
Developing a Bachelor's Program in Health Information Technology

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Abstract

There is little doubt that the healthcare industry is experiencing tremendous growth in regards to technology. If you have visited a healthcare professional recently, you may have seen a similar notice, "Please be patient as we implement a new electronic healthcare record system." This confluence of technology and healthcare provides a new field of study in IT – Health Information Technology (HIT). This paper describes the development and implementation process and the curriculum for a Bachelor of Science in Information Technology with a major in Health Information Technology. Developed in collaboration with nursing educators and in consultation with HIT professionals, this unique multi-disciplinary program blends technology and healthcare to prepare students for a wide variety of opportunities in the evolving field of HIT. The development of this degree was funded in part by a grant awarded under ARRA High Growth & Emerging Industries Grant as implemented by the U.S. Department of Labor's Employment & Training Administration.

Keywords: health information technology, HIT, curriculum development, EHR, +2 degree

1. INTRODUCTION

Nationwide, there is a significant focus on healthcare and technology that will only grow in future years. Mandates from the federal government that began with the Bush administration and continued by the Obama administration indicate that a strong push will be made to align technology and healthcare. The

federal government has also provided economic incentives for the adoption of health information technology through programs from the Health Information Technology for Economic and Clinical Health Act (HITECH Act) of 2009 (HITECH, 2011). Experts estimate that up to 200,000 new jobs will be created in the Health IT sector (Gonsalves, 2010). According to a study conducted by the University of San Diego

Extension, the top job of hot careers is "Healthcare Information Technology - As technology increases, so does the need for health information technicians to use and maintain patient data that is vital for quality healthcare and to keep all medical records organized and confidential. Technicians are needed for emerging jobs, such as healthcare integration engineer, healthcare systems analyst, clinical IT consultant, and technology support specialist." ("Health IT No. 1 List," 2011) The Bureau of Labor Statistics projects a 29% increase in jobs in the healthcare area as well as an average increase in Computer Occupations of 22% ("Overview of 2010-2020 Projections," 2012). Within the Computer Occupations, healthcare IT needs are specifically mentioned in Network and Computer Systems Administrators with a projected 28% increase ("Network and Computer Systems Administrators," 2012) and for Software Developers with a projected increase from 28-32% ("Software Developers," 2012).

Much of the demand for HIT professionals stems from the adoption of the Electronic Health Record (EHR) by hospitals and healthcare provider offices. According to the U.S. Department of Health and Human Services, the "percentage of U.S. hospitals that had adopted EHRs has more than doubled from 16 to 35 percent between 2009 and 2011. And, 85 percent of hospitals now report that by 2015 they intend to take advantage of the incentive payments made available through the Medicare and Medicaid EHR Incentive Programs." (HHS Secretary Kathleen Sebelius, 2012).

Although the current focus of HIT is EHRs, technologies such as robot assisted surgery, health care analytics, and personalized medicine based on bioinformatics will sustain and increase the demand for HIT professionals. At the same time, solutions to many current health care policy discussions such as cost containment, outcomes, and effectiveness will involve HIT. These trends indicate that there will be a growing need for HIT professionals.

HIT is not just about the use of information technology in healthcare. To support the growing use of IT in healthcare, employers are looking for students who can work with the new technologies that are being deployed, but also understand the world of medicine and health care. This offers an opportunity to provide degrees that develop skills in both of these

fields. Additionally, the universal need for health care, combined with local nature of health care delivery, offer educational institutions an opportunity to develop programs that serve their local communities.

It is clear that the emerging technology needs of healthcare provide us with an opportunity to launch a field of study in Health Information Technology. This paper describes the development and implementation process and the curriculum for a Bachelor of Science in Information Technology with a major in Health Information Technology. Developed in collaboration with nursing educators and HIT professionals, this unique multi-disciplinary program blends technology and healthcare to prepare students for a wide variety of opportunities in the evolving field of HIT. The development of this degree was funded in part by a grant awarded under ARRA High Growth & Emerging Industries Grant as implemented by the U.S. Department of Labor's Employment & Training Administration.

The remainder of the paper is organized in five sections. We begin by outlining the curriculum development process. We describe the course curriculum and new course development. After describing the curriculum we explore the process we used to select an Electronic Health Record system. Lastly, we explain other implementation details and conclude by summarizing other successes and challenges.

