Workforce Program Evaluation

University-Based Training Program Site Visit Report

March 2013

REPORT

Workforce Program Evaluation: University-Based Training Program- Site Visit Report

MARCH 21, 2013

NORC

at the UNIVERSITY of CHICAGO

Table of Contents

Executive Summary

To help address the increasing and evolving demands of the current health-care and policy environments, the Office of the National Coordinator for Health Information Technology (ONC) developed the Information Technology (IT) Professionals in Health Care Program (referred to as the "Workforce Program"). The Workforce Program comprises four constituent programs:

- *Community College Consortia (CCC) to Educate Information Technology Professionals in Health Care.*[i] This program provides $68 million to five consortia, which supported a total of 81 community colleges covering all 50 states, to establish or improve non-degree health IT training programs that can be completed within six months. The funded community colleges will help train more than 10,500 new health IT professionals by 2012. The training programs are designed for professionals with an IT or health-care background and focus on training students for the following professional roles: practice workflow and information management redesign specialists; clinician/practitioner consultants; implementation support specialists; implementation managers; technical/software support; and trainers.

- *Curriculum Development Centers (the Centers).*[ii] ONC awarded a total of $10 million in cooperative agreements to five universities to develop health IT curriculum materials and educational materials for use in training students in the six professional roles described above. In addition to use by the CCC program, the materials have also been made available to other schools and individuals outside the Workforce Program for wider use across the country. The recipients created three versions of these materials, with each one improving technically and substantively upon the previous version.

- *Competency Examination for Individuals Completing Non-Degree Training.*[iii] One two-year, $6 million, cooperative agreement was awarded to fund the design and initial administration of competency exams (also known as HIT Pro Exams) in health IT for the six professional roles that are the focus of the CCC program. Vouchers will be available to cover the cost of the exam for individuals who complete one of the CCC programs. Other health IT professionals will also be able to sit for the examination.

- ■ *Program of Assistance for University-Based Training (UBT).*[iv] This program provides grant funds totaling $32 million to nine colleges and universities to create or expand health IT training programs focused on six health IT roles that require a higher level of training. UBT program training focuses on the following roles: clinician/public health leader; health information management (HIM) and exchange specialist; health information privacy and security specialist; research and development scientist; programmer and software engineer; and health IT sub-specialist.

This report focuses on the UBT program, the goal of which is to rapidly increase the availability of individuals qualified to serve in specific health IT professional roles requiring university-level training. In particular, it discusses the site visits the evaluation team conducted with the UBT grantees for the purpose of reviewing the program's implementation activities, program and student enrollment characteristics, and findings regarding student employment.

Methodology

ONC funded NORC at the University of Chicago to conduct an independent evaluation of the Workforce Program that focuses on all four constituent programs. As part of this evaluation effort, NORC completed site visits to the nine UBT grantees in two rounds. NORC completed site visits to five of the nine UBT grantees from July 2011 through November 2011. Site visits with the remaining four UBTs occurred during October and November of 2012. As part of these site visits, the team held discussions with the programs' Principal Investigators (PIs) and leadership teams, career counselors, local employers, faculty members, and students. For one school that does not offer in-person learning, we conducted a "virtual site visit," during which we held all of the conversations via teleconference. While discussions during both rounds of site visits focused on similar topics, the first round included more emphasis on the implementation experience, while the second round emphasized students' experiences and employment circumstances, lessons learned, and plans for sustainability.

This report discusses key themes, information about the programs, and the perceptions and experiences of the various participants that emerged during all nine site visits.

Key Findings

While the findings from this evaluation will continue to evolve and be further tested through the NORC team's surveys and additional data-collection activities, the chief conclusions to be drawn from the nine UBT site visits include the following:

- Generally, grantees used the Workforce funds to enhance previously existing health IT programs and to create new Master's and certificate programs. Examples of the use of funds include transitioning programs to an online format, creating new courses, and hiring additional faculty and support personnel.

- All grantees reported selecting the Workforce roles for which they would provide training based on their existing capabilities and programs.

- Students have generally been impressed and satisfied with the caliber of their instructors and the course content.

- Most of the programs use a hybrid approach consisting of online and in-person learning for the various roles. While the majority of students were happy with this format and the flexibility it affords, they noted that their respective programs could improve some of the online tools.

- Most employers and faculty members believe the ONC roles are well-matched to employers' needs; however, employers and faculty members all noted that many employers are not familiar with the UBT programs.

- Employers who have hired graduates have been extremely happy with their work performance.

Introduction

To help address the increasing and evolving demands of the current health care and policy environments, the Office of the National Coordinator for Health Information Technology (ONC) developed the Information Technology (IT) Professionals in Health Care Program (referred to as the "Workforce Program"). The Workforce Program's primary goal is to train a new workforce of health IT professionals who will be ready to help providers implement and maintain electronic health records (EHRs) to improve health care quality, safety, and cost-efficiency. To this end, ONC designed the program to train and graduate high-caliber health IT professionals interested in supporting the growing and evolving health IT industry.

The Workforce Program is comprised of four constituent programs: the Community College Consortia to Educate Information Technology Professionals in Health Care program (CCC program), the Program of Assistance for University-Based Training (UBT program), the Curriculum Development Centers program, and the Competency Examination for Individuals Completing Non-Degree Training program (with the Competency Exam also known as the HIT Pro examination). In order to provide training in the appropriate areas needed in the growing health IT workforce, ONC defined 12 professional roles for the various training programs to target.

This report focuses on the UBT program, the goal of which is to rapidly increase the availability of individuals qualified to serve in specific health IT professional roles requiring university-level training. The UBT program provided funds to nine universities around the country. Training focuses on the following six roles: clinician/public health leader; health information management (HIM) and exchange specialist; health information privacy and security specialist; research and development scientist; programmer and software engineer; and health IT sub-specialist.

ONC funded NORC at the University of Chicago to conduct an independent evaluation of the Workforce Program that focuses on all four constituent programs. This evaluation is addressing a range of issues concerning the Workforce Program, including:

- The processes the grantees used to implement the programs and meet program goals,
- The extent to which the grantees met their respective Workforce Program requirements, and
- The extent to which the students enrolled in funded community colleges and universities gained employment in health IT.

