

Developing Health Information Technology (HIT) Programs and HIT Curriculum: The Southern Polytechnic State University Experience

Chi Zhang

School of Computing and Software Engineering
Southern Polytechnic State University
Marietta, GA, USA
chizhang@spsu.edu

Han Reichgelt

University of South Florida – St. Petersburg
St Petersburg, FL, USA
reichgelt@usfsp.edu

Rebecca H. Rutherford

School of Computing and Software Engineering
Southern Polytechnic State University
Marietta, GA, USA
brutherf@spsu.edu

Andy Ju An Wang

College of Applied Sciences and Arts
Southern Illinois University - Carbondale
Carbondale, IL, USA
awang@siu.edu

ABSTRACT

Health Information Technology (HIT) professionals are in increasing demand as healthcare providers need help in the adoption and meaningful use of Electronic Health Record (EHR) systems while the HIT industry needs workforce skilled in HIT and EHR development. To respond to this increasing demand, the School of Computing and Software Engineering at Southern Polytechnic State University designed and implemented a series of HIT educational programs. This paper summarizes our experience in the HIT curriculum development and provides an overview of HIT workforce development initiatives and major HIT and health information management (HIM) educational resources. It also provides instructional implications and experiences for positioning HIT programs and enhancing curriculum.

Keywords: Curriculum design and development, Course development models, Program assessment/design

1. INTRODUCTION

Health Information Technology (HIT) professionals are in increasing demand as healthcare providers need help in the adoption and meaningful use of Electronic Health Record (EHR) systems while the HIT industry needs workforce

skilled in HIT and EHR development. According to Bureau of Labor Statistics, the demand for personnel in medical records and health information technology for the 10-year timeframe between 2010 and 2020 will increase by 21%, while the average growth rate for all occupations is 14 percent (Bureau of Labor Statistics, 2012). Additionally,

Atlanta is often referred to as the health IT capital of the U.S., with more than 200 health IT companies in the state of Georgia, the majority of which are in Atlanta. The health IT software development jobs have grown 167% from 2010 to 2012 (Metro Atlanta Chamber Workforce Council, 2012).

In light of this, the School of Computing and Software Engineering at Southern Polytechnic State University started an effort in health information technology in 2010 to (1) design and implement a series of educational programs, including professional development courses, certificate programs, and degree courses; (2) conduct research into the issues that healthcare providers and hospitals face in selecting, implementing, and integrating HIT systems; and (3) conduct research and develop tools to strengthen the privacy and security of health information; and (4) help people understand their rights and the resources available to safeguard their personal health data (Zhang et al., 2012).

Currently, we have a concentration in HIT in our degree program of Bachelor of Science in Information Technology (BSIT). We also offer the undergraduate and graduate certificate programs in Health Information Technology, which can be taken either as a stand-alone certificate or as part of our BSIT or Master of Science in IT (MSIT) degree program. We recently proposed to create a Bachelor of Applied Science degree in HIT (BAS-HIT) (pending approval) for students who have earned an associate degree in health-related discipline from an accredited technical college and desire to obtain a bachelor's qualification with two years of additional study and no loss of credit. Additionally, in partnership with Consort Institute and Southern Polytechnic State University Continuing Education Center, the Accelerated Training in Health Information Technology (ATHIT) program is being offered for individuals seeking a new career in the HIT field. In this paper, we will share our experiences in the HIT program curriculum, course design, and development, and the future improvement considerations for the programs.

2. CURRICULUM DEVELOPMENT

2.1 ONC Workforce Roles and Curriculum Requirements

One of the key elements essential for “meaningful use” of HIT as legislated in the American Recovery and Reinvestment Act (2009) on February 17, 2009 and Title XIII of ARRA – the Health Information Technology for Economic and Clinical Health (HITECH) Act requires a new workforce of HIT professionals who will be able to help healthcare providers implement EHR systems to improve healthcare quality, safety, and cost-effectiveness. The HIT professionals are also needed to help develop, implement, and evaluate health IT across the health care systems in a long term (ARRA, 2009). One hundred eighteen million dollars was allocated for the Office of National Coordinator for Health Information Technology (ONC) for HIT workforce development programs (2011).

