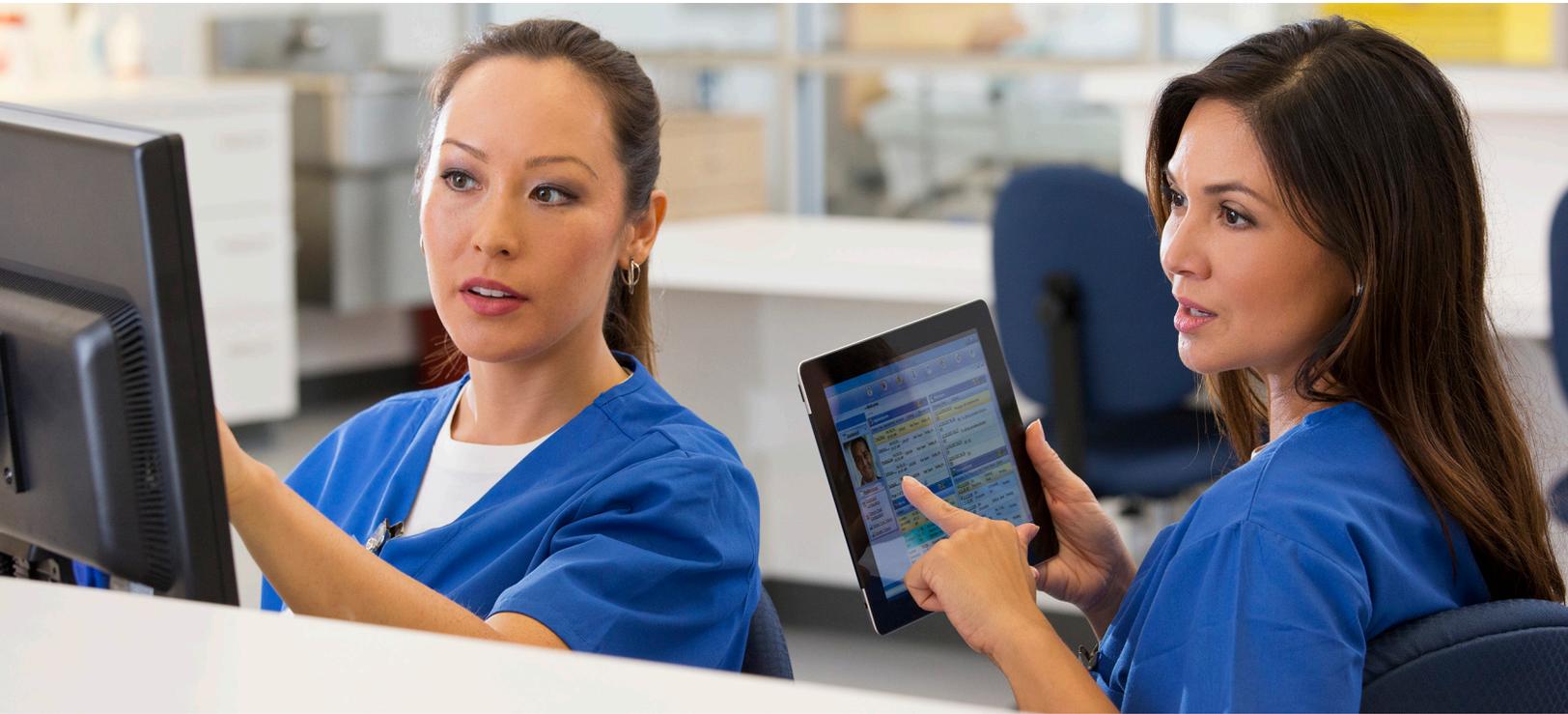


Health Information Technology (HIT) Student Connections

Final Evaluation Report



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Contents

List of Exhibits	vi
Executive Summary.....	ix
Introduction	1
Evaluation Design.....	2
Implementation Study.....	4
Outcomes Study.....	5
Implementation Study Findings.....	6
HIT Program and Course Development	9
Student Recruitment	11
Student Practica	12
Stacked and Latticed Credentials	13
Prior Learning Assessment and Competency-Based Education	14
Program and Career Advising.....	15
Workforce System Connections.....	16
Industry Partnerships	17
Institutional Capacity and Sustainability.....	18
Student Outcomes	20
Conclusions.....	23
Appendix A: HIT Student Connections Logic Model	A-1
Appendix B: Evaluation Data Collection and Methodology.....	B-1
Appendix C: HIT Student Exit Survey	C-1
Appendix D: HIT Student Demographics.....	D-1

List of Exhibits

Exhibit ES-1: Components of the Health Information Technology (HIT) Student Connections project	ix
Exhibit ES-2: Health Information Technology (HIT) Student Connections Project implementation study questions	xi
Exhibit 1: Components of the Health Information Technology (HIT) Student Connections project	1
Exhibit 2: Health Information Technology (HIT) Student Connections project implementation study questions	2
Exhibit 3: Health Information Technology (HIT) Student Connections project impact study questions	3
Exhibit 4: Summary of implementation study data sources	4
Exhibit 5: Overview of Health Information Technology (HIT) Student Connections project activities.....	7
Exhibit 6: Health Information Technology (HIT) Student Connections project new and redesigned courses.....	9
Exhibit 7: Screenshot of a coding crossword developed for HIT 231 International Coding of Diseases Coding III.....	10
Exhibit 8: Enrollments in Health Information Technology (HIT) 101, by term.....	11
Exhibit 9: Screenshot for a promotional video for health programs at ACC.....	12
Exhibit 11: Average number of Health Information Technology credits earned after one, three, and four terms, before and after grant implementation (fall 2015).....	21
Exhibit 12: Percentage of Health Information Technology (HIT) students who enrolled in HIT courses the following spring (for fall enrollees) or fall (for spring enrollees) after initial enrollment.....	22
Exhibit 13: Quarterly wages among pre- and post-Health Information Technology (HIT) program wage-earning students who enrolled in the HIT program and completed their degree between fall 2011 and spring 2015	23

Exhibit C-1: Characteristics of Health Information Technology (HIT) survey respondents.....	C-1
Exhibit C-2: Motivations for entering the Health Information Technology (HIT) program	C-2
Exhibit C-3: Education and career plans for year following Health Information Technology (HIT) program completion	C-2
Exhibit C-4: Student perceptions of course content and structure: fall 2016 to spring 2018.....	C-3
Exhibit C-5: Student interactions with student success coordinator.....	C-4
Exhibit C-6: Agreement with having various advising needs met during the Health Information Technology (HIT) program.....	C-5
Exhibit C-7: Student ratings of online course media	C-6
Exhibit C-8: Practicum scheduled prior to the beginning of the semester in which it was completed	C-6
Exhibit C-9: As a result of the technical skills and knowledge that I gained through this program, I am prepared to enter and/or advance in a Health Information Technology (HIT) career	C-7
Exhibit C-10: Would you recommend the Health Information Technology (HIT) program to other students?	C-7
Exhibit C-11: Student perceptions of course content and structure.....	C-8
Exhibit C-12: Student perceptions of guidance they received during the Health Information Technology (HIT) program.....	C-9
Exhibit C-13: Student ratings of Health Information Technology (HIT) course media and features	C-10
Exhibit C-14: What are the primary benefits of the Health Information Technology (HIT) program (open responses)?.....	C-11
Exhibit C-15: How would you improve the content of the Health Information Technology (HIT) program?.....	C-13
Exhibit D-1. Demographic characteristics of students enrolled in Health Information Technology (HIT) 101 from fall 2009 to fall 2017.....	D-1
Exhibit D-2. Average age of Health Information Technology (HIT) 101 Students by term	D-2

Executive Summary

Health Information Technology (HIT) Student Connections, a Trade Adjustment Assistance Community College and Career Training (TAACCCT) Round 4 grant project, sought to enhance the instructional quality, student supports, and workforce relevance of the HIT program at Arapahoe Community College (ACC). ACC is in the Denver metro area and enrolled just under 15,000 students during the 2016–17 academic year.¹ HIT is a nationally accredited program that culminates in a 64-credit associate of applied science degree and is the only accredited program in this field in Colorado that is offered online. The program is designed to be completed in about two years. From 2014–18, HIT Student Connections project staff engaged in multiple grant-funded activities, including increasing the quality and interactivity of the program’s online courses, developing a new certificate program, and enhancing employer relationships that corresponded to program needs and TAACCCT grant requirements (Exhibit ES-1).

Exhibit ES-1: Components of the Health Information Technology (HIT) Student Connections project

Development of the HIT program
<ul style="list-style-type: none"> • Introduction of stacked and latticed credentials • Development of competency-based programming based on the competencies required by the Commission for the Accreditation of Health Information and Information Management (CAHIIM) • Enhanced engagement strategy for online learning with added modules • Update of the HIT two-course practicum to emphasize clinical and technical skill attainment • Establishment of a framework for awarding credit for prior learning
New student success support structures
<ul style="list-style-type: none"> • Enhanced student program advising through expanded advising opportunities and resources • Career mapping and associated career guidance tools and training
Enhanced connections with industry
<ul style="list-style-type: none"> • Development of partnerships that leverage resources from the workforce system and other organizations • Enhanced employer engagement and support for health care sector strategies

The target population for the HIT program during the grant were Trade Adjustment Assistance (TAA)-eligible, veteran, incumbent, and other adult workers recruited through the public workforce system. A strong economy has resulted in few TAA-eligible workers in Colorado in recent years, but the project conducted outreach to veteran’s organizations and high schools and served students referred by ACC’s partner workforce center, Arapahoe/Douglas Works!. Most HIT students during the grant were female (91 percent)

¹ National Center for Education Statistics, Integrated Postsecondary Education Data System, <https://nces.ed.gov/ipeds/datacenter/institutionprofile.aspx?unitId=acadb1adb3b4>.

with an average age of 38, and 48 percent were incumbent workers (e.g., employed in health information management when they entered the program).²

Evaluation Design Summary

As the third-party evaluator for the HIT Student Connections project, RTI International conducted a two-part evaluation that included an implementation study and a student outcomes or impact study. Data for the implementation study were collected from project documentation, on-campus site visits, interviews with project staff and stakeholders, and student surveys. The overall objectives of the evaluation were to

- document changes in institutional capacity for delivering educational and career training programs;
- examine HIT students' experiences and performance (e.g., satisfaction, enrollments, progress toward completion, graduation rates) and their post-program plans and outcomes; and
- assess the extent to which grant activities enhanced the HIT program's ability to meet labor force and employer needs.

To meet these goals, the evaluation team's work was guided by a set of research questions that were developed in collaboration with project leads in accordance with U.S. Department of Labor guidance (Exhibit ES-2).

² ACC Office of Institutional Research and HIT Student Connections Exit Survey.

Exhibit ES-2: Health Information Technology (HIT) Student Connections Project implementation study questions

Questions required by the U.S. Department of Labor
• How was the curriculum selected, used, and/or created?
• How were programs improved or expanded using grant funds?
• What delivery methods were offered?
• What was the program administrative structure?
• What support services and other services were offered?
• Are in-depth assessment of participants’ abilities, skills, and interests conducted to select or enroll participants into the program?
• Was career guidance provided, and if so, through what methods?
• What contributions did each of the partners make in terms of 1) program design, 2) curriculum development, 3) recruitment, 4) training, 5) placement, 6) program management, 7) leveraging of resources, and 8) commitment to program sustainability?
Other research questions
• How successful was the project in recruiting the targeted groups, such as veterans and workers eligible for Trade Adjustment Assistance?
• How effective were the enhancements made to online course offerings at improving student engagement?
• How effective were student support services offered through HIT?
• To what extent were program participants awarded credit for prior learning, and what effect did such credits have on their program experiences?
• What workforce agency services was HIT able to leverage for the grant, and what role did these services play in students’ program experiences?
• To what extent has program implementation resulted in innovations that can be sustained and expanded once grant funding ends?

The evaluation plan also proposed a quasi-experimental impact analysis, using propensity score matching (PSM) to identify a comparison group of students from another HIT program in Colorado. With the assistance of the project leads, the evaluation team explored using data from Colorado’s other community college HIT program at Front Range Community College and for allied health students in other ACC programs. Data from the former were not available, and project staff felt that the HIT was too different from other allied health programs for students from those programs to serve as a valid comparison group. ACC was able to provide data on students enrolled in HIT programs from fall 2009 through fall 2018. Although the number of students in the prior cohorts and the data elements available could not support PSM, the descriptive analysis compares the outcomes of students before and after HIT implementation in fall 2015. The analysis compares enrollments and students’ credit accumulation rates before and after implementation and examines HIT graduates’ pre- and post-program earnings.

Implementation Findings

The HIT Student Connections team completed nearly all deliverables and activities proposed for the project, which for some project areas, such as employer outreach, included the implementation of multiple strategies. The exception was the development of an online HIT resource portal, which was found to be duplicative of an existing resource. The findings

below address each project area, summarizing the activities completed and their effects on the capacity of the program and ACC to sustain and build upon the grant work in the future.

Program Development

- **Program and course development:** During the grant, the project updated the HIT program to reflect topics and technology current in the health information management field. The content of the HIT program was updated to reflect American Health Information Management Association standards and the needs of local health providers. The redesign features industry-standard software, such as Neehr Perfect for electronic health records and Tableau for data analytics. The redesign eliminated outdated content and courses and reduced the program's credit hours from 66 to 64.
- **Enhanced online course delivery:** Project staff updated the online HIT program's courses using Quality Matters guidelines and Captivate software to increase course usability and accessibility and add features that promote student engagement, including gamification modules, illustrations and graphics, and podcasts.
- **Enhanced work-based learning:** Program staff transformed the HIT program's first practica to a virtual format that teaches the foundational skills that students need before beginning an on-site practicum at the end of their program. Program staff also instituted new systems and processes for arranging practica and sustaining employer engagement across ACC's allied health programs.
- **Student recruitment:** Program enrollments declined over the grant period, in part due to the Denver area's strong economy, which reduced enrollments across ACC. To attract students, project staff conducted outreach to employers and secondary schools and marketed the program through various media.