The Workforce Program evaluation is exploring these issues through both formative and summative evaluation approaches, providing critical formative feedback to the grantee institutions on their activities, and offering perspectives on the Program's contributions in helping to build a skilled workforce equipped to meet the current needs of a range of employers. The report describes: program and student enrollment characteristics, program implementation experiences, and findings regarding student enrollment. Key findings include:

- By and large, grantees used the Workforce funds to enhance previously existing health IT programs and to create new Master's and certificate programs. Examples of the use of funds include transitioning programs to an online format, creating new courses, and hiring faculty and support personnel.
- Students are generally impressed and satisfied with the caliber of their instructors and the course content.
- Most of the programs use a hybrid approach consisting of online and in-person learning. While most students were happy with this format as it allows for flexibility, they noted that their programs could improve some of the online tools.
- Most employers and faculty members believe the ONC roles are well-matched to employers' needs.
- Employers and faculty members all noted that many employers are not familiar with the UBT programs.
- Employers who have hired graduates have been extremely happy with their work performance.

Methodology

As part of this evaluation effort, from July 2011 through November 2011, NORC completed site visits to five of the nine UBT grantees. NORC completed site visits with the remaining four UBTs during October and November of 2012. As part of these site visits, we held discussions with the programs' Principal Investigators (PIs) and leadership teams, career counselors, and local employers. We also held small group discussions and/or focus groups with faculty members and students. For one school that does not generally offer in-person learning, we conducted a "virtual site visit," during which we held all of the conversations via teleconference. While the discussions during both rounds of site visits focused on similar topics, the first round included more emphasis on the implementation experience and the second round emphasized students' experiences and employment circumstances, lessons learned, and plans for sustainability. This report discusses key themes, information about the programs, and the perceptions and experiences of the various participants that emerged during all nine site visits.

Program Characteristics

This section provides an overview of characteristics of the nine UBTs. We gathered most of the information in this section through conversations with program directors and administrative teams.

Background and History of Providing Training in Health IT

Prior to funding, all of the grantees were offering graduate programs in health IT. In two of the instances where multiple schools formed consortia to apply for funding, some of the schools in the consortia did not offer graduate programs prior to receiving a grant. Prior to the Workforce funding, two grantees had National Library of Medicine (NLM) programs in place. Additionally, many of the schools noted that, prior to the funding announcement, they were planning to create new health IT training programs and that the Workforce grants helped them to realize these plans. Given all of the grantees' health IT backgrounds and their plans for future activities, most believed the grant was a "perfect fit."

Prior to securing Workforce funding, one grantee reported how the program leadership team started planning by: conducting outreach to learn about the skills health IT employers were looking for in order to fill open positions, soliciting feedback on the ONC roles, and fleshing out their existing curricula accordingly. The leadership team at this school created an advisory committee with academic and industry representation and held focus groups with a variety of parties including vendors, health IT consultants, the local Regional Extension Center (REC), and hospital and outpatient clinic staff. Other schools created similar advisory boards to prepare for and implement their health IT programs, as well as to help determine the particular ONC Workforce roles on which to focus. All grantees reported selecting the Workforce roles for which they would provide training based on their existing capabilities and programs.

Use of Workforce Funds

In total (across the nine grant recipients), the UBT grantees received $32,000,000 of funding, ranging from approximately $1.4 million to $5.4 million per grantee. The following institutions received funding: Columbia University, University of Colorado Denver College of Nursing, Duke University, George Washington University, Indiana University, Johns Hopkins University, University of Minnesota, Oregon Health & Science University, and Texas State University. The grantees used the Workforce funds to expand their existing health IT programs in various ways or to create new programs, and all believed the money was integral to their programs' growth. All but one of the universities created additional certificate

and Master's programs (some of which, as previously noted, were planned prior to funding). This remaining grantee noted that, although the training for Workforce students built on their already-existing programs, they added some additional requirements, including an internship lasting one quarter for certificate students and two quarters for Master's program students. Several grantees used the money to adapt their existing in-person courses to online programs, and other schools used some of the funds to revise existing course materials. Similarly, programs spent funds to train faculty who would be teaching online for the first time. Grantees also used funds to create new courses to fill gaps in and/or update existing programs.

A number of grantees used funds to hire staff to support their Workforce training programs, including project coordinators, career counselors, and additional faculty for the newly created or expanded programs. One program administrator mentioned that faculty positions were not tenure track given the funding's limited duration; however, she believed that, given the success of the program, the faculty would remain in their positions after the funding expires.

Grantees also used the funds to pay for recruitment efforts including online and print advertising via universities' newsletters and websites; social networking sites such as Facebook and LinkedIn; and at professional and trade conferences. One leadership team noted that it would have been very difficult for their program to recruit as many of students as they did without the Workforce funding.

All grantees also used Workforce funds to provide scholarships and tuition assistance to students. Programs differ in the share of students' tuition covered (ranging from partial to full coverage) and whether they provide students with a stipend. One grantee explained that aspiring students do not submit a supplemental application to receive UBT funding until after the program admits them. Although all grantees used some of their funding to supplement student tuition, not all health IT students received funding. For instance, since prior health IT experience disqualified applicants from receiving workforce funds, admitted students with such a background were not eligible for this assistance, but could receive the training.

Program Sustainability

Most grantees reported feeling confident that their HIT training programs would continue after the Workforce funds expired. Program administrators generally believed that their respective universities were happy with the programs and supportive of continuing the training they provide. One program reported that ONC allowed them to test a sustainability model on a single cohort, which provided valuable information regarding how much students were willing to spend for a health IT certificate.

Program administrators reported that this test cohort will allow them to charge an appropriate amount of tuition to all students in the future.

Many program administrators and faculty members stated that the programs would need to continuously adapt to the changing health IT landscape in order to remain successful and relevant. Some schools started addressing these evolving needs while they were receiving Workforce funding. To address the need for hands-on training with EHRs, for instance, one program opened an on-campus health IT learning center to simulate the use of health IT in a clinical setting. Another grantee is addressing the unique challenges of rural and urban low-resource areas by creating a set of training materials focused specifically on these settings. Lastly, another university held a meeting bringing together local health IT educators, Chief Information Officers (CIOs), and vendors. The meeting served as a call to action and provided a forum for health IT stakeholders to communicate their needs and develop an actionable plan for creating and sustaining a health IT workforce. Looking forward, several program administrators are planning to ensure that their curricula and programs evolve by reaching out regularly to employers to gauge their needs, identify the specific skills they are seeking in potential employees, and adapt their programs to meet these needs.