The goal of the ONC HIT workforce development is to provide specialized HIT training to new health IT professionals in the 12 ONC workforce roles (Office of National Coordinator for Health Information Technology (ONC), 2011). The community college consortia programs

focus on training students for the six professional roles: practice workflow and information management redesign specialists, clinician/practitioner consultants, implementation support specialists, implementation managers, technical/software support, and trainers. The program of assistance for university-based training focuses on establishing or expanding the university-level training programs for HIT professional roles: Clinician or public health leaders, Health information management and exchange specialists, Health information privacy and security specialists, Research and development scientists, Programmers and software engineers, and Health IT sub-specialists.

Taking the ONC workforce roles, our student population, and existing courses into consideration, as well as the collaboration with health IT experts and professionals, we identified and developed five courses for students with an IT background to focus on training for the eight health IT workforce roles as shown below in Table 1. Our current five required HIT courses can be completed in two semesters:

1. Foundations of Health Information Technology
2. Clinical Workflow Process: Analysis & Redesign
3. EHR Systems & Applications
4. Health Information Security & Privacy
5. IT Systems Acquisition & Integration.

Workforce Roles	Courses
Practice workflow and information management redesign specialists	1, 2, 3
Clinician/practitioner consultants	1, 2, 3, 4, 5
Implementation support specialists	1, 2, 3, 4, 5
Implementation managers	1, 2, 3, 5
Technical/software support	1, 2, 3
Trainers	1, 2, 3, 5
Health Information Privacy and Security Specialist	1, 2, 3, 4
Programmers and Software Engineer	1, 2, 3, 4

Table 1. Roles Prepared and HIT Courses

We are considering offering training for “Health Information Privacy and Security Specialist” and “Programmers and Software Engineers” roles because (1) we are a computing school that has extensive established programming and software engineering courses; (2) we already offer an array of information security and privacy related courses for the degree concentration at both undergraduate and graduate levels and our graduate information assurance and security certificate program; and (3) we conduct information security & assurance research and health information privacy and identity management from our Center for Academic Excellence in Information Assurance Education.

When developing our HIT programs, we not only considered the policies, regulations, grant opportunities – along with input from local HIT industry experts, our own expertise and student population – but also the major HIT organizations and guidelines, HIT professional certifications and program accreditation standards as well.

As a product of the workforce development programs, ONC develops and provides HIT workforce development

curriculum components (Office of National Coordinator for Health Information Technology (ONC), 2012) available for educators at <http://www.onc-ntdc.org/>. Compared to the ONC training program, our courses have covered 15 out of 20 ONC curriculum components as shown in Table 2.

ONC Curriculum Components	Covered in Courses
<ul style="list-style-type: none"> • Introduction to Healthcare and Public Health in the US • The Culture of Healthcare • History of HIT in the U.S Health Management Information Systems • Public Health IT • Professionalism/Customer Service in the Health Environment 	1
<ul style="list-style-type: none"> • Fundamentals of Health Workflow Process Analysis & Redesign • Quality Improvement • Special Topics on Vendor-Specific Systems 	2
<ul style="list-style-type: none"> • Working with Health IT Systems • Configuring Electronic Health Records 	1, 3
<ul style="list-style-type: none"> • Planning, Management and Leadership for HIT • Introduction to Project Management • Working in Teams 	5 and existing IT courses
<ul style="list-style-type: none"> • Introduction to Information and Computer Science 	Existing IT course
<ul style="list-style-type: none"> • Terminology in Health Care and Public Health Settings • Networking and Health Information Exchange • Usability and Human Factors • Training and Instructional Design 	Future courses

Table 2. Mapping ONC Curriculum Requirements

2.2 HIT Knowledge Clusters by AHIMA and HIMSS

Two major health information management and health IT organizations are AHIMA (American Health Information Management Association) and HIMSS (Health Information Management Systems Society). AHIMA, as the health information management professional association, plays an important role in educating medical records professionals. AHIMA provides educational resources and programs, guiding and developing curriculum, and administers certification exams such as Registered Health Information Technician (RHIT), Registered Health Information Administrator (RHIA), and Certified in Healthcare Privacy and Security (CHPS), among others (AHIMA, 2014b). CAHIIM (Commission on Accreditation for Health Informatics and Information Management Education) sponsored by AHIMA accredits associate and baccalaureate degree programs in health information management, and masters programs in the health informatics and health

information management professions (CAHIIM, 2014b). Individuals seeking entry-level professional credentials: RHIT or RHIA must graduate from a CAHIIM-accredited program (AHIMA, 2014a).

