences, such as high school staff and parents of prospective students. Almost all sites (13) targeted high school staff, such as teachers or guidance counselors, though not necessarily with SSA funds. Nine sites reached out to parents and families. The third most common targets of outreach were current community college students. Eleven sites targeted current community college students, though not necessarily with SSA funds.

In springtime interviews, administrators discussed their rationales for focusing recruitment efforts on particular populations. Staff at Bunker Hill felt that large numbers of current students who had an interest in STEM were "wallowing" in developmental math and could potentially enter and succeed in STEM programs with help in that area. At MassBay, administrators initially chose to focus on recruiting students into STEM programs of study who were already college-level math ready, arguing that these students, who are more likely to do well in STEM fields, were at a decision point for choosing a major but might not have considered STEM. Finally, Berkshire administrators focused on recruiting traditionally aged students from local high schools who had an interest in STEM and planned to attend community college. These students, the administrators felt, were most "at risk" of non-completion. According to the administrators, many students with an existing interest in STEM might not consider attending their local community college, while non-traditionally aged students who come to community college often have the kind of "diligence and commitment" that gives them a bit of an advantage. Thus, it is the students in between, the high school students planning to come to community college who are interested in STEM but do not have the strongest academic history who are most likely to benefit from participation in SSA.

Table 12: Outreach and Recruitment Audiences, Frequency, Spring 2014					
N=14	**Count**				
Audience	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
HS seniors	13	0	0	1	0
HS counselors, faculty or administrators	12	1	0	1	0
Families of prospective students	8	1	1	2	2
HS freshmen, sophomores, or juniors	7	2	0	5	0
Current CC students in STEM programs	7	3	1	3	0
Adult learners	7	0	0	6	1
Current, undeclared CC students	6	3	0	3	2
Current CC students with developmental math placements	6	3	0	5	0
Underrepresented groups	6	1	1	2	4
Elementary or middle school students	1	4	0	8	1

Figure 1: Outreach Audiences, SSA Funding, Spring 2014



Outreach to underrepresented and non-traditional students, spring 2014. During interviews in the spring, about half of the sites said they aimed to attract specific populations, including women, military veterans, racial minorities, first-generation college students, or adult returning populations. Most sites did not have targeted recruitment plans for these populations, but almost all planned some activities that would boost access for these populations to the SSA programming. Activities included recruiting from local "high-minority" or "high-needs" schools, collaborating with college offices such as the veterans' office or Adult Basic Education, working with community agencies such as employment or relocation assistance programs, reaching out to parents and families, scheduling SSA programs in the evenings so day-working students could attend, and bringing speakers who represent minority populations in STEM to talk about their experiences and careers.

In the survey, sites were asked whether they targeted underrepresented or non-traditional students through their outreach and recruitment activities. Many sites (9) reported efforts to recruit underrepresented or non-traditional students. Bristol, Massasoit, and North Shore Community Colleges reached out to schools in underserved communities. Middlesex, Mt. Wachusett, and Quinsigamond Community Colleges partnered with groups that work with underrepresented populations, such as community-based organizations, the Upward Bound program, and the Louis Stokes Alliance for Minority Participation program. Other strategies sites reported using to recruit students from underrepresented groups included conversations with high school personnel, advertising SSA through media most likely to reach underrepresented groups, and featuring students from underrepresented groups and female students in promotional materials. Two sites reported that they did not specifically target underrepresented or non-traditional students through recruitment activities, but that they planned to next year.

SSA career exploration activities, spring 2014. In spring interviews, many sites reported a focus on careers as an explicit part of their recruitment strategies for SSA, both for current college applicants and for younger students further down the "pipeline." Table 13 summarizes the spring 2014 career exploration activities that sites reported in the survey. Ten sites reported completing one or more career exploration activities. The most common activity was hosting speakers from industry or alumni (9 sites), followed by speakers from the community college (7 sites). Some sites (4) also facilitated career exploration field trips. Other activities included career counseling and incorporating career exploration into STEM course curricula.

"SSA has actually taught me more about my major and showed me a lot more potential jobs. It focuses more on seeing what you can do with a STEM career as opposed to just giving you the classes you need for a STEM degree."
STCC SSA student

Table 13: Career Exploration Activities, Frequency, Spring 2014

N=14	**Count**				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
Speakers from industry or alumni	5	4	0	5	0
Speakers from community college	5	2	1	6	0
Field trips	2	2	1	9	0
Other career exploration activities	2	3	1	5	3

SSA academic programs and curriculum development, spring 2014. Table 14 summarizes SSA sites' academic program and career development activities in spring 2014. Figure 2 shows the number of sites that completed activities in this area, with or without SSA support. Almost all sites (13) reported implementing at least one of the listed activities, and the most common activity selected was STEM curriculum development and revision (10 sites).

Most sites developed or revised curricula for their upcoming summer programs. In interviews, many sites reported focusing their curriculum development efforts on contextualizing their math or college skills curricula for STEM disciplines. Some sites also redesigned or developed new STEM courses with the support of SSA funding, several through cross-disciplinary faculty collaboration. For example, Berkshire Community College initiated a multidisciplinary solar panel project involving hands-on activities with accompanying curriculum. Other sites developed or revised curricula in life sciences, biotechnology, computer science, or math. For example, several sites developed or adapted a modularized, "self-paced" developmental math curriculum to use in SSA-sponsored courses. Some spring curriculum development activities were completed without SSA support or funding.

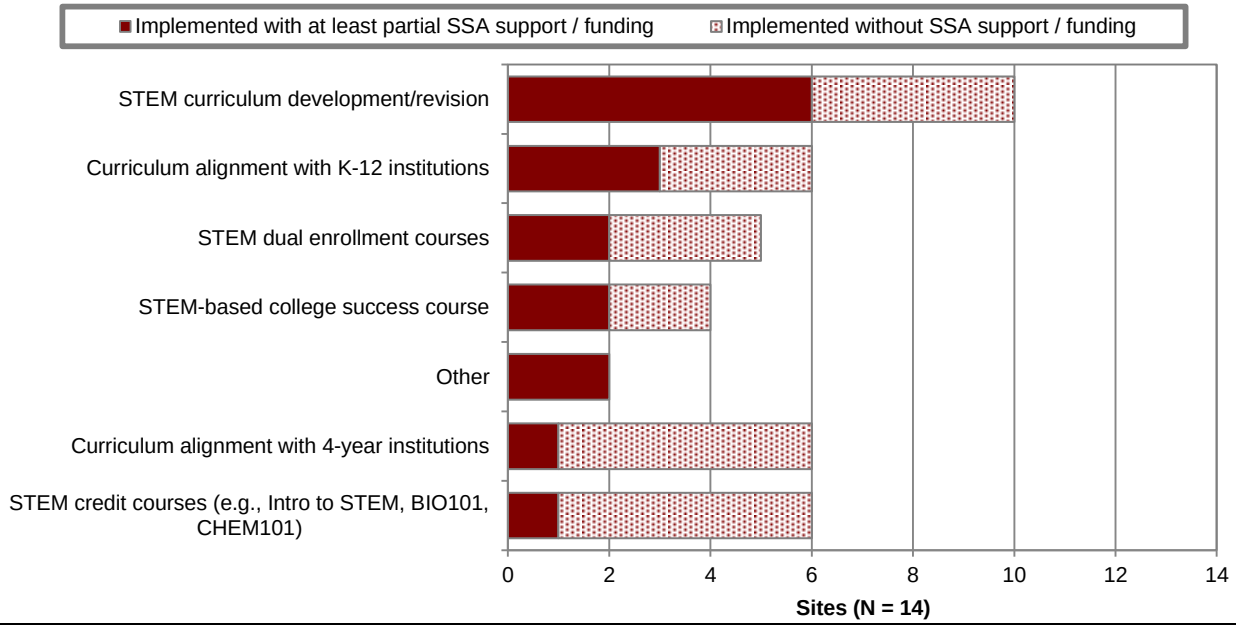
One Student's Perspective on Contextualization
"When I think of math, it's like numbers, but when you put it in a biology way or a chemistry way, I'm like, 'Oh, okay, this makes sense.' If you put the same question as just numbers, I'm like, 'Why do I need this?' … They should include the science part in the math part. I think, to students, math makes more sense that way, when you see it in real life, how it applies."
Bunker Hill SSA student

A few sites planned to connect college and high school faculty to work on curricular alignment or were connecting community college and 4-year college faculty to facilitate transfer alignment. For example, Middlesex Community College hosted a well-received "STEM Educator Institute" for high school and college STEM faculty, focused on curriculum alignment and expectations for student learning.

Table 14: Academic Programs and Curriculum Development, Frequency, Spring 2014

N=14	**Count**				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
STEM curriculum development/revision	6	4	1	3	0
Curriculum alignment with K-12 institutions	3	3	1	7	0
STEM dual enrollment courses	2	3	4	5	0
STEM-based college success course	2	2	1	9	0
Other	2	0	0	5	7
Curriculum alignment with 4-year institutions	1	5	1	6	1
STEM credit courses (e.g., Intro to STEM, BIO101, CHEM101)	1	5	2	6	0

Figure 2: Academic Programs and Curriculum Development, SSA Funding, Spring 2014



SSA Student Support Services, spring 2014. In interviews, almost all of the sites discussed plans to offer some form of enhanced student support services as part of SSA. Plans included increased tutoring and career advising, connecting students to faculty advisors or discipline-specific advisors, and hosting facilitated study groups. A few sites planned to designate an individual who would serve in several student support roles, including academic advisor, mentor, and career coach. Many sites planned to use technological tools to enhance student support, including advising software, online tools for career exploration or mentoring, videos with discipline-specific orientation information, and social media for communicating with students.

Most of the sites' student support plans also included activities designed to cultivate a greater sense of connection within cohorts of students. The most common strategies involved building cohort connections through group work in courses or through linked courses (e.g., "learning communities") and creating group-based support activities such as study groups, cohort meetings for enrichment activities (e.g., a career speaker series), group-based advising, or a physical space where students could gather to study or access support services. One site hoped to give students a greater sense of connection by recruiting students of similar age and backgrounds.

> *"I like the people here, too. Especially when you're wandering around aimlessly trying to figure out where you're supposed to go. Every single time I've had someone come up to me and say, 'What are you looking for? How's it going?'"*
> *Bristol SSA student*

SSA student support services – mentoring, advising, and coaching, spring 2014. Table 15 summarizes spring mentoring, advising, and coaching activities. Figure 3 shows the number of sites reporting activities in this area, with or without SSA funds.

Most sites conducted or planned at least one of the listed activities under the category of mentoring, advising, or coaching. Many did not use SSA funds for these activities. The most common activities were career mentoring, advising, or coaching and faculty advising (11). Fewer sites implemented peer mentoring or advising (7) or using advising software (5). North Shore Community College reported that development of their STEM peer mentor program was an example of "a great collaborative success" between its academic and administrative teams. Quinsigamond Community College reported on their efforts to impart a "personal touch" in their advising by using advising software to identify students who had not yet registered for the following semester, and then paying faculty members to personally call students in their departments to encourage them to register.