Student Enrollment and Characteristics

Student Enrollment Characteristics

As of February 2013, close to 1,000 students have graduated from UBT Workforce training programs and more than 750 additional students were currently enrolled. Exhibit 1 below displays grantee-specific numbers of graduates, enrollees, and total students.

Exhibit 1: Numbers of Graduates and Current Enrollment, by Grantee

	Graduated	Enrolled	Total
Columbia University	138	80	218
Duke University	46	69	115
George Washington University	133	130	263
Indiana University	34	60	94
Johns Hopkins University	126	88	214
Oregon Health & Science University	88	47	135
Texas State University	226	112	338
University of Colorado Denver College of Nursing	68	89	157
University of Minnesota	124	89	213
Total	983	764	1747

Regarding enrollment in Workforce roles, students most often enrolled in and graduated from the HIM and Exchange Specialist role. The Clinician Leader, Public Health Leader, and Privacy and Security Specialist roles followed in popularity amongst students. Far fewer students enrolled in and graduated from programs focusing on the Research and Development Scientist and the Programmer and Software Engineer roles. Exhibit 2 below details the numbers of students ever enrolled, graduated, and currently enrolled, by role.

Exhibit 2: Numbers of Ever Enrolled, Graduates, and Current Enrollment, by Role

	Clinician Leader	Public Health Leader	HIM & Exchange Specialist	Privacy and Security Specialist	Research and Development Scientist	Programmer and Software Engineer
Ever Enrolled	304	213	768	163	19	85
Graduated	195	102	479	98	7	48
Currently Enrolled	271		345	62	11	40

Student Background

Overall, faculty members were very impressed by their students' knowledge, backgrounds, and motivation to learn. The grantees all noted that students come from varying backgrounds, including both health and IT backgrounds. Students also ranged in their degree of work or professional experience. Some students came straight from undergraduate programs with no work experience, while other students were mid-career physicians looking to acquire additional skills in informatics or late-career IT professionals who were laid off from one industry and hoping to transition into health IT. Other categories of students include those who are working in an ancillary position in a clinical setting whose jobs are requiring more health IT use and knowledge and clinical professionals, particularly nurses, who are becoming EHR "super users."

Program administrators and faculty reported that most students tend to have some work experience, and many are working professionals enrolled in the programs on a part-time basis. Grantees also noted that students' backgrounds tend to vary by the type of program in which they enroll. One leadership team noted that the population enrolled in their certificate program is slightly older and at a more-advanced stage in their careers than are those in the master's programs, many of whom are at the beginning of their careers. However, this was not the case at every school. Staff from one certificate program reported solely recruiting students finishing undergraduate studies.

Faculty members and leadership teams at a number of universities discussed how the students' varying backgrounds was beneficial to the student body as a whole. One faculty member commented that the university tried to capitalize on students' diverse backgrounds by having them work on group projects with fellow students with different types of skills so they are best able to learn from one another. Faculty noted that students with a clinical background tended to do better in the more clinical roles, while students with an IT background excelled in the more technical roles. However, faculty members at one school commented that even some of the students with IT backgrounds needed retraining on the technical

material because informatics differs in many ways from the field of health IT. This can sometimes be challenging because it involves changing the thinking and expectations of people who have been in the IT field for many years. Additionally, some students with an IT background struggled to learn the health care jargon or vocabulary necessary for working in health IT. To address this issue, one university requires students without a health care background to take health-focused pre-requisite courses. Similarly, students without knowledge of IT are required to take IT-focused pre-requisite courses.

Motivations for Enrolling in the Program

Students noted they enrolled in the programs for various reasons, including a desire to transition to a new career, to seek a promotion, and/or to augment their current career. Students coming directly from undergraduate programs mentioned possessing few job prospects with solely a bachelor's degree and looking for a field with job growth. Additionally, several students currently working in the health care field noted they enrolled in the program to advance their knowledge of how health IT can enhance the quality of patient care; to better understand the health care industry overall; and to become more qualified for work related to meaningful use. Faculty members at one university believed the programs are training students to be leaders in the field, and hope the programs attract students with this degree of motivation.

Attrition

Overall, the UBT grantees reported seeing low attrition rates, similar to the universities' other programs. Program administrators note that the majority of students drop out due to the rigor of the program, and/or the time commitment required. A number of program staff and faculty members mentioned that some students who enroll in a certificate program are not prepared for the level of rigor that the universities require because they are working toward a certificate and not a more advanced degree. Leadership from one university noted the students who do drop out tend to do so early in the program's timeline, once they realize they are not able to commit the amount of time the program requires. Several programs have a process in place to intervene early with students who are struggling, to discuss the issues they are having, and encourage them to continue with the program. Another leadership team reported that while most students adapt and thrive in the program, an estimated 10 percent of students struggle with the program's rigor and 5 percent drop out.

Recruitment and Application Processes

As previously noted, the universities advertise their programs in a variety of ways, including in the universities' newsletters and websites; social networking sites such as Facebook and LinkedIn; at professional and trade conferences; through email and print advertisements; and via word-of mouth. Overall, the program administrators touted programs' popularity and report receiving large numbers of applications. One leadership team commented that they experienced varying degrees of success in recruiting students for their different programs, and that cost might be a factor. For instance, this particular grantee's certificate in the School of Nursing was very popular. The program leadership noted that nurses can typically receive funding for educational programs through the hospitals where they work. On the other hand, it might be harder for students enrolling in this particular grantee's School of Public Health certificate to afford the tuition, even with the ONC funds offsetting part of those expenses, because they believe it may be more difficult for students to secure additional resources for public health programs.

