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A Study of Transformational Change at Three Schools of Nursing Implementing Healthcare Informatics

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by

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Dedication

Although neither my mother nor my uncle will be able to celebrate with me in their physical bodies, their spirits will always be intertwined with mine. To my mom, Betty Crews Wyles, thank you for instilling in me the importance of an education. To my Uncle Jimmy Crews, your valuable support and recognition throughout my life has been a treasured gift.

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Finally, to the Deans of Nursing who supported my research at the schools of nursing: I hope this research serves beneficial to your on-going transformational change journeys.

Table of Contents

List of Tables

A Study of Transformational Change at Three Schools of Nursing Implementing Healthcare Informatics

Revonda Leota Cornell

ABSTRACT

The *Health Professions Education: A Bridge to Quality* (IOM, 2003) proposed strategies for higher education leaders and faculty to transform their institutions in ways that address the healthcare problems. This study provides higher education leaders and faculty with empirical data about the processes of change involved to implement the core competency of healthcare informatics. I chose the core competency of health care informatics as a base from which to conduct semi-structured interviews with faculty and college leaders at three schools of nursing intending to capture their stories about how healthcare informatics has been implemented, what strategies were used, and why they were selected.

All three nursing schools used patient case scenarios loaded into electronic health records in their computerized human simulation laboratories. Participants' at all three nursing programs reported increased use of the pedagogical approaches of active learning and problem-based learning in these simulation labs. These approaches encourage greater faculty-student and student-to-student interaction, engender more self-directed learning, and do a better job of providing students with a process for integrating previous learning.

University of Kansas and Large State University Schools of Nursing demonstrated results that substantiate the viability of the Mobile Model for Transformational Change. One school used almost all the suggested methods and achieved transformation; the other, which used some of the methods, was not transformed. I suggest the model would benefit from specific ways of detecting the breadth in the application of the change markers and from the addition of strategies for creating a breadth of intensity to the change processes. The components of the model relating to the structural and cultural markers of change need to be further developed to focus on the breadth of change. Finally, I suggest the Mobile Model needs greater emphasis on and clarification of the role and nature of intentionality in the change process, as well as a greater focus on the relationship between the core strategies, support strategies, and the breadth of change. The intent of college leaders is important, in part because without it the breadth of change required for transformational change is not likely to be achieved.

Chapter One

Introduction

A national panel of health care experts concluded that the American Health care system may be dangerous to our health; estimating that between 44,000 and 94,000 hospital patients die annually in the United States due to medical errors. Medical studies documented overuse, misuse and underuse of health care services: over-prescription of antibiotics, incorrect dosages of drugs, and lack of effective prevention strategies with patients (Chassin, Galvin, & the National Roundtable on Health Care Quality, 1998; Schuster, McGlynn, & Brook, 1998; (U.S. Department of Health Resources and Services Administration [HRSA], 2000).

The Institute of Medicine [IOM] confirmed these safety problems and published recommendations in their report, *To Err Is Human: Building A Safer Health System (1999),* declaring that serious safety problems exist because of the health care system's ineffectiveness in translating knowledge into practice, in using new technology, and in making the best use of its human and financial resources. The report reiterated the responsibilities of health care systems for employing professionals to enhance the clinical environment by (a) redesigning clinical systems in which they practice, and (b) ensuring that schools of higher education adequately prepare health care professionals to enter the health care system. A second report from the IOM, *Crossing the Quality Chasm* (IOM, 2001) provided its vision for the American health care system, establishing an ambitious

agenda for leaders to redesign a broken system and making it clear that reform around the edges would be inadequate.

As a result, the national advisory councils in medicine and nursing are facing intense pressure to transform the way nurses and doctors are educated and trained in the United States. Representative members from HRSA, the Bureau of Health Professions, Division of Nursing, the Council on Graduate Medical Education (COGME), and the (National Advisory Council on Nurse Education and Practice [NACNEP], 1997) reported to Congress that existing professional cultures and the relatively slow evolutionary processes that govern change in higher education are inadequate to counter the present level of threat to patient safety (HRSA, 2000).