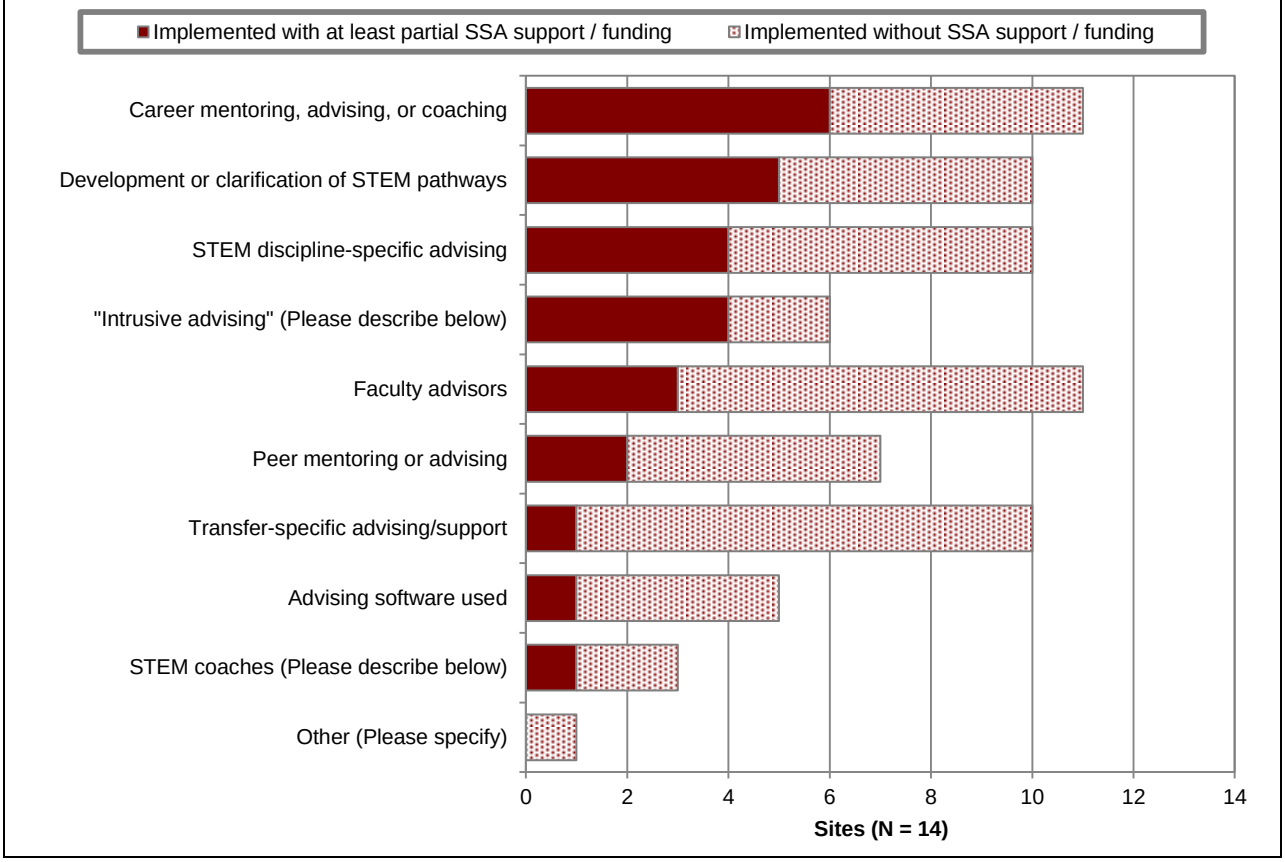
"You know you're not going to fall through the cracks."
Berkshire SSA student

When speaking with UMDI evaluators in the spring, almost all of the sites had strategies in place designed to clarify to students the critical steps required for degree completion, transfer opportunities, or a STEM career. The details of those strategies varied between sites. About half of the sites discussed ways to provide students with a clear course plan. One site required students to generate their own plan before completing their first 20 credits. A few sites had pre-generated course sequence maps that mark milestone courses and schedules. At a couple of sites, advisors helped students make plans using advising software, which automatically generates reminders for students and advisors.

Table 15: Mentoring, Advising and Coaching Activities, Frequency, Spring 2014

N=14	**Count**				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
Career mentoring, advising, or coaching	6	5	0	3	0
Development or clarification of STEM pathways	5	5	2	2	0
STEM discipline-specific advising	4	6	2	2	0
"Intrusive advising"	4	2	1	7	0
Faculty advisors	3	8	1	2	0
Peer mentoring or advising	2	5	1	6	0
Transfer-specific advising/support	1	9	1	3	0
Advising software used	1	4	1	6	2
STEM coaches	1	2	2	8	1
Other		1		5	8

Figure 3 Mentoring, Advising and Coaching, SSA Funding, Spring 2014



SSA student support services – orientation, tutoring, and test prep, spring 2014. Table 16 summarizes spring orientation, tutoring, and test preparation activities. This category encompassed a range of activities, from campus orientations to Accuplacer test preparation. Most sites (11) used Accuplacer testing but few sites used SSA funds for this. Six sites used SSA funds to support student orientation activities with STEM enhancements. Berkshire Community College included parents in its campus orientation, and reported that this was a successful strategy.

Table 16: Orientation, Tutoring and Test Prep, Frequency, Spring 2014

N=14	**Count**				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
Student orientation with STEM enhancements	6	1	2	5	0
Professional tutoring	5	5	0	4	0
Accuplacer testing	3	8	1	2	0
Peer tutoring	3	5	1	5	0
Facilitated study groups	1	3	2	7	1
Accuplacer test prep	0	7	1	6	0
Other	0	0	0	4	10

SSA student support services – financial or physical resources, spring 2014. Table 17 summarizes sites' spring activities related to financial and physical resources. Most sites provided some financial assistance, such as tuition assistance, books and supplies, or enrollment incentives. Enrollment incentives ranged from scholarships to tote bags.

At the time of the spring interviews, many sites mentioned existing physical "centers" of student support services and/or study spaces to support SSA students (and others). A few sites had set aside study areas specifically for STEM students that were staffed by tutors or faculty. A couple of sites had more comprehensive support centers (one specifically for STEM students) that included career and educational advising, group and individual coaching or tutoring, and space to study.

Table 17: Financial and Physical Resources, Frequency, Spring 2014

N=14	**Count**				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
Financial support for books, supplies, etc.	4	4	2	3	1
Financial assistance (including tuition or fee waivers or stipends)	3	4	1	5	1
Enrollment incentives	3	0	1	8	2
Physical study space provided	2	5	0	6	1
Other	0	0	1	3	10

SSA planning, professional development, and infrastructure enhancements, spring 2014. Table 18 summarizes spring activities related to planning, professional development, and infrastructure enhancements. Most sites hired staff and convened a STEM or SSA advisory group. Many sites reported that dedicated staff was key to effective program implementation. Staff organized events, planned summer programs, recruited students, and managed day-to-day paperwork. Advisory groups also played an important role. Quinsigamond and Berkshire Community Colleges noted that they had active advisory groups which helped set priorities and design programs.

Nine sites provided professional development for their faculty, and four sites provided professional development for K–12 teachers. Two sites used SSA funds to purchase advising, career focus, simulation, or other software.

Table 18: Planning, Professional Development and Infrastructure Enhancements, Frequency, Spring 2014

N=14	**Count**				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
Hire SSA staff	10	1	2	1	0
STEM or SSA advisory group convened	8	1	1	3	1
Professional development for college faculty	4	5	1	4	0
Development of lab or instructional space (including staffed study space)	4	2	1	7	0
Obtain advising, career focus, simulation, or other software	2	3	1	8	0
Professional development for K-12 teachers	1	3	2	8	0
Other	1	0	0	4	9

Summer 2014 Activities: Summer Bridge and Other Summer Activities

Summer activities were a key part of every site's SSA implementation, though they varied in goal, size, and structure. At almost every site, SSA funding supported activities aimed to promote STEM interest, build college readiness, and accelerate academic progress. Many sites hosted summer bridge or academy programs that combined all three of these elements. Several sites used SSA funding to support multiple summer activities that each included one or two of these elements. Every site built STEM career exploration and career awareness into their summer programs. The majority of sites included math remediation. Most offered students financial support for summer participation and a few offered stipends or other completion incentives. A couple of sites offered financial aid to STEM students near degree completion. Sites also worked to enhance student support services through additional advising, tutoring, or mentoring. Half of the sites offered STEM coursework. After math, engineering was the most common discipline, followed (in descending order) by computer science, biotechnology, laboratory and life sciences, manufacturing, robotics, environmental science, and clinical or health sciences.

This sub-section summarizes sites' responses about their summer activities. Snapshots of selected summer programs visited by UMDI are included at the end of this section. Summer program goals, as reported by the sites, are included in Appendix P.

Activities funded partially or fully through SSA award, by site, summer 2014. Table 19 summarizes, by site, summer activities funded by SSA. In the survey, sites were asked to identify activities occurring at their campus from a list of options and whether or not they were funded in full or in part through SSA. Table 10 shows only summer activities that sites indicated were funded through the SSA award. Sites' activities in these areas that were not funded through SSA are not captured in this table. In the sections that follow, details on each topic will be provided.

Table 19: Activities Funded Partially or Fully Through SSA Award, by Site, Summer 2014

	Total sites	Berkshire	Bristol	Bunker Hill	Cape Cod	Greenfield	Holyoke	Mass Bay	Massasoit	Middlesex	Mt. Wachusett	North Shore	Northern Essex	Quinsigamond	STCC
2.1 Mentoring, Advising, or Coaching															
Development or clarification of STEM pathways	7	x					x	x	x	x			x	x	
STEM discipline-specific advising	11	x	x	x		x		x	x	x	x	x	x	x	
Faculty advisors	6			x		x		x	x					x	x
"Intrusive advising"	6	x	x			x				x	x			x	
Transfer-specific advising/support	4		x	x			x					x			
STEM coaches	4			x		x								x	x
Peer mentoring or advising	9	x		x			x		x	x	x	x	x		x
Career mentoring, advising, or coaching	9		x	x		x	x	x	x		x		x	x	

Table 19: Activities Funded Partially or Fully Through SSA Award, by Site, Summer 2014															
	Total sites	**Berkshire**	**Bristol**	**Bunker Hill**	**Cape Cod**	**Greenfield**	**Holyoke**	**Mass Bay**	**Massasoit**	**Middlesex**	**Mt. Wachusett**	**North Shore**	**Northern Essex**	**Quinsigamond**	**STCC**
Advising software used	0														
Other	0														
2.2 Orientation, Tutoring, and Test Prep															
Student orientation with STEM enhancements	7	x			x	x	x	x				x		x	
Professional tutoring	9	x	x		x	x	x		x		x		x		x
Peer tutoring	9	x		x	x		x			x	x	x	x		x
Facilitated study groups	4				x	x					x				x
Accuplacer testing	7	x	x		x					x		x	x		x
Accuplacer test prep	4	x							x	x					x
2.3 Financial or Physical Resources															
Physical study space provided	4				x			x	x		x				
Financial support for books, supplies, etc.	12	x	x	x	x		x		x	x	x	x	x	x	x
Financial assistance (including tuition or fee waivers or stipends)	12	x	x	x	x	x	x		x	x	x	x		x	x
Enrollment incentives	9	x	x	x			x		x	x	x			x	x
2.4 Curriculum Development															
Curriculum alignment with K-12 institutions	1									x					
Curriculum alignment with 4-year institutions	1									x					
Collaborative course design with interdisciplinary faculty	6	x					x	x		x				x	x
Development/revision of STEM credit course(s) (e.g., Intro to STEM, BIO101, CHEM101)	5		x			x	x	x						x	
Development/revision of developmental math course(s)	7			x		x	x		x		x	x		x	
Development revision/of dual-enrollment course(s)	4					x	x		x	x					
Other	0														

Table 19: Activities Funded Partially or Fully Through SSA Award, by Site, Summer 2014															
	Total sites	**Berkshire**	**Bristol**	**Bunker Hill**	**Cape Cod**	**Greenfield**	**Holyoke**	**Mass Bay**	**Massasoit**	**Middlesex**	**Mt. Wachusett**	**North Shore**	**Northern Essex**	**Quinsigamond**	**STCC**
2.5 Planning, Professional Development, and Infrastructure Enhancements															
Professional development for STEM faculty advisors	3		x					x						x	
Professional development for STEM faculty instructors	6		x			x	x	x	x					x	
Infrastructure enhancements	8	x				x	x	x	x	x	x		x		
Other	1					x									
4.1 Summer 2014 Career and Program Exploration															
STEM hands-on experiences	11	x	x	x			x		x	x	x	x	x	x	x
Career exploration oriented field trip(s)	10	x	x	x			x	x	x		x	x		x	x
Career exploration oriented speaker(s)	13	x	x	x	x	x	x	x	x	x	x		x	x	x
Student access to career exploration software	5					x	x		x				x	x	
Career-exploration internships (Paid)	2							x		x					
Career-exploration internships (Unpaid)	0														
Academic program exploration	9			x		x	x	x	x	x		x	x	x	
Other	0														
4.2 Summer 2014 College Readiness Activities															
Refresher courses before placement test (e.g., math boot camp)	7	x			x	x			x	x		x			x
Accuplacer testing	5	x	x		x				x	x					
Accuplacer test prep	3				x				x						x
STEM-based college success skills workshops/course	11	x	x	x		x	x		x	x	x		x	x	x
Other	1												x		