The UBT programs' application processes are similar to those used for the universities' other graduate programs. Applicants are typically required to submit an application form, essay, transcripts, and letters of recommendation. Further, one certificate program also requires applicants to interview in person. Administrators from this certificate program reported looking for applicants who excel in "soft skill" areas including communication and those with a positive attitude. Program staff emphasize these skills because they believe a major role for their graduates in the health IT workplace is serving as the translator between pure-clinical and pure-IT staff. Program selectivity differs across both UBTs and certificate or Master's programs within a given UBT. Schools cited admissions rates ranging from a third of applicants at one, more selective program to "most" at another program. Not surprisingly, the leadership teams reported typically not accepting applicants with non-health, non-IT backgrounds.

Program Implementation

Start-Up Processes

The grantees encountered relatively few problems as they implemented their programs. One leadership team noted, however, that determining the correct level of rigor for courses was difficult due to the diversity of students' backgrounds and differing needs across cohorts. Other program administrators reported planning programs under the assumption that most students would matriculate as full-time students and needed to modify programs as they realized that many students were also working full-time. Another leadership team described the implementation process as helping make the department more cohesive, as many diverse elements in the department were "forced" to work together. Although grantees did hire new faculty members to teach courses, the majority of faculty members teaching in the Workforce-funded programs had been teaching at the universities previously.

Most programs noted they continued to refine the curriculum and their programs from one cohort to the next. Grantees described how student feedback was integral to this process, with one citing an example of how student evaluations of early courses led faculty members to schedule regular "virtual" office hours, introduce content specific to each workforce role earlier in the curriculum, and incorporate EHR usage as part of the monthly in-person workshops. Another grantee described how feedback from their first cohort of Master's students persuaded them to change the learning format and how both student feedback and trial-and-error led them to make changes in the amount of time devoted to the practica and specific health IT topics.

Regarding the ONC Workforce roles, some UBT administrators believed that the roles were not always well-defined and that it was sometimes unclear what type/s of position they would help students secure. One program leadership team suggested that ONC work with the Department of Labor to create job codes to help ameliorate this problem and open up additional funding streams to students. Faculty members from two schools, as well as some employers, believed that a health IT data analyst role would be helpful insofar as providers could benefit from employees able to clarify and maximize the usability of available data.

Students at one university acknowledged that the programs were still in their infancy and would continue to develop and grow. However, many felt that their program expanded too quickly in order to meet target numbers, and that program developers did not think through how well some of the original pedagogical

strategies would function when the numbers grew simply because large classes can complicate the use of online teaching techniques such as discussion boards.

Program Characteristics

The grantees are all administering multiple training programs, including certificate and Master's programs. UBTs house programs in a variety of schools and departments at the universities, including the Schools of Nursing, Medicine, Public Health, Business, Health Sciences, and Biomedical Informatics; and the Departments of Biotechnology, Information Technology, and Health Information Management. Four of the nine grantees forged partnerships with other universities in applying for Workforce funding and using funds to create training programs. In these instances, while the universities collaborate, their programs are separate.

Integrating health IT programs into the university: One school reported establishing a Center for Health Informatics to connect the health IT programs across the different university components and departments. The Center served as a tool for collaboration as well as ensured that programs were aligned and that classes originating in different areas of the university were complementary and not overlapping in content.

The grantees took different approaches to integrating their multiple health IT programs. One grantee formed certificate programs in their Schools of Medicine, Nursing, and Public Health, and created a core set of courses that students across all programs must take. The grantees commented that their various programs provide different types of training and attract students with different backgrounds. One school described their certificate program as being more applied than the Master's program and covering only the "essentials" of health IT. Students can complete this certificate program on a part-time basis whereas the Master's program requires full-time enrollment. Another university with a Master's program housed in its School of Business noted that, although this program attracts students who are more interested in business, the students are very pleased with a separate degree that allows them to concentrate on informatics.

Although students were generally pleased with their experiences, they did share a number of recommendations on how the universities can improve their programs. Several students voiced concern about the short length of the program, explaining that it prohibited them from learning about the field in the level of detail that they would have preferred. Students from one program were concerned that program developers focused too narrowly on producing graduates who can deal with current health IT issues, such as meaningful use, but had not considered the bigger picture of how informatics may have a larger impact on society.

Faculty

As stated, while some grantees hired new faculty members, most faculty were already teaching at the universities prior to the UBT funding. Overall, students felt the faculty members were knowledgeable in their content areas, motivated, and interested in helping students succeed. Students also felt that the instructors' relevant professional experience in their respective fields enhanced the quality of their teaching. Some students did comment that they would have appreciated more timely feedback on projects and grades. Additionally, other students described several lapses in communication between the TAs and students, the TAs and instructors, and the instructors and the students. In particular, they felt TAs and instructors should explain more thoroughly their approach to grading papers and tests, and when students should expect to receive their grades.

Grantees reported regularly using industry experts as guest lecturers to augment faculty members' knowledge and perspectives. They feel that this exposure increases students' understanding of the material and allows them to establish valuable industry connections. Students were also impressed by the guest lecturers and appreciating the opportunity to interact with them.

Learning Platforms

The grantees reported offering a combination of online and in-person training. Additionally, many of the grantees are offering hybrid learning platforms that include both in-person and online training either by requiring a mix of in-person and online courses or by allowing students to choose whether to attend online or in-person. UBTs described how they are offering some online courses asynchronously (self-paced) whereas others are more structured. One program's administrators described students meeting in person for a "kick-off" weekend at the start of the program and again at the culmination to present final projects. In between these in-person meetings, students learn exclusively online. Faculty members reported that hybrid or online models are flexible configurations that allow the largely adult, working student body to complete the program while still addressing other responsibilities. One program's leadership team explained that the university's administration is encouraging distance-based online education. This school's UBT program offers about one-third of its courses online. The infrastructure is in place for distance-based learning, but the individual instructor decides whether to teach the course online or in-person.

A number of UBTs offer programs exclusively online. Program administrators report that an online format makes it possible for programs to attract students from a wider geographic area than if students needed to attend class in person. Programs aimed solely at online students (as well as those that require students to come in-person once or twice during the duration of the program) report attracting students from around the U.S. as well as from foreign countries.