Student Supports

- **Student services:** The HIT program experimented with a variety of support services, including hiring a student success coordinator, developing advising resources, and providing tuition support from the college and workforce services. Relatively high dropout rates and long average times to degree for some students led program staff to implement cohort scheduling and stricter course prerequisites in fall 2017. Program staff members hope that the changes will make it easier to track students' progress, and for students to meet their program requirements and maintain momentum.
- **Career Services:** The student exit survey results suggest that fewer than half of HIT students seek career advising; nearly all students work while enrolled, and two-thirds planned to stay with their current employer after completing the program. The project developed a comprehensive career map of the health information field, and

students also had access to job search support through ACC's career office and an on-campus staff member from workforce services.

- **Competency-based education and credit for prior learning:** During the grant, the HIT program developed and implemented a challenge exam allowing students to test out of the program's gateway HIT 101 course, which has resulted in credit awards. Faculty from across ACC also participated in training on prior learning assessment. As a result, project leadership reported more interest and openness to awarding credit for prior learning at ACC and a change in policy that allows prospective students to earn credits for prior learning prior to enrolling.

Partnerships

- **Workforce system connections:** The HIT project established an agreement with Arapahoe/Douglas Works!, ACC's local workforce center, to provide tuition assistance for 75 technical program students and on-campus job search services. The connections established through the grant laid the groundwork for post-grant collaboration between the college and center to develop apprenticeships in health fields and led the college to develop a new position to promote work-based learning.
- **Employer engagement:** Project staff hired health information management professionals to develop course components and challenge exams and provide feedback on program materials. An extended tour of more than two dozen area employer by HIT staff resulted in an increase in the number and type of employers serving as practica sites for HIT and other programs.

Institutional Capacity Building

- **Increased e-learning and work-based learning capacity:** Project staff highlighted two areas of increased institutional capacity resulting from project activities: online course development and work-based learning opportunities. For the first, ACC adopted new software, developed asynchronous training resources for faculty, and expanded the number of specialists in the e-learning center by hiring instructional designers that were hired and trained through the grant. For the latter, ACC strengthened its employer and workforce system partnerships and has secured a grant to pursue allied health apprenticeships in partnership with employers.
- **Continuation of grant-funded activities by college staff:** ACC has retained most of the staff hired with grant funds to continue activities initiated during the grant. These staff members include the HIT program director, the practicum coordinator, and instructional designers. The college also hired staff for two new positions in the past year: a work-based learning coordinator and dual enrollment coordinator. The work of these staff members will include work-based learning development and secondary outreach (respectively) that grew out of grant-funded activities.

Participant Impacts and Outcomes

Data on the project's impact on participants and outcomes draw on student survey and administrative data from ACC's Office on Institutional Research.

- **Student ratings of course delivery:** Updating course content and delivery was a priority of the project. Although pre-implementation data are not available, students' ratings of course media and interactive features of the program increased over the grant period, and student rating of course quality were consistently high.
- **Student overall satisfaction:** The satisfaction levels of program completers were high throughout the grant period, from the start of implementation in fall 2016 through spring 2018. More than 90 percent of graduates surveyed agreed that the program's content was relevant to their professional interests, well organized, and supported learning. The same proportion also indicated that they would recommend the program to others.
- **Graduate earnings:** The quarter after degree completion, graduates' inflation-adjusted average earnings were \$12,306 and two quarters after, \$13,196, an increase of about 34 percent prior to grant implementation. In two or three years (to allow students who enrolled after implementation time to graduate), the program may want to replicate this analysis to monitor changes over time. Once more students complete the data analytics certificate, a similar analysis could be done on their pre- and post-program earnings.

Limitations

As noted in the quantitative analysis section, a rigorous analysis of the effects of the HIT Student Connections project on student outcomes would require data that are not currently available. A quasi-experimental impact, for example, would need additional data elements for matching that would ideally include a measure of prior achievement, such as placement test scores. In addition, more students would need to complete the program before an analysis is possible; of the 134 students who have enrolled in the program since implementation in fall 2015, only 14 have graduated. As of this report, only three students had completed the new data analytics certificate in fall 2017.

Conclusion

The HIT Student Connections project achieved the programmatic and institutional objectives of its proposed TAACCCT implementation plan, and ACC has directed staff and other resources for sustaining the new programs and practices introduced through the grant. The project team enhanced the HIT program's online courses and developed tools and resources that will assist ACC in doing the same for other courses. The project also introduced new opportunities for awarding credit for prior learning and spurred training and policy changes that will facilitate the development of additional credit awards of this type in

allied health and college-wide. Hires made in HIT also led to changes in the administrative structure of ACC's allied health programs that are designed to support continued program improvements and employer outreach. Additionally, ACC used the connections of grant staff with the public workforce system to initiate a joint strategy to pursue apprenticeship programs in allied health. The project team also developed guidance resources but learned that students preferred working one-on-one with an advising staff or faculty member.

Grant activities coincided with an enrollment decline in the HIT program which inspired project staff to explore opportunities for training incumbent workers that are planned to continue after the grant. Online course and programs generally have higher dropout rates than in-person courses, and the project's work to redesign the program's gateway course and introduce cohort scheduling in part aimed to address this issue in HIT. The available student-level data did not support an analysis of the impact of these activities of student outcomes, but future research should explore whether the introduction of new HIT program features to support student learning and completion attracts new students and improves educational and employment outcomes.

Introduction

This is the final evaluation report for the Health Information Technology (HIT) Student Connections project from Arapahoe Community College (ACC). The project was funded through the U.S. Department of Labor's Trade Adjustment Assistance Community College and Career Training (TAACCT) Round 4 grant program. ACC's HIT program is nationally accredited and culminates in a 64-credit associate of applied science degree. ACC offers the only online accredited health information management degree program in Colorado. The program is designed to be completed in two years, but only 7 percent of students did so between fall 2009 and spring 2018, likely because most (75 percent) work full time while enrolled, and 90 percent are employed (full time and part time).

From the awarding of the grant through March 2018, the HIT Student Connections project worked to advance ACC's capacity to provide industry-relevant training for health information management professionals, with a focus on the needs of the health care sector in the Denver metro area. To meet this goal, project grant activities addressed three priority program areas: revisions and updates to program content, delivery, and structure; student support services; and industry outreach and engagement (Exhibit 1). A logic model summarizing the project's inputs, activities, outputs, and expected outcomes and impact is included in Appendix A.

Exhibit 1: Components of the Health Information Technology (HIT) Student Connections project

Development of the HIT program
<ul style="list-style-type: none">• Introduction of stacked and latticed credentials• Development of competency-based programming based on the competencies required by the Commission for the Accreditation of Health Information and Information Management (CAHIIM)• Enhanced engagement strategy for online learning with added modules• Update of the HIT two-course practicum to emphasize clinical and technical skill attainment• Establishment of a framework for awarding credit for prior learning
New student success support structures
<ul style="list-style-type: none">• Enhanced student program advising through expanded advising opportunities and resources• Career mapping and associated career guidance tools and training
Enhanced connections with industry
<ul style="list-style-type: none">• Development of partnerships that leverage resources from the workforce system and other organizations• Enhanced employer engagement and support for health care sector strategies

This report provides details and insights on the efforts and progress made by the HIT Student Connections project from 2014 to 2018. During this period, the evaluation team conducted in-depth site visits and had regular check-in calls and telephone interviews with

key staff, local employers, and stakeholders engaged in the project; reviewed project reports and documentation; surveyed and interviewed students; and reviewed course materials. In addition, the evaluation team collected student-level administrative data from the ACC’s office of institutional research to compare the education outcomes and earnings before and after implementation. The analysis summarizes the evaluation’s implementation findings, participant outcomes, and the project’s accomplishments and lessons learned.

Evaluation Design

The goal of RTI International’s third-party evaluation of the HIT Student Connections project was to provide formative and summative evaluation findings that documented and assessed project implementation, provided actionable data for project staff, and analyzed the impact of the project on student outcomes. For the first and second goals, RTI used a mixed-methods evaluation design that included analysis of qualitative data drawn from project documentation, site visits, interviews, and student surveys. Data collection was guided by a set of research questions drawn from U.S. Department of Labor guidance and developed in consultation with the project team (Exhibit 2).

Exhibit 2: Health Information Technology (HIT) Student Connections project implementation study questions

Questions required by the U.S. Department of Labor
• How was the curriculum selected, used, and/or created?
• How were programs improved or expanded using grant funds?
• What delivery methods were offered?
• What was the program administrative structure?
• What support services and other services were offered?
• Are in-depth assessment of participants’ abilities, skills, and interests conducted to select or enroll participants into the program?
• Was career guidance provided, and if so, through what methods?
• What contributions did each of the partners make in terms of 1) program design, 2) curriculum development, 3) recruitment, 4) training, 5) placement, 6) program management, 7) leveraging of resources, and 8) commitment to program sustainability?
Other research questions
• How successful was the project in recruiting the targeted groups, such as veterans and workers eligible for Trade Adjustment Assistance?
• How effective were the enhancements made to online course offerings at improving student engagement?
• How effective were student support services offered through HIT?
• To what extent were program participants awarded credit for prior learning, and what effect did such credits have on their program experiences?
• What workforce agency services was HIT able to leverage for the grant, and what role did these services play in students’ program experiences?
• To what extent has program implementation resulted in innovations that can be sustained and expanded once grant funding ends?

The evaluation also included a fidelity of implementation analysis that compared the original model proposed for the program, as represented by the logic model (Appendix A), with the program as implemented. The implementation findings note deviations from the model and discuss the implications of these changes for programmatic and student outcomes.

Additionally, the evaluation plan proposed a quasi-experimental impact analysis of the effects of the project on student education and employment outcomes, using propensity score matching (PSM) to identify a comparison group of students from another HIT program in Colorado. This analysis proposed to examine the impact of grant-funded activities on various educational and workforce outcomes (Exhibit 3).

Exhibit 3: Health Information Technology (HIT) Student Connections project impact study questions

Study questions
• Do HIT students achieve credits-earned milestones at a faster rate than the comparison group?
• How does enrollment persistence of HIT students compare with that of the comparison group?
• What proportion of HIT students earn industry-recognized credentials, and how does this proportion compare with that of the comparison group?
• How does the attainment rate of other credentials among HIT students compare with that of the comparison group?
• How does the time-to-credential of HIT students compare with that of the comparison group?
• How do employment rates of HIT program graduates compare with those of program graduates in the comparison group? How do these rates vary by credential earned?
• Among employed program graduates, how do the earnings of HIT program graduates compare with those of program graduates in the comparison group six months following program completion? How do earnings for both groups vary by the level of degree earned?
• How does the pre- and post-wage differential of HIT program graduates compare with that of program graduates in the comparison group? How does the wage differential vary by the level of degree earned?

Implementation Study

The implementation study findings are based on an analysis of qualitative and quantitative data from multiple sources, including site visits, interviews, and project documentation (Exhibit 4).

Exhibit 4: Summary of implementation study data sources

Data source	Schedule and data collected
Site visits	One-day on-site visits conducted in February 2016, November 2016, and April 2017. Site visits included interviews with project staff, Health Information Technology (HIT) program faculty, college leadership, and HIT students.
Interviews	Aside from project and HIT program staff, RTI conducted periodic telephone interviews with staff from other Arapahoe Community College (ACC) allied health programs; staff from ACC's departments of eLearning and Business, Technology, and Workforce Partnerships; three partner employers; and workforce agency staff.
Program documentation	The evaluation team reviewed online course materials, syllabi, and modules; HIT program outreach materials; and industry partner profiles.
Meetings with project team	The evaluation team conducted bimonthly or monthly calls with project staff who shared updates on project activities, accomplishments, and challenges.
Student surveys	At the end of the program's capstone course, students completed an evaluation exit survey in fall 2015 (the first semester after program implantation) and in each semester (fall, spring, and summer) through fall 2018. RTI also surveyed students in the program's introductory course (fall and spring 2017), and the Registered Health Information Technology exam prep course launched in fall 2017 to collect feedback from students to inform course design.

The evaluation team shared summary memos of site visit findings with the project team about a month after each visit. The evaluation team also shared annual interim reports in July of 2016 and 2017. These reports provided formative feedback, highlighting the project's achievements, opportunities, and challenges, and offered the project team a set of recommendations, based on the evaluation team's analysis.

This final implementation report draws on the summaries and findings of the annual interim reports as well as new project documentation, interview, and survey data collected from September 2017 through March 2018. For the analysis, the evaluation team used the implementation evaluation questions and constructs proposed for analyzing the initiative's work that were included in the evaluation plan to develop a set of codes.³ The research team used qualitative analysis software to code the interim reports, project documentation, and interview transcripts, and used code reports to develop the themes and findings presented in this report.

³ The implementation evaluation plan constructs were pathway identification, partnerships, program design, curriculum, pedagogy, student services, prior learning assessment, student recruitment, faculty support, lessons learned, and challenges.

The student exit survey collected data from students completing the program's final course each semester. Students were asked to rate the quality of the program content, instruction, and delivery; describe their employment prior to and during enrollment; and share their post-program plans. A separate section on HIT students' program experiences and employment summarizes the data collected through the student exit survey.

Outcomes Study

The original proposal for the assessment of student outcomes was to use a quasi-experimental design with a comparison group identified using PSM. In the study, the researchers would use PSM to identify a sample of non-HIT program participants from among allied health or HIT students attending a school other than ACC, or from a historical cohort of HIT students, who matched the HIT program participants on academic and background characteristics. In the final step, the researchers would then use regression analysis to compare the outcomes of the two groups to assess the impact of the program.

Unfortunately, the data needed for this analysis were not available. The project team was not able to access data from the other HIT program offered at a Colorado community college (Front Range Community College) and, given the differences in employment prospects between allied health fields, did not believe that a comparison between HIT students and students from the other program would be valid. Instead, ACC's institutional research office provided data on students enrolling in HIT 101 (the program's gateway class) from fall 2009 on. The available data cannot, however, support a quasi-experimental analysis for two reasons. First, the data included placement test data for only about 15 percent of students, and other variables measuring students' prior education or achievement were not available. Second, among the treatment group (the 134 students who enrolled in the HIT program between fall 2015 and fall 2017), only 14 (10 percent) had completed the program by the end of the 2018 spring term. Since the average time-to-degree for HIT students from 2009 to 2018 was just under three years, more time is needed for a group of students large enough for analysis to earn a credential and enter the workforce.