HIMSS (Healthcare Information and Management Systems Society) is geared toward the HIT professionals and healthcare providers who need help with the adoption and use of healthcare information systems. It promotes optimal use of IT and management systems for better healthcare. HIMSS provides professional development opportunities for healthcare information and management systems professionals. CPHIMS (Certified Professional in Healthcare Information & Management Systems) is a well-respected professional certification program administered by HIMSS. Information required by the CPHIMS is divided into 3 areas: General, Systems, and Administration, which are further divided into General (Healthcare & Technology Environments), Systems (Analysis; Design; Selection, Implementation, Support, & Maintenance; Testing & Evaluation; Privacy & Security), and Administration (Leadership & Management) (CPHIMS, 2014a).

As AHIMA and HIMSS are the leading organizations for identifying HIT and HIM professionals' credentials and competencies, we examined both CPHIMS and AHIMA curriculum competencies and knowledge clusters (AHIMA, 2011; CPHIMS, 2014b) and mapped them with our course components, as shown in Tables 3 and 4.

AHIMA HIM Competencies (student learning outcomes)	Knowledge Clusters	In Course
Health data management	Health data structure, content, and acquisition; healthcare information requirements and standards; clinical classification systems; Reimbursement methodologies	1, 2, 3
Health statistics, biomedical research, and quality management	Healthcare statistics and research; quality management and performance improvement	1, 2
Health services organization and delivery	Healthcare delivery systems; healthcare privacy, confidentiality, legal, and ethical Issues	1, 4
Information technology and systems	Information and communication technologies; Information systems; data security	1, 4
Organization and management	Human resource management; strategic planning and organizational development	5

Table 3. Mapping AHIMA Curriculum Requirements

CPHIMS Competencies	Knowledge Clusters	In Course
General	Healthcare & Technology Environments	1, 2, 3
Systems	Analysis; Design; Selection, Implementation, Support, & Maintenance; Testing & Evaluation; Privacy & Security	2, 3, 4, 5
Administration	Leadership & Management	1, 5

Table 4. Mapping CPHIMS Curriculum Requirements

The AHIMA curriculum competencies and knowledge clusters are identified based on revised Bloom’s Taxonomy – remembering, understanding, applying, analyzing, evaluating, and creating (Krathwohl, 2002). AHIMA has specified that the content be introduced and reinforced in the curriculum and may occur in more than one course in the program.

3. COURSE DESIGN AND DEVELOPMENT

The individual courses are designed with reference to the ONC HIT workforce curriculum development program together with pedagogical models for effective teaching and learning. For example, Fink’s Integrated Course Design model was used to refine the course “Clinical Workflow Process: Analysis and Redesign”. Integrated Course Design methodology (Fink, 2003) is used for improving the design and delivery of the course in order to enhance student learning. The methodology was centered on Fink’s taxonomy of significant learning, namely foundational knowledge, application, integration, human dimension, caring, and learning how to learn, as shown in Figure 1. It is believed that significant learning is achieved through in-depth situational analysis, effective teaching and learning activities correlated to the course objectives, appropriate feedback, and assessment procedures. The course was designed to engage students, enhance student learning and prepare them to meet the needs of healthcare organizations and HIT development.

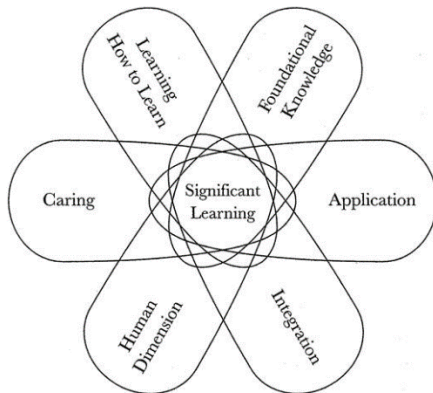


Figure 1. Taxonomy in Course Design (Fink, 2013)

The use of Fink’s Integrated Course Design model with the objectives of Clinical Process and Workflow course led to teaching, learning, and assessment activities with the adoption of a problem-based learning strategy.

The foundational material of the course was taught using lectures, case scenario videos and assigned reading. The learning effectiveness of the foundational material was assessed by multiple-choice quizzes and short answer questions.

Students later applied the foundational material in case studies that were evaluated through rubrics to ensure the students’ work met expectations for each assignment. The material was integrated as the student used additional knowledge and tools in increasingly complex assignments through the semester.