In addition to previously mentioned efforts to prepare instructors for online teaching, one UBT offers students a free one-credit class aimed at preparing them to be effective e-learners. The course's goal is to advance students' understanding of the program technology and online communication and presentation skills. Instructors reported that students who attended the course were more engaged and better communicators. Similarly, students found the course beneficial.

Program administrators at a number of UBTs that offer their training programs solely or partly online reported the importance of preparing faculty for teaching online. Programs ensured that faculty members were prepared to teach online by employing only instructors with previous online teaching experience, requiring all instructors to train in effective distance learning, and providing faculty with constructive criticism on how to improve their online teaching technique over time.

Combining online and in-person learning: Students and faculty at one university praised a learning platform that offered online learning with in-person experiences. Program administrators described offering the program mostly online via recorded lectures, two textbooks, audio files, quizzes, and projects. The program provides a specified time each week for students to call in and speak with a faculty members and ask questions. Once a month, students meet in-person for a day. This combination platform offers much of the flexibility of online learning with face-to-face opportunities to form relationships and participate in real-time.

UBTs using an online learning platform (or online components of hybrid programs) utilized a number of different software programs and technologies to facilitate learning. Programs reported using software that creates a website with course materials including audio or video recordings of lectures, syllabi, course readings, discussion boards, and links to live class sessions (e.g., BlackBoard and TRACS). A number of UBTs used additional techniques to stimulate greater interaction among students such Second Life, with students creating avatars and meeting in virtual classrooms or study groups.

Students who participated in online learning believed the most effective instructors maximized the capabilities of the learning platform (e.g., through interactive features including discussion boards and "live chat" sessions) instead of simply transferring in-person lectures to an online format. Students criticized some instructors who simply read their PowerPoint presentations rather than presenting the material in a more-active and engaging manner. Students who learned online desired more direct communication with faculty.

As stated, some faculty members struggled to adjust to the online learning environment. At one university, faculty members cited their inability to gauge the immediate reaction of students to their lectures as a source of difficulty in monitoring students' confidence and progress throughout the course. To address this issue, instructors made themselves available for questions at times and in ways (e.g., via email or phone) convenient to students. Faculty members also attempted to maintain constant communication with the students to ensure they were grasping materials and keeping up with the course material. Programs reported using online discussion tools and virtual office hours to ensure that students received the needed level of attention. Although most professors reported being content with an online format, faculty members at one school did observe that, in general, the in-person courses were organized more effectively than were the online courses.

Many students working full-time noted that the online nature of the program was the reason they applied because, without the flexibility of online learning, attending classes would not be possible. Students at one university felt that increased discussion board participation by instructors would improve the online discussions and make students more actively engaged. Additionally, technical glitches with the discussion boards and online lectures caused problems at some universities and decreased their utility. Students who participated in online learning across programs reported some level of frustration with the technology regardless of the software. Issues with the online learning platform included: the inability to load course software onto mobile devices, a lack of training on how to best utilize course software, and the technology serving as more of a distraction than a learning aid (e.g., Second Life avatars). Some students also reported connectivity issues although this was sometimes due to a lack of access to high-speed internet in rural areas and was thus outside the program's control. One of the specific drawbacks to online learning that students reported was the lack of opportunity for networking and forming close connections to classmates. Students at one university also wished that online materials for each course were available earlier. Despite these various issues, in general, students were happy with online learning, but many acknowledged it is a personal preference and that some students will simply always prefer in-person learning.

UBTs were less likely to offer exclusively or primarily in-person learning than they were to offer other learning platforms. Program administrators of one certificate program chose an in-person format for a nine-week intensive program due to a number of hands-on components—although, even in this case, students were able to participate concurrently at another campus via webinar. The UBT believed that in-person learning would be most effective given the number of hours per week it expected students to devote to the program. The in-person learning platform also allowed for an emphasis on developing communication and professional skills.

Faculty members discussed the differences between platforms, and emphasized that they are still learning how to ensure that, regardless of the method, students receive the same quality of education. One grantee noted that a recent survey of students found that 90 percent preferred online courses. Other faculty members discussed the fact that personal preference plays a large role in a students' success with the various formats.

Internships and Practica

Approximately half of UBT programs require internships or practica for students. At the universities that do not currently require them, faculty members and students alike suggested they should be incorporated into the program to ensure that students receive the hands-on training potential employers are seeking. Faculty members at one university commented that students must experience what they are learning in the classroom before employers consider them competent, especially since many of the students "have no idea what takes place in a hospital." Other faculty members noted that the practicum provides students with a rich, well-rounded knowledge of health IT and that it is important to have real-world experience. Program administrators at several programs, particularly online programs attracting students from around the country, cited the difficulty of placing students in internships. Career counselors noted the amount of time and effort that would be needed to help find internships for all students.

Universities with practicum requirements handle them differently. At some universities, the requirement differs depending on the specific program in which the student enrolls. At one university, the length of the practicum depends on the program and ranges from 9-16 weeks part-time. At another university's program, the practicum is 10 days full-time. Students in one certificate program must create an electronic portfolio, which consists of journal entries recorded during the duration of the practicum in order to get credit for their participation. Another certificate program allow students to opt out of the otherwise required "Capstone Project" if they complete a practicum. Practicum completion requirements vary as well. At one university, students must submit a paper at the end of the practicum that is evaluated by the host organization; at others, students fulfill the requirement simply by reporting to work during the length of the practicum.

Program administrators also reported differences in the assistance they offer students in finding a practicum or internship placement. At some universities, it is the students' responsibility to find an internship/practicum host; at others, faculty members and career counselors are actively involved with placing students. Another program gives students the responsibility of finding and securing a practicum, but then has to approve it.

Overall, while the universities and students are successful in finding internship opportunities, programs do report some challenges. One program administrator reported that students experienced difficulty when attempting to do practica at hospitals that requested the university to purchase malpractice insurance for the students. Several programs, especially those that teach exclusively or mostly online and that attract students from a wide geographic area, expressed the desire to offer formal internship opportunities but cited the administrative and/or financial burden of helping students find placements across the country (and, in some cases, in other countries).