2. CURRICULUM DEVELOPMENT PROCESS

The Computing and Information Technology (CIT) Department at Miami University is uniquely positioned to offer a program in Health Information Technology as it is housed in the same academic division as the Nursing Department. The CIT Department, the Nursing Department, and industry professionals worked together to create an academic program which is timely and relevant to the local community and the State of Ohio. This degree provides additional educational opportunities for students in technology or healthcare, those earning associate degrees from local community colleges, and working professionals. With the recent changes under the University System of Ohio's (USO) strategic plan, the primary mission of the regional campuses is no longer a focus on only associate degrees and the first two years of a baccalaureate degree. The mission has instead expanded toward increasing the number

of baccalaureate degree programs, especially those that are completion degree programs.

Faculty members from both the CIT and Nursing Departments formed the HIT Subcommittee where we designed a +2 baccalaureate completion degree that would appeal to students with an associate degree (or background) either in IT or healthcare.

Involving HIT Professionals

Area HIT professionals played a significant role during the entire development process. Immediately after forming, the HIT Subcommittee held a meeting with local HIT professionals and faculty from area community colleges to brainstorm on the set of skills and knowledge that a graduate of an HIT program would need. With this list of skills, the HIT Subcommittee designed a draft curriculum that included not only courses focused on IT but also courses in Nursing, Anatomy and Physiology, and liberal education. The HIT professionals reviewed the draft curriculum, met with members of the HIT Subcommittee, and made suggestions for improvement. HIT professionals also contributed to the development of the two courses that focus specifically on Health IT (HIT I and HIT II), outlining suggested topics for the courses and reviewing course proposals. The first time that the HIT I (CIT 431) and HIT II (CIT 432) courses are offered a HIT professional will team-teach with a CIT faculty member.

Approval Process – A Team Approach

Since this would be the first time that Miami University would offer a Bachelor of Science in Information Technology, the state approval process was extremely detailed. Including appendices, the proposal was over 400 pages in length. Members of the HIT Subcommittee prepared sections of the proposal and met weekly to review the sections. These sections not only included the proposed curriculum but also topics such as assessment, regional accreditation, needs assessment for degree, job prospects for graduates, university support infrastructure, administrative organization, syllabi for all courses in the degree program, projected number of students, curricula vitae for all faculty members, and budget. When the proposal was completed, it was reviewed and approved by the following:

- CIT Department
- Academic Division

- Council of Academic Deans
- University Senate Undergraduate Curriculum Committee
- University Senate
- University Board of Trustees
- State of Ohio

Health Careers Collaborative & DOL Grant

The program discussed in this paper was funded in part by ARRA High Growth & Emerging Industries Grant as implemented by the U.S. Department of Labor's Employment & Training Administration. Miami University worked with Cincinnati State Technical and Community College as part of a larger effort titled the Health Careers Collaborative (HCC) of Greater Cincinnati to create an educational pathway for students interested in careers in HIT. New programs were developed so that students can earn an associate degree in HIT from a local community college and then move seamlessly to a bachelor's program in the same area. Partners of the HCC include area hospitals, community colleges, regional campuses, and community-based organizations. The connections that were possible because of this grant repeatedly proved to be valuable. For instance, at one point, we worked with several agencies to write a grant attempting to secure additional dollars in scholarships for future students.

3. HIT CURRICULUM

The curriculum for the bachelor's program was divided into two primary categories: prerequisite and foundational requirements; and the HIT common core. If the student came into the program with an associate degree in either health or technology, our hope is that many of the prerequisite and foundational requirements would be met. At a high level, courses required in the program fall into three general categories: liberal education courses, IT courses, and Nursing/Health related courses. Tables 1 and 2 illustrate that foundational requirements include courses in technology, zoology, medical terminology, and general education. The HIT common core consists of higher level courses in IT with several Technology and Nursing courses focused on Health Information Technology.

