Healthcare Information Management Systems Concentration Curriculum Choices: Evaluating the CIO Perspective

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ABSTRACT

The need for rigorous and relevant education in healthcare information management systems (HIMS) has been well documented. HIMS curriculum planners must continually assess the needs of the industry to ensure that HIMS programs are current and applicable. Additionally, HIMS concentration programs, designed to augment health administration, management, and allied health curriculum, must offer only the most important HIMS knowledge areas due to the limited number of courses that can be included in this format. Therefore, HIMS program planners must continually assess employer perceptions regarding program content importance and relevance. A survey was conducted to determine the HIMS knowledge areas that are deemed most important by healthcare CIOs. The results of this study were then compared to a similar study conducted in 1998 to determine if there have been any significant changes in CIO perception regarding HIMS knowledge area importance.

Keywords: Curriculum Development, Health Informatics, Health Administration, HIMS, CIO, Minor, Concentration, Health Education, Health Information Technology.

1. INTRODUCTION

As Information Technology (IT) continues to expand by leaps and bounds, knowledge deficits in this discipline are becoming more and more a major impediment to the strategic and tactical planning responsibilities of healthcare managers. In addition, workers with IT knowledge are in great demand. Healthcare information management systems (HIMS) practitioners are keenly aware of the IT personnel shortage. HIMS curriculum planners can address this need by preparing healthcare professionals with the IT skills and knowledge necessary to fill entry level HIMS management and analytical roles. Moreover, students enrolled in health administration and management related programs could become better prepared for today's workforce by electing to enter into a minor or concentration in healthcare informatics or HIMS.

2. BACKGROUND

A review of the existing health administration programs show that although many offer a survey course in HIMS, very few have created an HIMS specialization, concentration, or post-graduate certificate options. The lack of academic focus for formal HIMS education is perplexing considering the number of MBA programs that have recognized the importance of offering an MIS concentration. Many academic business programs offer

students a valuable option of supplementing traditional business curriculum with relevant study in the management of technology.

Other healthcare related professions have embraced information technology as a core requirement in academic preparation. Specifically, the medical profession has added information technology as a required learning component in many academic medical programs (Chastian 2002; Salas and Anderson 1998). Advanced HIMS applications are assuming a greater role within the modern healthcare delivery system and there is an increasing need for members of the medical and other healthcare professions to receive appropriate education in these areas. Additionally, the lack of management involvement and ownership of IT projects has been cited as a major impediment in the successful application of IT in healthcare (Martin et al. 1998; Feurer et al. 2000; Ummel 2003).

Formal HIMS preparation for healthcare administration (HAD) students can help cultivate an important appreciation of IT so that, as new healthcare administrators, they can become knowledgeable participants in the HIMS planning and implementation process. However, the number of reported HIMS academic programs are not adequate for the large number of people who require the training (Kinn 1996; Buckeridge and Goel

2001; Staggers et al. 2001; Junium et al. 2001). Thus, providing more advanced and concentrated HIMS education could lead to increasing opportunities for health professionals both in the range of education offered as well as new employment opportunities. Idea generation during the design phase should include input from members of faculty, students, businesses, and professional leaders (Diamond 1998; Lee and Gilmour 1977). Previous studies have assessed the employer preferred skill sets for core undergraduate healthcare informatics programs and full graduate medical informatics degrees (Panko and Valenta 2000; Valenta 1993, 1996; Hoffman and Ash 2001).

Developing and maintaining a relevant HIMS concentration requires a systematic approach for creating a program that will meet the specific needs of its constituency and at the same time fit into the course offering limitations of a concentration or minor. Due to the limited number of credit hours available for degree concentrations (e.g., a typical minor course load requirement may consist of: 25 credits, 7-8 courses for baccalaureate minor programs or 18 credits, 6 courses for a graduate degree concentration) curriculum planners need to make sure that the most appropriate and relevant courses are offered. Thus, the curriculum selection process for any program should weigh heavily upon external factors such as the importance that potential employers place on the various skills and knowledge areas to be offered. Moreover, existing programs should continually monitor curriculum choices by assessing the changes in perspectives as industry dynamics evolve (Panko and Valenta 2000; Valenta.1993, 1996). Therefore, a continual assessment and evaluation, regarding healthcare CIO preferences for HIMS education, will provide important insight for developing a condensed but effective HIMS academic program.