Table 19: Activities Funded Partially or Fully Through SSA Award, by Site, Summer 2014															
	Total sites	**Berkshire**	**Bristol**	**Bunker Hill**	**Cape Cod**	**Greenfield**	**Holyoke**	**Mass Bay**	**Massasoit**	**Middlesex**	**Mt. Wachusett**	**North Shore**	**Northern Essex**	**Quinsigamond**	**STCC**
4.3 Summer 2014 College Academic Activities															
Developmental math courses: STEM contextualized	8		x	x			x	x	x	x			x		x
Developmental math courses: STEM project-based learning	4						x		x	x					x
Developmental math courses: Self-paced with faculty/embedded tutors	11	x	x		x	x	x	x	x	x	x		x		x
Developmental math courses: Computer-based curriculum	10	x	x		x		x	x	x	x	x		x		x
Developmental math courses: Other	1	x													
STEM dual-enrollment courses	5				x	x	x				x	x			
STEM credit courses (e.g., Intro to STEM, BIO101, CHEM101)	7		x			x	x	x	x					x	x
Collaborative learning	10	x	x				x	x	x	x	x		x	x	x
Experiential learning	9	x					x	x	x	x	x		x	x	x
Research experience	4						x		x	x	x				
Learning communities	3		x						x		x				
Other	1						x								

SSA program applications, acceptance, enrollment and completion, summer 2014. SSA supported over 700 students in summer bridge programs, STEM courses and workshops, and internships during summer 2014. Individual summer SSA activities varied widely in their numbers of participants, from 5 or 6 students completing a semester-long or several-weeks-long math course, to 150 in a one-hour computer coding workshop. Most activities or programs were completed by between 5–35 participants. Most sites accepted all applicants while about a third of the sites were selective, accepting between 44–94% of applicants. Program completion rates were high across all sites. Only a couple of programs had rates below 80%. The majority of programs had 90% or higher completion rates. Details on the number of students who applied, were accepted, enrolled, and completed each sites' programs are in Appendix Q .

Site highlight. Although many sites struggled with recruitment, Springfield Technical Community College's concentrated spring recruiting effort yielded a notable 120 applications for its summer program. However, it experienced a sharp drop-off between students who were accepted (65) and those who subsequently agreed to participate (33). The site reported that this could have been due to the intensive 40-hour a week schedule. The SSA coordinator noted the high retention among the students who did participate and commented that a strength of STCC's recruitment process was the clear

communication of program requirements up front. Students "knew what they were getting into from the beginning," she said, and therefore could appropriately self-select into or out of the program.

SSA program attendees, by type, summer 2014. Table 20 summarizes the audiences participating in SSA summer programs. Recent high school graduates participated in SSA at most sites and many sites' SSA participants also included current community college students. "Other" attendees were primarily adult learners.

Table 20: SSA Program Attendees, Summer 2014

N=14

Attendee	# Sites
Recent high school graduates	12
Current community college students	11
Current high school students	5
Middle school students	2
Other prospective community college students	5
Other	5

SSA academic activities, summer 2014. Table 21 summarizes SSA sites' summer academic activities. All SSA sites offered some academic activity over the summer. The majority of sites offered developmental math courses, often taught with modularized curricula that were "self-paced" or computer based (e.g., using MyMathLab). These classrooms typically had multiple instructors present, to work with students one-on-one or create "pull out" sessions for groups of students struggling with the same concept. Typically, modularized math curricula were not contextualized for STEM. At a few sites, STEM-contextualized math courses were taught in a workshop-type interactive learning environment (sometimes supplemented with modularized computer-based homework).

"I've finished two years of math in two semesters. That is a great feeling because, as an engineering major, the requirements list just goes on and on and on ... and they all require calculus to be finished before you can actually take those classes."
Bunker Hill SSA student

Many sites (11) offered STEM credit courses and most sites (12) focused on creating collaborative and experiential learning opportunities. Most STEM courses supported through SSA were offered together with enrichment activities (or courses) such as college success skills training and additional student support services. Although only a handful of sites offered research experiences, these were notable among students and SSA staff as influential and positive learning experiences.

"Everybody has different learning styles. It's hard to find a class that is hands on and this one fits my learning style."
Holyoke SSA student

Table 21: Academic Activities, Frequency, Summer 2014					
N=14	**Count**				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
Developmental Math courses					
Self-paced with faculty/embedded tutors	11	2	0	1	0
Computer-based curriculum	10	3	0	0	1
STEM contextualized	8	2	1	2	1
STEM project-based learning	4	3	0	6	1
Other	1	0	0	1	12
Other Academic Activities					
Collaborative learning	10	2	1	1	0
Experiential learning	9	3	0	2	0
STEM credit courses (e.g., Intro to STEM, BIO101, CHEM101)	7	4	0	3	0
STEM dual-enrollment courses	5	1	1	7	0
Research experience	4	2	0	8	1
Learning communities	3	1	0	10	0
Other	1	0	0	3	10

SSA career and program exploration activities, summer 2014. Table 22 summarizes sites' summer activities related to career and program exploration as reported in the survey. STEM career and program exploration activities were part of every site's SSA summer programming. Almost every site provided career exploration-oriented speakers (13) and held STEM hands-on experiences (12). These activities were among those commonly praised by students in focus groups, who appreciated exposure to career options they had never heard of or considered. Career exploration-oriented field trips were another common activity, and students also generally found these to be enriching experiences. Activities related to building STEM career awareness included conducting workshops to meet science professors, introducing adult learners to STEM program options, guiding students through planning for STEM majors, and exploring STEM majors as part of the summer bridge program. Although internships were not reported as a common strategy, students who participated in them found them to be valuable learning experiences.

"[Science] is more broad than I thought. Science is incorporated into a lot of things I didn't even realize"
Massasoit SSA student

Table 22: Career and Program Exploration Activities, Frequency, Summer 2014

N=14	**Count**				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
Career exploration oriented speaker(s)	13	0	0	1	0
STEM hands-on experiences	11	1	0	2	0
Career exploration oriented field trip(s)	10	0	0	3	1
Academic program exploration	9	1	0	1	3
Student access to career exploration software	5	3	1	4	1
Career-exploration internships (Paid)	2	1	0	11	0
Career-exploration internships (Unpaid)	0	2	0	11	1
Other	0	0	0	1	13

SSA college readiness activities, summer 2014. Most sites supported college readiness activities through SSA. The most common activities were STEM-based college success skills workshops or courses, which many students commented were helpful as they transitioned into college. These workshops and courses ranged in format from occasional enrichment activities provided by peer mentors to a three-credit, multi-week course. In focus groups, students identified several elements of these courses and workshops that they had found valuable, including note-taking skills, familiarization with college offices, and learning the college's online systems. Most sites also offered refresher courses before placement tests (e.g., math boot camp).

"This class [intro to computer systems engineering] was a good way to get back into college because I had to make a dedicated time commitment, but the course is mostly hands on. The [college success course] was an added bonus to the class. It really helped me in easing into the college and makes returning to college less scary. "
Quinsigamond SSA student

SSA activities to support transfer awareness, summer 2014. In the survey, sites were asked if they promoted transfer awareness and readiness in STEM fields through SSA.

- Ten sites reported activities designed to promote transfer awareness and readiness.
- Three sites visited 4-year colleges where they learned about transfer requirements.
- Three sites had presentations to increase transfer awareness.[8] For example, Holyoke Community College had a workshop co-facilitated by the STEM career counselor and the college transfer counselor.
- Three sites offered personal advising on transfers.

At MassBay Community College, their SSA-supported Women in Engineering program allowed their STEM students to spend a day visiting Northeastern University's engineering program. One student who was on the trip commented that it made the possibility of transfer seem clearer: "They break down career pathways that are available …. It gave me a better foundation for what I need to get done [in order to transfer]."

"It's great to have somebody to talk to who has been there because I don't have somebody like that in my life. [Now] I feel like it's there—it's possible, and I can do it."
MassBay student participating in an industry mentorship program discussing transfer to a 4-year school

Students in Middlesex Community College's SSA research internships and workshops (offered in partnership with UMass Lowell), commented that transfer to a 4-year school seemed much more attainable after having those experiences.

[8] Greenfield, Holyoke, Middlesex.

SSA student support services, summer 2014. Sites used SSA funding to initiate or expand a variety of student support activities during the summer. The most common activities were financial support, advising, and tutoring. The next four sections summarize various aspects of student support services at SSA sites during summer 2014.

SSA student support services – mentoring, advising, or coaching, summer 2014. Table 23 summarizes summer mentoring, advising, and coaching activities as reported in the survey. Between activities funded through SSA and through other sources, almost all sites had STEM discipline-specific advising (12) and peer mentoring or advising (12). A few sites had a designated STEM or SSA coach or advisor who helped students navigate issues including school-work-life balance, enrollment and financial aid, academic pathways, and career choices. Quinsigamond Community College had an integrated career and academic advising system, supported by software that allows advisors to monitor student's micro-level academic progress and communicate with faculty. Students at MassBay Community College created visual flowcharts with their advisors to map out their paths to program completion. According to students, these flowcharts made planning and scheduling very straightforward and "easy to follow, step by step."

Table 23: Mentoring, Advising and Coaching, Frequency, Summer 2014

N=14	Count				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
STEM discipline-specific advising	11	1	1	1	0
Peer mentoring or advising	9	3	1	1	0
Career mentoring, advising, or coaching	9	2	1	2	0
Development or clarification of STEM pathways	7	4	0	2	1
Faculty advisors	6	4	2	2	0
"Intrusive advising"	6	2	1	4	1
Transfer-specific advising/support	4	6	1	2	1
STEM coaches	4	2	2	6	0
Advising software used	0	6	0	8	0
Other	0	0	0	3	11

SSA student support services – orientation, tutoring, and test prep, summer 2014. Table 24 summarizes summer orientation, tutoring, and test preparation activities as reported in the survey. Almost all sites (13) had peer tutoring and Accuplacer testing. At several sites, peer and/or professional tutors were embedded in classrooms. Faculty commented that this embedded support made it easier for them to engage with experiential learning and hands-on activities in class. At a few sites, study groups were facilitated by faculty, at others by professional tutors, and at others still by student "supplemental instruction" leaders. A few sites noted that orientations needed to be tailored to the type of student—specifically, that high school students needed an orientation that covered different information than incoming college students. These sites planned to implement these tailored orientaitons in Year 2.

Table 24: Orientation, Tutoring and Test Prep, Frequency, Summer 2014

N=14	**Count**				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
Peer tutoring	9	4	0	1	0
Professional tutoring	9	2	1	2	0
Accuplacer testing	8	6	0	1	0
Student orientation with STEM enhancements	7	3	1	3	0
Accuplacer test prep	5	5	0	5	0
Facilitated study groups	4	2	2	6	0
Other	2	0	0	2	10

SSA student support services – financial or physical resources, summer 2014. Table 25 summarizes sites' summer activities related to financial and physical resources.

Most sites used SSA funds to provide tuition assistance or pay for books and supplies. Four sites provided stipends to students participating in summer programs. These stipends ranged from $250 to $1,750. Many sites (9) provided incentives for program enrollment such as free lunches, paid student internships, t-shirts, or books. Quinsigamond Commuity College gave guitars to students taking a "build your own electric guitar" class and desktop computers to students who built the devices while enrolled in an Introduction to Computer Systems Engineering Technology course. Although students could attend summer programs for free at almost every site, at a few sites, students needed to purchase their own textbooks or access codes for math software. At one site, students paid normal tuition and fees for summer SSA courses.

"The fact that the course was of no charge … that absolutely was … THE deciding factor for me. I would not have considered it seriously coming from my position."
Quinsigamond SSA student

A couple of sites offered scholarships to STEM students who were near program completion. In interviews, administrators explained that the goal of these scholarships was to address the difficulty some students have with scheduling a full 15-credit course load during the academic year or, in some cases, students running out of financial aid before the summer. Administrators said that this common issue can extend students' time to completion and sometimes throws off their course sequencing.