New Course Development

Many of the courses that we identified as important were already offered by our institution: Statistics, Health Care Informatics,

Database Management, Ethics, as well as several other IT courses. However to offer a current and state-of-the-art program five new courses were developed:

- CIT 348 Information Management and Retrieval
- CIT 431 Health Information Technology I
- CIT 432 Health Information Technology II
- NSG 321 Healthcare Systems and Culture
- CIT 458 Collaborative System Design and Integration

Substantial amounts of effort went into the design and development of each of these courses. Almost all were developed in consultation with an industry professional. Additionally, CIT 431 and CIT 432 will be team-taught by an industry professional this fall.

Prerequisite and Foundation Requirements (65-69 credit hours):	Credit Hours
BTE 224 Medical Terminology	3
CIT 154 Personal Computer Concepts and Applications	3
CIT 157 Foundations of Information Technology I	3
CIT 158 Foundations of Information Technology II	3
CIT 214 Database Design and Development	3
CIT 268 Human Computer Interaction	3
CIT 276 Systems Analysis and Design	3
COM 135 Public Expression and Critical Rhetoric	3
CSE 163 Intro to Computer Concepts and Programming	3
MTH 102 Intermediate Algebra	3
ZOO 171 Human Anatomy And Physiology (4)	4
ZOO 172 Human Anatomy And Physiology (4)	4
ZOO 325 Pathophysiology or ZOO 342 Genetics or ZOO 232 Human Heredity	3-4
English Composition	6
Fine Arts and Humanities	3-6
Global Perspectives	9
Natural Sciences (6)	6

Table 1. HIT Foundation Courses

Developing a Pre-HIT

We determined fairly early in the process that it would be beneficial to design a Pre-HIT designation. Majors are categorized as Pre-HIT majors or HIT majors depending on the course

work completed to date. Pre-HIT majors become HIT majors when they had completed a specific set of courses in the major such as: Personal Computer Concepts and Applications, Intermediate Algebra with a C or better, Foundations of Information Technology I and II, and Human Anatomy and Physiology I and II. The designation as pre-HIT was implemented for two reasons. First, students need to complete courses in a particular order to be successful and determine if this major is appropriate for them. Secondly, the success of the program can better be measured when student outcomes are based on completion of these very basic requirements.

HIT Common Core (33 hours):	Credit Hours
CIT/CSE 262 Technology, Ethics and Global Society (3)	3
CIT 348 Information Management and Retrieval (3)	3
CIT 358 Information Technology Assurance and Security (3)	3
CIT 431 Health Information Technology I (3)	3
CIT 432 Health Information Technology II (3)	3
CIT 448 Global and Strategic Issues in Information Technology (3)	3
ENG 215 Technical Writing (3) or ENG 313 Introduction to Technical Writing (3)	3
ENT 316 Project Management (3)	3
NSG 321 Healthcare Systems and Culture (3)	3
NSG 343 Health Care Informatics (3)	3
Business Statistics (4)	4
Capstone Course: CIT 458 Collaborative System Design and Integration	3
Liberal Education Thematic Sequence	9
Additional coursework to meet bachelor's degree requirements of 128 earned credit hours	

Table 2. HIT Common Core

4. CHOOSING AN EHR APPLICATION

Because the Electronic Health Record is a fundamental component of our new degree program, choosing the right EHR was very important. We spent a significant amount of time researching, comparing and contrasting different EHRs. Our selection of an EHR was complicated by the sheer number of solutions available (over 300 at the time that we started

our research), and the complexity of the systems themselves.

The Process of Selection

We identified the major stakeholders, including students, faculty, employers, and our IT support staff and identified factors that we felt would be important to each. Our budget for the purchase of both the hardware and the software to support the EHR solution was approximately \$50,000, and would need to be spent before February 2013 (so ongoing support costs would have to be borne by the department). Many EHR implementations cost in the millions, so our budget was definitely a limiting factor in the selection process. Our research did uncover some web-based solutions that are free (supported by advertisement revenue), but they lacked the customizability that we thought was important to students who would be integrating solutions as a career. One of the key factors that we heard from our industry experts was that our graduates would need to be able to engage in workflow customization, or be able to match the solution they designed to the existing workflow of the client. We focused our efforts on those solutions that could support a wide variety of care settings, including hospital, ambulatory, and long-term care. Lastly, looking for a solution that included multiple modules (e-prescribing, document management, analytics, etc.) that students would be able to integrate together.