UBTs offered a number of ways to combat early challenges with placing students in internship and practicum experiences. In general, in order to give students as much time as possible to prepare and find an opportunity, the universities introduce the internship/practicum requirement early in their programs. At one university, students complete a goals analysis sheet to help identify their interests and what specifically they would like to do as part of their practicum. Another program pays internship hosts a $2,000 incentive to take on student-interns. Program administrators reported working to varying degrees to help students find practicum placements. At least one program employs a career counselor to find an internship for each student, although most programs offer students the opportunity to reach out to program administrators and faculty for help, the job of finding an internship is left up to the student. All of the UBTs are hopeful that the internships and practica may evolve into full-time employment for students. At several universities, practicum hosts have hired a number of students who impressed them during the practica experience.

Employers' perceptions on internships and practica: Generally, universities are hearing positive feedback from internship and practicum host organizations and discussions with employers yielded similar results. Generally, employers learned about the UBTs from industry networking (e.g., the Healthcare Information and Management Systems Society (HIMSS) and the American Medical Informatics Association (AMIA)), via direct contact from program administrators, hiring graduates, or knowing a colleague who participated in a UBT program. One employer reported that students brought a wealth of knowledge from the classroom and their previous jobs. Employers reported believing that internships or practica are of utmost importance to Workforce students, especially those without previous health IT experience. They noted that the real-world skills that students gain during these opportunities further prepare them for future employment in the field. Particularly, employers emphasized clinical workflow and specific EHR experience as key attributes in potential employees. Several employers who regularly host interns from one program discussed hiring graduating students regularly. One employer mentioned that internships could also help students decide if they actually want to pursue a career in health IT.

Several employers agreed on the importance of strengthening relationships between academic and employer communities to ensure more real-time feedback on industry needs. In some markets, employers were unaware of any official outreach to employers from the UBTs or ONC. During one conversation, employers expressed that some of the UBTs were producing qualified graduates for some, but not all, of their employee needs.

A successful internship program: One University's faculty and students along with local employers praised their internship program. The career counselor works closely with each student and employer to find an ideal match in an internship. Students spend two intensive weeks full-time in their internship and report learning a great deal and performing substantive work. Employers engage in the Workforce program by participating as guest lecturers and in other program events. Students and employers both report that many internships lead to full-time jobs after graduation.

Students' perceptions of internships and practica: Overall, students appreciated their internships and practica, as they provided them with valuable real-world experience. Students who participated in an internship or practicum experience often cited this as the most valuable part of their training. Students experienced mixed success in securing practica, however. Students at some universities commented that securing a practicum was very time-consuming and stressful, and that the universities should try to streamline and improve the process for the future. Students at universities who employed a career counselor whose role it was to help in internship placement or that assigned students a practicum advisor believe these individuals were helpful in identifying opportunities and providing personalized advice. At one university, students requested a more formalized internship process and they suggested that the programs create databases of potential internships with different types of organizations to help students find these opportunities.

Students' experiences while participating in internships and practica also varied. At one university, students felt that their practicum preceptors were not sufficiently engaged. However, students at another program were extremely pleased that they were able to complete "real work" during their internships and believed they had learned a lot in the process. Some students also felt their practica were too long (as long as 16 weeks, in one instance), and noted it would be preferable if a wider range of practica were available. Other students who participated in two-week full-time practica believed their experience was sufficient in duration and the knowledge they gained. At other schools, students identified the lack of practicum or formal internship opportunity as their large source of frustration with the program.

Course Content

Faculty members at many universities reported using already existing materials for courses newly created under the UBT program. Faculty also looked at the literature, best practices, and informatics professional guidelines to design new curriculum. They also pulled materials and information from a number of fields including public health, biostatistics, health policy, nursing, and business. Additionally, as previously mentioned, some programs reached out to employers to learn what skills and expertise they were seeking in potential employees.

Faculty perspectives on course content: Faculty members identified several gaps in their programs' curricula, although these gaps varied from one program to another. At one university, faculty suggested integrating a case study component to the courses and mentioned that the program leadership is taking steps to do this. Faculty members at another university noted that health IT and health information exchange (HIE) policy is an important component that is currently missing from their curriculum. Faculty members also suggested that providing further applied training, as opposed to theoretical training, might make students more employable. One university is already taking steps to do this and has added project management and business processes (e.g., billing cycles, outsourcing). Faculty and program administrators at all universities acknowledged the fact that courses need to be constantly reviewed and updated given rapid changes in the health IT industry and environment.

Faculty members at several universities reported using commercial and open-source software in their classes. At several universities, programs persuaded EHR and health IT software vendors to donate their products. Other universities reported students using a free, web-based EHR product called Practice Fusion that allows them to practice manipulating an EHR and complete projects using de-identified patient data. Another program offers students access to a virtual lab through AHIMA, which allows them to access and explore a number of different health IT technologies. Students believed experience with EHRs and health IT software was invaluable; however, those using open-source software expressed the desire for more familiarity with proprietary health IT solutions. Some students mentioned specific EHR software with which they wanted experience due to high market penetration in their geographic region.

Students' perspectives on course content: In general, students were happy with their courses and indicated that the curriculum provided a clear understanding of the subject matter. Most students felt the courses provided a broad understanding of informatics and created a base of knowledge that would help them pursue and understand more-specific, informatics-related interests.

Students' opinions of the workload varied across universities and across different programs within single universities. Students at several universities believed they received the amount of knowledge and work they were expecting. Regarding other programs, students' expectations regarding the amount of work were inconsistent with program expectations. This seemed especially true for certificate program students who were also working full-time. Some students believed that a certificate program (as opposed to a Master's) would neither require much time nor include rigorous courses. Given these expectations, some students struggled early on with the courses, but most adapted to the amount of time and effort necessary. (As previously mentioned, programs also modified expectations and reported communication from their programs' start about time and effort expectations.)

Some students noted weaknesses in the course content, most of which were specific to particular programs. At one university, students commented that some of the content was irrelevant or not cohesive and that the faculty did not seem to be working together to put together a coherent program. However, other students at the same university disagreed, noting the curriculum was thorough and fluid. Students at other programs cited the following program flaws and noted that program administrators should:

■ Offer certain courses earlier in the program as some subtopics within certain courses seemed out of place,

■ Standardize the quality and amount of work required for the courses (which varied widely),

■ Update course content more frequently (as some course materials cited outdated information),

■ Ensure that courses include enough lecture time to accompany difficult and voluminous reading assignments,

■ Offer more applied learning opportunities,

■ Ensure greater coordination between the universities' various programs, and

■ Offer a greater variety of courses.