The human dimension, another component in Fink’s taxonomy, was addressed in discussion topics that required the student to develop and support positions based on course material and literature reviews. Caring about the course material was encouraged with guest speakers including medical and health IT professionals and a required clinic visit.

The learning of how to learn skills – the last component in the taxonomy – was developed through the use of a variety of sources of information and the application of the skills in case studies.

Table 5 illustrates the course design using Fink’s model. The case studies and clinic visit project were well received by the students; as one student commented, “The real world assignments were effective. I enjoyed applying the concepts to real world projects.”

Fink’s Taxonomy	Teaching and Learning Activities	Assessment
Foundational Material	Lectures and assigned reading	Multiple-choice and short answer quizzes
Application	Case Studies	Assignment rubrics
Integration	Increasingly complex case studies requiring use of tools discussed in lectures	Assignment rubrics
Human Dimension	Discussion topics that required positions supported by research	Discussion rubrics
Caring	Guest lectures by Medical and IT professionals; Case study requiring clinic visit	Student report and clinic surveys
Learning to Learn	Discussions and case studies requiring use of a variety of sources of information and the application of the skills	Report and research paper rubrics

Table 5. Using Fink’s ICD Model for HIT Course Design

In addition to learning material delivery, hands-on exercises with EHR systems are integrated into the courses. The dean and the department chair helped secure a range of EHR systems CPSI, NeuMD, and eClinicalWorks. A few open source software were also used in the HIT courses, such as VistA by Department of Veteran Affairs, openEMR, and AHIMA Virtual Labs to support students in these various HIT programs.

These commercial and open source systems provide students with the opportunities to get familiar and practice with the hospital and ambulatory EHR and practice management systems. Students were also encouraged to investigate the health app usability issues, and to design and develop mobile health apps using an open source platform App Inventor, which is designed for the users without prior programming experience (Massachusetts Institute of Technology, 2014; Zhang, 2014).

4. A RECENTLY-PROPOSED BAS IN HIT PROGRAM (PENDING APPROVAL)

4.1 Background

The American Association of Collegiate Registrars and Admissions Officers (AACRAO), the American Council on Education (ACE), and the Council for Higher Education Accreditation (CHEA) have published a joint statement on the transfer and award of credit (ACE, 2011).

The joint statement is intended to serve as a guide for institutions developing or reviewing policies dealing with transfer, acceptance and award of credit. Following its work on the Statement, in 2001, CHEA and the 19 recognized institutional accrediting organizations provided a framework for meeting transfer of credit responsibilities (CHEA, 2002). The CHEA framework offered four criteria that accrediting organizations and institutions are asked to consider when decisions are made about transfer of credit and academic quality. The CHEA later proposed to begin establishing a framework for action in 2010 focusing on the eight issues of the future of accreditation that emerged during 2008-2010, including the issue relating to transfer of credit (CHEA, 2010).

Regional accrediting bodies, such as the Southern Association for College and Schools (SACS), have position statements concerning transfer credit (SACS, 2003) that encourage proactive approaches to ease the way toward resolving transfer of credit problems while maintaining curricula coherence and academic and institutional integrity.

One of the ways to help ensure quality in the transfer of courses is to examine the curriculum from the transfer institution, along with faculty and other pertinent accreditation criteria, whereas another is to accept courses only from accredited institutions.

4.2 Articulation Agreement and Two-Plus-Two Programs

For many states, 2+2 programs are designed to accept students who have completed their first two years and earned an Associate Degree (AS), to transfer to four-year institutions to complete their Bachelor's Degree (BS) (e.g. Georgia Department of Education, 2014; SUNY Adirondack, 2014). In the state of Georgia, there are two separate college/university systems: the University System of Georgia

(USG) that encompasses two-year, four-year, and research universities offering Associate, Bachelor, Master and Doctoral degrees and the Technical College System of Georgia (TCSG). The TCSG comprises schools offering certificates, diplomas and Associate of Applied Technology (AAT) and Associate of Applied Science (AAS) degrees.

At Southern Polytechnic State University, we have chosen to look at accepting transfer students from accredited institutions from the TCSG and established an articulation agreement with most of the institutions within the TCSG (Southern Polytechnic State University, 2014; University System of Georgia, 2011). We accept the complete AAS or AAT degree in a computing field. A series of Bachelor of Applied Science degrees in several areas have been created at SPSU. The Information Technology department has created a Bachelor's of Applied Science in Information Technology (BASIT) that fully accepts the two-year AAS and AAT degree credits earned in a computing field from any regional accredited TCSG schools. The students then complete the last two years at SPSU to receive their BASIT degree (Rutherford et al., 2011; Rutherford and Reichgelt, 2009).