3. RESEARCH QUESTIONS

In order to assess the evolving importance employers place on various HIMS knowledge areas, two research questions must be answered:

1. What are the important HIMS knowledge areas from the perspective of HIMS employers (CIOs)?
2. Have the perceptions of CIOs, regarding HIMS knowledge area importance, changed over the past four years?

4. METHOD

In attempting to answer the two research questions, existing data from a 1998 study were compared against new data acquired by means of a survey administered as part of this research (Lang 1998). The methodology for this study followed a four-step process:

The first procedure included: (a) a review of literature related to HIMS student and educator opinions associated

to HIMS knowledge area, importance, and interest, (b) a review of curriculum selection for other HIMS programs, (c) a review of information on implementation and evaluation of adult education programs, and (d) a review of related planning and curriculum development methods for adult learners. In addition, the following sources were investigated: (a) the archives of the Health Information Management Systems Society (HIMSS), (b) the annals of the College of Health Information Management Executives (CHIME), (c) example curriculum and program content from similar graduate HIMS education programs from accredited higher learning organizations, and (d) related HIMS studies and research.

Second, using the survey developed in the 1998 study as a model, a new "electronic" version of the survey was developed to assess HIMS employers' (CIOs) current opinions regarding HIMS knowledge area importance. The survey questions and format were developed and piloted in the earlier study. A formative and summative committee, consisting of expert HIMS educators and practitioners, was formed to review the standards for developing the survey and evaluating the data. After reviewing the information obtained in the literature along with a review of other HIMS graduate program curricula, the specific HIMS knowledge areas that educators and professionals found important were identified (Lang 1998). Although HIMS educators differ in the specific curriculum description, content, and methodology used to facilitate the student acquisition of HIMS knowledge areas, each knowledge and skill area can be grouped within three main HIMS categories: (a) information technology fundamentals, (b) methodology and application of IT, and (c) the administration, management, and leadership aspects of HIMS (Valenta.1993, 1996; Hoffman and Ash 2001; Lang 1998; CPHIMS 2001; Ball and Douglas 1997; Begler 1995; Elliot 1995; Glaser 1994; Kooker and Richardson 1994; Tan 1990). Considering that the intent of this study is to identify key knowledge areas that could be covered in a HIMS concentration to support a terminal degree in health administration/ management, it was decided to measure only those HIMS knowledge areas that would not be covered in other business administration/health management core courses (see Table 1).

Three questions were slightly modified from the 1998 survey to improve clarity and more accurately reflect the HIMS knowledge area content. The statement "Database Access, Database Management and Data Modeling Systems" was changed to "Data Modeling, Database Development, and Database Management Systems." The statement "Decision Support by means of Data Analysis" was changed to "Management Decision Support by means of Data, Information, and Statistical Analysis" and the statement "Information Systems Analysis, Design and Problem Solving" was changed to "Information Systems Analysis, Integration, Design, and Problem Solving."

Additionally, a new question was added to the survey related to the importance for HIMS professionals to

HIMS Knowledge	HIM Skill/Knowledge Areas Measured	HIMS Skill/Knowledge Areas Not Measured (*covered in core HAD/Business or other curriculum*)
1.) Information Technology Fundamentals	a.) Clinical Applications b.) Database Fundamentals c.) Network Fundamentals d.) Hardware, Software Fundamentals e.) Internet Development Technology	a.) Financial Applications b.) Managed Care Applications
2) Methodology and Application of IT	a.) Systems Integration, Analysis, Design, Implementation, and Problem Solving b.) Decision Support/Data Analysis c.) Information Processing, Office Automation	
3) Administration, Management, and Leadership aspects of HIMS.	a.) Project Management b.) Vendor/Solicitation/Procurement c.) Social, Legal, Ethical Issues d.) Information Security	a.) The Healthcare Environment, Organization b.) HR Management c.) Planning and Budgeting

TABLE 1 - HIMS Knowledge Area Items Measured Vs. Not Measured

acquire knowledge in the use of Internet/Web Development Tools. Each item was rated on a seven-point sliding scale (1 = not important, 7 = very important,). The survey was sent to the formative committee, via email, for review and critique. A demographic section was added to analyze the organizational, professional, and educational background for the respondent population. A comment section was added so that open-ended commentary could be collected and evaluated. All recommendations and changes were subsequently incorporated in the final survey.

