

Say Good-Bye to the Silos and Hello to Collaboration: A New Curriculum Approach

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Abstract: In sharp contrast with the customary traditions of educational silos in the delivery of knowledge and understanding, this paper presents a true interdisciplinary curriculum that is designed to supply the community with graduates who are prepared to take on diverse roles in health care and information management. The complexity of our modern communities and their anticipated futuristic needs suggest that graduates in health care must be able to apply more than a traditional singular knowledge domain to articulate problems and provide solutions to those problems in meaningful ways. The curriculum approach presented will facilitate interdisciplinary knowledge learning from existing classes, foster faculty collaboration, and enhance the resource sharing and integration. In essence, this new curriculum collapses the boundaries of education silos.

INTRODUCTION

Health care is one of the top social and economic problems facing Americans today. The rising cost of medical care and health insurance affects the livelihood of nearly every American in one way or another (Ginsburg, 2008). Recent studies indicate that one of the key reasons that cause the skyrocketing increase in U.S. national health care spending is lack of information sharing, which subsequently results in medical errors and waste, along with the increasing concerns on health care service quality, safety, and accessibility. While the health care problem is not easy to solve, timely actions must be taken to prevent its further worsening or, more positively, to eliminate its root cause of errors and waste. As recognized by the health care professionals, one possible and effective solution to the health care problem is to apply health information technologies (HIT) to enable the digitization and sharing of health information that will not only avoid the duplications, errors, and waste but to enhance the efficiency of health care service without compromising its quality (Falan et al. in-press).

Over the years, advances in information technology and changes in healthcare delivery have expanded the demand for healthcare information within and beyond institutional boundaries. The environmental trends that have contributed to this expansion include the push for patient safety using evidence-based practice initiatives and decision support, health care consumer involvement in decision-making, and the electronic health record. Based on a recent labor market report, published by the U.S. Bureau of Labor Statistics (2011a), health care is one of the largest industries and it provided 14.3 million jobs for wage and salary workers. More strikingly, ten of the top 20 fastest growing occupations are health care related. Specifically, the healthcare industry will generate four million new wage and salary jobs between 2008 and 2018, and during the period, business and professional services will generate 2.6 new jobs (U.S. Bureau of Labor statistics (2011b). This unmet job demand is primarily in response to the rapid growth in the elderly population. In the report, it is also pointed out that a good percentage of these jobs will require four years of college education (U.S. Bureau of Labor Statistics, 2011b).

In response to the emerging needs of health care that more health care professionals must be well versed in the knowledge and management of information technologies and as well as to echo the Academic Strategic Plan 2010 of the university (Western Michigan University, 2010), the faculty developed and have proposed a university-wide interdisciplinary undergraduate curriculum, entitled *Health Informatics and Information Management (HiiM)*. By nature, HiiM curriculum is interdisciplinary. The premise of HiiM curriculum is to leverage the talents of WMU faculty for program delivery while enhancing investment in faculty and staff development. Therefore, implementing this curriculum will involve minimal administration overhead and little resource duplication at each college. This paper discusses the health information technologies, the market demands of professionals who work in health care and the interdisciplinary curriculum that has been designed to build needed skills in our community.

Information and Communication Technologies (ICTs)

Great efforts have been made to infuse technology into health care to improve productivity, decrease error, and produce better outcomes (DesRoches & Jha, 2009; Gagnon et al., 2009). Health technologies have been designed to provide an array of functions from automating inventory and restocking of drugs on medication carts to the use of robotics to deliver health care to those that are geographically separated from providers. Health care technologies affect not only health care practitioners that deliver health care but also the recipients of that care. One classification of health care technologies, the information and communication technologies (ICTs), is used to capture processes, store, retrieve, and share clinical information. ICTs are designed to interface with multiple systems and programs to allow for input and computation so that decision support can be utilized to improve care. While many health care technologies are ubiquitous, electronic health records on an interoperable ICT have been slow to emerge.