As part of the effort in HIT program development, the IT department began exploring other ways to serve students who wanted to receive a bachelor's degree in HIT. One of the best ways to address this need was to tap into the BAS degree articulation to ascertain whether there was a possibility of creating a new BAS degree in HIT. After researching the technical schools that currently offer HIT programs, the IT department began efforts to establish a new BAS degree in HIT. By using the established articulation agreement between SPSU and TCSG, the department proposed a new program – the BAS-HIT (Bachelor of Applied Science in Health Information Technology) for students who wished to transfer from the two-year TCSG colleges to SPSU to complete their Bachelor's degrees (Rutherford et al., 2013). The Department of IT at SPSU and the TCSG have worked together to align our HIT curricula to ensure a smooth transfer from TCSG to SPSU and the rigorous requirements of the BAS degree.

4.3 Course of Study

The TCSG schools have a variety of AAS degrees in computing fields – such as network, database, programming, web design, and information security (Rutherford et al. 2011). These different majors have some similar courses but most of the degree is made up of specialized computing courses appropriate to the major. When creating our BASIT program, a process was created where the general education course for transfer was evaluated by the Registrar's office and the major course would be sent to the BASIT coordinator for evaluation.

As in our established BASIT program, students transferring into the BAS-HIT program are required to complete their last two years – 60 semester hours, at SPSU. Students in the BAS-HIT program are required to obtain both breadth and depth of IT education as the students in the BASIT and our regular four-year degree program BSIT. This is driven both by the demands of employers of our graduates, the ABET CAC accreditation standards in IT, and the IT model curriculum.

The specialized courses for the major of HIT are very different from the other computing majors that can transfer to the BASIT program. In order to process the transfer of courses into the new BAS-HIT program, we follow the established process for transfer evaluation. More importantly, we examined the HIT curriculum at TCSG institutions. The transfer of credit is not done on a course-by-course transfer, but, instead, a group of major HIT courses taken as part of the AAS degree are transferred as a “technical block”. This allows for the maximum number of transfer courses from the AAS-HIT degree. The students also transfer in several general education courses they complete as part of their AAS degree. Most students will transfer in 52-58 semester hours from their AAS degree – with a maximum of 37 semester hours of major HIT courses in the “technical block”.

The HIT students transferring from TCSG schools obtained depth before they obtained breadth; therefore we needed to restructure the courses that make up the BAS-HIT program. For example, students from TCSG had taken a series of specialized occupational courses, such as medical terminology, pharmacotherapy, medical coding and classification, among others. These courses are more healthcare-related rather than technology-related. In order for the students to obtain breadth in IT and HIT specifically, the students take 2 programming courses, 3 lower-level IT courses, 2 upper-level computing courses, 6 upper-level IT courses including HIT practicum, 2 specialized HIT courses, and the additional required general education courses.

The additional courses are:

1. Programming (two courses)
2. Technical writing
3. Professional practices & ethics
4. Database systems
5. Hardware/Software concepts
6. Introduction to web development
7. Software acquisition & project management
8. Data communication & networks
9. Information security administration
10. Clinical workflow process: analysis & redesign
11. Health information security & privacy

All courses are offered in a variety of modalities, including completely online, face-to-face and in a blended or hybrid mode, with half the session online and the other face-to-face. Delivering courses fully online allows students from across the state and even the globe to participate in the program. This provides tremendous flexibility to students who are not able to come to campus for the courses.

We have established a virtual hands-on laboratory learning environment to provide hands-on experiences for online students, such as router configuration, network design, web development, virtual electronic health record systems, and information security related exercises.

The ability for students to begin at a two-year technical college and then transfer to a four-year university to complete a bachelor’s degree has already proven very successful in our regular BASIT program. We currently have approximately 175 BASIT students. We believe that

we will see immense growth in this new BAS-HIT program as well.

5. PROGRAM AND COURSE ASSESSMENT

To meet ABET requirement for our accredited BSIT program, we included the HIT courses in the curriculum assessment. Instructor reflection and student feedback are collected at the end of each semester when the courses are offered, and curriculum assessment is conducted regularly. Most of the HIT courses have been developed in both delivery mode – distance learning and classroom delivery, which have made entirely-online HIT programs available.