Statement of the Problem

Despite the many calls for reform and transformation in health professions' education, higher education change literature does not fully address the processes needed to implement transformational change (Kezar, 2001; Eckel & Kezar, 2003). According to Eckel and Kezar (2003), "Transformational change is unfamiliar territory for most higher education leaders, uncommon for most institutions, and little discussed in the literature" (p. ix). In their book, *Taking the Reins: Institutional Transformation in High Education* (2003), they continue:

> Institutional leaders and policy makers have neither the experience with institutional transformational nor a solid empirical literature base on which to draw. There is little meaningful data to advance an understanding of the process of large-scale or transformational change. (p. x)

Thus, no adequate road map exists for accomplishing the significant changes the IOM is seeking.

In 2001, HRSA requested the IOM's Board to convene an interdisciplinary education committee to create strategies for restructuring the allied health, medical, nursing, and pharmacy professions' educational systems. The Health Professions Education Summit held June 17-18, 2002, included 150 individuals whose participation was recommended by COGME, NACNEP (1997) and HRSA. Literature, including the existing requirements and standards promulgated by accrediting and licensing bodies and interested organizations, provided evaluative data for the summit participants. They worked in small interdisciplinary groups to draft an overall vision statement and to propose strategies for educational reform. This resulted in a third published report (IOM, 2003).

The third report, *Health Professions Education: A Bridge to Quality* (IOM, 2003), provided the following vision statement, inclusive of five core competencies: "All health professionals should be educated to deliver patient-centered care as members of an interdisciplinary team, emphasizing evidenced-based practice, quality improvement approaches, and informatics" (IOM, 2003, p. 23). Five cross-cutting strategies were recommended for each of the competencies:

1. define a common language and core competencies across the health professions
2. integrate the core competencies into the oversight process
3. motivate and support leaders and monitor the progress of the overall reform effort

4. develop evidence-based curricula and teaching approaches relating to informatics

5. develop faculty as teaching and learning experts. (p. 156)

According to Ehnfors and Grobe (2004), the core competencies are inoperable without health care professionals who are knowledgeable about informatics. In my research, I define informatics as the information technology needed in the delivery of patient care. *Crossing the Quality Chasm* (IOM, 2001) refers to healthcare informatics as the most significant tool to improve patient safety, to translate scientific clinical knowledge into practice, to decrease the chasm between what is acknowledged as good care and the care actually provided, to enhance communication among the health care teams, to increase effective coordination of patient care, to redesign processes of patient care, and to effectively use human and financial resources.

Nursing is a major professional discipline within the health care industry. A report published by the NACNEP (1997) revealed that practicing nurses are not generally computer literate and recommended incorporating informatics skills and competencies at all levels of nursing education. Incorporating informatics skills and competencies can be accomplished, according to the report, by teaching information seeking and evaluation skills and integrating nursing informatics into nursing science, practice, and education. Healthcare informatics is a new core competency but still is not required for licensure by any state boards in any of the health care professions.

Theoretical Framework

The *Health Professions Education: A Bridge to Quality* report (IOM, 2003) clearly documents the need for reform and transformation of higher education. Reform refers "to an innovation that is typically exerted from the top of a system or organization, or from outside the organization" (Kezar, 2001, p. 14). A number of the IOM recommendations focus on oversight organizations because the IOM committee believes that

> integrating a core set of competencies one that is shared across the professions into health professions' oversight processes would provide a good deal of leverage in terms of reform and is an important first step in aligning incentives and providing a catalyst for both educational institutions and professional associations to make necessary changes. This effort would build upon existing efforts and create synergies across the disciplines. (IOM, 2003, p. 121)

Thus, external bodies are being called upon to help encourage the institutions of higher education to transform clinical training, to conduct research, and to participate in leadership development and training of faculty toward meeting the overall vision (IOM, 2003).