In focus groups, students who had access to STEM-specific study spaces repeatedly commented on their value. Typically, students felt that such spaces created a sense of belonging—a place where they could build relationships, receive support, and feel special.

"I like the idea of being in a class with other students that are in the same field as me, because just in case I go into a science course or engineering course and you see somebody that you recognize, that could be your study partner. It could benefit you later on, which I like."
Bunker Hill SSA student

Table 25: Financial and Physical Resources, Frequency, Summer 2014

N=14	**Count**				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
Financial support for books, supplies, etc.	12	0	1	1	0
Financial assistance (including tuition or fee waivers or stipends)	12	0	1	0	1
Enrollment incentives (please describe below)	9	0	2	2	1
Physical study space provided	4	7	1	1	1
Other	0	0	0	1	13

SSA student support services – required activities, summer 2014. Sites were asked whether they required students to participate in any support services and/or activities as part of summer programming. Many sites (8) required students to participate in support services. Greenfield, Mt. Wachusett, North Shore, and Springfield Technical Community Colleges had mandatory study halls or studios. Bristol, Cape Cod, North Shore and Springfield Technical Community Colleges required students to meet with an advisor or peer mentor. Berkshire, Greenfield, Middlesex Community Colleges held mandatory events related to student support services. The rest (6) did not require participation, however some sites (4) described optional support services they offered. These included one-on-one advising, tutoring, and peer mentors.

"The thing I like about it is … we can all raise our hands and answer or ask a question. It is kind of like a discussion even though math isn't really a discussion topic."
STCC SSA student

In focus groups, students said they generally appreciated the required study or support services time – although they did not always appreciate when it was scheduled in the day. For example, when asked what helps them keep up with an accelerated work load, one student at Springfield Technical Community College said, "being able to do my homework right after class and with the teacher there – that helps." Another student said a benefit was that they "often don't have to take homework home" because they were given enough time in study halls to finish their work. However, some students felt captive in study halls in the middle of the day, because afternoon classes meant they could not leave even when they had finished their work.

SSA student support services – activities to support peer and faculty relationships, summer 2014. Two open-ended questions in the survey asked sites about their efforts to create or foster peer-to-peer and student-faculty relationshiops through SSA.

Sites were asked whether they designed activities and supports to help students build relationships with other students, including attempts to create a sense of cohort cohesion. Most sites (9) organized activities with an explicit goal of developing a sense of a cohort. These included group projects, a scavenger hunt, and shared lunches. Other sites (3) described a more informal approach, where the intensity of the program and the hours spent in class together resulted in strong peer relationships. For example, students at Bunker Hill Community College who participated in an intensive accerlated math program through SSA over the summer were invited to participate in a 4-day workshop introducing them to a STEM discipline before the fall semester started. These workshops offered students an opportunity to re-engage with their summer cohort before the semester started and also to prepare for their first STEM courses at the same time.

Sites were also asked whether they designed activities and supports to help students build or strengthen relationships with faculty and staff. Most sites (11) reported activities designed to support relationships with faculty. Some of these sites (8) had activities with an explicit goal of developing relationships with faculty. These included social events, mentoring, faculty selection and staff participation in the classroom. Other sites described a more informal approach, where students developed relationships throughout summer programs.

SSA curriculum development, summer 2014. Table 26 summarizes summer curriculum development activities reported on the survey. Developmental math courses were the most common development/revision activity and the most likely to be SSA funded. Additionally, many sites worked on collaborative course design with interdisciplinary faculty. Few sites used SSA funds for curriculum alignment with 4-year institutions, however many sites were doing this without SSA funds.

Table 26: Curriculum Development, Frequency, Summer 2014					
N=14	**Count**				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
Development/revision of developmental math course(s)	7	2	1	4	0
Collaborative course design with interdisciplinary faculty	6	1	1	5	1
Development/revision of STEM credit course(s) (e.g., BIO101, CHEM101)	5	3	2	4	0
Development revision/of dual-enrollment course(s)	4	3	2	5	0
Curriculum alignment with K–12 institutions	1	2	2	9	0
Curriculum alignment with 4-year institutions	1	7	0	6	0
Other	0	0	0	2	12

SSA planning, professional development, and infrastructure enhancements, summer 2014. Table 27 summarizes sites' summer activities related to planning, professional development, and infrastructure enhancements. Of these, infrastructure enhancement was the most common activity. The most common infrastructure enhancements were building or upgrading labs (e.g., math, computer). In addition, sites improved science equipment (e.g., microscopes) and purchased tablets for classes.

In reflections on the summer, especially looking ahead to Year 2 budget reductions, many sites felt that infrastructure improvements had been sustainable investments that would continue to pay off for future cohorts of SSA and other STEM students.

Table 27: Planning, Professional Development and Infrastructure Enhancements, Frequency, Summer 2014

N=14	Count				
Activity	Implemented with at least partial SSA support / funding	Implemented without SSA support / funding	Planned, but not implemented spring 2014	Did not take place	I don't know / missing
Infrastructure enhancements	8	0	0	6	0
Professional development for STEM faculty instructors	6	1	4	3	0
Professional development for STEM faculty advisors	3	2	3	6	0
Other	1	0	0	1	12

SSA programs – groups involved in implementation, summer 2014. The administrative structure for SSA was similar for most sites. The greatest variation was in the structure and role of the advisory group. The primary SSA administrator at 14 out of 15 sites worked out of academic affairs. One worked out of student affairs. Eleven of the 15 administrators were deans and the remaining were directors or vice presidents.

At the time of the spring interviews, every site planned to have a coordinator in charge of summer SSA programming. Some of these coordinators were to be faculty and others staff. In most cases, these coordinators also served as more general SSA or STEM program coordinators or managers. Two sites planned to have coordinators only for their summer programming, although, due to bureaucratic challenges, one site was unable to hire a coordinator for the summer.

The nature of the committees formed to advise, implement, or steer SSA work varied by site. A few had broad coalitions across many college divisions, while others had smaller implementation groups or executive committees. A couple of sites had nested SSA within larger STEM-focused projects that had their own advisory boards and did not have an SSA-specific advisory group. Finally, a few sites did not have formal committees or advisory boards, but nevertheless said that implementing SSA was a "collaborative process."

Table 28 and Table 29 summarize survey results showing the various groups that were involved in implementation. Every site that completed the survey reported faculty member involvement. More than half selected the category "other," for which many sites reported community college administration and staff involvement.

Each of these groups played different roles in program implementation. Faculty members were predominantly involved as classroom instructors, in program planning, or as curriculum designers. Current community college students were involved as mentors and study facilitators or tutors. Industry representatives served as speakers or field trip hosts. Alumni were mentors or speakers.

Table 28: Groups Involved in Program Implementation, Summer 2014

N=14

Group	Number of sites
Faculty members	14
Other	11
Current community college students	9
Industry representatives	8
Alumni	5
Community members	5

Table 29: Other Groups Specified as Involved in Program Implementation, Summer 2014

N=14

Other involved group	Number of Sites
SSA or community college staff	8
Community college administration	4
4-year college	2
High school staff	1
External consultant	1

Summer Site Visits

UMDI evaluators visited five of the fifteen STEM Starter Academy sites in July and August of 2014: Bristol, Holyoke, Middlesex, Quinsigamond, and Springfield Technical Community Colleges. As limited resources circumscribed the scope of data collection, UMDI evaluators selected sites with the aim of capturing a diversity of program structures and features while including some geographic variation. The visits had some common features—observation of SSA summer activities, interviews with key program staff, and focus groups with SSA students—but varied widely in their details, including the specific activities observed, the people with whom we spoke, and the settings in which we spoke with them. For a complete description of site selection methods and data collection and analysis procedures, please see the Methods section of this report.

With field data from only a subset of SSA sites so far, UMDI will not attempt to draw broader conclusions about the SSA initiative. Instead, the goal of this section of the report is to provide a snapshot of the sites visited and the variety of activities and practices observed. This section is organized into two parts: an overview of the broad similarities and differences between the sites, and summaries of each of the five sites. The summaries reflect data collected during the site visits as well as interview and survey data.

Part 1: Variations on Common practices. SSA implementation at the five summer site visit sites had common features—for instance, all sites offered some variant of a free summer bridge program with academic support, career and academic pathway exploration, college success skills training, and completion incentives. In the details of these features and others, however, SSA implementation at the five sites differed considerably. These differences started with the length and number of programs offered at each site. Summer bridge programs ranged from 2 to 11 weeks in length and from half days to full days. At four sites, the summer bridge program was just one of two or more SSA-supported activities offered over the summer.

Aside from length, the features of summer bridge programs varied in their content, modality, and combination. Every site offered some college-credit coursework. At four sites, these were full-credit science courses, while at one site the course was a one-credit scientific thinking course. Likewise, college success skills training was part of every program, but the way it was incorporated varied across sites. Two sites combined STEM-contextualized college success skills credit-bearing courses with college-credit science classes and math coursework. A third site combined a non-contextualized one-credit college success course with a college-credit science class but without math coursework. The remaining two sites included college success skills as part of non-credit enrichment activities incorporated into the summer bridge. Academic support was provided at every site, often with tutors, teaching assistants, or peer mentors embedded in classrooms. Two sites mandated "study hall" time.

Site visits also revealed a few other variations on common practices related to completion incentives, advising, and math remediation. Every site offered students some sort of completion incentive, but these incentives varied in amount and in type. All sites offered students some kind of career and academic advising, but the division of labor among individual advisors varied across sites from career-specific counselors to more generalized "coaching," to advisors with specific career and academic advising roles. Finally, all but one site offered some form of math remediation over the summer, but the implementation varied not only in terms of how math was integrated into the summer program but also in the curriculum and pedagogical techniques used for teaching it.

Part 2: Site Summaries.

Bristol Community College (BCC). SSA implementation at BCC included three major branches: (1) learning communities that pair developmental math with a college success seminar, (2) a summer bridge program, and (3) financial aid to BCC students in STEM majors who are near degree completion to take coursework during the summer session.

The learning communities were piloted in the spring at each of BCC's three campuses. Courses were targeted to high school seniors and were offered in the evenings to accommodate their school schedules. Each learning community paired a STEM-contextualized college success seminar with a computer-aided developmental math course, for a total of four hours during one evening per week. Professional math tutors were available and students were required to participate in an extra hour of math tutoring each week. Students also received support from a STEM advisor and academic advisors. The learning communities were offered again in the summer at all three campuses, this time open to current community college students, high school students, and students who had started in the spring learning communities but who had not completed all the developmental math modules. The summer learning communities included the same courses as in the spring, but were offered across two days per week, for two hours each day (4–6 p.m.). In both the spring and summer learning communities, courses and books were free to students. Summer students who successfully completed both courses received a $250 book store voucher.

"I like getting a heads up about what coming to college is like. Waking up in the morning, knowing that you could skip the class, but you really shouldn't because the benefit is to you. I like that kind of responsibility."
Bristol SSA student

Incoming and current BCC students could join the summer bridge program, which included three college courses, STEM exploration activities, and STEM advising. The program ran for 11 weeks, 4 days per week from 8 a.m. to noon. Students took a math course (developmental or college algebra), a STEM-contextualized college success seminar, and a science course (developmental chemistry or biology for majors). STEM exploration activities included field trips and guest speakers. All students met with a dedicated STEM advisor throughout the summer. Courses were free, but students were required to purchase their science text books. Students who passed their summer bridge courses received a $500 book voucher for the BCC book store. Summer bridge program students created a new STEM club in the fall, which is co-advised by two STEM faculty.

Students from the summer bridge program said they appreciated the exposure to possible STEM careers, the support for transitioning to college, and the collegial atmosphere among the cohort of students. One student particularly enjoyed the guest speakers and how "you get to get a feel for all the different jobs and different types of work—the different things you can do." Some faculty also discussed career options and offered some advising during class, which students appreciated and wanted more of. Students also valued the early introduction to the college, which they felt gave them an advantage in terms of an easier transition. Part of that transition was feeling well supported by BCC and SSA staff, as one student said, "When you're … trying to figure out where you're supposed to go. Every single time I've had someone come up to me and say, 'What are you looking for? How's it going?'" A few students noted that they needed to learn to be proactive in asking for help, but that "anybody you ask is willing to help you." When they tried to do admissions or financial aid paperwork on their own, it felt "overwhelming." Finally, being in a cohort of students with similar motivations and interests was also a positive experience for students, with one student saying, "It's a cool atmosphere. Everyone is happy to be here … we put ourselves here."