In the absence of the comparison group and other data needed for the quasi-experimental analysis, this report includes simple descriptive statistics and univariate analysis to describe the characteristics and programmatic experiences of HIT program participants. As feasible, the analysis notes changes over time, comparing indicator values before and after program implementation. Since the implementation of the project began in 2015 but was not completed until fall 2017 when the course revisions were done and all three of the new certificate courses were offered for the first time, the results are preliminary.

Implementation Study Findings

The HIT Student Connections project implemented a variety of activities that can be classified in eight programmatic areas (Exhibit 5). The results of project implementation included the creation of new credentials for HIT and other allied health students, the development of templates and resources for online course development, and redesigned HIT courses and program schedule. Activities in each of the program areas are summarized in the sections that follow.

Exhibit 5: Overview of Health Information Technology (HIT) Student Connections project activities

Program goal	Strategies	Activities, year 2	Activities, year 3	Grant end status (2018)
Develop stacked and latticed credentials	<ul style="list-style-type: none"> Develop stackable certificates for HIT and other programs Expand cross-program certificate opportunities 	<ul style="list-style-type: none"> Developed training modules and badges in electronic health records for certified nurse aide students Developed health care data analytics certificate courses 	<ul style="list-style-type: none"> Implemented health care data analytics certificate that prepares students for Certified Health Data Analyst designation Established articulation agreements with four-year institutions 	<ul style="list-style-type: none"> First data analytics certificate completers in fall 2017 Identified two articulation opportunities for online four-year programs
Update content and online delivery of HIT program	<ul style="list-style-type: none"> Align program with Commission for the Accreditation of Health Information and Information Management (CAHIIM) competencies Update HIT course technology, videos, and activities 	<ul style="list-style-type: none"> Introduced and provided training for Quality Matters (QM) program standards Mapped HIT courses in preparation for redesign Hired industry specialists to create course content 	<ul style="list-style-type: none"> Streamlined and aligned HIT 101 with current industry practice Developed in-house electronic health records simulation and practice patient data forms for allied health programs Created new course podcasts and interactive modules 	<ul style="list-style-type: none"> Updated all HIT courses in accordance with QM Implemented consistent course templates and formatting Streamlined program content and updated with recent industry standards and employer input Enhanced interactivity of courses
Enhance student practica	<ul style="list-style-type: none"> Streamline and standardize practica placement and skills Extend practica support to other allied health programs 	<ul style="list-style-type: none"> Secured staff support for new practica placement process Developed virtual practicum Implemented practical placement process for emergency medical services and massage therapy students 	<ul style="list-style-type: none"> Identified new practica partners Developed practica handbooks for employers and students Supported allied health practica placements Developed virtual practica to prepare HIT students for on-site practica 	<ul style="list-style-type: none"> Maintained virtual and revised on-site practica courses developed under grant College-funded allied health practica coordinator will provide support for practica placements
Award college credit in HIT for prior learning	<ul style="list-style-type: none"> Develop new prior learning assessments (PLAs) Create PLA development model for the college Modularize HIT courses 	<ul style="list-style-type: none"> Conducted Adult Learning-Focused Institution survey and program review with Council for Adult and Experiential Learning Conducted PLA training for faculty and staff 	<ul style="list-style-type: none"> Developed new challenge exam for HIT 101, and developing exam for another course Cross-walked Arapahoe Community College's (ACC's) allied health programs and military training for veterans with assistance from the American Council on Education (ACE) 	<ul style="list-style-type: none"> First students awarded credit for prior learning for 101 challenge exam ACC policy change allowing individuals not enrolled in the college to earn credit for prior learning

Exhibit 5: Overview of Health Information Technology (HIT) Student Connections project activities—Continued

Program goal	Strategies	Activities, year 2	Activities, year 3	Grant end status (2018)
Enhance student program advising	<ul style="list-style-type: none"> Expand program advising opportunities Develop additional advising resources 	<ul style="list-style-type: none"> Developed video and materials on program plan development Developed and piloted group advising sessions Launched health career readiness assessment Developed health program infographics and marketing materials 	<ul style="list-style-type: none"> Developed student cohort models and advising video on program planning Implemented cohort model for fall 2017, making program requirements easier to track and meet for students 	<ul style="list-style-type: none"> Cohort program structure in second semester Established prerequisites for HIT coursework
Improve career development support services	<ul style="list-style-type: none"> Institute additional career development services for students 	<ul style="list-style-type: none"> Hired career navigator Initiated LinkedIn professional photo shoots for students Coordinated with local workforce service office to provide job preparation services to students 	<ul style="list-style-type: none"> Completed HIT career map Reached out to employer partners on employment opportunities for HIT students Collaborated with ACC career services office on health care job fairs 	<ul style="list-style-type: none"> Hired new health career specialists at ACC career center Partnered with Colorado governor's HIT office to track industry trends
Leverage workforce services resources	<ul style="list-style-type: none"> Leverage workforce services for HIT program 	<ul style="list-style-type: none"> Instituted weekly office hours for workforce representative on campus Scheduled sessions for students on workforce services financial aid opportunities 	<ul style="list-style-type: none"> Finalized memorandum of understanding with workforce center Continued on-campus workforce center office hours Disbursed funding to more than 75 ACC students, from HIT and other programs, through workforce center 	<ul style="list-style-type: none"> ACC hired work-based learning manager to serve as campus-wide liaison for workforce center Expanded ACC and workforce center collaboration on apprenticeship programs and incumbent worker training Secured state of Colorado grant to scale work-based learning
Enhance employer engagement	<ul style="list-style-type: none"> Map regional HIT career pathways Solicit employer input on HIT program content Recruit new employer partners 	<ul style="list-style-type: none"> Conducted research on regional HIT job titles, skill sets, and competencies Hired employer representatives to serve as consultants for course development 	<ul style="list-style-type: none"> Hired industry representatives to develop HIT program components and teach courses Engaged consultant to collect information on industry trends and identify incumbent worker training opportunities Developed tiered employer partner management system 	<ul style="list-style-type: none"> Offered Registered Health Information Technician prep to incumbent workers who can earn continuing education units Expanded HIT program industry board to include more industry members as well as representatives from four-year colleges and secondary schools

HIT Program and Course Development

In enhancing HIT program instruction, the project team focused on two areas: updating course content and improving online course delivery (Exhibit 6). Through this work, the project team addressed needed changes in program structure by reducing the number of required credits and introducing cohort scheduling. The intent of these changes was to improve the program’s alignment with industry standards and the needs of area employers, enhance student learning, and improve student retention rates.

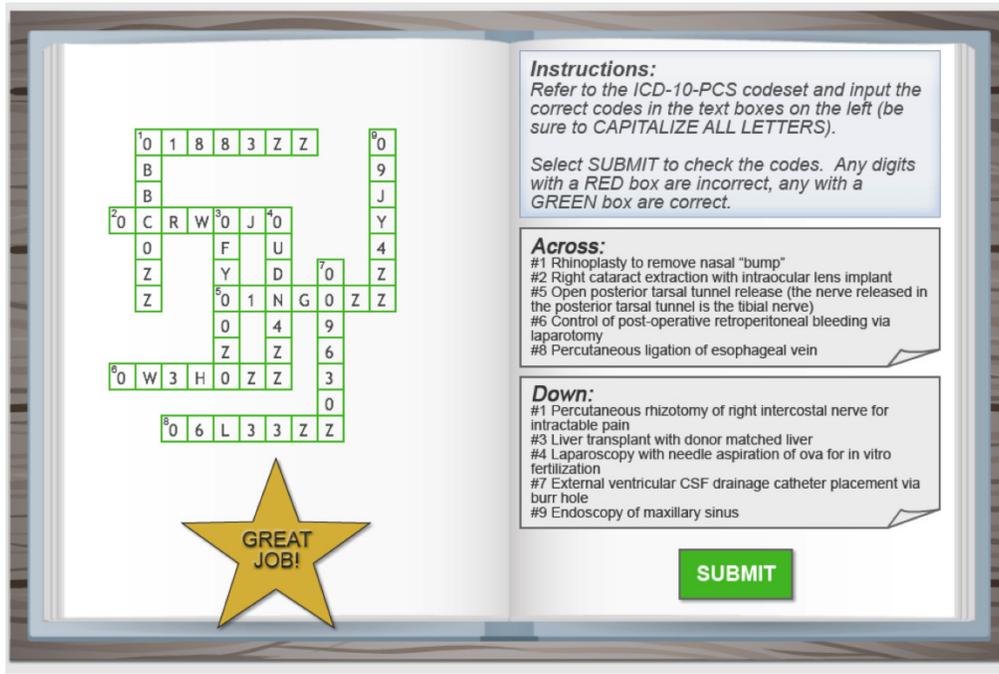
Exhibit 6: Health Information Technology (HIT) Student Connections project new and redesigned courses

HIT courses
HIT 101 Health Information Management Science
HIT 105 Principles of Healthcare Reimbursement
HIT 111 Health Data Management and Information Systems
HIT112 Legal Aspects of Health Records
HIT 122 Workflow Fund of Healthcare
HIT 188 Health Information Practicum I
HIT 220 International Classification of Diseases (ICD) Coding I
HIT 221 ICD Coding II
HIT 222 Quality Management
HIT 225 Health Information Management
HIT 231 ICD Coding III
HIT 241 CPT Coding Basic Principles
HIT 289 Health Information Capstone
Data analytics certificate courses
HIT 263 Healthcare Data Standards and Quality
HIT 264 Data Visualization
HIT 265 Data Analytics Applications

To improve course delivery, project staff updated the presentation and organization of all of ACC’s HIT courses in accordance with Quality Matters (QM) guidelines. This work included introducing more consistency across courses, including common course descriptions and welcome pages, a course template, and an interactive syllabus template. To enhance interactivity and promote student engagement, the project’s instructional designer worked with instructors to design new course components, including gamification modules, illustrations and graphics, and podcasts (Exhibit 7). The team also revised the programs Desire2Learn (D2L) course template and developed training videos and materials on D2L and QM for HIT course instructors. Instructional designers added gamified practice modules to the program’s final course, HIT 289, to help students prepare for the Registered

Health Information Technician (RHIT) certification exam. In the HIT student exit survey, students' ratings of media in the HIT course, including illustrations and interactive features, increase over the grant period.⁴

Exhibit 7: Screenshot of a coding crossword developed for HIT 231 International Coding of Diseases Coding III



SOURCE: SkillsCommons, www.skillscommons.org.

Project staff revised HIT program content in accordance with the revised Commission on Accreditation for Health Informatics and Information Management (CAHIIM) education competencies and in accordance with recommendations from the industry's certifying organization, American Health Information Management Association (AHIMA). Program staff, for example, were concerned about relatively high rates of students not continuing in the program after the required introductory course, HIT 101. The course content was revamped to match system-wide competencies and narrowed in scope; the number of credits students earn for this program was also reduced from 6 to 3. Area industry specialists were contracted to develop content, such as mock medical coding and course modules on health record quality control; industry organizational policies, regulations, and standards; and data security.

Program content changes also resulted in the elimination of a course on medial code-sets and nomenclature, which reduced the number of credits in the program from 66 to 64. Instructors incorporated relevant content from the discontinued course into another course.

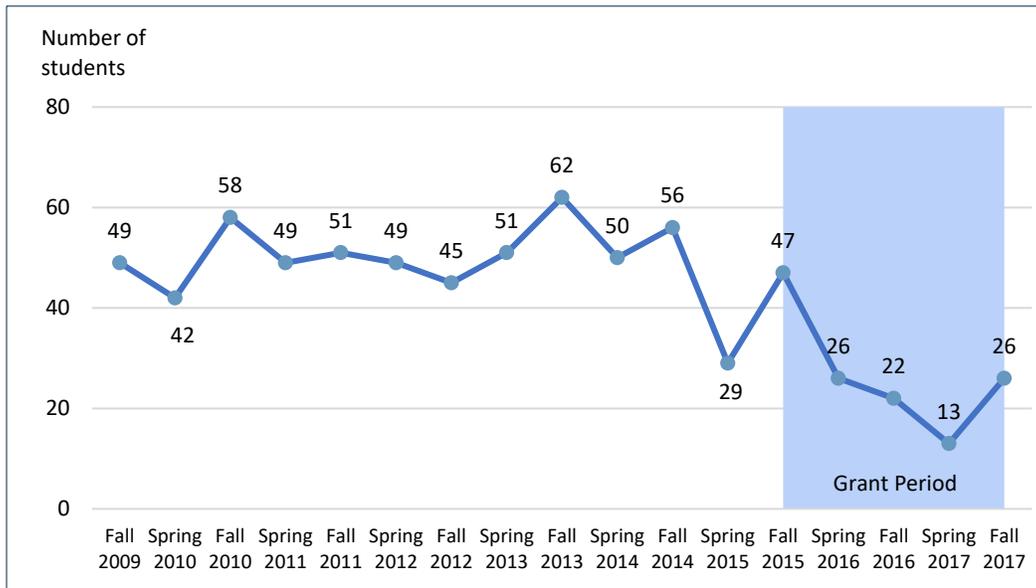
⁴ HIT Student Connections Student Exit Survey. See Appendix C for more detailed information.

A bigger change was the shift to cohort scheduling beginning fall 2017. Following the model used by ACC’s other allied health programs, HIT students now start the program in fall and complete the same sequence of courses as a cohort. Under the new schedule, project staff members anticipate a reduction in students’ need for advising on course-taking, freeing up faculty time. They also hope that cohort scheduling will help students maintain their course-taking momentum, resulting in fewer students taking terms off and dropping out. Now, missing a semester means having to wait a year to re-enroll, which may discourage stop-outs.

Student Recruitment

During the grant period, the HIT program experienced an enrollment decline. Prior to fall 2015 about 49 students per term took the program’s required introductory course (HIT 101), while after fall 2015, about 27 students did so (Exhibit 8).

Exhibit 8: Enrollments in Health Information Technology (HIT) 101, by term



NOTE: ACC discontinued the option of beginning the HIT program in spring and summer after the introduction of cohort scheduling in fall 2016.

SOURCE: Arapahoe Community College Institutional Research Office.

The HIT enrollment decline was greater than the overall drop in ACC’s enrollment that began as the regional economy grew. Program staff attributed the decline to multiple factors including changes in the industry reducing the demand for medical coding and market saturation in the region resulting from the program’s 40-year history of training health information management professionals in the area.