To enhance effective teaching and student learning, we considered the following aspects when delivering our HIT courses. First, we tied course material to real-world issues by introducing students to current information in the fields from major HIT online portals, academic publications, and professional organizations. We also integrated real-world issues and research into course material. Secondly, we kept current with the teaching content, engaged the classroom with a variety of media, provided prompt and constructive feedback, and encouraged active learning. Third, we invited guest speakers to classes for students to have opportunities to meet with healthcare professionals and HIT industry experts and establish connections with local HIT companies. Students are also provided with information of professional training webinars, certification training and HIT job fair information. We also involved students in HIT research. A few graduate students have published their class research papers in regional academic conferences since 2012.

Academic competency of faculty is essential to the success of any academic programs. At Southern Polytechnic State University and School of Computing and Software Engineering in particular, faculty members receive full support for professional development, such as sponsorship for taking the professional certification exams, travel support for presenting at the academic conferences, and support for a variety of professional training events. With the help from administration, the IT Faculty members are able to keep current in their fields including getting certified in information security (CISSP – certified information security systems professional certification) and in HIT (CPHIMS – certified professional in healthcare information management & systems certification). Faculty members have been active in course improvement and research in HIT and thus they provide up-to-date HIT information and have designed and developed a series of hands-on labs in HIT courses, which significantly help the success of student learning.

Students reported that they had learned a lot from the HIT courses and were satisfied with their learning experience. A graduate student with a published paper in the discipline wrote, “I feel very lucky to have you support my paper in such a way that no one else has before.” Another student expressed his gratitude for the guest presentation: “The guest speaker delivered a great presentation. It was both informative and inspirational, and included extremely valuable career advice - that can be applied to any student, not just Health IT. I truly believe that such guest speakers are very important component in preparing students to real world of IT.”

6. PROSPECTIVE IMPROVEMENT

6.1 Expansion of Current HIT Programs

Our various HIT programs are designed to provide IT students and IT professionals with sufficient knowledge of the healthcare industry, the peculiarities of HIT and EHRs, to enable them to assist providers and hospitals in the implementation and meaningful use of EHRs and other HIT systems. The future goals may include expanding the current HIT certificate programs to degree programs through collaboration with information systems program, nursing program, and computer science program. Our degree programs can have different focuses in health informatics and the sub-discipline nursing informatics. Where health informatics is defined as “the interdisciplinary study of the design, development, adoption and application of IT-based innovations in healthcare services delivery, management and planning” (Proctor, 2009), nursing informatics is defined as “the synthesis of nursing science, information management science, and computer science” (McGonigle and Eggers, 1984).

The future goals of this effort may also include (1) providing executives of hospitals who have a thorough understanding of the healthcare sector but who may lack a formal background or in-depth training in a specific area of HIT, with the knowledge and skills to manage the HIT in their organizations more effectively; (2) providing healthcare providers with technical competency to implement EHRs with certified EHR technology and tools for building health information exchange capacity; (3) combining business intelligence and data mining with healthcare data to provide high-level decision support in medical information management; and (4) providing certification and compliance testing services both to organizations that build and market HIT systems, and to healthcare providers and hospitals who have implemented HIT systems, including EHRs and Health Information Exchange (HIE) systems.

To prepare qualified individuals to serve in specific health IT professional roles requiring university-level training in addition to the skilled professionals for a career in HIT requiring short-term training, we will be considering how to expand the curriculum in our current certificate programs with more courses and knowledge clusters, such as Terminology in Health Care and Public Health Settings, Mobile Health Development, Quality Improvement, Health Information Exchange, and Practicum in Health Information Technology, to name a few. We are also considering collaborating with other academic programs at our school to integrate different course modules into new courses targeting different groups of students.

6.2 Accreditation Consideration

In addition to expanding HIT programs, further curriculum effort will also focus on measurement of the course evaluation results, application to online and international students, and development of a learning portfolio for the course and certificate programs.

Once established, depending on focus of the programs, health information technology, health informatics and nursing informatics programs may consider getting

accredited by the accrediting agency in the field, such as ABET (Accreditation Board for Engineering and Technology), CAHIIM (Commission on Accreditation for Health Informatics and Information Management), and CCNE (Commission on Collegiate Nursing Education). We have been using the resources from the HIMSS, AHIMA, and ONC guidelines as well as the CAHIIM candidacy requirements – the standards for Health Informatics - Master's Degree Education, and the standards for Health Information Management Education (CAHIIM, 2014a) to continuously improve our HIT curriculum and programs.