Selecting GE Centricity

We projected that the first class that would use the EHR solution would be taught in the fall of 2012, which meant that faculty would need to be trained in summer 2012. It was impossible, in the time frame given, to look at all of the available solutions. So, we contacted the top players by market penetration according to HIMSS (over 15,000 implementations was the benchmark) and researched the largest-scale open source projects. HIMSS has implementation numbers for the proprietary solutions, and it was easy to determine that the VA's VistA system is the largest open-source solution. Many of the larger vendors politely indicated that they had no solution that would fit our budget. As we fit the solutions to the matrix we eliminated all but the VistA solution or GE Healthcare's Centricity solution. We chose to implement GE Centricity in part because the Community College Consortia to Educate Health

IT Professionals in Health Care Program (Community College Consortia, 2012) was using the VistA solution. Since our program is a bachelor's completion degree, some students entering our program might have received the training on VistA. Using a commercially available solution would provide those students with valuable experience.

EHR Infrastructure

All but the smallest EHR solutions require multiple servers to implement, and Centricity is no exception. To support the high-availability that we would need, our IT support group recommended two applications servers, a SQL cluster, and two Terminal Servers (to allow students and faculty to work from home), all virtualized and on a physical blade in our datacenter. Since this was being purchased through a DOL grant, the hardware would have to be separate from the existing infrastructure. The implementation team involved a project manager and IT support staff from the vendor, multiple IT support staff from the data center who are responsible for the configuration of the solution, IT support staff on the regional campus who will be responsible for managing the software after installation, and faculty from the department who will be using it.

5. IMPLEMENTATION

The program was approved at the state level in August of 2011, just days before the semester began. Therefore, it was not possible to begin the fall semester with the curriculum and students in place. Instead, the fall semester was used to educate internally, market the program, advise students, connect with additional professionals, and begin the process of purchasing and installing our EHR.

Educating the University

Internally, we worked to inform the various internal constituents regarding the new academic program. Time and attention needed to be given to developing new phone numbers, creating a "hitinfo" e-mail address, and creating e-mail lists of potential students. Before marketing to people outside of the university we had to make sure those within the university understood the program well enough to answer questions and direct inquiries. Because the program was offered on two different campuses, we needed to carefully and systematically

educate both groups. We met with various groups within the institution including admissions, co-op/internships, advising, financial aid, and business services. In each of these sessions we explained the program, outlined the curriculum, indicated the type of students who may be especially interested, and we emphasized the likely interest in hiring these graduates.

Marketing the Program

With the help of the grant we had a very aggressive marketing campaign which included web, radio, newspaper, movie theaters, and billboards. We worked closely with a marketing team to identify the contents of advertisements, the visuals of the billboards and movie ads, and the newspaper advertisements. We developed, printed and distributed flyers and booklets featuring the HIT program to potential students and other interested community members. All of the marketing pieces revolved around a similar look and message. Subsequent presentations were developed which kept this same marketing theme. The HIT program was featured in events with local high school counselors. We held an "HIT Open House" featuring a prominent local professional and spoke with many outside agencies.

Connecting With Health Organizations

In addition to marketing, the chair and several faculty members worked hard to network with additional working professionals in the field. The chair and faculty members went to local and national conferences, joined on-line HIT organizations, and met with local business and industry professionals in an attempt to both further educate themselves and to build awareness and interest in the program. The department spent several afternoons visiting and learning from several different local medical organizations. To date the department has connected with over 80 working professionals and plans to continue to stay connected with those professionals.

Advising

Our advertised "start date" for the program was January 2012. Prior to that time we individually talked with approximately 30 interested students about careers, course requirements and possibilities in HIT. By May of 2012 we have spoken individually to over 150 potential

students. The program grew from an enrollment of zero declared majors in January 2012 to over 80 declared majors by May of 2012.

Not long ago our region had many high paying jobs in the paper, automotive, and steel industries that did not require a college degree. Those jobs have now been outsourced and our region's residents are painfully aware of the importance of a college education that connects to employment. Not surprisingly, almost all advisees were very focused on the employment outcome of their degree choice. Some students were incoming freshman who had researched the HIT industry and believed this was an advantageous place to start their career. Some students had been laid off their previous positions and had funding to pursue retraining. Veterans who had served as medics found the HIT program to be a good connection between their previous skills and future employment.