In addition to the curriculum updates to meet industry needs for training on the medical reimbursement cycle and security and privacy, project staff members initiated new recruitment strategies and developed new inlets for students to engage with the HIT

program, such as offering training to incumbent workers. For the latter, a consulting firm assisted with employer outreach and identifying incumbent training opportunities. As a result, the program offered an RHIT prep course through community education that was marketed to alumni and industry partners.

To expand recruitment, project staff conducted outreach to health care facilities in rural areas and out of state, participated in career fairs, and joined ACC tours to area high schools. Staff also used advertisements on radio and other media to publicize allied health opportunities at ACC and developed promotional videos (Exhibit 9). By the grant's end, project staff members were cautiously optimistic that the 26 students who enrolled in HIT 101 in fall 2017 were the start of an upward trend in enrollments resulting from their outreach.

Exhibit 9: Screenshot for a promotional video for health programs at ACC



SOURCE: SkillsCommons, www.skillscommons.org.

Student Practica

Prior to the grant, the HIT students completed two practica on-site with an employer. Feedback from employers and students suggested that more preparation for the practica would help students benefit from the experience and ensure that all students enter their practica with the same foundational skills, making practicum planning easier for employers. Beginning in summer 2016, a virtual practicum replaced the first on-site practicum (HIT 188) so that students have the skills needed for the second on-site practicum (HIT 289). The virtual practicum introduces students to a set of essential workplace skills through a series of hands-on exercises. The exercises cover health record data management, analysis, visualization, and interpretation—skills that past students and employers have identified as

needed prior to practica placement. Program staff reported that feedback has been positive, with students reporting a close match between the exercises and the work done in health information management offices. HIT faculty also updated the HIT 289 course with content on the RHIT exam, to encourage more graduates to pursue the credential, and developed protocols and handbooks with expectations for placement sites and students.

Prior to the grant, a single faculty member served as HIT program chair, taught courses, and arranged student practica. The project's full-time practicum coordinator instituted processes and procedures to streamline the placement process, which resulted in timelier placements. The coordinator has since assumed responsibility for practica across allied health programs and introduced the same processes and procedures in other programs. From fall 2016 to summer 2017, 82 percent or more students reported that their practica were arranged the semester prior to placement, but the percentage declined to 67 percent in fall 2017, and to 50 percent in spring 2018.⁵ During the grant period, ACC instituted a new database to manage practicum site partners and contracts and made the practicum coordinator position permanent at the end of the grant.

Grant-funded industry outreach expanded the number of practicum site partners for HIT through visits to more than 30 area health care facilities. The connections resulted in a higher demand for practica sites than ACC could meet and expanded the types of employers involved. In addition to the large hospitals and smaller health care facilities that the program has partnered with in the past, staff also established practica with long-term and acute care centers, physical therapy centers, and medical specialty and hospice facilities.

Stacked and Latticed Credentials

With the widespread introduction of electronic health record systems during the past decade, health care systems have access to a large amount of new data, creating a need for specialists skilled in data analytics. In response to this industry need and with the help of industry experts, project and program staff developed three new courses to create two new certificate programs: one in healthcare data analytics, and another in general data analytics. The program for specialists in healthcare data analytics assists students in preparing for the Certified Health Data Analyst Designation, and the first students completed the program in fall 2018. ACC is also considering offering a related data analytics

I am impressed with ACC for developing [the data analytics certificate program]. Other colleges have some good stuff, but don't offer a lot with health care-specific analytics... ACC may be the second in the nation.

—System Manager of Data Governance and Interoperability and HIT employer partner

⁵ HIT Student Connections Student Exit Survey. For more information, see Appendix C.

certificate to students in other fields, such as business, and is exploring an electronic health records certificate that could be latticed across health fields.

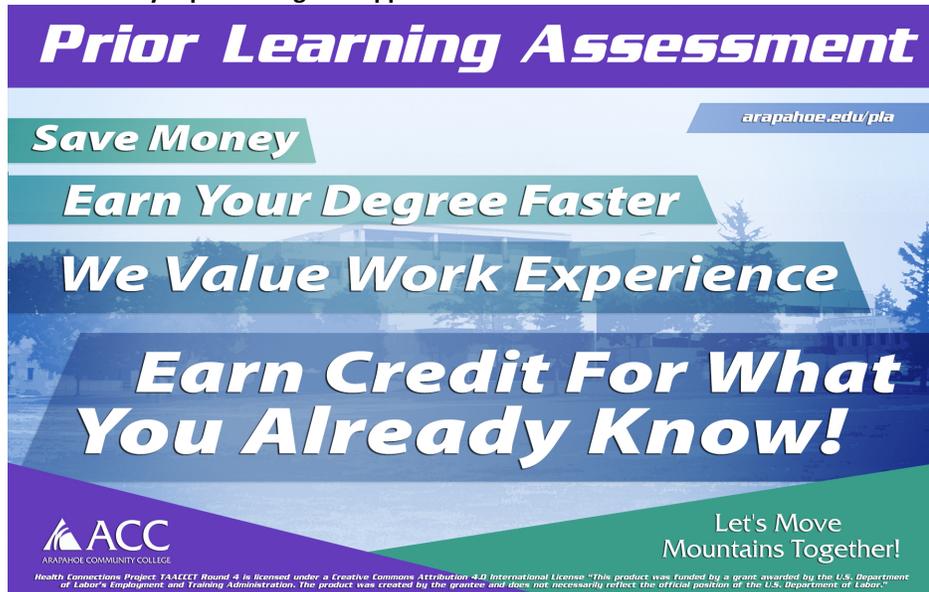
More challenging was the project's pursuit of articulation agreements with online programs offering bachelor's degrees. Program faculty observed that transfer has not been common among HIT graduates but predicted more jobs in health information management would require a bachelor's degree as the demand for data analytics skills grows. During the grant, HIT established an agreement with Weber State University in Utah, and staff learned that HIT graduates who earn the RHIT can automatically transfer to the University of Southern New Hampshire's bachelor's degree program in health information management. Program faculty members are also exploring articulation agreements with related programs outside of health information management, such as information technology or business.

Prior Learning Assessment and Competency-Based Education

The project team began its work to increase opportunities for students to earn credits through prior learning assessments (PLAs) by preparing faculty and programs for PLA development. The Council for Adult and Experiential Learning (CAEL) conducted multiple workshops on PLA for ACC faculty and administrators and assisted with the development of a HIT career map. The map includes job descriptions and competencies that can be mapped to program content to help faculty identify opportunities for awarding credit for prior learning. Project staff also created a database of past PLA awards in allied health programs at ACC for health care experience gained through the military. Additionally, staff met with ACC's veteran advisory group and explored other colleges' approaches to offering credits to military personnel.

Project staff members developed challenge exams for awarding credit for prior learning for two lower-level HIT courses. By the end of the grant, three industry pilot testers had earned 3 credits via this exam and could skip 101 if they choose to pursue the program (Exhibit 10). Further credit awards will be handled on a case-by-case basis, depending on the type of experience and credentials of the prospective student.

Exhibit 10: Flyer promoting PLA opportunities at ACC



SOURCE: SkillsCommons, www.skillscommons.org.

Program staff and leadership noted that the grant-funded activities for PLA have had the cumulative effect of increasing the ACC community's understanding of and receptivity to credit awarded via PLA. Faculty now are engaged in discussions about how best to reconcile credit for various skills with the theoretical and broader perspectives of education programs. As a first step, ACC leadership changed the college's credit for prior learning policy, which now allows prospective students to earn credits prior to enrolling so they know how many credits they qualify for at ACC prior to enrolling.

Program and Career Advising

Unlike many TAACCCT programs, the HIT project did not include a career navigator but instead combined that role with the student success coordinator and leveraged existing supports. ACC career services staff members are well versed in allied health careers, and the program's practica also link students and staff with area employers. To provide students with a comprehensive overview of the health information management field, project staff designed the HIT career map, which they developed to support their prior learning assessment work, to be useful for students. The map provides detailed information on the skills and pay associated with a wide variety of HIT occupations and occupation levels.

Several grant-funded activities were directed, at least in part, at increasing HIT student persistence and reducing students' time to graduation, including the student success coordinator. The coordinator worked with HIT and other allied health programs to field prospective student inquiries and advise students on program requirements and schedules. The coordinator also assisted with industry outreach and practicum placements, developed guidance tools and resources, and helped students adjust their plans to accommodate the introduction of cohort scheduling in HIT.

Some advising innovations tried by the project were not continued but led to other ideas that met students' support needs. Early in the project, staff members offered group advising sessions covering common program questions. They also developed a video that guides students through the process of creating a program plan. These resources did not have the desired effect of reducing students' need for assistance from faculty, so staff instituted prerequisites for HIT program courses and cohort scheduling, following the example of other allied health programs. Initial student feedback suggests that the changes have made program requirements clearer and made it easier for students to complete courses in the recommended sequence, but the impact of the changes on student retention and completion will not be known for a year or two.

[The cohort schedule] created a more streamlined program. We realized... that having a huge menu of classes left students somewhat unguided, taking too long, and not taking courses in optimal sequence. After the change, advising got easier and it helped to make it clear [to students] how their schedule would impact their time to graduation.

— HIT Student Success Coordinator

The project also developed an allied health interest assessment but found that interest among prospective students in taking the assessment was low. Near the end of the grant, ACC hired a new health specialist in advising who plans to incorporate the assessment in one-on-one work with students. She anticipates that the assessment will be useful for advising students who were not accepted into their desired medical or allied health program and need explore the fit between their interests and skills and other programs.

Workforce System Connections

Other student support services were provided by ACC's local workforce investment board, Arapahoe/Douglas Works! (A/D Works). According to project staff, A/D Works's past collaboration with the college was limited to mutual referrals at a rate of about one or two per year. Through the program's TAACCCT-funded agreement with A/D Works, a center employee spent time on campus each week to help students navigate the multistep financial aid application process for *Workforce Innovation and Opportunity Act (WIOA)* education funds and offered workforce preparation services, including resume and interview coaching. Under

the agreement, the number of ACC students receiving *WIOA* funding increased from one to two students per semester to 15 or more, for a total of 75 by spring 2017.⁶

Project and workforce staff attributed the success of the partnership to having a consistent, single point of contact at the college with knowledge of both organizations. The HIT project director, who served in this role, had worked at A/D Works prior to taking a position at ACC and understood the systems and internal operations of both organizations. After the director left ACC in 2017, the dean of workforce and community education hired a work-based learning manager with workforce system experience to help align ACC programs with A/D Works's need for competency-based certificates and to develop apprenticeships. In spring 2018, ACC was awarded a grant from the Colorado Department of Labor and Employment and the Colorado Workforce Development Council to scale work-based learning efforts.

I think we have a much stronger relationship with A/D Works, which [the HIT Student Connections director] helped set up through the TAACCCT grant. We are focused on helping to create apprenticeships in finance, technology, and healthcare... I am now actively on the workforce board. Now when opportunities do come up, I know who to contact and when to contact them.

—ACC Dean for Community and Employer Engagement

Industry Partnerships

At the beginning of the grant, the HIT program had connections with area employers as practica locations. Through the grant, project staff hoped to expand the number and type of employer partners and find opportunities for offering training to incumbent workers.

During the first year of the grant, the project staff's visits to area employers focused on the development of new practicum sites for HIT and other allied health programs. One staff member described the aim of the outreach as building a sense of community in the health care industry to build a pool of qualified candidates, rather than expecting a return on investment or payment from individual placements. The outreach resulted in multiple new employer partners, and the demand for practica placements grew beyond what the program's enrollment could support.

In response, the project team shifted focus to establishing training partnerships for incumbent workers. The team hired a consulting firm in late 2016 to collect information on local trends in the HIT industry and identify short-term incumbent worker training opportunities. The consulting firm also assisted with gathering allied health industry

⁶ The *WIOA* funds available for education declined in 2018, and eligibility requirements changed in response to low jobless rates.

information from the employers partnering with ACC's new health care–focused campus in Castle Rock. Staff noted that the consulting firm's executive-level experience did not always translate well to education and ACC's need to connect with hiring managers but believed that experience helped build ACC's business outreach capacity. The HIT program offered its first training for incumbent workers during the grant, and the grant-funded activities supported the creation of a system, with protocols and tools, for monitoring and branding relationships.

In addition to direct outreach, the project hired local health information management professionals to contribute to the development of program materials and credit for prior learning challenge exams. To sustain employer input and market the program, the HIT program also expanded the program's industry board, which now also include instructors from other area HIT programs and secondary schools.

Institutional Capacity and Sustainability

Project activities not only resulted in significant changes to the HIT program's content and structure but also contributed to the implementation of a new administrative structure for the HIT department and ACC's other allied health departments. Prior to the grant, allied health's small departments, of one to three faculty each, lacked the time and support needed to do develop programs and curricula and connect with employer and community organizations. All allied health faculty members reported to one dean, who had more than 60 direct reports from allied health and other programs.

Using grant funds, the HIT program hired a director who eventually became the director of allied health, a position new to the college with responsibility for faculty supervision, program evaluation, and outreach. The benefits of this change convinced the college to continue this position after the grant to oversee programs in HIT, mortuary science, physical therapy assisting, exercise health science, medical office technology, and medical laboratory technology. According to program staff, the allied health director provides needed cross-program strategic administration and, through employer and workforce outreach, serves as a resource for keeping curriculum relevant and program marketing. Using the same model, ACC is considering cross-program directors for its nursing and emergency medical service programs. Post-grant program support also includes the allied health practicum coordinator, another position initiated with grant funds that will be maintained with college support.

Over one half of students enrolled at ACC take at least some of their coursework online, and about 36 percent of ACC's students attend exclusively online.⁷ Program staff shared that

⁷ "Arapahoe Community College," National Center for Education Statistics, accessed August 10, 2018, <https://nces.ed.gov/collegenavigator/?id=126289#programs>.

TAACCCT brought new instructional designer capacities to the college and positively influenced e-learning throughout the college. The plan is to maintain the instructional grant-funded instructional designer positions after the grant, providing ACC's eLearning program with the capacity to maintain and expand the innovations introduced under the grant. The instructional designers have also created course templates and course features that allow instructors who have been trained on ACC's course platform and QM guidelines to make their own updates. The trainings are available as recorded modules available on demand to instructors.