7. CONCLUSIONS

While one would normally expect IT students be able to independently develop sufficient knowledge of an application domain, the structure of the health care industry in the United States is complex, leading us to the conclusion that we needed to introduce a series of courses to prepare students for careers in Health Information Technology.

We have developed our curriculum with careful consideration of the workforce roles for university-based education set out by the ONC. The course organization and content development have been guided by the work of AHIMA and HIMSS. All of this has been done within the framework of continuous assessment and improvement required by ABET, our program accrediting agency.

Our programs were introduced relatively recently, and it is therefore too early to make any definitive statements on the success of our program. However, a number of our graduates have found employment either with health care providers or with health information technology vendors, and we believe that one of the reasons for their success has been the programs that we designed to help them develop a greater understanding of the health care sector and the way in which it uses IT. As the sector becomes convinced of the value of well-educated HIT professionals, the need for such professionals will continue to grow, and we believe that our programs in this area help the nation address this human resource development need.

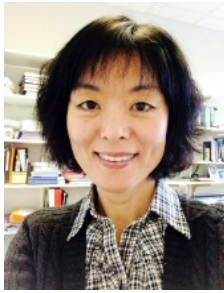
8. REFERENCES

- American Council on Education (ACE). (2011). Joint Statement on the Transfer and Award of Credit.
- American Health Information Management Association (AHIMA). (2011). 2011 AHIMA Curriculum Competencies and Knowledge Clusters - Health Information Management Baccalaureate Degree.
- American Health Information Management Association (AHIMA). (2014a). Commission on Certification for Health Informatics and Information Management (CCHIIM) Candidate Guide.
- American Health Information Management Association (AHIMA). (2014b). Getting Certified by American Health Information Management Association. Retrieved June 25, 2014, from <http://www.ahima.org/certification>.
- ARRA. (2009). The American Recovery and Reinvestment Act of 2009.