Students who had not been accepted into the highly selective nursing program at our institution found they could translate their coursework and interest into the HIT program. Second career nurses who no longer felt able to physically assist patients were attracted to this program as a way to leverage their valuable content knowledge without the level of physical exertion their previous responsibilities required.

Students found the HIT program attractive for a number of reasons such as: strong career focus, broad future prospects of information technology, additional coursework that could lead to promotion in a nursing career, the opportunity to use "real" EHR software (GE Centricity), and the convenient location and attractive tuition of the Miami University regional campuses. Some students expressed concern that once EHR implementations were complete that there would not be additional employment opportunities available to them. While there is a great deal of pressure to have implementations completed as soon as possible, it is our belief that important employment opportunities will continue to exist due to the changing nature of healthcare, reimbursement policies, reporting requirements, legislative changes, legacy issues, and security changes, to name a few.

6. SUCCESSES, CHALLENGES, AND CONCLUSIONS

In a relatively short period of time, the department moved from an abstract idea to the

implementation of a new Bachelor of Science degree with over 80 students who have declared a major in Health Information Technology. In retrospect, there were many things done right in the development of the program the highlights of those are listed below:

- Involving HIT professionals from the beginning
- Including Nursing faculty in the development of the program
- Distributing the required work within the department
- A careful and systematic approach to the selection of an EHR
- A deliberate effort to educate within the university
- An aggressive and comprehensive marketing plan
- Expert and pro-active advising
- Monthly contact with students via e-mail educating them about course offerings and special events
- Developing a wide network of HIT professionals

A New Field

Perhaps our biggest challenge in the creation of this program revolved around the "newness" of this field. Established standards and benchmarks for success are not established. We did not have a published "body of literature" upon which we could draw. Jobs in this area are new and therefore, employers find the needs for such positions rapidly changing. Related to this challenge is that the faculty in our department have backgrounds in computer science and technology (not healthcare). While nursing played a major part in the development of the program, the health expertise within the department is limited.

Advising

Advising new students proved to be far more time intensive than expected. Because we designed this program as a bachelor's completion degree, many students came to the program with a significant number of credit hours already completed. These credit hours needed to be carefully and systematically evaluated. The HIT program requires the completion of a number of courses that are highly sequenced and as a result scheduling is advising intensive. For example, if a student does not take courses at the appropriate time,

then there is a strong possibility that graduation could be delayed. Not only is this inconvenient, but many students have educational funding for a limited period of time.

Quarters to Semesters

Because we developed a program that is intended to articulate well with students who have associate degrees, we worked hard to establish some initial articulation agreements with local community colleges. The process was somewhat difficult because of the additional stress several of these institutions were under because of a transition from quarters to semesters. All public universities in the state of Ohio are converting from quarter systems to semester systems with the implementation date being fall of 2012. While we are on semesters, the community colleges we worked with were not. The community colleges were re-designing entire curriculums to the semester system making it difficult to identify which courses would in fact transfer. Additionally, current students bring in credits which are on the quarter system. As a result, some transfer coursework only represents a portion of the material needed to complete HIT requirements. We have used a petition process within the department to determine which combinations of courses from other institutions can be combined to meet our requirements. This work is highly customized as each student brings in their own combination of coursework from various institutions. If petitions are approved, notations are made on the student record to show progress towards degree completion.

Students who have brought in a large number of credits often have busy lives involving child/parent care and busy work schedules. As a result, students have become more interested in online and hybrid offerings. This has caused us to look at our portfolio of course offerings to determine which courses may be suited for online or hybrid delivery.

Transition of Leadership

An additional challenge included the transition of leadership in the department. In the three years between the development of the idea and the implementation of the program, the department had three chairs. While each chair remained involved in the process (which greatly facilitated continuity) the change in leadership created an additional layer of complexity to the process.

In conclusion, developing a new Bachelor's degree program has been an exciting, interesting and challenging effort. In a very short period of time, this department has moved from an abstract idea to having 80 majors. While the curriculum has been developed, the program approved, and we have a significant cohort of new students, our work in this area has really just begun.

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