ACC is also building on grant activities to develop new incumbent worker training opportunities. Given the region's strong economy, labor shortages, and declining enrollments for entry-level training, ACC health faculty members are developing a leadership course curriculum for health care partners and are exploring options to offer certified nursing assistant or phlebotomy training on-site at long-term care facilities.

Near the end of the grant, ACC created a work-based learning manager position to serve as a single point person for industry and the workforce system. Like the former TAACCCT grant director, the manager is a former A/D Works employee and is familiar with postsecondary and workforce systems. She will work with the ACC foundation and the dean of community and workforce partnerships to sustain the employer connections established during the grant. She will also collaborate with the workforce system and employers to develop apprenticeship programs in nontrade fields at ACC. The first apprenticeship program in medical assisting will allow students to "earn as they learn," attaining a credential at low cost while gaining work experience. Based on this experience and employer interest, the college is also considering an apprenticeship in billing and coding.

We're trying to be sensitive to employer needs, mitigate their pain points... our unemployment rate is low and demand for talent is insane right now. ... Businesses want students with experience/education, but they also just need employees. We propose to train the students as they go along in their jobs, in skills that are relevant to their work.

—ACC work-based learning manager

Student Outcomes

The evaluation outcome study draws on two data sources: the HIT exit survey, which was administered to students in the program's capstone HIT 289 course each semester starting in fall 2015, and student-level administrative data provided by ACC's office of institutional research. For more details on data collection, see Appendix B.

Student Feedback

The HIT Student Connections Exit Survey was designed to collect information and feedback on students' HIT program experiences. The survey was administered to students in the program's final course, HIT 289, every semester from fall 2016 to spring 2018, and completed by all 85 students who enrolled in the course during the grant period.

In addition to feedback on various program components summarized in earlier sections of the report, respondents were asked to assess the program overall. Virtually all respondents were positive about the HIT program's preparation and quality. Across all semesters, 62 percent of survey respondents strongly agreed with the statement, "As a result of the technical skills and knowledge that I gained through this program, I am prepared to enter and/or advance in a HIT career," and 37 percent agreed. Sixty percent of respondents indicated that they would strongly recommend the program to other students, and 31 percent would recommend it.

The program [is] real life not just classroom education. Everything we learned in the courses applies to actual situations in the HIT/HIM [health information management] department setting.

—Spring 2018 Exit Survey Respondent

When asked to describe the benefits of the program, over half (48) of respondents highlighted one or more features of the program. The most common response (15) addressed the convenience of online study, especially for working students. Nine respondents noted the program's preparation for the RHIT credential and AHIMA accreditation. Respondents also highlighted specific skills, stating, for example, "This program has set me up for future success in my current job, and it has given me the opportunity to rise above my peers in knowledge of HIPAA [Health Insurance Portability and Accountability Act]." Additionally, respondents offered suggestions for improving the program that addressed a variety of program areas, including strategies for offering coding classes (e.g., sequentially and in person), which students seemed to find particularly challenging. A full set of responses, as well as additional exit survey data are included in Appendix C.

Education and Income Outcomes

The average time to program completion among HIT students prior to the grant period was just under nine semesters, or about three years. In terms of calendar time, many students may take even longer, since 84 percent of students enrolled between fall 2011 and fall 2015 took one or more semesters off (including summer semesters). The data available at the time of this reporting (through spring 2018) therefore does not include enough semesters to assess the effects of project implementation on program completion. Given the data limitations, the results presented below should be regarded as preliminary but may lay the groundwork for future analyses of program outcomes once additional data become available.

One measure of progress to degree is credit accumulation. RTI analyzed HIT students' credit accumulation before and after fall 2015 at one-, three-, and four-semester intervals, using data on HIT program course-taking (data were not available on non-HIT courses), which were available from fall 2011 through spring 2018. These intervals were selected so that each analysis included the same amount of summer terms (when students take fewer credits) for students starting in fall and spring.

Students enrolled in the HIT program prior to fall 2015 earned HIT program credits at a faster rate than students enrolled after fall 2015 (Exhibit 11). On average, students who enrolled prior to fall 2015 earned just over 6 credits in the HIT 101 program by the end of the first term, about 10 credits by the end of the third term, and 14.5 credits by the end of the fourth term. By comparison, students enrolled in fall 2015 or later had earned about 3, 6, and 8 credits in the HIT program at each interval. Project staff attribute the change to the reduction in the number of credits awarded from 6 to 3 credits for the program's introductory course, HIT 101. Instead, these three program credits are now earned through HIT 122 course, Workflow Fund of Healthcare.

Exhibit 11: Average number of Health Information Technology credits earned after one, three, and four terms, before and after grant implementation (fall 2015)

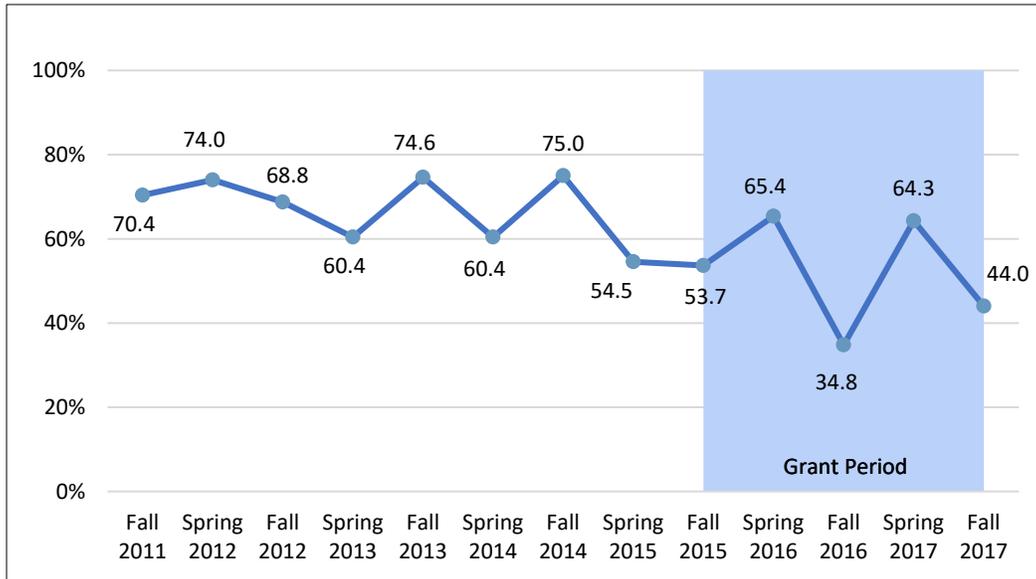
Interval	Enrolled between fall 2011 and fall 2015			Enrolled fall 2015 or later		
	Mean	Maximum	Valid N	Mean	Maximum	Valid N
One term	6.3	26.0	248	3.3	14.0	134
Three terms	9.8	26.0	208	6.0	22.0	108
Four terms	14.5	39.0	158	8.4	35.0	95

SOURCE: Arapahoe Community College Institutional Research Office.

As a measure of program retention, RTI also analyzed the proportion of students who continued taking HIT courses in the fall or spring semester after their first HIT course enrollment (spring for fall enrollees and fall for spring enrollees) before and after grant

implementation (Exhibit 12). The first-to-second-semester retention rate prior to fall 2015 was 68 percent, and in fall 2015 and later it was 52 percent.

Exhibit 12: Percentage of Health Information Technology (HIT) students who enrolled in HIT courses the following spring (for fall enrollees) or fall (for spring enrollees) after initial enrollment



SOURCE: Arapahoe Community College Institutional Research Office.

The Colorado Department of Labor and Employment provided quarterly wage data for students enrolled in the HIT program from fall 2009 to spring 2015. The earliest wage data available are from the fourth quarter of 2008; the latest, from the first quarter of 2017. To compare student wages before and after the HIT program, the sample was limited to students for whom two full quarters of wage data were available before their earliest enrollment in HIT coursework, and for two quarters after degree completion.

Among the 47 students who enrolled in the HIT program and completed their degrees between fall 2011 and spring 2015 and who had valid, nonzero wage data, inflation-adjusted average pre-enrollment wages were \$9,814 two quarters prior to enrolling in HIT (Exhibit 13). The quarter after degree completion, graduates' real average earnings were \$12,306, and two quarters after, \$13,196, an increase of about 34 percent. Wage data for HIT students who enrolled after implementation in fall 2015 or later were not available, and too little time has passed since implementation for an adequate number of students to complete the program for analysis. As more data become available, the HIT program may want to replicate this analysis to monitor changes over time.

Exhibit 13: Quarterly wages among pre- and post-Health Information Technology (HIT) program wage-earning students who enrolled in the HIT program and completed their degree between fall 2011 and spring 2015

	Average wage pre-HIT program enrollment	Average 1 st quarter wage after last enrollment	Percentage change	Average 2 nd quarter wage after last enrollment	Percentage change
Degree completers	\$9,814.38	\$12,305.63	+25.4%	\$13,195.73	+34.4%
Degree non-completers	\$10,205.64	\$11,431.73	+12.0%	\$12,118.31	+18.7%

n = 112 (47 students who completed a HIT associate of applied science (AAS) degree and 65 students enrolled by between fall 2011 and spring 2015 who had not completed a HIT AAS degree)

NOTE: Data exclude the 24.1 percent of students initially enrolled from fall 2011 through spring 2015 who reported wages of \$0 in one or more quarters included in this table and the 47.4 with missing wage data.

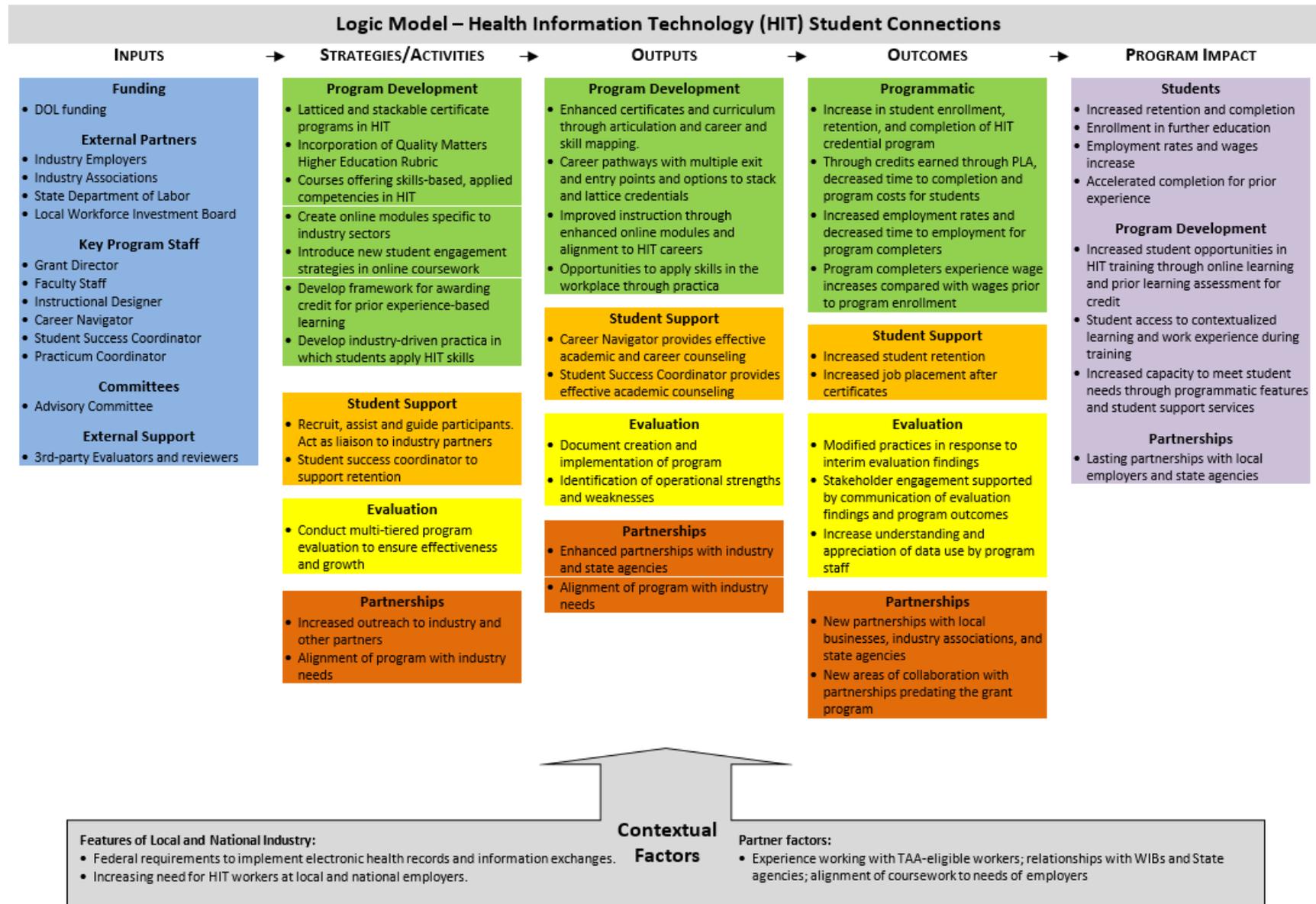
SOURCE: Arapahoe Community College Institutional Research Office and Colorado Department of Labor and Employment.

Conclusions

As described in this evaluation report, the ACC implemented a mix of programmatic and instructional strategies, rather than a single intervention, that enhanced the HIT program’s ability to meet student and labor market needs. Implementation activities centered on improving instructional programs and aligning them with labor market needs through enhanced course delivery and content updates, stackable credentials, and student support services. Program staff also leveraged employer partnerships and connections with the local workforce center to provide targeted support to participants. These program-level strategies were supplemented by the project team’s efforts to extend grant activities to other allied health programs and to support employer engagement and timelier and more beneficial practica placements for students.

An analysis of the limited outcome data available at the time of this report suggests that program participation and completion are associated with higher earnings for program participants. Future research, using data on larger numbers of students as more cohorts complete the redesigned program, will have the potential to conduct a more rigorous analysis to test these findings and examine the effects of the program on other outcomes, including program completion, certification rates, and longer term earnings.