Third, the new survey was piloted and modified based upon input from a formative committee. A summative committee piloted the modified version and further suggestions and recommendations were incorporated. The final version was then sent via email to 221 randomly selected members of the College of Healthcare Information Management Executives (CHIME - HIMS CIOs) during the month of September 2002. There were 77 respondents. Each email included a cover letter with response instructions, survey intent, and anonymity/ confidentiality guarantees. Respondents simply "clicked" on a link, which allowed them to respond immediately online. This method proved to be efficient in that it allowed for real-time filing of response data

and eliminated the possibility of data errors that can occur from manual data entry (Zatz 2000).

Finally, data analysis was performed on the survey responses. First, the frequency of each demographic category was calculated to identify key demographic patterns for the respondent population. Then, using MS Excel, two-tailed unpaired t-tests (assuming unequal variances) were used to compare the responses from the current survey to the 1998 data. The mean response from each measured category was calculated for both the sets of data. Then the t-test was performed for each response mean pair to measure any significant changes between the CIO responses from 2002 compared to 1998.

5. STUDY JUSTIFICATION

The demographic characteristic summary of the sample is presented in Table 2. 45 percent of the respondents were employed at Integrated Delivery Systems (IDS). 45 percent were from organizations with less than 500 beds. 68 percent reported more than 100 physicians on staff and 34 percent had between 1,000-2,999 employees in their organizations.

Organization Type	Count
Integrated Delivery System	35
Hospital	32
Managed Care Organization	2
Medical Group/PHO)	3
Long Term Care Organization	2
Independent Diagnostic Center	2
Other	1
Beds	**Count**
1-499 Beds	35
500+	32
No Bed Classification	10
Physicians	**Count**
100+ Physicians	52
Less than 50	18
50-99	7
Employees	**Count**
1,000-2,999 Employees	26
3,000-4,999	19
10,000+	13
1-999	8
5,000-7,499	5
7,500-9,999	6
IT Staff	**Count**
1-24 IT Staff	21
150+	19
25-49	18
100-49	8
50-74	8
75-99	3
CIO Years	**Count**
10+ Years	26
7-9	18
4-6	18
1-3	15
Education Level	**Count**
Master's Degree (MA,MS,MBA)	44
Bachelor's (BS,BA)	30
MD or PhD	1
Other	2

TABLE 2 - Sample Demographics

27 percent of the respondents had an IT staff complement between 1-24 FTEs, and 34 percent had been a CIO for more than 10 years. Finally, 57 percent of the respondents reported having a Master's level of education consisting of an MS, MA, or MBA. Overall the sample was well qualified to judge the importance of HIMS knowledge areas as they apply to the contemporary healthcare milieu.

6. RESULTS

Research Question #1: "What are the important HIMS knowledge areas from the perspective of HIMS employers (CIOs)?"

Employers indicated the following HIMS knowledge areas as very important (greater than 60 percent of the respondents ranked the knowledge area between 6-7 on a 7 point scale): a) Project Management (mean = 6.2), b) Clinical Applications (mean = 6.1), c) Information Security (mean = 6.0), d) Systems Integration, Analysis, Design, Implementation, and Problem Solving (mean = 5.8), and e) Vendor/Solicitation/Procurement (mean = 5.6) (see Figure 1).

The following HIMS knowledge areas were deemed marginally important (greater than 50 percent of the respondents ranked the knowledge area between 6-7 on a 7 point scale): a) Social, Legal, Ethical Issues (mean = 5.3), b) Hardware, Software Fundamentals
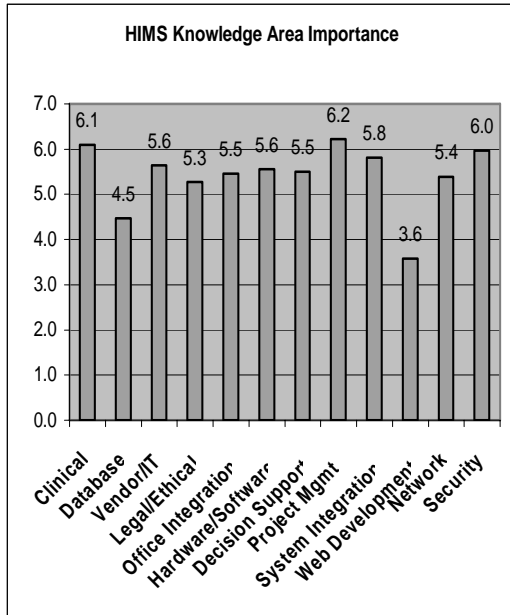
HIMS Knowledge Area Importance

Figure 1 - HIMS Knowledge Area Importance

(mean = 5.6), c) Decision Support and Data Analysis (mean = 5.5), and d) Network Fundamentals (mean = 5.4).