Electronic Health Record (EHR)

The EHR system is designed to manage, store, share, retrieve, and communicate information about the health status of individuals. It is a record of the patient's health care experience that includes the medical problems, treatments, referrals, and outcomes. The EHR also serves as a way to determine quality and promote process improvement (DesRoches & Jha, 2009; Carter, 2008). Health care organizations have been slow to embrace EHRs until the past few years when the government initiated and influenced the adoption rate of electronic health records for managing information (The United States 111th Congress., 2009; Congressional Budget Office, 2008). Although the Institute of Medicine defined critical functionality in 2003 (Committee on Data Standards for Patient Safety, 2003) and the criteria was further expanded and clarified in 2009 (Jha et al., 2009) wide spread adoption of the EHR is limited due to lack of consensus on key functionality. Jha et al. cited that barriers to EHR adoption also include financial constraints, maintenance costs, employee resistance and lack of adequate information technology expertise (2009).

Recently, in response to the financial concerns and to ensure that the EHR would be used in beneficial ways, meaningful use criteria emerged that offer incentives (thousands of dollars) to organizations and providers who implement systems and demonstrate that they use the systems meaningfully. If practitioners purchase systems that use incentives, but do not show "meaningful use" then the incentives are not awarded. Examples of meaningful use criteria for the first stage adoption for the 2011-2012 year include having a patient list, medication list, use of computerized order entry, patient electronic access, clinical summary and so forth (Centers for Medicare and Medicaid Services, 2011). In order to take advantage of the meaningful use incentives, systems and policies must be designed that align with meaningful use criteria and people must have the information management and systems skills to accomplish those goals.

Many health care and information technology analysts believe that health information technology (HIT) will have positive impacts once implemented, however the benefit is often more speculative than fact or biased due to research methodology (Congressional Budget Office, 2008). The perception remains consistent that the EHR provides benefits such as improved data accessibility, improved reporting, quality and safety measurement, improved outcomes and patient safety (Yoon-Flannery et al., 2008; Carter, 2008).

To date, the transition from paper-based records to electronic health records has created a job demand for health care professionals to concentrate on the domain knowledge that encompasses health care and information technology and their associated management. The historic move from paper to electronic health records and the most recently passed national health reform bill that mandates health information be exchangeable among organizations, service providers, patients, and other health care stakeholders (e.g., insurers, government agencies) changes the fundamental processes of health care delivery. These changes have created a great challenge to those working in education to prepare students for these roles. While many academic programs and departments (e.g., nursing, business, music therapy, occupational therapy, physician assistant, and computer sciences) have attempted to make students understand and deal with issues associated with information management, the emerging market demands more graduates with integrated education in both health care and information technology. Specifically, the new positions require a deeper knowledge of how health care delivery and operations could be enhanced, enabled, and streamlined by meaningful employment of health information technology.

MARKET DEMAND

A recent report released by HealthTechnica (2010) shows that the healthcare information technology market is estimated to be \$53.8 billion by 2014, growing at a compounded annual growth rate (CAGR) of 16.1% over the period between 2009 and 2014. The market is expected to grow because of the tremendous demand for general applications that include electronic medical records (EMRs), EHRs, computerized physician order entry system (CPOE) and non-clinical systems. It is expected that the market for general applications will grow at an overall CAGR of 13.0% over the same period.