When asked about challenges they faced in SSA, students were primarily interested in expanding the opportunities to explore STEM fields. Some wanted more exposure to computer science. Several were interested in internships or job shadowing experiences. A couple others wanted more field trips to see how STEM is applied "in real life." A couple of students had trouble with the early (8 a.m.) start time, but several said "it's not that bad," and all agreed that it was great to be done by lunchtime.

Holyoke Community College (HCC). The SSA programming at HCC falls into two main branches, defined primarily by their participating populations. An adult learners branch targets students in the Adult Basic Education (ABE) or Transitions to College & Careers (TCC) programs (including those who have GEDs and those who are still working on a high school equivalency certificate). A second branch targets current high school students as well as entering and current HCC students.

Concurrent with these two programs during the summer, HCC faculty teaching the summer bridge courses worked with other STEM faculty to collaboratively design a new STEM 101 class grounded in experiential learning. This course is meant to be a gateway course to a variety of STEM disciplines. It will be initially offered in the spring 2015 semester and will be one of the course offerings in HCC's SSA 2015 summer bridge.

Adult pre-STEM transition to college program. Adult learners were offered a free six-week "pre-STEM" summer program, which integrated several components into a course that met for six weeks, three days a week for three hours per day. The components included developmental math contextualized for sustainability and health careers, developmental reading and writing, college readiness skills, and career counseling. One day per week was a science lab day and students attended one STEM-themed field trip. The curriculum for the course was collaboratively designed and taught by instructors from the ABE program, instructors from the TCC program, and faculty from the Health and Natural Sciences department.

> *"They are teaching us one thing and then they are applying the math to that specific thing so you see how the math goes into it. … So everything's related. It's not that you're just learning some math just because that's what math is."*
> *HCC pre-STEM student*

Two sessions of the course were offered, one in the morning (with 15 students) and one in the evening (with 8 students). There were a minimum of three—and sometimes as many as five—instructors or staff in the classroom at any given time. An ABE TCC career counselor attended lab sessions and also provided workshops on basic and STEM-related job seeking skills. After the six-week summer pre-STEM session, it was anticipated that most students would spend another semester in the Transitions to College & Careers program before enrolling in credit-bearing classes at HCC.

During a focus group, participants said that instructors frequently utilized experiential and collaborative learning approaches, which was consistent with our observations. At the time we observed, the class was in the middle of a lesson on proportions using the application of a home energy audit. Students were applying math principles to make scale drawings of their living spaces. There was a hum of activity as students sat at tables of two and talked to each other while the four instructors circulated in the room. The students seemed engaged and interested in their work, and very willing to interact with their instructors.

> *"I've been out of school for a lot of years. And now my plant closed and I have to come back and get education and the math has changed. The symbols you use are different. I'm learning a lot in the math section so when I start in September the math course I take will not be quite as daunting."*
> *HCC pre-STEM student*

During the focus group, the ABE students offered primarily positive feedback about the program. Focus group participants said they valued the presence of multiple instructors in the classroom, which they said

(1) helped students stay accountable and on-task, (2) ensured that nobody was left behind, and (3) provided the benefit of hearing the same concept explained in different ways. The math content was challenging for these students, but they said they were receiving the kind of support they needed to make progress. In particular, they appreciated the contextualization of the math concepts and the hands-on nature of the learning environment. The application to sustainability was interesting to them and students said that knowing how math concepts could be applied gave them more motivation to learn. The adult learner students were very job- and career-focused and were glad that the class was tailored to those interests. Students were grateful for the free course and several commented that they would not have been able to attend if it had not been free.

STEM Starter Academy. The branch of HCC's SSA program that served high school and college students offered a 4.5-week compressed session in which students could choose from a four-credit earth/environmental science course, a four-credit engineering lab science course, or a self-paced developmental math class. Classes met three to five hours per day, in the mornings, four days per week with extra enrichment activities on Thursday afternoons (including career counseling and college success skill sessions with peer tutors). Most students attended field trips to a local hydropower plant and a high performance computing center. Throughout the summer, students had access to a tutoring center with professional tutors and a career counseling center with a highly engaged counselor and study space. All courses and materials were free, and students who met the instructors' attendance policies and completed with a minimum of a C- received a $250 stipend.

> *"I hadn't taken a science class and I saw this and I thought it was kind of interesting. The fact that it is free – the book is already paid for so you don't have to shell out $200-$300 for that – it's that little nudge that some people need to get going and kind of open our eyes to a different path. … I'm considering science now."*
> *HCC summer bridge student*

In the focus group, students said they valued the experiential-learning aspects of the science courses, which were each designed and taught by one primary instructor. The engineering course focused on logic and problem solving, primarily using puzzles, and also included some robotics and computer programming. The environmental science course involved regular outdoor field work and indoor lab work. Instead of final exams, students were required to do final projects, which they presented to each other during the final week of the course.

During our observation of the engineering-focused course, the students were all quietly engaged in their work: a worksheet of problems and puzzles. They sat in groups of three or four around tall lab tables, but were all working individually, some pushing around physical objects (similar to tangram pieces), others scribbling on the page, and others just staring at the page, trying to figure the problems out in their heads. The instructor was circulating, stopping to answer questions or check in. The students' excitement about the course material became evident when the instructor asked for a couple of student volunteers to demonstrate a physical puzzle they had solved earlier in the class. Two students volunteered very quickly and exhibited no hesitation in coming to the front of the room, tying their wrists together, and then demonstrating both the correct and incorrect solutions. They and the other students seemed eager to show someone this new piece of learning.

The self-paced nature of the math class was challenging for some students, but also allowed them to see their individual progress more clearly. In the focus group, one student noted, "You have to determine for yourself [whether] to study and to excel …. I have to challenge myself to just keep going ahead." Despite the challenge, this student was making progress by spending dedicated time outside of class in the tutoring center. The course used the MyMathLab software, which allows students to move through a series of modules (designed by HCC faculty) that were tailored to gaps in students' knowledge (based on

pre-tests). The class was co-taught by two instructors, and regularly had a professional tutor and a peer mentor present. The instructor said that students worked on a collaborative activity once per week. During the observation, the room was quiet as students worked individually at computers. Each of the two instructors was sitting with a student and offering one-on-one help. The students seemed hard at work and not distracted—an observation echoed later by one of the instructors who said that students in the SSA section of the course seemed more focused than those in previous sections he had taught.

Feedback from the focus group suggests that students particularly valued the experiential learning aspects of the courses (including the field trips), their accelerated pace, and the lack of costs. Students explained that the pace meant that there was less time to be bored with any one topic. It also meant that they were less likely to miss class because they knew that it would be hard to catch up. Although this group was somewhat less career-focused than the pre-STEM ABE group, students felt that the the career information they received was valuable and in particular they appreciated the self-assessment tools. Several students said they had not been considering a science major when they entered the program, but were leaving the program with a STEM interest.

Middlesex Community College (MCC). MCC used SSA funding to support a wide range of activities that included building STEM career and program awareness, increasing college readiness, creating opportunities for research experience, boosting preparation for math testing, and aligning STEM curriculum. SSA activities are run through MCC's existing Health & STEM Pathways Center, which offers students academic and career advising (by three dedicated staff), physical study space, and computer access. The Pathways Center also led the implementation of widespread Supplemental Instruction in STEM classes and a peer mentor program for STEM students.

In the spring, MCC held two career-oriented events. A career fair provided opportunities for MCC students to meet with local STEM-industry employers who had open entry-level positions. The organizers contacted 158 companies that had one or two job openings and 22 employers attended. About 100 students participated. A dedicated STEM career counselor, along with other Pathways Center staff met with students in advance, helping them generate or revise their resumes and prepare for conversations with employers. A career exploration event targeted students who were still exploring potential academic and career paths. Organizers aimed to help students see the connections between the academic programs and majors available at MCC and various STEM career paths. The event included hands-on STEM-field demonstrations by industry representatives, STEM faculty, and students. It also featured a panel of industry representatives who discussed the different types of jobs at their company. In addition to current community college students with undeclared majors, organizers invited high school students and their parents. At the event, MCC's summer offerings (summer bridge and math boot camp) were advertised.

> *"I definitely thought research was a much faster paced thing. … I thought I would just look it up, do it, and then it's done! But no, [it took] weeks just to produce one little thing. [The experience] makes me more interested in doing research. When you put that much time into it and then you finally find it or complete it, it's just that much more gratifying."*
> *MCC summer research intern*

MCC also organized and hosted a "STEM Educator Institute" in the spring, which was a curriculum alignment workshop between faculty from MCC, UMass Lowell, and area high schools that focused on the current state of alignment and strategies for improvement. MCC's K–16 associate dean led the effort, which engaged 30 teachers and faculty from various STEM and health fields, who were given stipends to participate in the three-day workshop. Participants offered positive feedback about the workshop and reported discussions about developing future workshops. The organizers conducted an evaluation of the workshop and MCC offered to share their findings with UMDI and DHE.

In May and June, MCC used SSA funding to support two multi-day hands-on science lab workshops at the UMass Lowell (UML) campus, taught by UML faculty. The workshops, which focused on either medical microbiology or biotechnology methods, were targeted to current MCC students who had already completed some foundational coursework in STEM and math. They were designed to provide students with some exposure to research and to a 4-year college setting. Workshops were offered free of cost, with lunch included, and were very popular with students. Students appreciated that the workshops were "actual hands-on lab work," and that they could gain exposure to lab technology at UML that was not available at MCC. The students who attended the workshop were from a range of MCC STEM majors and students enjoyed the opportunity to talk with colleagues in fields different from their own. They reported that the workshops made transfer to a 4-year school seem more achievable, both because of the experience with the 4-year faculty and setting, and because the workshop content included discussions of alignment between MCC and UML programs. These kinds of workshops were regularly offered in January, independent of SSA, through a collaboration between MCC and UML. SSA funded the expansion of this program with the addition of these two spring/summer workshops.

> *"What really got me engaged at the college was the field trips …. I love school, but getting outside and seeing the real world and using knowledge that we learn here, that's what really prompts me to be more involved in school."*
> *MCC SSA student*

Summer SSA activities at MCC included a bridge program, a test-prep math "boot camp," and paid summer research internships. The summer bridge program targeted incoming students and was designed to build students' interest and engagement with STEM fields, help students develop college success skills, and familiarize students with MCC, especially health and STEM program offerings and student support services. The program was offered twice, for two weeks per session, from 9 a.m. to 1 p.m. each day and was free (including snacks). It included day-long, hands-on workshops in computer science, biotechnology, clinical lab techniques, and environmental science; a one-credit course focused on scientific inquiry; and workshops with various campus resources and student support service providers. A total of 28 students participated across both sessions. The four-week math boot camp was offered as a computer-based, self-paced course designed to help incoming or current MCC students accelerate their progress into college-level math coursework. The course was based on an online curriculum designed by an outside contractor, JFY*Net*, and was taught in a computer classroom by an MCC faculty member with two embedded peer tutors. The class met four days per week in the afternoons and was free.

Through SSA, seven MCC students—selected by Pathways Center staff—participated in 10-week stipended summer research internships at UML, Northeastern University, and the New England Aquarium. Students worked on individualized assignments under the supervision of faculty and graduate students at the hosting institution. Summer interns had overwhelmingly positive feedback. They particularly appreciated the exposure to settings they had been considering for their future: 4-year college, research, and job. Students said the internship made the prospect of transferring to a 4-year school seem less intimidating, and relationships with "passionate and engaged" faculty and graduate students even inspired some to consider a path to graduate school. The research process was more challenging and less straightforward than they had expected, but consequently, students said, meeting those challenges was more rewarding. Working in a setting that required both independent and collaborative work gave students an opportunity to experience what they thought of as a "real job" environment, which they appreciated as they considered STEM careers. Finally, students said it was very satisfying to apply classroom knowledge to practical problems, especially through hands-on experiences. Owing to the effective role models students worked with and the opportunity to apply learning to real experiences, students felt that the internships increased their awareness of possible academic and career paths.