At one program, students admitted they did not realize curriculum gaps until they started looking for a job. Students at another university commented that, although there were some gaps in the course content, they were able to learn more about some of these topics on their own.

Group Projects

Most of the UBTs incorporate group work in their programs' courses. Faculty, leadership, and students alike felt that group projects were a good way for students to learn from one another, and to participate in hands-on learning. Several universities use a team-based learning approach in which programs place students with diverse backgrounds into small groups of five to eight. They review quizzes and complete

weekly projects together, allowing students to learn from each other. Overall, students appreciated the opportunity to work in groups of people with varying backgrounds and skill sets. Students commented that group projects were particularly helpful in preparing them for collaboration that will likely be required in their jobs. Additionally, many students believed that that the dynamics of the group project felt like a "real-world" experience and taught them how to work as a team.

Faculty members and students did have some suggestions to improve group work. Some students reported that group projects posed challenges when too many occurred simultaneously. Students wished for coordination between courses to ensure that multiple group projects from different courses were not occurring simultaneously given that group work is very time-intensive. Students at one university noted that the faculty and TAs could better manage group projects by providing direction and ensuring that all members of the group contribute equally. Some students felt constrained by the technology available (or required) to perform group work. Students reported that one program required them to use Second Life for group work in order to track participation, but they would prefer using a pared-down communication mechanism technology such as Skype. Faculty members at one university noted that it is important to watch for members of the group who are dominating the group and having too large an influence on the group's discussions.

Employment

Workforce Needs

A number of employers noted there is a large demand for skilled professionals to assist with EHR implementation. One employer is currently hiring 50 to 60 people per month and several employers mentioned their willingness to provide additional on-the-job training to new hires as needed. Employers described the characteristics of a successful applicant as having: A diverse array of skills in both medical areas and IT (they noted that, in the past, hospitals focused more on candidates with pure IT backgrounds for their IT teams); strong communication skills and the ability to speak to and understand the needs of clinical staff and also understand how to provide input to technical staff to create applied solutions; effective decision-making and problem-solving skills; some clinical background (preferred, but not required), at least some familiarity with medical terminology; an understanding of clinical workflow; and some level of experience with EHRs.

The Program's Workforce "Roles"

Employers generally agreed that the ONC roles match employers' needs. One employee felt that the information redesign, clinician/practitioner consultant, and coding roles were especially relevant. Some employers noted that they are looking for employees who can cover multiple roles, as opposed to just one. Another employer discussed a recent study published in JAMIA that found that, while the ONC roles fit workforce needs in many instances, providers often expect the same person to fill multiple roles in smaller offices. Employers agreed it would be helpful if students received training in how to optimize data collection to provide information that will be useful for real-time and prospective decision-making. Other employers suggested adding roles or modifying existing roles to include design of EHR systems (i.e., presenting data and coordinating decisions support), interoperability (e.g., HL7 transactions, Direct protocols), the impact of payment reform on customers and software development, and telehealth.

Employers' Familiarity with the Programs

Most of the universities are conducting outreach to potential employers. One career counselor commented that, in addition to working with the students, he is working to "brand" the program to employers and help them understand the types of students who will graduate and be available for employment. Universities also created LinkedIn groups to help students to network, find employment, and to educate employers about the programs. The universities also noted that alumni are a key resource in educating

their employers about the UBT programs and graduates. One career counselor commented that some employers are unsure what an informatics degree is and where these students fit into their organizations. This counselor is addressing this problem by introducing individual students to employers and allowing employers to make their own determinations as to where the student best fits within their company. Faculty members emphasized the importance of advertising as a means of reaching not only potential students but employers as well. While they are confident the students are competent, they are not sure employers are aware that the students exist. Program leadership teams also recommended that ONC assist in advertising , publicizing the programs, and potentially bringing employers together to post job opportunities on an ONC (or other centralized) website.

Although most of the employers we spoke with were familiar with the UBT programs, some noted that other employers in the field are not as familiar with the programs. Employers agreed that the UBT programs' connection to ONC is an important point to publicize. One employer described contacting a large medical practice that was hoping to hire health IT staff. While that practice was unaware of the Workforce program, they expressed interest in it once they learned about the qualifications of the students and the content of the curriculum. Several employers noted that the RECs should take a more proactive role in increasing awareness of the Workforce program in the areas in which they serve. Employers emphasized the importance of social networking tools, such as LinkedIn, and the important role that professional organizations, such as HIMSS, AMIA, and medical societies could play in increasing awareness among a greater set of employees. Many students echoed the feedback of employers and believe that one of the biggest problems associated with finding employment is that not all employers are aware of the program and are not sure how to gauge its worth or the training it provides.

Employment Experiences

Students reported mixed experience regarding job searches. Faculty members and students alike believe that success depends in large part on geographic location and the needs of local markets. A number of students described relocating in order to secure the kind of job that they were looking for. One UBT asks applicants about their willingness to relocate as program administrators believe that is often necessary in order to obtain employment. Students with experience in only health or only IT reported experiencing more difficulty in finding a job than students whose previous experience is more diverse. In contrast to students' feedback, two universities reported that their students with IT-only experience were having a harder time finding employment than were students with health-only experience.

Students believe that, although having no previous health IT experience was a requirement for admission to the program, this was a major factor in their difficulties securing employment. These students report hearing from employers that their training merely qualifies them for entry-level positions. One employer also noted that hospitals are willing to leave positions vacant for six to eight months in order to find someone with the precise experience necessary to fill the position rather than train a less-qualified individual on their specific EHR or in other areas. To combat this, one university is advising students to seek out volunteer and/or additional internship opportunities. Faculty members are also reminding students to highlight their existing internship experiences on their resumes. Another challenge students reported is that they typically come into the program with high salary expectations that may not be realistic. Many students noted that, as they learned more about the field, they reduced their expectations.