There exists an unmet market demand for health informatics and health information technology professionals to cover workforce shortage for almost all the segments within the health care industry. The demand for health IT professionals was spurred by the 2009 federal American Reinvestment and Recovery Act (ARRA). The government legislation provides millions of dollars in increased Medicare and Medicaid reimbursements to hospitals that meaningfully implement an EHR system by a 2011 deadline (The United States 111th Congress, 2009). These incentives become penalties for hospitals that have not implemented an EHR by 2015. With a finite number of technology professionals in the healthcare industry, and only 1.5 percent of U.S. hospitals currently using comprehensive clinical information systems, a huge gap in the supply/demand exists (Falan and Han, 2011)

In addition, the labor market report published by the United States Bureau of Labor Statistics indicates that health care is one of the largest industries in 2008, and it provided 14.3 million jobs for wage and salary workers (2011b). More strikingly, ten of the top 20 fastest growing occupations are health care related. In specific, the healthcare industry will generate 3.2 million new wage and salary jobs between 2008 and 2018, which is more than any other industry. This report confirms that the market demand for a specialized advanced degree that integrates Health Informatics with Information Technology is growing and shall be met by the future graduates from American four-year colleges and universities (U.S. Bureau of Labor Statistics, 2011b).

As demonstrated, there is a strong push for health care providers to use electronic approaches to manage information to improve quality, reduce costs and conserve resources. At the same time, this creates an urgent need for health care workers, clinicians, information technology professionals, managers and administrators to have more knowledge and skills related to health information management and systems. Next, an academic response to the emerging demands for health care professionals to have health information technology knowledge and skills is presented.

CURRICULUM

Western Michigan University established the Center for Health Information Technology Advancement (WMU-CHITA) in 2010. The center, supported by the university, is administered through a joint effort of two faculty representing the Haworth College of Business and the College of Health and Human Services. The Center's mission is to build programs in research, education, and service that will help students gain new knowledge and skills in the area of health care and information technology. As part of the mission, the faculty of the Center determined that there was a need for a new major to help prepare students for future roles and the need for change began with a review of errors in health care (Falan, et al., in press).

Why is this Curriculum Important?

Health care is fraught with errors, redundancies and escalating costs (Falan et al., in-press, PricewaterhouseCoopers, 2009; PricewaterhouseCoopers 2008; Rand 2010; Institute of Medicine, 2000). These issues originate from several perspectives, but some are particularly important. First, many health information technologies actually introduce error into health care processes with adverse effects (Horsky, Ahang, & Patel, in press; Sarnikar & Murphy, 2009; Ash et al., 2007; Harrison et al., 2007; Heeks, 2006) and systems are missing requirements that result in interruptions in task performance, inadequate functionality, missing or inadequate feedback (Sarnikar and Murphy, 2009).

System design is not the only issue involved with the problems in health care delivery. Clinicians want to have adequate information to make day-to-day decisions, yet have little knowledge or experience how to derive more out of the systems they use or desire to build (Revere et al., 2007). The health care professions have distinct information requirements that make collecting the needed information challenging and suggest that a one-size-fits-

all approach will not meet the needs of health care professionals. The health care disciplines must be able to identify their unique information needs so that it is available in the systems themselves. These problems can be resolved. In order to influence health care errors, systems, and health information management problems, university graduates must be armed with the skills and tools to be effective in solving these problems.

Academics

Creating and using systems that benefit clinicians and patients begins in academics with the fundamental knowledge that students acquire related to health care and information management systems. Given that the demand is growing for health care professional skilled in health information management, we explored many different ways to bring the necessary knowledge to students and concluded that a new curriculum major was warranted. The pervasive downturn of the economy and financial constraints of the university along with the desire for an interdisciplinary curriculum led us to think about different ways of offering the major. Faculty's objectives for the proposed curriculum were to minimize the cost to the university, use existing resources and engage faculty. Faculty reviewed sample programs across the nation and the criteria for accredited programs in this knowledge domain. Based on the review, it was determined that many curriculums centered on information management but lacked essential health care domain knowledge. Additionally, the faculty wanted a curriculum that could be utilized as a double major for those engaged in clinical curriculums. Therefore, it was essential to review the requirements of other majors in terms of courses that will give students an advantage toward a double major.