During theAugust visit, UMDI conducted a focus group with student leaders who were affiliated with various SSA activities,[9] including students who acted as peer mentors during the SSA summer bridge, students who attended the laboratory workshops, students who participated in summer research internships, and students who participated in the Gulf of Maine Institute (GOMI, an environmental science leadership initiative that students attended with SSA support). Students provided much positive feedback about the Pathways Center (PC) itself, where SSA activities were housed. Students valued the availability of physical and advising resources at the PC. They noted that it was very helpful to have the PC close to the building where most science classes were offered. Furthermore, they felt that, unlike real or imagined experiences at other campuses, the staff at the PC did not wait for students to come to them with questions, but instead actively reached out to offer help. One peer mentor commented that he emulated this behavior in his mentoring role, saying, "It made me change how I interact with other people. I never minded helping people, but now it's like, 'I'm not going to wait for you to ask me, I'm going to ask you, 'Do you need help?'' … I realize [now] there are students who don't want to ask for help because they feel like it's dumb." Students recounted the ways that PC staff helped them find the resources they needed.

> *"I come here to study all the time, so it helped me stay on top of my classes. I think it helped me want to be involved … because I was a mess before this. I literally did not know what I wanted to do."*
> *MCC lab workshop participant speaking about the Pathways Center*

Students appreciated that the PC was smaller and quieter than the library and they seemed to feel a sense of belonging in that space. This sense of belonging helped students stay involved in school, they said, because they were around other students who were engaged and working hard.

Students also praised the engagement and passion of MCC's STEM faculty who, students said, helped foster students' interest in science: "The professors, their passion for science is so much that you're like, 'Yeah, I want to do this too!'" Students also valued the way faculty incorporated hands-on learning experiences into the classroom and field trips that illustrated applications of concepts learned in the classroom. One student commented, "I like to touch it and not just read about it. Just reading about it isn't enough for some people."

Throughout their experiences with SSA and PC activities, students felt they were constantly exposed to new possibilities for their future paths in STEM fields. One said, "I didn't realize that there are so many things that you could go into until you hear about them." Students valued the opportunities SSA provided for them to be in leadership roles. Students who had taken the medical microbiology workshop found it very rewarding to demonstrate their new skills in blood typing at the career exploration event. One commented, "It was good for us because we were showcasing the skills that we had just learned. All dressed up in our scrubs—it was really fun." Another student, who had participated in GOMI, had gained valuable experience with public speaking, "We used to have to give presentations every day [in GOMI]. That really helped me because it is kind of intimidating to give a speech when you're not so used to it. But each day we gave these presentations and it helped me. I gained self-esteem and confidence."

> *"If you don't know something, you can go find someone in the Pathways Center and …they'll help you out or they'll send you to someone who knows the answer. So, finding resources is pretty easy here. It's nice communication when they say, 'I don't know it, but I'll send you to someone else who does know it.'"*
> *MCC SSA student*

[9] Notably, this focus group was conducted with key SSA staff sitting at the table with the students.

Quinsigamond Community College (QCC). QCC used SSA funds to support a variety of activities on their two campuses, including contextualized dual-enrollment math courses, curriculum development, summer bridge and college transition programs, and STEM interest workshops. The goal of many of QCC's programs is to provide exposure to STEM and opportunities to students who wouldn't ordinarily get this exposure. QCC has integrated Career, Academic and Personal Success (CAPS) advisors, supported by SSA. CAPS advisors use Starfish software to track detailed student performance and to communicate with instructors and students with the goal of proactively supporting students who are struggling for a variety of reasons. QCC also has a centralized learning center, housed in the same building as the library, with professional and peer tutors (including for STEM fields), student success skills advisors, free online tutoring, computer work stations, and study space.

One of only a handful of SSA sites to offer academic programming through SSA in the spring, QCC offered two dual-enrollment Math 100 courses (college-level math) with STEM contextualization at local area high schools. Also in the spring, QCC's math faculty developed a new math class combining the highest level, pre-college math with the first course in college-level math. The combined curriculum is contextualized with STEM applications and is designed to expedite students' transitions through developmental math and into STEM program pathways. It was offered in fall semester 2014.

SSA-affiliated activities at QCC over the summer were numerous and varied, but all revolved around project-based experiential learning to engage students in STEM topics. Three free summer bridge programs were offered to high school students as well as incoming and current QCC students. Two programs offered college credit, including a one-credit college skills course embedded in both: biotechnology (three weeks) and introduction to computer systems engineering (five weeks). A third program, Build your own Electric Guitar (three weeks), was offered without credit but subsequently developed into a credit-bearing course for the fall. The biotechnology and electric guitar courses were offered on the Worcester campus during the day and the computer systems engineering course was offered at the Southbridge campus in the evening. In each program, students left the course with a piece of technology—biotech students with a tablet, guitar course students with the guitar they built, and computer systems students with a desktop computer they built during the course.

For high school and middle school audiences, QCC held three free STEM workshops over the summer: a three-week Technology Academy to introduce students to computer-related careers and college programs, a three-day Engineering Challenge to expose students to engineering challenges and collaborative work, and a one-week Girls Robotics program to prepare students for an annual robotics competition. In addition to these programs, QCC also collaborated with a local non-profit organization that works with families who have recently immigrated from Africa to host a day-long "STEM Family Academy." This event introduced high school and middle school students in those families to STEM opportunities at QCC. Finally, QCC used SSA funds to support a Seniors Transitioning to College pilot program, a two-week program that introduced first-generation incoming QCC students from Worcester Public Schools to campus resources and support services, and explored STEM career paths.

During our site visit, we observed the Seniors Transitioning to College Course and the Computer Systems Engineering course and spoke with students in the latter. Both courses were taught by the same instructor, a faculty member who had long been involved with QCC's K–12 STEM pipeline programs and who expressed a strong commitment to creating access to college and STEM pathways for underrepresented groups. In both courses, the instructor had recruited teaching assistants who received "co-op" credit for assisting with the class, which facilitated a more experiential classroom environment. In the Seniors Transitioning to College course, students had been given Microsoft Surface tablets and the instructor was walking them through the process of using them to access QCC's online portal and to take notes in class. The ten students in class that day were scattered throughout the room at long tables facing the board. The

instructor explained step-by-step instructions for setting up a certain note-taking software while one TA demonstrated at the front of the room and two others circulated to offer individual help. To guide students, the instructor asked questions, such as, "What sections might you have for each class? How would you save your syllabus? What is a syllabus?" Students were very engaged, clearly paying attention to the instructor. Some worked in pairs, many talking to the TAs.

UMDI arrived early to observe the evening Introduction to Computer Systems Engineering course. The instructor had not yet arrived but both TAs were already there, along with three students. The TAs reported that students often showed up before class and stayed after to finish their assignments. The room hummed with the fans from the computers that the students were in the process of building. Students each had their own station, in four rows of two students each, facing the front of the room. When the instructor arrived, she wrote an outline for the day on the white board and then began walking students through the process of attaching and configuring printers to their machines. Her instruction was very practical and contextualized for possible employment settings. For example, as she discussed printer configurations, she discussed possible office environments that might require different kinds of network sharing. The eight students were all male, ranging in age and race/ethnicity. Five students were adult returners and three were incoming students from high school. There was also a wide spectrum of computer literacy across the group, and it seemed critical to have the circulating TAs to help students who were stuck a few clicks behind the rest of the group.

During a break, the instructor invited the evaluator to ask questions of the students, whose primary sentiments about the course was gratitude. Many students commented on the patience and caring expressed by the instructor, one student on the verge of tears as he expressed these sentiments. Several also praised the instructor's clear explanations. Many students said they felt empowered by the course, particularly because of the technology content, and felt that it would improve their employment prospects. One said he felt that the course "takes you out of the dark because technology is everywhere." The free college credit was a draw for many and several mentioned the free computer as a further incentive. Several students noted that the tiered structure of the Computer Systems Engineering Technology program at QCC felt accessible to them—with several certificate programs requiring different commitment levels as well as an associate's degree option. Rather than the "years of college" they had anticipated, these options made the technology field seem less intimidating. One student, returning after years away from school, felt that the college skills component of the course was very helpful. The combination of this component with the main course was a good way to transition into college, he said, because it requires a dedicated time commitment but is still a primarily hands-on course and therefore "less scary." For some students, the course had a steep learning curve, and several also commented on the intensive time commitment (5–10 p.m., two days per week for five weeks), especially for those (the majority) who commuted from Worcester.

Springfield Technical Community College (STCC). The SSA program at STCC focused primarily around a summer-long intensive bridge program for incoming STCC students. To be admitted, students had to have graduated from high school in the previous 3 years, needed to be Massachusetts residents, had to enroll at STCC, and had to have a minimum GPA of 2.0. Students were required to attend and participate in all aspects of the program, 5-days per week, from 8 a.m. to 4 p.m., for 7 weeks. The program started with an Accuplacer test followed by two weeks of math review and a STEM contextualized college success course. After the first two weeks, students were retested and placed into math courses for the remaining five weeks. Two-thirds of the students placed into college-level "tech math" and 1/3 into Algebra II. For the remaining five weeks, in addition to that math course, students continued with the College Success course, and participated in an accelerated 3 credit Introduction to Engineering Technologies course. Throughout the program, mandatory study hall, math lab, and lunch times were scheduled into students' days. All study halls and math labs had either instructors or tutors

embedded. To keep class sizes small, three sections of the math and college success courses were offered. The Introduction to Engineering Technologies course was also originally divided into two sections, but the instructors quickly combined them into a larger, collaborative class taught by both instructors. Fridays were dedicated career exploration days, which involved field trips, speakers, activities, and discussions.

Of 120 applicants to the program, 65 students were selected to participate, 33 students enrolled and 30 completed all activities. The group was diverse in terms of race/ethnicity, gender and high school context. Half of the enrolled students were students of color, 60% were female, and half were from urban high schools. Nineteen high schools were represented among the 33 students.

The program was free to students, including lunch, and students were eligible to receive stipends of up to $1,000 at the end of the summer based on a point system related to attendance and engagement. The point system required students to meet regularly with a dedicated STEM coach who advised students on how to navigate issues related to being a student, including counseling around life issues that could interfere with academic life. The coach was in contact with students daily, showing up during study hall and open lab times where students often pulled her aside to discuss issues they were facing. Although the coach did not register students for classes, she did help students navigate the registration process, advising them not only about courses, but also on communicating with their advisors and thinking about their schedules in big-picture terms. For example, she said, "We have 17-18 year olds – young women – who might not *need* to go to class at night. So we need to think about these things instead of just thinking if there is space available in the class or if it fits into their schedule… If there are any little hiccups that could put them in danger, I'd like to catch those." She also mentioned advising students who may have been too ambitious in the number of credits for which they had registered.

> *"I didn't know exactly what I would be doing [once] I got my degree. … And now, I've seen possible careers I can do … So I've gone from 'just get the degree and find something' to having a specific goal in mind."*
> *STCC SSA student*

During the site visit, the evaluator observed in one section of the college success course and in the combined Engineering Technologies course. In the college success course, there was a guest lecturer from the career center who presented a PowerPoint on creating resumes. The instructor said this was atypical and that the class is generally formatted as a guided discussion. Seven students sat at computers. When an 8th student entered late and moved to a seat near the rear of the room, the instructor said casually, "You're last. You're in front." The student complied without protest. Before the class started, the instructor checked in with students, and seemed to have a good rapport. It was the last week of the program and students had final projects due later in the week – they were to present on career paths in STEM – and these were the primary topics of conversation with the instructor. Students were to spend some of their class time working on these presentations. Before the guest began, the instructor reminded students to be respectful and to put their cell phones away, warning them in a semi-joking tone that he would confiscate any phones he saw. Once the guest lecturer started, students paid quiet attention, about half taking notes in their notebooks. The instructor stood at the back of the room, facing the students' computer screens. It was not a very interactive presentation, and students did not ask many questions, but they did respond when the presenter asked questions of them.