> *Success in finding jobs*: A number of students noted the importance of being willing to relocate in order to find a (or the ideal) job. Several students believe their willingness to move to a market with greater demand for their skills or to the location where their employer needed them is the reason why they were able to secure a job in health IT.

Students who successfully found employment are working with a wide range of employers, including vendors, hospitals, public-health agencies, and consulting firms. A number of students from one of the universities launched independent consulting firms and hired other students to work for their companies. Some of graduates received promotions or raises in the jobs they worked at throughout their time in the program. Other students who maintained the same job made lateral moves to focus on more health IT-specific responsibilities. Employers commented that the industry's uncertainty about what they want in a job candidate may contribute somewhat to students' difficulty in finding permanent employment.

Perceived Job Readiness

Overall, students felt the programs provided them with the necessary skills to be successful in future jobs. One student commented that his program was particularly good at producing employees for a consulting role. Additionally, career counselors reported that graduates often entered the program uncertain about its utility and their future in health IT, but they left the program believing that enrolling was the right choice. As previously noted, students believed that programs' inclusion of more real-world experience opportunities would improve their ability to secure jobs. Program administrators, faculty, and employers reported similar sentiments. Some faculty members were unsure whether programs ensured that students gained the problem-solving skills needed to address the applied problems that are characteristic of informatics positions. Additionally, program leadership and faculty expressed some concern about whether a six-month certificate allows enough time to sufficiently train students in the ONC roles. For

example, the leadership did not think six months would be sufficient to train someone to be a programmer unless that individual was already well-versed in programming.

Employers generally felt the programs would prepare the students for the workforce. However, they offered UBTs several suggestions including: adding more hands-on learning; training students in different care settings (e.g., hospitals or private practice); and more frequently and methodically reaching out to employers for insight into current workforce needs in order to tailor programs to meet them. Additionally, employers suggested that programs reach out to HIMSS and AMIA for input and support. This may not only bolster the program's visibility, but might also give the programs more credibility and improve students' employment prospects. Employers who reported hiring graduates of Workforce programs were very pleased with their performance and the level of knowledge they brought to their organizations. Overall, employers reported that graduates were enthusiastic, displayed a strong work ethic, and made important contributions to projects. One employer commented that, compared to graduates of other programs, the graduates of UBT programs were better prepared and understood many of the nuances of health IT. Faculty members, employers, and students alike all commented that employers might give the program more weight when considering job applicants if it provided students with a certification.

University Career Services

Most programs employ career counselors and/or offer services to assist students with their job hunts. The extent of these services differs significantly across UBTs as well as between different programs of one grantee. Some programs hired a career counselor dedicated to the students enrolled in a specific training program; while others utilized the counselor serving all students at the institution (or in the department). Whereas the role of career counselors at some programs is to serve as a resource of students who seek them out, at other programs, it is much more involved. At one program the career counselor reviews every student's resume and helps place each student in an internship. Another program's career counselor noted that he tailors his assistance to specific students to ensure that each student's job hunt focuses on their personal interests and career goals.

Programs (or the whole universities) are offering services including career fairs, resume-writing and job search seminars, networking advice, listservs, job coaching, LinkedIn and Facebook groups, and one-on-one assistance. Universities also bring in potential employers to give seminars and talks. Students at most universities found these services to be useful, and several students reported meeting their current employers at a school-sponsored career fair. Students who attend some or all classes in person may be in a better position to take advantage of many of these services. Programs with online leaning formats are making an effort to provide virtual versions of some of these services (e.g., notifying students of a

HIMSS virtual career fair), although students generally did not find these resources helpful. Program administrators also feel that alumni are a major resource for students seeking employment. Universities often try to connect students with alumni and encourage them to be active on the LinkedIn and Facebook groups. UBT administrators reported that many alumni also hired program graduates from subsequent cohorts.

Students offered several suggestions for improving career services. Students enrolled in one program expressed disappointment that they did not receive the same career services that non-UBT students in their department receive. The students stated that their program does have a career counselor to work with the UBT students, but that the services are not nearly as robust. Students at another university indicated they would benefit from more information about how to further their educations. Students felt that, while the wealth of health IT information introduced in the UBT program was beneficial, many have struggled to decide what to pursue next.

Conclusions

All universities used Workforce funds to enhance previously existing programs, as well as to create new Master's and certificate training programs. Examples of the use of funds include transitioning programs to an online format, creating new courses, and hiring faculty and support personnel. Students were generally impressed and satisfied with the caliber of their instructors and also appreciated the use of guest lecturers from the field. Likewise, most students were happy with the course content, but offered some recommendations for improvement, including an increased focus on applied skills and designing the courses to form a more-cohesive program. Students, faculty, and employers alike all believed that internships and practica are very important and necessary aspects of health IT training programs and strongly suggested that the half of UBT programs without such a requirement add one. Most students were happy with a hybrid approach to learning consisting of online and in-person courses, as it allows for flexibility though they noted that their programs could improve some of the online tools. Additionally, some faculty members experienced difficulty adjusting their teaching methods to the online environment.

Most employers and faculty members believed the ONC roles are well-matched to employers' needs; however, many suggested that ONC add a data analyst role to help translate data and make them more usable. Overall, students, faculty members, and employers felt that the training that students have received has adequately prepared them for employment. Employers do suggest that increased training in applied skills would be helpful. Though employers who have hired graduates have been extremely happy with their work performance, many employers and faculty members believed that most employers are not familiar with the UBT programs. Suggestions for increasing awareness include working with organizations such as HIMSS and AMIA and getting ONC more involved in promoting the programs.

---

[i] Based on information provided on the ONC CCC website and in the Funding Opportunity Announcement, both of which are available here:
http://healthit.hhs.gov/portal/server.pt?open=512&objID=1804&mode=2

[ii] Based on information provided on the ONC Curriculum Development Center website and in the Funding Opportunity Announcement, both of which are available here:
http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__curriculum_development_program/1807

[iii] Based on information provided on the ONC Competency Examination website and in the Funding Opportunity Announcement, both of which are available here: http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__competency_examination_program_%282%29/1809

[iv] Based on information provided on the ONC UBT website and in the Funding Opportunity Announcement, both of which are available here: http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__university-based_training_program/1808