Finally, the respondents rated the following HIMS knowledge areas less than important (less than 45 percent of the respondents ranked the knowledge area between 6-7 on a 7 point scale): a) Information Processing and Office Automation (mean = 5.5), b) Database Technology (mean = 4.5), and c) Web Development Technology (mean = 3.6).

Research Question #2: "Have the perceptions of CIOs, regarding HIMS knowledge area importance, changed over the past four years?"

The t-test performed comparing the categorical 2002/1998 arithmetic means revealed a statistically significant change in importance for the following HIMS knowledge areas: a) Clinical Applications (significantly more important), b) Database Technology (significantly less important), and c) Decision Support (significantly less important). There were no significant changes in the other HIMS knowledge areas with regards to importance (see Table 3).

7. COMMENTS SECTION

The most frequent comment was related to the importance of the leadership aspects of IT for HIMS management-track employees. Respondents indicated that it was essential for HIMS professionals be fluent in the various components of the IT equation. Being adept at explaining technical issues in non-technical terms was

deemed more important than obtaining expertise in any one technical area. Additional comments centered on the importance of understanding the diverse business and process related issues in healthcare. Finally, clinical application knowledge was mentioned as a key knowledge requirement for using IT to improve patient safety.

8. DISCUSSION

Project management is one of the most leadership-focused areas of study. IT project management encompasses many of the aspects of knowledge deemed important by CIOs. The success of any IT project relies heavily upon how well the project is managed. The five stages of project management (Initiation, Planning, Execution, Control, and Closure) provide a roadmap for managing successful IT investments. With the increasing demand for computerization in healthcare coupled with the shrinking of resources available for capital investment, project management knowledge has never been more important for IT managers. In addition, with the push towards decentralizing the IT decision-making process, it is imperative that healthcare administrators become adept at managing IT projects. Business unit ownership, sponsorship, and accountability for IT projects will continue to be primary management initiatives. Thus, healthcare line managers will need to assume a more accountable role in assuring the successful return from expensive IT investments (Heldman 2002; Ummel 2003; Sucher 2003). Without the prerequisite knowledge in IT systems project management, administrators cannot deliver successful IT projects in an environment fraught with mounting constraints in time, cost, and quality. Although many HIMS academic programs cover some of the important tenets of project management in system development related courses (i.e., requirements modeling, scope management, quality planning, assurance, and control), most do not offer full courses in IT project management. Considering the high level of importance placed on this individual area of knowledge (mean = 6.2), HIMS curriculum planners should consider offering a full course in IT Project Management.

With the advent of the Institute of Medicine's report on patient safety (with subsequent recommendations for the use of IT to improve the practice of medicine) and HIPAA's (Health Insurance Portability and Accountability Act) patient information security and confidentiality guidelines, many HIMS academic programs have recognized the importance of offering full courses in Clinical Applications, Information Security, and Systems Analysis, Integration, and Design. Considering the high importance that CIOs place on these knowledge areas (respective means = 6.1, 6.0, 5.8) and the growing importance of clinical information systems knowledge (0.6 mean increase from the 1998 rating), HIMS concentration curriculum

HIMS Knowledge area	2002 Mean (n=77)	1998 Mean (n=60)	Difference	P(T<=t) two-tail
Clinical Systems	6.1	5.5	0.6	**0.0035
Database	4.5	5.2	-0.7	**0.0024
Vendor/IT	5.7	5.4	0.3	0.1540
Legal/Ethical	5.3	5.2	0.1	0.7120
Office Integration	5.5	5.7	-0.2	0.2604
Hardware/Software	5.5	5.5	0.0	0.7717
Decision Support	5.5	6.0	-0.5	**0.0102
Project Management	6.2	6.2	0.0	0.9252
Systems Integration	5.8	5.9	-0.1	0.6236
Web Development	3.6	N/A	N/A	N/A
Network	5.4	5.5	-0.1	0.7147
Security	6.0	5.9	0.1	0.5287

**Significant change ($\alpha = 0.05$)

TABLE 3 – Mean Score Comparison: 2002 vs. 1998

planners should strongly consider offering full courses in all three of these areas as well. Furthermore, including the HIMS social, legal, and ethical issues in an information security course would also address the importance placed on this area of knowledge (mean = 5.3).