The Introduction to Engineering Technologies course was conducted in a large lab classroom with tall workbenches in a semicircle facing a chalkboard. There were 32 students and two faculty. Students were gathered around catapults they had been building, in groups of 4-5. The students were excited to go outside and test out their catapults, but the instructors insisted that they be able to calculate a predicted distance the catapulted ball would travel when shot. There was a babble of activity, verging on chaotic, as the instructors walked around to check in with each group about their calculations and group members talked among themselves and worked to put the finishing touches on their machines. One instructor wrote

a formula on the board and attempted to explain it over the din. He repeatedly said "Are you paying attention? Pay attention please. You're distracting the class," but the room was never quiet. As an incentive, he would add, "nobody starts until we all finish," meaning no one could take their machine outside until everyone completed the calculations. The students explained to the evaluator that each student is required to turn in their own calculations sheet for each lab. Nevertheless, it seemed that some people were not writing anything down. As the instructors came around to each group, most students seemed willing to engage in the calculations, but many required a lot of prodding. For example, the instructor had drawn a diagram on the chalk board and explained which radial measurement of the launching arm was "R1" and which was "R2," but as the instructor came around and asked, "what's your R1?" over and over students responded with "what's R1?" It seemed as if the students who hadn't caught the explanation that the instructor had given and anticipated that he would come around and explain it to them individually.

In a focus group, students said they had reaped many benefits from participating in the SSA summer program. They appreciated the career awareness, math and college preparatory activities, the free credits, and the resume-boosting power of the program. They also felt very well supported and could not think of support they would have wanted but were not receiving.

> *"So far, I've learned a lot more than coming out of high school so I really feel that, come fall, I'm going to be adjusted to the homework load, and more time management – being able to schedule all my time for homework and classwork a lot better than if I had just taken the whole summer off and goofed around with my friends."*
> *STCC SSA participant*

Many students said the career awareness activities exposed them to possible academic and job paths they might not have considered. For example, when guest speakers visited, "They give you a little background in what they do. And it's usually jobs I'd never heard of. Like this one guy manufactured lasers that could cut through steel and I didn't know that was an actual job." SSA career-focused activities (including aspects of the college success course) also helped students link academic programs to future career possibilities. One student said, "For one of the projects [in the college success course] we did career research. It helped me further define what I wanted to do." The college success course also helped students adjust to college life and be better prepared to handle a college-level course load.

Many students appreciated the math preparation they gained through SSA. Most felt they had benefitted from the two-week review and were surprised at the gains they made in that short time. They also appreciated that they would be ahead in their math when the fall came around, and especially that they did not have to pay for those credits. Students said the tech math class was very fast paced, but was made manageable by the collaborative and interactive teaching style of the instructor ("It is kind of like a discussion even though math isn't really a discussion topic") and the availability of the facilitated math lab ("being able to do my homework right after class and with the teacher there – that helps"). The tech math class used STEM contextualized examples, which students also appreciated.

> *"They definitely help you map out what you're going to need to ultimately use that degree to its potential. They don't just focus on getting the degree; they tell you what you can do with it."*
> *STCC SSA student*

Students felt that their participation in SSA would help their employment prospects: "It looks really good for employers. … They can say, 'Hey, you took the next step. You [had]the motivation to go at it.'" Another student adds, "You're dedicated. You sacrificed your entire summer to learn more about STEM."

The focus group students also offered some constructive criticism of the program, but there was somewhat less consensus in their critiques than in their praise. Some felt that the intensity was too much – the long days across the entire summer – while others thought that was a fair price to pay for the

opportunity. Some students critiqued the way study hall was structured into the middle of the day because students who had finished their work were just sitting around. At the same time, many students had jobs and struggled to get to them on time with a day ending at 4 p.m., so preferred having study hall at the end of the day, so they could leave when they had completed their school work and could make it to their jobs on time. Some students were frustrated that there seemed to be few consequences for students who were "still being a high school student," not taking the program seriously and thereby creating a distracting environment for others. Finally, and there was widespread agreement on this, students wanted to be able to leave campus for lunch, or at minimum be given a cafeteria lunch menu in advance so they would know when they wanted to bring their own lunches.

Highlights of Student Experiences

One of the goals of the SSA evaluation is to highlight student experiences, some of which are provided in this section. In the survey, site staff and administrators shared anecdotal evidence of the ways SSA impacted their students. Additionally, students themselves discussed their experiences with UMDI evaluators during focus groups. The highlights that follow are divided into two parts. First, a few selected quotes from the online survey are presented. Second, one student's experience with SSA is featured.

Anecdotes from Administrators

In the online survey, several site administrators wrote about their students' experiences with SSA. These are a few selected quotes from that section of the survey:[10]

- "We had a participant who was recently released from juvenile detention for violent crime. His participation in this program was part of his ongoing efforts to turn things around for himself. He has applied for the early entrant program for the spring. He has found a haven here at Greenfield Community College. The STEM Starter Academy helped him to prove to himself that he can go to college."
- "We have many non-traditional students here at Bunker Hill Community College, from older students to those who work full time and go to school, to those with severe financial need, even homelessness. To hear those students express such gratitude to the professors and mentors who were there to help them makes me feel that this grant is really doing some good. One of our non-traditional students even wrote a poem for his professors on the last day of class."
- "One of our bridge students who had no idea what direction she wanted to go in discovered her passion in one of the workshops provided by the bridge. She was able to get the last spot in the program for the fall."

One Student's Experience with SSA

A student at Middlesex Community College explained how he had dropped out of high school, but found his way into a SSA-supported STEM program at the college. At the time when he spoke with a UMDI evaluator, he had been serving as a peer mentor to SSA summer bridge students:

> I didn't come here [to college] the conventional way. I came through a GED program. … I always knew that I wanted to come to college, but the high school system never worked for me. When I was 16, I [was] kicked out of high school …. I was never a bad student …. It was about interaction with other students. … I was put in classrooms in high school where there was a kid

[10] A complete collection of responses to this section of the survey can be found in Appendix R.

> who would show up every day and make a ruckus. For 50 minutes we're supposed to be learning something. I didn't learn anything. So I'm like, "Why should I show up if I'm not going to learn anything?" So I just took the book and I learned it at home. … That's what I like a lot about college: that kids are just as serious as me, or they're serious but just don't understand the concepts, which I'm fine with, but you don't create havoc in the classroom …. When I came [to Middlesex Community College], everyone was helping me and everyone was like, "Hey man, we want you to be successful." This system is more supportive of me …. My habits were pretty bad in high school, but when I came here, the people who helped me said, "Okay, we're right here for you," and they were the first people I met. The first orientation day, my professor talked about the STEM program and really got me into it. And the help was just there. So, even though I didn't come here traditionally and had bad habits, some of those actually went away because of all of the resources and all of the help I got. … Now I'm an orientation leader and visiting classes that are teaching STEM to their first year students.

This student found that the SSA-funded support systems for STEM students at Middlesex helped him not only become a better student, but also be in a position to be a role model to others.

Fall Highlights

UMDI collected data on fall SSA activities through four instruments. This section includes preliminary findings from (1) the online survey, (2) fall participation data collected through primary and secondary participant data requests, (3) phone interviews with nine SSA sites, and (4) site visits with another 4 SSA sites.

The Year 2 report will include a thorough discussion of UMDI's fall work. In the interest of providing an early look at these fall data, however, the research team conducted a preliminary analysis and identified a few key findings, presented below. It is to be emphasized that the analysis was merely preliminary and that the set of findings below will be expanded and otherwise modified as the team analyzes the data more thoroughly. Annual reports submitted by sites provide thick descriptions of SSA implementation details as well as site-specific outcome data and reflections.

Survey Findings – Plans to Engage and Retain Students in Fall 2014

In the online survey, sites were asked an open-ended question about their plans for retaining or remaining engaged with SSA students from the summer to fall. Many sites (9) planned to offer one-on-one supports, such as peer mentor, tutors and advising sessions. Several sites (5) planned to hold STEM-related events to which summer students will be invited and or receive priority registration. Three sites planned to offer summer students scholarship or extra financial support for the fall. Two sites mentioned they had formed STEM clubs, which were planning to engage in various STEM interest activities during the fall.

Interview and Site Visit Highlights

Overview. During fall 2014 UMDI evaluators conducted four site visits to campuses and nine telephone interviews with SSA administrators and staff. The two-fold purpose of these activities was to review SSA implementation across campuses and to capture grantees' reflections on successes, challenges, lessons learned, and next steps.

Highlights.

Successes.

- *STEM Awareness*. Interviewees typically reported that SSA has contributed to an increasing awareness of STEM—its components and the many academic pathways and career opportunities available to students. Some of these interviewees described a sense of re-casting traditional notions of STEM, both on their campuses and in their communities.
- *Re-branding the community college*. There is an emerging sub-theme within the conversation on increasing STEM awareness that relates specifically to the notion of the community college. Some grantees expressed that *not only* are they communicating a message that STEM fields are interesting, exciting and viable, *but also* they suggest that the community college setting is, for many students, a highly attractive one. Refuting a perception that community colleges are not an appropriate institution for the study of STEM, they emphasize updated and contextualized courses, internship and research experiences being offered, as well as the multiple support systems in place to ensure student success. Some interviewees noted that they have begun to build awareness of community colleges as pathways to STEM in the minds of high school guidance counselors, a constituency who may typically not have had community colleges on their radar.
- *Increased collaboration*. Echoing a theme articulated in Year 1, interviewees typically cited increasing collaboration across divisions, between divisions and between administrative staff and faculty. At some sites there is a sense that this continued collaboration is leading to a common vision and strategy for recruiting and retaining students. For example, one interviewee commented that "we are all using the same recipe," suggesting that staff from advising, admissions, academic affairs and financial aid as well as remedial math teachers are all working together and sending the same message.
- *Learning how to support the STEM student*. Some interviewees observed that the STEM student is different from other students, and they described a process of figuring out how to support the STEM student. Typically these efforts involve intensive case management (frequent and consistent supports such as mentors and tutors), "intrusive advising," cohort-building and other efforts to foster a sense of belonging and connectedness among students, and an overall positive message about students' potential for success. At some sites the summer bridge program provided an opportunity for students to begin to make connections, and in some cases the presence of a physical space for students to meet and work in is believed to contribute to this sense of belonging. At still other sites, the importance of a "go-to" person for students is emphasized. Throughout, there is a belief that STEM students appreciate being part of a STEM-specific group.

  These collective efforts to support students are widely believed to have been successful. Administrators and faculty tended to report, for example, that students spend time together and/or return to the program for informal visits and/or formal support. A limited set of student focus groups revealed similar findings—that students feel known and cared for. It is anticipated that these efforts will ultimately lead to successful retention, achievement and completion rates.

Challenges.

- *The ongoing need to build a STEM pipeline.* Ideally, administrators and staff conceptualized a shift in Year 2 from recruitment to retention, and while those efforts to retain students and support their success are certainly underway, a persistent need for outreach and recruitment demands time and other resources.

- *Progress monitoring and evaluation.* Some interviewees noted challenges to measuring and evaluating the effects of their efforts. Challenges include: a) the long-term return on some efforts (e.g., outreach to high school students) and, b) the integration of students into various fields such that they lose contact with the SSA staff originally responsible for their enrollment. One interviewee asked, "How do we show the effects of all these things we're doing?"

Lessons learned and next steps.

- *Ambitious programming.* At some sites, there was a recognition that summer programs and/or fall program requirements were overly demanding for students and also for organizers and faculty. In some instances, plans to revise course loads and/or pacing are under way; additionally, staff positions are being created to provide a deeper level of effort at some sites.
- *Revised peer mentoring.* While perceptions of peer mentorship are overall positive, some grantees are considering whether or how to modify their peer mentorship programming. In particular, some grantees identify a need to provide training in how to be mentors. It is notable that some grantees have training already in place, and some grantees have developed support and supervision structures (e.g., mentor blog, faculty follow-up).
- *Sustainability*. Strategies to ensure the sustainability of SSA-supported efforts include continued partnering across departments and divisions (building relationships, coordinated and integrated planning and implementation of activities), infrastructure-building (equipment, web platforms), and the leveraging of multiple funding sources.
- *Working groups.* Grantees value the opportunity to exchange experiences with colleagues. Given time constraints, however, they assert that they are unable to take the initiative to organize and otherwise lead these groups. If calls or other forums are organized, grantees report a very strong likelihood of participating.