As a result, faculty from different schools and colleges collaborated to establish a new curriculum major called Health Informatics and Information Management (HiiM). The HiiM major is interdisciplinary in its design to promote the collapse of academic silos and increase the sharing of teaching/knowledge/research resources across multiple colleges at Western Michigan University. This curriculum provides students with the latest developments in health care information management and systems. The undergraduate major interdisciplinary curriculum, HiiM, consists of seven pre-HiiM courses in the human sciences (including medical terminology, biology and statistics, anatomy and physiology), eight core required courses, and three specialty courses offered by hosting colleges at WMU. A few of the eight core courses include Informatics for health care professionals, Health Information Systems and Management, Systems Analysis and Design, Information Assurance and Compliance, Capstone project, Health Services Practice management. Each hosting college offers its own unique specialty courses like the following: Business Analytics, Data Mining, IT project, Health Systems and the Environment, and Independent Research.

The expected outcomes of the curriculum follow the Commission on Accreditation for Health Informatics and Information Management Education (CAHIIM) that include demonstration of competencies in:

- Health data management
- Information policy
- Information systems
- Administrative and clinical workflow

The major domains of the curriculum are designed to flow logically with the 2011 AHIMA Curriculum Competencies (AHIMA, 2011) which include:

- Health Data Management
- Health Statistics & Research Support
- Organization & Management
- Information Technology Systems
- Organization and Management

This major will produce graduates to meet the market demand for both balanced and specialized knowledge/skills in the combined domain of health informatics and information management. The interdisciplinary nature of this new major will provide a unique field of study that will better prepare students to acquire both health care domain knowledge and the education in information management before pursuing their future careers.

Whereas many curricula originate within a single college or department, this major is designed to be scalable in terms of participation from all colleges across the university and is categorized as a university level major. The courses for this curriculum were selected from courses offered throughout the university. All courses

within the university offerings were reviewed for applicability to the major proposed using a keyword search. The faculty found many courses to apply to the HiiM major from across the university. The courses selected for the curriculum were based on the criteria for accreditation for health information management programs by the American Health Information Management Association (AHIMA, 2011). Once applicable courses were identified, faculty were contacted to determine if they would be willing to closely align content of a course section offering to fulfill the criterion requirements from AHIMA. The majority of the required courses for the major are derived from the College of Health and Human Services, College of Arts and Sciences, and Haworth College of Business. The courses selected for this major provide graduates with a background in healthcare and business processes that are essential for success in their careers. The unique contribution of this major is its ability to generate specific skill sets across different knowledge domains. For example, students electing the HiiM major through the College of Health and Human Services will have the opportunity to choose specialty courses like health care literacy, health care administration and so forth. Those students who pursue the HiiM major through Haworth College of Business will have opportunities for in-depth study in data analytics, networking, project management, and security and more.

Benefits for Hosting College Graduates

Initially, two colleges will host the HiiM Major, the Haworth College of Business and College of Health and Human Services. As other colleges or departments join in the delivery of the HiiM curriculum major, the benefits will continue to grow across the university. Next, the benefits for the hosting college are described.

The College of Health and Human Services is designed to provide a collection of programs focused on improving the health and well-being of people and communities through skills, knowledge, and leadership. This proposed curriculum is designed to provide skills and knowledge in the capture, management, retrieval, and utilization of health care information that is essential for knowledge development and for promoting the health and well-being of people and communities. Additionally, graduates will gain a good understanding of workflow processes, system analysis and design, and information management that are derived from the courses in Haworth College of Business. This curriculum seeks to promote an interdisciplinary environment to build specific knowledge and skills that will be used by bedside clinicians, clinical managers, health information system designers, information technology managers, and administrators in the promotion of organization and/or entrepreneurial goals in health care. The most important benefit is that business students and health care students will develop interdisciplinary-domain knowledge instrumental for pushing health care forward in positive ways.