The high level of importance placed on the Vendor/Solicitation/Procurement process (mean = 5.7) warrants attention. As the CIO continues to look for ways to improve efficiency, outsourcing some or all of the IT operation is becoming a popular strategy. Thus, expertise in managing the IT/vendor relationship is a growing interest. Although a full course dedicated to managing and developing the IT/vendor relationship would certainly address the preference and importance that employers have placed on this knowledge area, the limitations and scope of a traditional academic minor/concentration program may not allow for a full course in this area without sacrifice. Fortunately, the IT vendor management process is appropriately addressed in the planning, executing, and closing phases of project management. Therefore, if a full course in Project Management is offered, students could get a healthy exposure to IT/vendor management topics such as: a) make or buy analysis, b) contract type selection, c) procurement and solicitation planning, d) contract administration, e) closure and acceptance.

CIOs considered technical knowledge areas of HIMS important (Hardware, Software Fundamentals (mean = 5.6), and Network Fundamentals (mean = 5.4)) but not as important as the leadership areas of HIMS management. Thus, curriculum planners should focus HIMS concentration planning for technical knowledge more in the area of concept articulation than actual expertise. Furthermore, HIMSS also supports this theory by way of

their professional certification process (Certified Professional in Healthcare Information and Management Systems (CPHIMS)). The technical portion of the CPHIMS examination tests how well the examinee can "articulate characteristics" of various HIMS technical knowledge areas. The mastering of IT terminology, and the understanding of how a specific technology can be applied to address a certain process or business related problem, may be less rigorous than gaining competent expertise in a specific technical application (i.e., Oracle, Java, etc.). Thus HIMS curriculum planners could condense and combine various fundamental technical knowledge area training in one or two course offerings (e.g., HIMS Infrastructure I – Survey of System and Application Software in Healthcare Organizations, and HIMS Infrastructure II – Survey of Hardware, Networking and Telecommunications in Healthcare).

Optional or elective HIMS courses could be offered in areas that CIO's have deemed important but less essential for management–track professionals. Although Decision Support (DSS) (mean = 5.5) was rated relatively important, the significant reduction in importance for this knowledge was notable (0.5 mean decrease in importance from the 1998 rating). The rewording of this knowledge area for the 2002 survey may have impacted the change observed in this category. Additionally, the continued decentralization of the DSS process coupled with the proliferation of user-friendly adhoc data reporting and statistical analysis applications may serve as a speculative rationale for the reduction of CIO focus in this knowledge area. Although DSS may be an important analytical skill for healthcare middle managers, it may be less important for CIOs and other HIMS managers since users are now less reliant on

the IT department to retrieve and analyze data. Additional research is needed to provide further explanation.

Finally, the marked decrease in database expertise (0.7 mean decrease in importance from the 1998 rating) is less confounding. The possibility that the statement rewording could have compromised the reliability of the observed change in this category should be considered. In any case, respondent commentary suggested a greater importance associated with business and process knowledge over technical expertise. Thus, a full course in relational database technology would not be warranted as a core concentration requirement based upon the 2002 CIO perception. The fundamentals of database technology could be adequately addressed in a general software survey course. However, courses in Database and DSS technologies could combine nicely to provide a useful "option" for students who seek a more analytical professional role (i.e., clinical data analyst).

9. CONCLUSION

Upon undertaking the development of a HIMS educational program, planners should solicit input from experts in the healthcare industry, academia, as well as input from HIMS learners. In this study, the preferences of industry leaders were solicited to ascertain which knowledge areas were considered important for a concentrated study in HIMS to augment the curriculum of an existing healthcare-related academic program. The results indicate that HIMS educational planners should strongly consider course development in the areas of Project Management (including IT Solicitation and Vendor Management), Clinical Application Systems, Information Security, and Systems Integration, Analysis, Design, Implementation, and Problem Solving. Additional research should be conducted to compare and contrast the importance of these knowledge areas from the perspective of HIMS educators and recent HIMS graduates.

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