DHE Interview

On January 7, 2015, the UMDI project manager conducted a 1-hour telephone interview with the DHE Associate Commissioner who directs the STEM Starter Academy Initiative (hereafter, "the director"). The purpose of the interview was to explore the director's perspectives on the first year of SSA implementation and implications for Year 2. Key findings from that interview are summarized below.

Successes

Rapid start-up. Campuses put initiatives in place quickly. Despite a relatively short turnaround time, they designed summer bridge activities and effectively recruited students for those activities.

Cross-campus collaboration. The joint grant proposal was a first indication that campuses were talking together and sharing ideas. Participation in the June grantees' meeting as well as conversation conducted via monthly grantee telephone calls are further evidence that campuses are collectively reflecting on their work and learning from one another.

Intra-campus collaboration. Campuses have used SSA funds to leverage other grants already in place. Conversations and collaborations are taking place between departments and projects, such as Developmental Math, Complete College America, and GPS.

Evaluation. Having a formal evaluation process in place from the beginning has been helpful. It has been useful in reinforcing a sector wide approach and communicating DHE's intention to support learning across the campuses. The relationship between DHE and UMDI has been very positive, bringing a valuable external and independent "thought partner" perspective and a particular discipline to the work. The collaborative efforts to structure an informative and helpful evaluation have yielded important questions, data collection tools and strategies, and valuable information. The grantees' annual report structure has proved to be highly effective, yielding a rich set of qualitative data (descriptions of and reflections on campuses' work). Seemingly small tasks such as the drafting of minutes of the grantees' monthly calls were also very important.

Challenges

Rapid start-up. The director indicated that the rapid start-up of the initiative was a significant challenge for the sites, and that the sites met that challenge.

Spending deadline. The original spending period was to end June 30, 2014, but DHE requested and ultimately secured an extension through December 31, 2014 (FY 15). Currently the Year 2 cycle ends September 30, 2015, which again poses challenges because of its mid-semester timing.

State budgetary challenges. The lack of predictability and stability of an annual budget process poses challenges to a multi-year initiative. Specifically, the 50% reduction to SSA's budget in Year 2 (FY15) caused campuses to modify their plans. The director explained that while the potential for budgetary fluctuation from year to year was recognized from the start, the magnitude of the FY15 cuts was surprising. Overall, the strategy employed with respect to unpredictable budgets was to consider carefully the kinds of spending that were called for in Year 1, to use the funds for efforts that would yield results in Year 1, and to minimize efforts that would require sustained funding. The thinking was to support strategies that would create change in Year 1, with an eye toward longer term capacity building. Accordingly, in Year 1 campuses were guided to focus on recruitment of Cohort 1, and then to shift in Year 2 to retention and recruitment of Cohort 2. That work has largely proceeded as planned; the initiative continues and campuses are working successfully. The adjustments resulting from the 9c budget cuts are that campuses will not recruit significantly more students in Year 2 and the initiative will have to adjust to a different rate of increase than it may otherwise have experienced.

Increasing the consistency of STEM programming across the community college system. While the initiative was never intended to promote "one size fits all" programming, there is a need to continue to learn how to share experiences across campuses, codify best practices, and use SSA to foster more consistent programming that parents, students, and others can recognize.

Mechanisms for cross-campus collaboration. In addition to monthly telephone calls, the June meeting (and a planned February meeting), there is still a need for mechanisms to support cross-campus collaboration. An online tool designed for that purpose has been under-utilized to date but it is possible that sites were overwhelmed with Year 1 workload and that the tool may be better used in Year 2. Campuses have expressed an interest in more face-to-face meetings, but time and cost constraints pose challenges in that regard.

Emerging Best Practices

Early emphasis on building students' support structures. One message that is suggested by grantee reports is that cohort-building and other efforts to build students support systems are effective. It appears that programs that emphasized these supports early on (e.g., during summer bridge programs) are

finding that *early emphasis* is important. As students transition from bridge programs and begin to encounter academic and other challenges during the semester, having classmates they identify with and other supports to success are proving to be useful.

Other Reflections

Face-to-face contact with the sites. It was important for the director to have visited some sites, to have seen some of the work first-hand and to communicate to staff and students.. Similarly, it was important for UMDI to have conducted site visits. These activities convyed a message to the sitest that their work was important.

DHE's responsiveness to the field at start-up. It was important to address campuses' questions promptly and to share experiences from the start, especially given the short timeline from receipt of funds to implementation.

Strategic direction and local flexibility. SSA is a fairly complicated initiative, covering 15 campuses and spanning multiple projects. In that light it was important for DHE to provide clear direction on the intent of the initiative, to reinforce that message, and to avoid making changes in Year 1. DHE attempted to provide a broad and clear framework while allowing campuses flexibility to design and conduct their work thoughtfully.

Sustainability. Sustainability has been discussed since the incipetion of the initiative, and campuses are demonstrating multiple strategies to ensure sustainability, such as collaborations among departments, leveraging resources across projects, efforts to integrate work and positions into existing infrastructure, and investments in laboratory and other equipment. There will, nonetheless, be a need to consider how some ongoing expenses, such as staff positions, will be supported after SSA funding ends.

DHE's priorities and setting the work in context. SSA is fundamental to DHE's work and is synergistic with the overarching priorities of the organizat**i**on: to recruit and retain students for STEM fields, and to align academic programs with industry needs. The initiative responds directly to the calls articulated in the Vision Project's recent report *Degrees of Urgency*. It interfaces with a number of other projects such as Developmental Math, and it is situated in a broader statewide STEM context, complementing efforts such as the Pipeline Networks and the Governor's STEM Advisory Council. Fostering the development of a statewide network, supporting a sector-wide conversation and achieving greater retention and success fall squarely within the Department's vision to enhance STEM statewide.

Next Steps

"Do good work and tell people." The next challenge is to "tell the story" of what SSA has achieved thus far, how it has done so, and what impacts have been realized. It is important to communicate learnings that have resulted from the SSA experience and to bring those learnings to bear ("to put the spotlight on STEM") in addressing the key issues facing the commonwealth. It is important to understand whether there is a "halo effect" of SSA. The director concluded, "We have an obligation to show the effectiveness of this investment and its impact."

Technical Assistance

UMDI provided technical assistance to DHE and SSA sites during Year 1 including:

- Resource development
- Preparing minutes of monthly conference calls of SSA grantees
- Evaluation and feedback on SSA grantee gathering – June 2014
- Providing assistance in preparing the Year 1 Annual Site Report template
- Assistance to sites with data collection efforts
- Meeting with IR personnel at launch of supplemental student data collection activities
- Regular communication with DHE and response to outside requests for information; and
- Support to DHE in compiling Year 1 site reports

Resource Development. As part of UMDI's technical assistance to DHE and to the SSA sites, UMDI prepared a resource document titled, "STEM Starter Academy: Promising Practices for STEM Programs in Community Colleges." The document is included in Appendix L.

The *Promising Practices* document provides brief descriptions of practices highlighted by the literature that are intended to support community college student engagement, retention, progress, and graduation in STEM fields. The document was intended to support community colleges in their efforts to build upon, codify, and extend system-wide best practices that undergird student progress through and completion of STEM curricular pathways. The document covers a wide range of topics including: outreach and recruitment, retention, advising, developmental education, transfer to 4-year colleges, transfer to industry, and data management. Practices were selected for inclusion based on their potential utility to the Massachusetts community colleges participating in the SSA initiative. Practices were drawn from a range of sources including academic papers, evaluation reports, and conference proceedings.

DHE shared the *Promising Practices* document with SSA sites and encouraged them to use it to inform their implementation strategies. DHE also used the document to initiate discussions at the SSA convening in June. Sites referenced items from the document during subsequent conference calls, interviews, and site visits. UMDI used the document to inform the development of our data collection instruments.

SSA Grantee Phone Meetings. SSA grantees participated in 10, hour-long conference calls over the course of 2014, facilitated by David Cedrone. The purpose of the calls was to share information across sites as well as to provide sites with guidance regarding SSA implementation and budgeting. The sites' primary contacts participated in the calls early in the year and were later joined by SSA coordinators who had been hired in spring and summer. UMDI evaluators also joined each call. Over the course of the year, topics ranged from planning and recruiting for summer bridge programs and generally promoting the SSA initiative to evaluation and reporting. Budgets and budget planning remained a consistent topic throughout. A summary of topics discussed during each phone meeting is included in Appendix N.

SSA Grantee Gathering Feedback. DHE convened a day-long meeting of SSA grantees in Southbridge on June 25, 2014. Representatives from each of the 15 community colleges attended. The agenda included morning and afternoon breakout sessions and UMDI drafted brief survey instruments to

gather feedback on each of those sessions. After the meeting, UMDI summarized the data that were collected, and shared a summary with DHE and SSA grantees shortly after the meeting. A summary of the data collected via those instruments is included in Appendix M.

Annual Site Report Template. In consultation with DHE, UMDI drafted a template for SSA grantees' Year 1 Annual Site Reports. A draft of the template was shared with sites and feedback solicited on the October 23 conference call. The final template was distributed to sites on 10/29/14. To ease the evaluation burden on sites, along with the site report template, UMDI distributed to each site 1) documents containing that site's responses to the online survey (completed 10/3/2014) and 2) a "crosswalk" document that outlined which portions of the survey responses might be relevant to each of the report sections. The full Year 1 Annual Site Report template and the crosswalk document are available in Appendix S.

Assistance to sites with data collection. UMDI provided assistance to sites with data collection activities such as accessing and completing the online survey, formatting and submitting primary and secondary supplemental student data collections, completing annual site reports, and generally understanding evaluation activities. Evaluators occasionally held phone meetings with SSA grantee representatives to discuss instruments, frequently answered questions by email, and periodically responded to posts on the SSA group website.

Meeting with IR personnel at launch of data collection. In advance of the due date for the initial request for student-level data from sites, UMDI coordinated a one-hour conference call with representatives from the Institutional Research offices of each site and representatives from DHE's Assessment and Policy Analysis office. The agenda for the call included a brief overview of SSA evaluation activities and clarification of data elements requested in the spring 2014 data collection. Minutes from this call are available in Appendix T.

Communication with DHE and response to outside requests for information. UMDI remained in regular communication with DHE throughout the evaluation period. These communications included status updates on data collection activities, providing interim feedback to DHE on evaluation findings, soliciting feedback on data collection instruments, and evaluation activity planning. UMDI also provided data to assist DHE in responding to periodic outside requests for information.

Support to DHE in compiling Year 1 site reports. Sites submitted year 1 annual reports to DHE and UMDI assisted DHE in standardizing, editing, and compiling these site reports for their inclusion in DHE's annual SSA report. Although all sites worked from the same template, the reports were not uniform in their layouts, and UMDI organized them into a more standardized format for easier comparison across sites.

Strategic Considerations

- The scope, content, and scale of SSA programs and activities at sites was extremely varied in Year 1. To facilitate distillation of learning across sites, DHE might consider 1) encouraging sites to formalize or further develop their own internal evaluation practice and 2) facilitating the development of uniform evaluation practices across sites.
    - For example: Site administrators found reporting the former SSA status (as a secondary participant) of current primary participants difficult because this data had not been uniformly collected. Anticipating such a data request, sites could collect self-report data from students who apply to SSA programs (e.g. using checkboxes that indicate how a student heard about SSA that would indicate whether or not that student participated in an SSA activity as a secondary participant.)
- DHE may wish to further specify the intended participants in SSA interventions. SSA administrators expressed some confusion over which populations DHE would prefer SSA programs to serve. Some specific questions included whether or not to focus recruitment on dual-enrollment students (who are often higher-achieving), students with high math aptitude and low STEM awareness, or students with high STEM awareness and low math aptitude.
- DHE may wish to consider additional strategies to facilitate cross-campus collaboration. Site staff and administrators value these collaborations, but have little time to lead them. Administrators at one site felt that productive collaboration between community colleges on the Transformation Agenda grant had been facilitated by having a "pivot point" in the form of a coordinator from the Massachusetts Community College Executive Office.

Appendicies