The Haworth College of Business (HCoB) focuses on business education with respect to multiple specialties. The HiiM Major will provide students admitted to HCoB the opportunity to combine their education in computer information systems and management with complimentary education from the College of Health and Human Services and the College of Arts and Sciences necessary to be professionals in health information technology and health care management. This new major offers business students with more blended training and education such that they can be employed by the unmet market demand in health care IT and management. The three specialty tracks offered by HCoB will provide business students with more options to pursue their career as specialists in data analysis, health care information networking, and health care management. In sum, the domain knowledge in business and computer information systems and their combination with the domain knowledge in health care will improve the placement of HCoB graduates.

DISCUSSION

The development of this major is intended to propel student learning in terms of health care and information management. While it is understood that many improvements can occur in health care, it will not happen without people and those people must have the necessary skills and knowledge in health, systems, and information management.

The creation of this HiiM curriculum was not a simple process. All faculty and departments impacted by this curriculum were consulted and provided the opportunity to contribute toward this endeavor. Several courses required content enhancement to conform to the criteria expected of AHIMA. To facilitate the correct content, we had more discussions with faculty. We found faculty that were interested in this curriculum and who were willing to implement changes to their courses to fit the

accreditation criteria. If faculty had not been willing to make changes to existing courses, it would have required the development of new courses. During this economic slowdown, it is unlikely that the university would support the development of a curriculum of new courses. Faculty buy-in is critical to the success of the curriculum development and approval.

It is interesting to note that many people in our university expressed excitement over the new curriculum and offered to us recommendations for this work. We listened carefully to those who gave us their ideas and recommendations for consideration. Due to the slow economic times, careful attention to costs and resources was essential. When we came to junctures where resources or capacity issues could be problematic, alternative solutions were created, which involve looking at essential content and determining how we could meet the requirements for accreditation differently.

CHALLENGES

As with any new curriculum development, there are challenges that will arise. In this case, due to the interdisciplinary nature of this curriculum, curricular management, capacity, and program management will be more complex than most traditional curriculum majors.

Curricular Modification

First, two hosting colleges will jointly manage the proposed curriculum. This means that there will need to be guidelines for decision making related to changes to the curriculum. We propose that faculty from each hosting college is involved with curriculum review and that a curriculum committee be established across the university to handle such matters. Due to the systematic process of curricular changes, it will be inefficient to have all curriculum changes go through more than one college curriculum. This is an issue that will need to be discussed. WMU-CHITA has established a community council that will provide a voice of the community and the members will be instrumental in shaping this curriculum to national and international interests.

Capacity

For the first few years, it is likely that the university will have capacity for students in this major. At such time that demand exceeds capacity, new sections of the courses will need to be offered and that may require additional faculty lines. Currently, several courses are cross-listed across the university to help with capacity issues. Cross-listed courses provide us the means to offer on section of a course at a participating college and all students regardless of college membership will be able to register for the course. This action conserves resources. As the demand grows, the cross-listing approach facilitates a means spread the burden of course delivery across the university.

Program Management

In order to meet the guidelines put forth by CAHIIM, the program will need a director who can attend to the program at least half time, and will likely grow to full time. When this issue arises, the hosting colleges and deans will be required to work together to resolve the financial responsibilities of that position.

CONCLUSION

There is no quick fix solution for the problems that are inherent in health care in terms of information management and their accompanying systems. The demand for skilled and knowledgeable professionals in the health informatics and information management areas is growing at an alarming rate. The academic community has a responsibility to offer and provide curriculum that is in line with the current and projected needs of our communities, locally and abroad. The strengths of this curriculum are that promotes interdisciplinary collaboration and cooperation among faculty across the university, the curriculum (in its early stage) is cost and resource efficient, and students will benefit greatly from multiple domain knowledge exposures. Learning the skills and knowledge of this curriculum major will enable students to have leadership positions in many health care areas. It is well understood that what the community needs from our graduates will be continuously shifting due to changes in technologies and methods of doing work. It is our goal to prepare students and shift our curriculum major as the need arises to be leaders in this industry. It is expected that our focus will remain strongly targeted on the content and competencies of this curriculum to make large impacts on our community.

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