Appendix A: HIT Student Connections Logic Model



Appendix B: Evaluation Data Collection and Methodology

The HIT evaluation included a formative evaluation of the project's implementation and a quantitative analysis of the project's effects on student outcomes using student-level administrative record data. Data collection began in fall 2016 and continued through June 2018, when the evaluation team concluded exit interviews with project leadership and key stakeholders. The formative evaluation collected information on the HIT team's challenges and successes in implementing the project and assessed the project's effects on the capacity of the program and college to provide training aligned with workforce needs. The summative evaluation of project outcomes relies on the results of a student exit survey and student-level quantitative data on students who enrolled in the HIT program prior to (from fall 2009) and during the grant period through fall 2018. Although the number of students covered in the data was too low to support a quasi-experimental impact analysis of the project using propensity score matching, the analysis calculated descriptive statistics and compared student outcomes before and after HIT implementation. Further details on evaluation data collection and analysis are provided below.

Student Surveys

Evaluation activities during the past year included surveys administered to HIT students by RTI and project staff. In fall 2016 and spring 2017, students enrolled in the program's capstone course (HIT 289) and completed an updated version of the exit survey that was first administered in fall 2015. This survey collected information on students' employment outcomes, experiences, and satisfaction with the program as well as suggestions for improving the program. In spring 2017, HIT 101 students were asked to complete a survey developed by RTI and project staff at the end of the course. A detailed analysis of the HIT Student Connections Student Exit Survey is included in Appendix C.

As part of an effort to improve student retention, project staff used a survey to collect information on whether the content or quality of HIT 101 was impacting student dropout decisions. The evaluation team assisted project staff in developing survey questions that solicited respondents' feedback on the course and recommendations for improvement. Data from the survey were shared with program staff to inform the HIT 101 redesign work and are not reflected in this report but were used by project staff to inform program improvements.

Site Visits

RTI conducted one-day site visits to ACC in February and November 2016 and in April 2017 to conduct interviews and collect information on the project's status, implementation challenges and successes, course revisions, and plans for the remaining months of grant funding. The site visits took place on the ACC campus and included interviews with project and HIT program staff as well as an employer representative. In addition, the spring site visit included interviews with Holly Hall, the HIT program director who began in 2017, and attendance at a HIT program advisory committee meeting. Following each site visit, RTI prepared site visit reports summarizing the data collected and the site visit findings.

Interviews

HIT Student Connections project staff members were interviewed by the evaluation team to gather their experiences and reflections on implementation, outcomes, and sustainability early in the grant and near the project's end. Items from the interview protocol addressed their overall views on the implementation of the TAACCCT programs, their involvement in implementation, and sustainability and transferability beyond the life of the grant. In addition, project staff members provided updates and answered questions during bimonthly meetings with the evaluation team.

Administrative Student Record Data

During the fall 2016 site visit, RTI began working with ACC's institutional research office to access the student-level data needed for the evaluation impact study. The initial data delivery included data on students who enrolled in the HIT program during the grant period (starting fall 2014) and on a historical cohort of students who enrolled in the program from fall 2009 until the grant began. The data provided included information on student demographics, the numbers of semesters enrolled, and degree attainment. These data were matched with wage and employment data from the Colorado Department of Labor and Employment to assess the effects of the HIT program on labor force outcomes.

Appendix C: HIT Student Exit Survey

Each term, the students enrolled in the HIT program’s capstone course (HIT 289) completed the evaluation exit survey, which gathered participant information including gender, prior education, and motivation for participating in the HIT program. The survey also gathered feedback on program and course design and content, the support students received during the program, and how well students believed the program prepared them for their future careers, among other topics.

All students enrolled responded to the HIT 289 exit survey from fall 2016 through spring 2018, for a total of 85 responses. The responses provided information on the HIT 289 students’ demographic characteristics and background (Exhibit C-1).

Exhibit C-1: Characteristics of Health Information Technology (HIT) survey respondents

Characteristic	Percentage of survey respondents
Female	90.6
Employment status at time of enrollment	
Full time	75.3
Part time	12.9
Not employed	11.8
Employed in the health information management field	48.2
Highest previous academic achievement	
High school diploma or GED	18.8
Some college, no degree	34.1
Associate degree	9.4
Bachelor’s degree	24.7
Master’s degree	4.7

n = 85

SOURCE: HIT Student Connections Exit Survey.

Respondents also provided information about their motivations for enrolling in the program and their post-program plans (Exhibits C-2 and C-3). Entering a new field, completing an associate degree, and seeking an increase in wages each were selected as a motivation for enrolling in the HIT program for about half of the students.

Exhibit C-2: Motivations for entering the Health Information Technology (HIT) program

Motivation	Percentage of survey respondents
Enter a new field	52.9
Complete an associate degree	48.2
Increased wages	48.2
Earn a credential in current field	35.3
Learn new skills in current field	24.7
Transfer to a four-year institution	11.8
Other	8.2

n = 85

SOURCE: HIT Student Connections Exit Survey.

At the end of their HIT program sequence, HIT 289 students were asked about their future education or career plans: 29 percent of survey respondents did not have any plans to continue their education or training in the coming year, 19 percent planned to enter a four-year degree program, and 12 percent planned to enroll in ACC’s data analytics certificate program (Exhibit C-3). A third of students reported having “other” education or training plans; the majority of these students planned to sit for the RHIT exam or seek other credentials and certifications. About half (49 percent) of the students surveyed expected to work full time in the coming year, and two-thirds (66 percent) expected to remain with their current employer.

Exhibit C-3: Education and career plans for year following Health Information Technology (HIT) program completion

Education plans for the coming year	Percentage of survey respondents
No plans	29.4
Enroll in four-year degree program	18.8
Enroll in Arapahoe Community College’s Data Analytics program	11.8
Enroll in another two-year or less degree program	9.4
Other	32.9
Employment plans	
Stay at current employer	65.9
Work full time	49.4
Seek new employment	43.5
Work part time	7.1
Work outside of the HIT field	4.7
Other	14.1

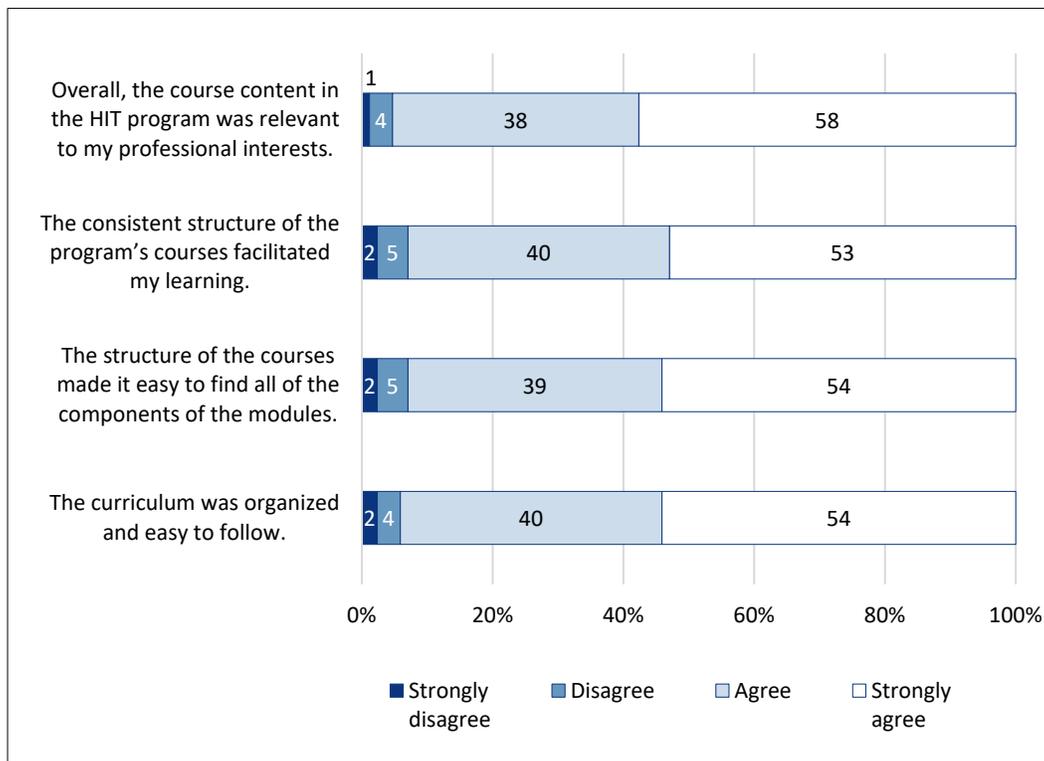
n = 85

SOURCE: HIT Student Connections Exit Survey.

Student Perceptions of Course Content and Structure

Respondents were asked to rate their agreement with a series of positive statements concerning course structure, content, and curriculum and how those factors impacted their ability to learn and follow the coursework using a 4-point scale (strongly disagree = 1, disagree = 2, agree = 3, strongly agree = 4). Over half of the respondents strongly agreed and 93 percent or more agreed that the course content was relevant to their professional interests, that structure facilitated learning and course navigation, and that the curriculum was organized and easy to follow (Exhibit C-4). Scores for these measures differed by two-tenths of a point from term to term, and no differences were statistically significant (data not shown).

Exhibit C-4: Student perceptions of course content and structure: fall 2016 to spring 2018



n = 85

SOURCE: Health Information Technology (HIT) Student Connections Exit Survey.

The Student Success Coordinator

Almost three-quarters (74 percent) of HIT students enrolled from fall 2016 to spring 2018 reported interacting with the student success and retention coordinator. Overall, just under half (47 percent) of respondents reported interacting with the coordinator one to three times and 22 percent interacted with the coordinator three to six times. Peak assistance was during summer and fall 2017, when cohort scheduling was introduced. Students reported that the

coordinator assisted them with multiple aspects of their program and most commonly with general program information (41 percent overall) (Exhibit C-5). About a quarter (27 percent) of the other responses cited assistance with practica or internships.

Exhibit C-5: Student interactions with student success coordinator

	Fall 2016	Spring 2017	Summer 2017	Fall 2017	Spring 2018	Total
How many times did you interact with the student success coordinator?						
1–3 times	14.3	67.6	37.5	20.0	64.3	47.1
3–6 times	7.1	2.9	25.0	53.3	14.3	16.5
More than 6 times	0.0	5.9	37.5	20.0	7.1	10.6
0 times	78.6	23.5	0.0	6.7	14.3	25.9
Which of the following has the student success coordinator helped you with?						
General program information	14.3	32.4	50.0	66.7	57.1	41.2
Graduation	7.1	29.4	37.5	20.0	14.3	22.4
Registration	0.0	14.7	25.0	20.0	28.6	16.5
Understanding Arapahoe Community College admission requirements	0.0	11.8	12.5	26.7	14.3	12.9
Initial program intake	21.4	8.8	25.0	6.7	0.0	10.6
Other	0.0	35.3	50.0	26.7	21.4	27.1
Did not interact with the coordinator	78.6	23.5	0.0	6.7	14.3	25.9
Total	n = 14	n = 34	n = 8	n = 15	n = 14	n = 85

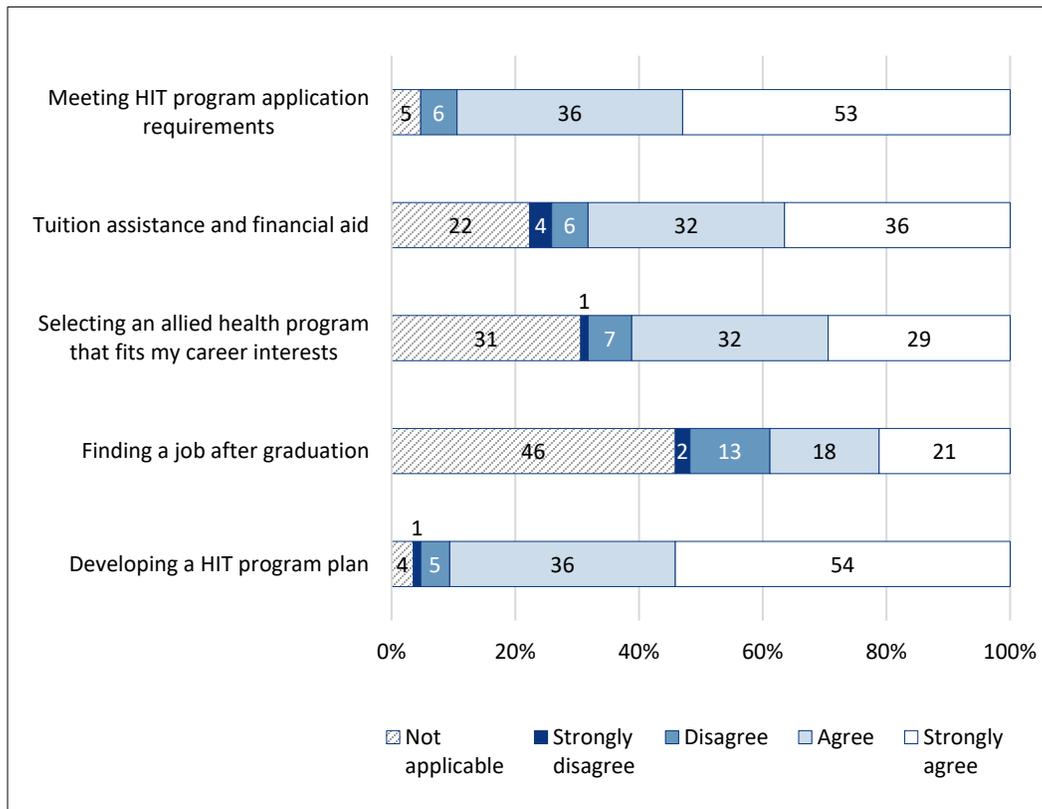
SOURCE: Health Information Technology (HIT) Student Connections Exit Survey.

Students were asked to provide feedback on how the student success coordinator could better assist students. Almost two-thirds (63 percent) of the 27 students who provided feedback reported satisfaction with the coordinator, while a third suggested improvements in the timeliness, frequency, or thoroughness of communications.

Guidance

Students were asked whether they had received the guidance they needed for several topics (Exhibit C-6). Most respondents (greater than 90 percent) agreed that needed guidance was provided for meeting program requirements and developing a plan. Several assistance categories related to financial aid and employment were relevant only to a subset of respondents, reflecting that over one half of students were employed in health information management when they enrolled and thus do not need assistance in these areas. When analyzed by year (data not shown), no consistent patterns in students’ experiences emerged.

Exhibit C-6: Agreement with having various advising needs met during the Health Information Technology (HIT) program



n = 85
SOURCE: HIT Student Connections Exit Survey.