- Bureau of Labor Statistics. (2012). Medical Records and Health Information Technicians: Occupational Outlook Handbook. *U.S. Bureau of Labor Statistics*. Retrieved June 25, 2014, from <http://www.bls.gov/ooh/healthcare/medical-records-and-health-information-technicians.htm>.
- Certified Professional in Healthcare Information & Management Systems (CPHIMS). (2014a). Introduction to CPHIMS. Retrieved June 25, 2014, from <http://www.himss.org/health-it-certification/cphims?navItemNumber=13647>.
- Certified Professional in Healthcare Information and Management Systems (CPHIMS). (2014b). CPHIMS Candidate Handbook and Application.
- Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM). (2014a). Accreditation Standards. Retrieved June 26, 2014, from <http://www.cahiim.org/accredstnds.html>.
- Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM). (2014b). CAHIIM Accredited Program. Retrieved June 25, 2014, from <http://www.cahiim.org/>.
- Council for Higher Education Accreditation (CHEA). (2002). A Framework for Meeting Transfer of Credit Responsibilities.
- Council for Higher Education Accreditation (CHEA). (2010). Establishing a Framework for Action.
- Fink, L. D. (2003). *Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses*. Wiley.
- Georgia Department of Education. (2014). Associate to Baccalaureate Transfers: The Two-Plus-Two. Retrieved June 26, 2014, from <https://secure.gacollege411.org/>.
- Krathwohl, D. R. (2002). A Revision of Bloom's Taxonomy: An Overview. *Theory into Practice*, 41(4).
- Massachusetts Institute of Technology. (2014). MIT App Inventor. Retrieved June 25, 2014, from <http://appinventor.mit.edu/explore/>.
- McGonigle, D. & Eggers, R. (1984). Establishing a Nursing Informatics Program. *Computers in Nursing*, 2, 4–30.
- Metro Atlanta Chamber Workforce Council. (2012). 2013 Workforce Trends Report. Retrieved from <http://www.metroatlantachamber.com/docs/resources/click-here-for-the-full-report-.pdf?sfvrsn=0>.
- Office of National Coordinator for Health Information Technology (ONC). (2011). Workforce Development Programs. Retrieved June 25, 2014, from <http://www.healthit.gov/providers-professionals/workforce-development-programs>.
- Office of National Coordinator for Health Information Technology (ONC). (2012). ONC HIT Curriculum Overview. Retrieved June 25, 2014, from <http://knowledge.amia.org/onc-ntdc>.
- Proctor, R. (2009). Definition of Health Informatics. Retrieved June 26, 2014, from <http://www.nlm.nih.gov/hsinfo/informatics.html>.
- Rutherford, R. H. & Reichgelt, H. (2009). Creating a 2+2 Information Technology Degree Program – the Bachelor of Applied Science in Information Technology. *ACM Special Interest Group on Information Technology Education Conference (SIGITE)*, Fairfax, VA.
- Rutherford, R. H., Reichgelt, H., & Wang, J. A. (2011). The 2+2 Bachelor of Applied Science in Information Technology Follow-up 2 Years Later: Dealing with Challenges. *Proceedings of the 2011 Conference on Information Technology Education* (pp. 149–154).
- Rutherford, R. H., Reichgelt, H., Zhang, C., & Yang, M. (2013). The 2+2 Bachelor of Applied Science in Health Information Technology (BAS-HIT): Continuation of the 2+2 BASIT Program. *Proceedings of the 14th Annual ACM SIGITE Conference on Information Technology Education* (pp. 141–142).
- Southern Association of Colleges and Schools (SACS). (2003). Transfer of Academic Credit: A Position Statement. Retrieved from <http://www.sacscoc.org/pdf/081705/transfer%20credit.pdf>
- Southern Polytechnic State University. (2014). Articulation Program with Technical College System of Georgia. Retrieved June 25, 2014, from <https://www.spsu.edu/tcsg/>.
- SUNY Adirondack. (2014). Transfer Agreements. Retrieved June 25, 2014, from <http://www.sunyacc.edu/studentlife/services/counseling/services/transfer/agreements>.
- University System of Georgia. (2011). Complete College Georgia: Georgia Higher Education Completion Plan 2012.
- Zhang, C. (2014). Healthcare Mobile App Development with App Inventor in a Health IT Course. *Southern Association for Information Systems (SAIS) 2014*.
- Zhang, C., Reichgelt, H., Rutherford, B., Brown, B., & Wang, A. J. A. (2012). Developing and Improving Interdisciplinary Health Information Technology Certificate Programs. *Proceedings of the 13th Annual Conference on Information Technology Education* (pp. 43–48).

AUTHOR BIOGRAPHIES

Chi Zhang is an Assistant Professor of Information Technology in the School of Computing and Software Engineering at Southern Polytechnic State University in Marietta, GA. She holds degrees in Computer Science and Instructional Technology and a PhD in Information Technology from the University of Nebraska. She is a certified professional in healthcare information & management systems (CPHIMS). Her current research interests include health information technology and electronic health record system adoption & implementation, business intelligence in healthcare, usability evaluation, and IT education.



Han Reichgelt currently is Dean of the School of Computing and Software Engineering at Southern Polytechnic State University in Marietta, GA. He holds degrees in Philosophy and Psychology from the University of Nijmegen in the Netherlands, and a PhD in Cognitive Science from the University of Edinburgh in Scotland. He has held positions at the University of Edinburgh and the University of Nottingham in the United Kingdom, at the University of the West Indies, Mona, Jamaica, and at Georgia Southern University in the United States. He will take up the position of Regional Vice-Chancellor for Academic Affairs at the University of South Florida, Saint Petersburg, in July 2014.



Becky Rutherford is Professor of IT, Interim Dean of the School of Computing and Software Engineering, and Associate Vice President of Institutional Effectiveness at Southern Polytechnic State University in Marietta, GA. She holds MS in Computer Science from Southern College of Technology, BS and MS in Music Education and Ed.D in Guidance & Counseling from Indiana State University. Dr. Rutherford's research interests include women in STEM fields, information privacy issues, learning styles for the classroom, curriculum design and development, and degree program development and assessment.



Andy Ju An Wang is Professor and Dean of the College of Applied Sciences and Arts, Southern Illinois University, Carbondale. He obtained his BS, MS, and Ph.D. all in Computer Science and has been teaching at both undergraduate and graduate levels in various universities since 1982. Dr. Wang has broad interests in information systems security, information security model and metrics, component-oriented programming, and computer science education.



Copyright of Journal of Information Systems Education is the property of Journal of Information Systems Education and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.