Survey respondents rated the media and interactive features of their classes more positively after fall 2016, with average scores of 3.4 and 3.5 (between agree and strongly agree) for every semester after, with one exception (Exhibit C-7). The change corresponds to the timing of the updates for many of the program’s courses, although more data from semesters prior to implementation would be needed to confirm the trend.

Exhibit C-7: Student ratings of online course media

	Fall 2016	Spring 2017	Summer 2017	Fall 2017	Spring 2018	Total
The illustrations helped me understand the course material	3.1	3.5	3.4	3.5	3.5	3.4
The interactivity aided my understanding of the subject matter	3.1	3.4	3.1	3.5	3.4	3.4
The videos were engaging and supported learning	3.3	3.5	3.4	3.5	3.4	3.5
Total	n = 14	n = 34	n = 8	n = 15	n = 14	n = 85

n = 85

SOURCE: Health Information Technology (HIT) Student Connections Exit Survey.

A goal of the grant was to institute new systems to improvement quality and timeliness of practica placements; overall, approximately 75 percent of respondents reported that their practica was scheduled before the beginning of the semester in which it occurred (Exhibit C-8). However, that figure declined after summer 2017, from 88 percent in summer 2017 to 50 percent by spring 2018. Nearly all (92 percent, data not shown) students during the grant period, however, agreed that their practicum provided valuable, hands-on experience in the HIT field. A few students provided suggestions on potential improvements to the practica, most commonly recommending better communication of practicum requirements and expectations.

Exhibit C-8: Practicum scheduled prior to the beginning of the semester in which it was completed

	Fall 2016	Spring 2017	Summer 2017	Fall 2017	Spring 2018	Total
Agree	85.7	82.4	87.5	66.7	50.0	75.3
Disagree	14.3	14.7	0.0	33.3	50.0	22.4
Missing	0.0	2.9	12.5	0.0	0.0	2.4
Total	n = 14	n = 34	n = 8	n = 15	n = 14	n = 85

n=85

SOURCE: Health Information Technology (HIT) Student Connections Exit Survey.

The summary questions in the survey suggest that students who complete the program are universally satisfied with the HIT program overall: 99 percent agreed or strongly agreed that they were better prepared to enter and advance in a HIT career for all technical skills and knowledge that they had gained through the program (Exhibit C-9).

Exhibit C-9: As a result of the technical skills and knowledge that I gained through this program, I am prepared to enter and/or advance in a Health Information Technology (HIT) career

	Fall 2016	Spring 2017	Summer 2017	Fall 2017	Spring 2018	Total
Strongly disagree	0.0	0.0	0.0	0.0	0.0	0.0
Disagree	0.0	2.9	0.0	0.0	0.0	1.2
Agree	28.6	38.2	25.0	40.0	42.9	36.5
Strongly agree	71.4	58.8	75.0	60.0	57.1	62.4
Total	n = 14	n = 34	n = 8	n = 15	n = 14	n = 85

n = 85

SOURCE: HIT Student Connections Exit Survey.

About 90 percent of respondents also agreed that they would recommend the program to others, and 8 percent would recommend it, but “with reservations” (Exhibit C-10).

Exhibit C-10: Would you recommend the Health Information Technology (HIT) program to other students?

Would you recommend this program to other students?	Fall 2016	Spring 2017	Summer 2017	Fall 2017	Spring 2018	Total
I would strongly recommend it	64.3	64.7	37.5	66.7	50.0	60.0
I would recommend it	28.6	26.5	62.5	20.0	35.7	30.6
I would recommend it with reservations	7.1	8.8	0.0	6.7	14.3	8.2
I would not recommend it	0.0	0.0	0.0	6.7	0.0	1.2
Total	n = 14	n = 34	n = 8	n = 15	n = 14	n = 85

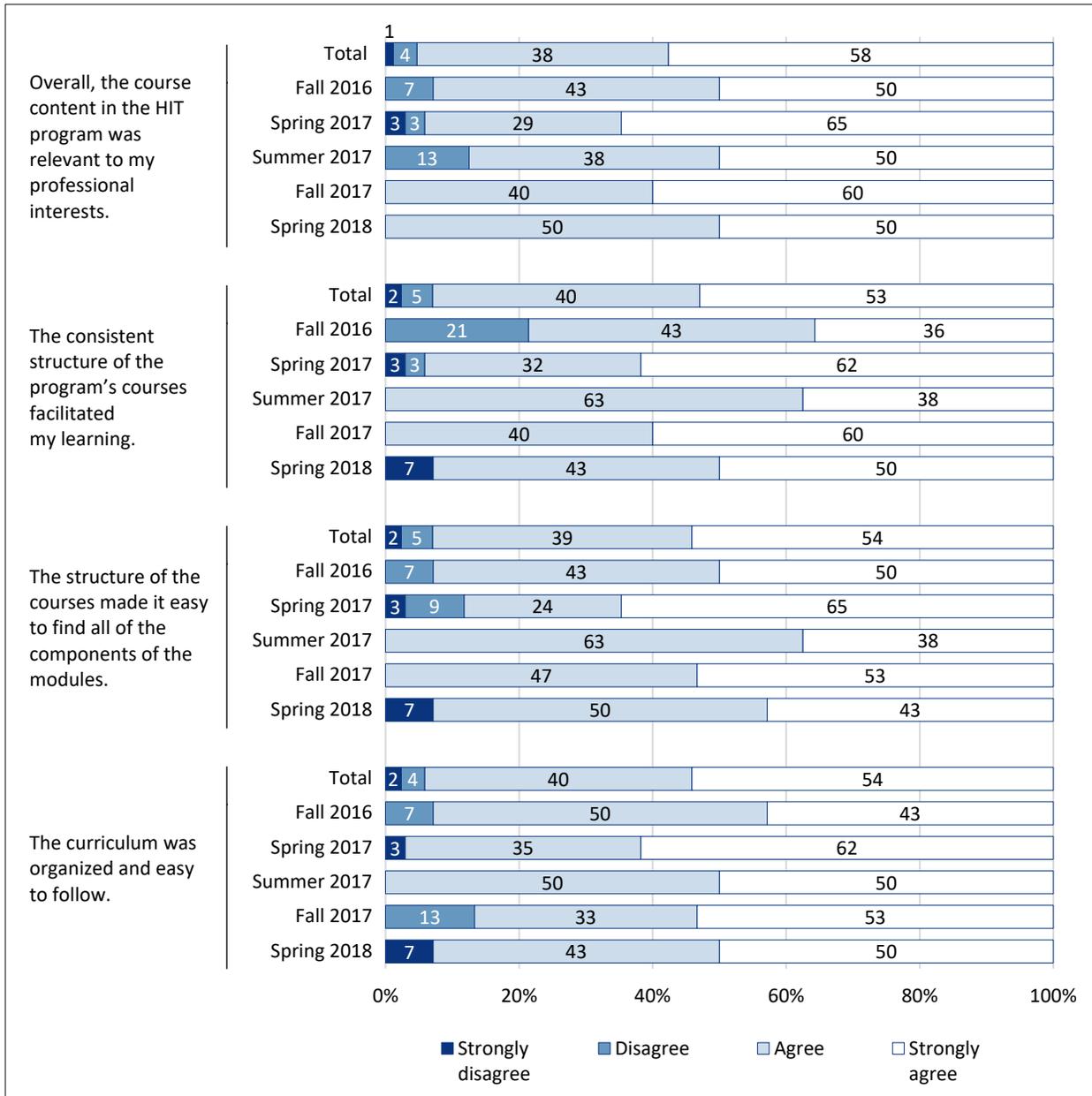
n = 85

SOURCE: HIT Student Connections Exit Survey.

When asked for any suggestions on how to improve the program, some respondents noted that the program seemed less cohesive in the final terms and suggested more emphasis on specific topics, such as legal issues and coding; some recommended staggering and offering the coding classes in person rather than online.

Supplemental Tables

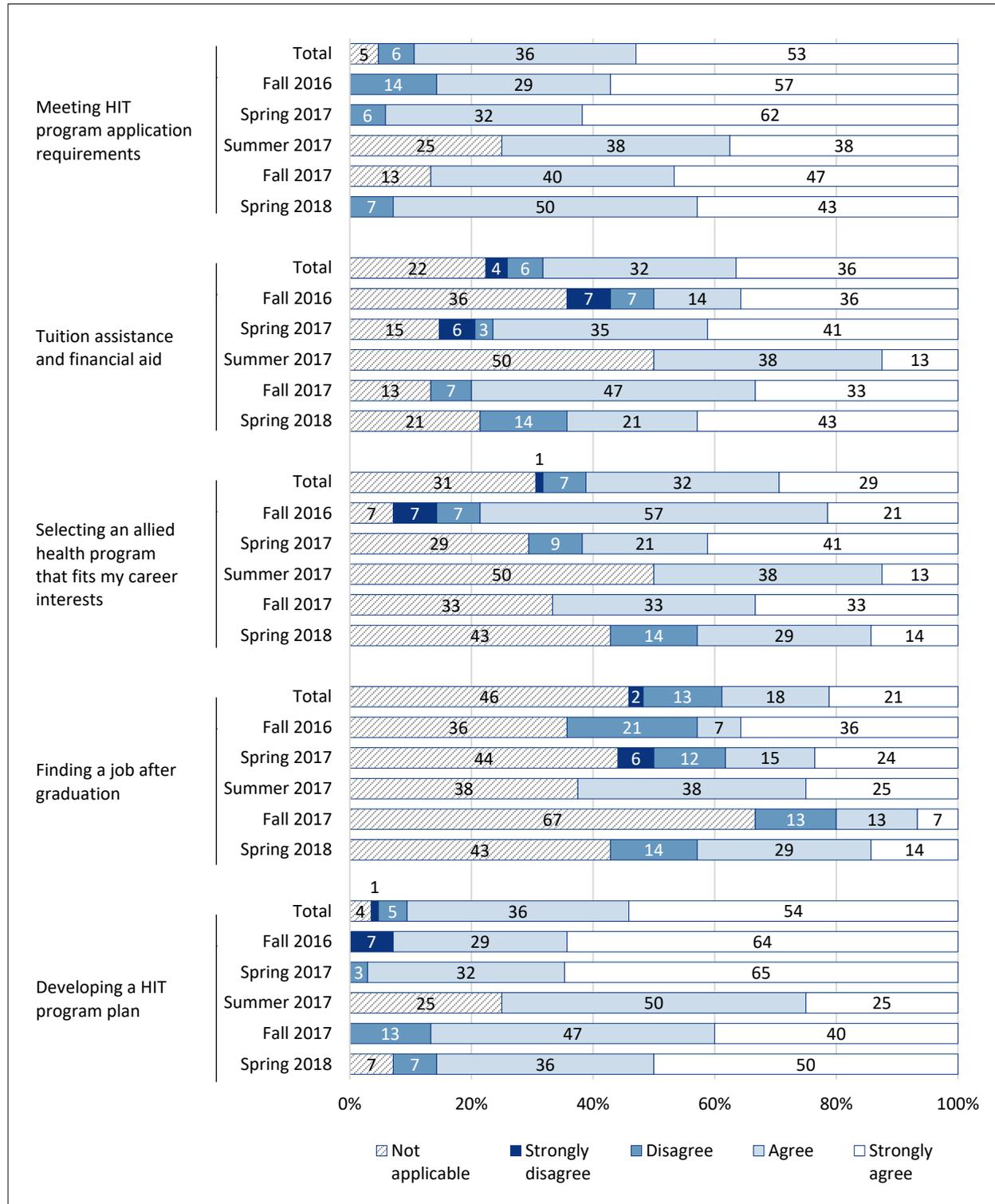
Exhibit C-11: Student perceptions of course content and structure



n = 85

SOURCE: Health Information Technology (HIT) Student Connections Exit Survey.

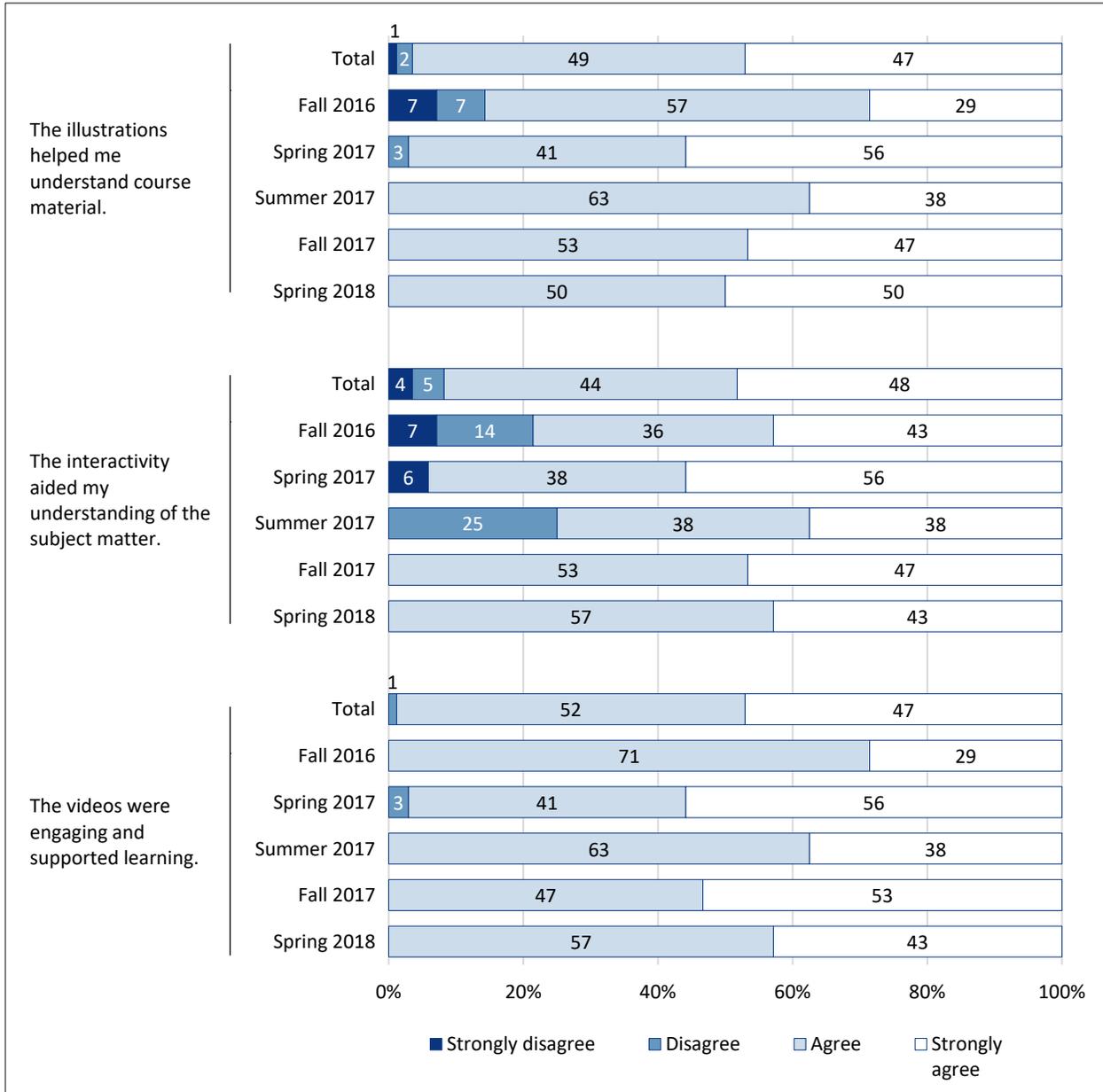
Exhibit C-12: Student perceptions of guidance they received during the Health Information Technology (HIT) program



n= 85

SOURCE: HIT Student Connections Exit Survey.

Exhibit C-13: Student ratings of Health Information Technology (HIT) course media and features



n = 85

SOURCE: HIT Student Connections Exit Survey.

Exhibit C-14: What are the primary benefits of the Health Information Technology (HIT) program (open responses)?

Fall 2016
CAHIM accreditation. The ability to learn at a pace that suits working individuals. A well-rounded program that I believe will help me achieve my career and educational goals.
From my practicum experience, I know ACC is very involved in the HIT community.
I think it does prepare students for a career in healthcare.
Learning the different aspects of the HIT program.
Online access, internship, and the classes.
Online classes
Online courses
opening doors into different jobs in healthcare.
That it is online and that they let you do your practicum courses of your choice or at the facility that you currently work in.
The basic knowledge you gain and the availability of the courses. I had computer problems a few times during my courses that if I could've used a tablet I would've been set.
The organization of the program, the accreditation of the program, the instructors (except for my first Eng Comp instructor, who was a nightmare,) the professionalism of the program, the internship, and the ability to complete the program online with flexible scheduling for working people.
Spring 2017
A more productive individual; a healthier family; and a healthier community. More people skilled to work and pay taxes, to fuel our economy, and keep our economy healthy.
Being able to take it online
Credential is marketable.
Good program organization and accredited by AHIMA
Having a better understanding of the correct way of billing and coding. Learning the different aspects and points of view from people that actually work at this on a day to day basis
I feel that it was really well-rounded. While I didn't get as much coding experience as I would have liked, I'm sure that there are other who wanted less coding!
I liked that there was a rounded education of all aspects of working with a medical record.
It benefited me in my current position. Learning the full background and more in depth about HIT.
It exposed me to many different elements of HIT which is how I found my passion in Cancer Registry.
Its very thorough with the information
On-line course work.
On-line, the instructors, the practicum help. I love ACC and I always try to get people to enroll into the program
On-line learning for full-time employees.
Online learning, working full time and family all are workable
Promising career field with different opportunities to suit individuals career path.
Supplied overall HIT knowledge.
The ability to sit for the RHIT exam after graduation.
This program benefits those who are not already in the field and seek an associate degree.
This program has set me up for future success in my current job, and it has given me the opportunity to rise above my peers in knowledge of HIPAA

Summer 2017

Being able to do it on my time and around my work schedule. Having my home computer or the public library was good to do my work.

It expanded upon what I learned when at work and also learned new knowledge, such as coding.

Knowledge of HIT aspects.

Preparation to take the certification exam for sure

The biggest benefit to this program for me was the online access. Being able to access information when it was convenient for me made it much easier to complete this program. Without the online access it would have taken me much longer to complete the program.

This program gave me the education I need to find a job in the HIT field

Fall 2017

Challenging, but can lead to a very promising career

Convenience of being all online

I have acquired skills or was able to enhance skills for my current HIM position. I enjoyed the principles of management courses and look forward to applying them along with the many other applications learned the last two years. Thank you!

I think the HIT program is great. It exceeded my expectations in the academic aspect because it involved actual HIM industry-based learning activities that HIM professionals encounter in real life. For me the primary benefit was the opportunity to learn the most relevant techniques that apply to the actual work environment. I am grateful with the HIT program because since my first semester I felt welcomed for the faculty and personnel of the ACC. I believe that the support and assistance of the instructors made a big difference in the learning environment because they were very helpful in guiding students throughout the semester. They provided tools such as: v Instructional videos v Additional resources with links to articles v Discussion boards v Virtual practicum v Exercises with answer keys These activities help expose students to the activities of the actual work environment. I am grateful to the HIT program and all the faculty members because since my first semester they made me feel welcome. Thanks to my coordinators and instructors of the HIT program, I could obtain a job at Children's Hospital Colorado and I am so happy to feel that I belong to the healthcare field that has always interested me. Thanks!

The primary benefits of this program is that it can all be done online.

The program consists of real life not just class room education. Everything we learned in the courses applies to actual situations in the HIT/HIM department setting.

Spring 2018

Gaining knowledge and ability to sit for RHIT

I do feel like it gave me a good education and understanding of Health Information Management. I did learn about the law, the basics of coding, and a lot about graphs and charts.

Online access and Extremely knowledgeable staff

Prepared basic skills for the RHIT

The benefits are that it is a well-rounded program that is CAHIIM accredited

The credential and degree you can obtain for opportunity for advancement in the workforce.

The instant feedback on homework and exams really helped me with studying and retention.

The primary benefits include gaining technical knowledge for the job field, knowing federal laws, code and terminology sets, management practices, and practicum experience.

The program allows one to begin coding as a profession right after completion.

To prepare me for a position in HIT.

Exhibit C-15: How would you improve the content of the Health Information Technology (HIT) program?

Fall 2016
Give the ability to take more complicated courses in a classroom setting i.e. coding.
I do have to say the majority of my courses have been great. I have had issues with a couple to which I didn't like the minimal instructor correspondence. We need feedback that is not graded to get the material at times.
I just think overall communication. I have done an online school where your advisor would call every week to once a month to make sure that everything was going well, as well as helping you apply for ACC. I never once received a call from ACC.
I suggest coding classes be in classroom for 3 or 4 times.
I wish there were more extracurricular HIT-related meetings and activities through the school. in Colorado Springs.
I would like to mention that if there is any way to minimize coding courses and mix them with more kind of IT course or towards IT also field. the reason why I said that is because many of the student won't be coders or have anything to do with coding job, why waste more time to study something that we won't use or hard to get jobs in.
I would suggest not having the student take 2 coding classes at once. It makes for a very hard semester. Maybe one coding class along with another class but not coding.
Instructors post teaching sessions when applicable, especially in coding classes. Have live class sessions per week in order to communicate with the instructor.
Once again, I have no basis for comparison and therefore, no suggestions. I will say this program provided me with the experience I expected and because of distance learning and great instructors (except for my first English Composition instructor, who was frankly awful,) I was able to finally, FINALLY, achieve my goal of completing a degree program!
Some of the classes required me to submit an assignment then correct it with the answers from the answer key and then I'd have to resubmit the assignment to get full credit. I didn't understand that sort of practice and I don't think I benefited from that.
The only think I would do is encourage students to not take 2 coding classes at one time. Working a full time job and trying to take 2 coding classes is very challenging.
weekly due dates to help keep student n track
Spring 2017
As I got closer to end of program professors were less engaged. Such as 1. I took vacation time for a RHIT exam webinar and it was cancelled that day, so I used my vacation for nothing. 2. Schedules and syllabuses were not updated each semester from the previous semester. 3. Response time to questions in discussions was unacceptable. I put in discussion question over a week ago and still have not heard back. 4.Proffesors and Chair of HIT need to work on communication with students.
Be sure dates of information are current. Too many times dates in the information were for previous semesters
Excellent program
I am satisfied with my experience.
I would like to see more about CFR 42 part 2 and 27-65
I would reassess ICD coding as an in-person course.
Initial classes were informative. However, the online practicum was a disappointment as it was basically a review of all previous classes and the capstone was not well organized or facilitated.
Maybe more interactive things like a Skype class
More CFR 42 and 27-65 stuff
Once there was a clear direction of when ICD-10 was going to be implemented, everything else went very smoothly.
Some of the courses were irrelevant to what I'll be doing in my career, but overall I think the program encompasses everything I need to prepare for the RHIT.
take out classes that don't pertain the program. My interest was in the billing and coding, not learning anything about medicare records
Very good content involving the HIT program.

Summer 2017

After taking the mock exam, I thought the classes on healthcare reimbursement and legal aspects could be improved upon. I thought the questions were the most challenging and I felt I was the least prepared for these sections.

I think there is too much coding and not enough about EHR's a documentation requirements.

Personally, I find power points very useful in studying, so if there could be a power point for review for each module it might prove beneficial. Also, for the discussions page, the students could all contribute to a study guide for things that they struggled with most

Fall 2017

I think that if there is any improvements to be made for the HIT program, it would be to only teach what we are actually going to use in the HIM field. I feel that there was some information that was taught, that I will never use.

The entire HIT program was well organized and beneficial. I would not change a thing.

Spring 2018

Everything seemed to flow and work well until this last semester. It was so disjointed and confusing, I don't feel like I have learned much. I feel as if I have struggled and am barely getting through. I have emailed my professors more this semester than I did in all my other semesters combined. I have to look at the program overall, because if I had to evaluate the course just by this last semester, I'd give the program an F. Professors need to make sure materials are available and that they know what they are doing and what is being taught and required of students.

From what I am hearing from other people, the RHIT exam consists of more behavioral based questions than the practice exams given in the class, so I am hoping that the classes prepared me for the test. I won't know how prepared I was until I take the exam for sure.

More focus of legal topics, especially with release of information. More support for students looking at entering a coding career or wanting to earn coding credentials.

The content was solid, straight forward and relevant to the times. Continue to keep the details current as the content is great.

SOURCE: HIT Student Connections Exit Survey.

Appendix D: HIT Student Demographics

Most HIT students (90 percent) from fall 2009 to fall 2017 were female (Exhibit D-1). The racial and ethnic composition of HIT 101 enrollees changed after fall 2015; the proportion of white students declined from 71 to 60 percent, and the proportion of Hispanic students grew from 11 to 19 percent. The proportion of students who were Pell Grant recipients also increased from 12 to 31 percent.

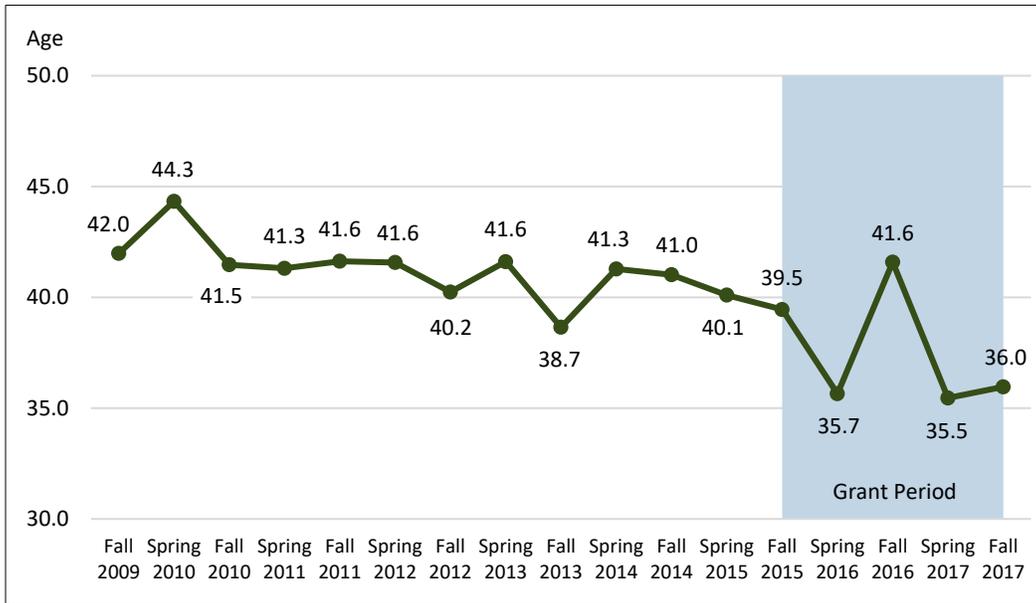
Exhibit D-1. Demographic characteristics of students enrolled in Health Information Technology (HIT) 101 from fall 2009 to fall 2017

Student characteristics	Before fall 2015		Fall 2015 to fall 2017		Total	
	#	%	#	%	#	%
All Students	591	100	134	100	725	100
Female	530	90.0	122	91.0	652	90.0
Male	61	10.0	12	9.0	73	10.0
Race/ethnicity						
American Indian or Alaskan Native	4	1.0	1	1.0	5	1.0
Asian	21	4.0	6	4.0	27	4.0
Black or African American	46	8.0	14	10.0	60	8.0
Hispanic	63	11.0	25	19.0	88	12.0
Multiple races	16	3.0	5	4.0	21	3.0
Native Hawaiian and other Pacific Islander	4	1.0	0	0.0	4	1.0
Non-resident alien (international)	1	0.0	0	0.0	1	0.0
Unknown	19	3.0	3	2.0	22	3.0
White	417	71.0	80	60.0	497	69.0
Pell Grant recipient	72	12.0	41	31.0	113	16.0
Earned transfer credit	374	63.3	90	67.2	464	64.0

SOURCE: Arapahoe Community College Institutional Research Office.

The average age of HIT students declined from 41 from fall 2009 to spring 2015 to 38 from fall 2015 to fall 2017 (Exhibit D-2). In some post-2015 semesters, the average age was about 35, the youngest average age across the semesters compared. The average age of students who enrolled in HIT 101 over the entire period was 41.

Exhibit D-2. Average age of Health Information Technology (HIT) 101 Students by term



SOURCE: Arapahoe Community College Institutional Research Office.