Transformational change is defined as "change affecting institutional cultures, [as] deep and pervasive, [as] intentional, and [as] occurring over time" (Kezar, 2001, p. 27). This type of change alters "organizational structures and processes, leads to reorganized priorities, affects organizational assumptions and ideologies, and is a collective, institution-wide undertaking" (Kezar, 2001, p. 53). The 2002 Health Professions Educational Summit recommends transformation of the educational system

by involving the culture, professional values, and the existing infrastructure in which professions are educated. This provided an opportunity for me to conduct case studies of the change process in three U.S. baccalaureate schools of nursing that have demonstrated exemplary progress toward meeting the healthcare informatics core competency.

Eckel and Kezar's (2003) Mobile Model for Transformational Change (See Appendix A) provides a structure to conceptualize transformational change processes, and serves as a coherent framework to guide me in capturing emerging themes within the change process in the selected schools. Transformational change is different from other types of change in its focus on institutional culture, values and basic assumptions, as well as, intentional conversations relating to the impact of the daily work environment of the people involved.

Eckel and Kezar (2003) found getting "people to think differently" is more important than anything else. Leaders at the transforming colleges and universities explore the meanings of proposed changes for faculty work and pedagogies, and create a personal reality by continually negotiating meaning and trying to reach consistent new understanding within the shifting faculty work environment. This process of "getting people to adopt new mind-sets is a cognitive and intellectual process spurred by a set of activities that can be intentionally designed to leave behind old ideas, assumptions, and mental models" (p. 73). In the organizational behavior literature this process is known as organizational sensemaking (Gioia & Chittipeddi, 1991; March, 1994; Weick, 1995).

The Mobile Model (See Appendix A) consists of five core change strategies: (a) senior administrative support; (b) collaborative leadership; (c) staff development; (d) flexible vision; and (e) visible action. An additional 15 supporting strategies, which do

not occur as frequently as the five core strategies, play a significant role in facilitating transformational change. Like a mobile, the various interdependent change strategies may move independently, and are connected directly or indirectly to one another.

Transformational change is associated with particular strategies and activities directed toward implementation of new processes inclusive of structural, cultural and attitudinal markers of progress. The structural evidence markers are those familiar concrete measurements that can be counted and measured to baseline sets of data. The additional evidence of attitudinal and cultural shifts suggests more depth to the change. The 2002 Educational Summit strategies reference various structural, attitudinal, and cultural changes as objectives and/or issues needing to be addressed. For example, structural markers of progress cited by both Eckel and Kezar (2003) and the 2002 Educational Summit strategies include changes in curriculum in pedagogies, student learning and assessment practices, policies, budgets, new departments and institutional structures and new decision-making structures. Examples of cultural and attitudinal markers of progress cited include changes in the patterns of interactions between individuals or groups, changes in the campus self-image, changes in the types of conversations, and in new attitudes and beliefs.

Rationale

The literature on change in higher education does not focus on transformation as a specific type of change. Instead, as (Eckel & Kezar, 2003, p. x) remark, “change, as a broad topic, is informative about the content of change, what factors are related to the change outcomes, and the conditions related to change, but not the processes leaders must use to bring about change, let alone transformation”.

In 2001, the National Advisory Councils in Medicine and Nursing publicly acknowledged a need for transformational change in the way nurses and doctors are educated and trained in the United States. The 2002 Health Professions Education Summit published a vision statement and strategies for restructuring the allied health, medical, pharmacy and nursing professions' educational systems in the IOM (2003) document. Governmental and regulatory agencies overseeing health care quality have scheduled conferences and meetings to address the serious patient safety issues raised in the IOM reports.

The external bodies governing professional nursing education are establishing accountability processes to monitor the progress of the overall reform effort. The IOM (2003) recommended biennial interdisciplinary summit meetings to be held beginning in 2004. These summit meetings were to focus on reviewing progress toward explicit targets as well as establishing objectives for the next phase in preparing professionals for the 21st century health care system. The Agency for Health care Research and Quality [AHRQ], 2005, as the nation's lead research agency on Health care quality, patient safety, efficiency and effectiveness, serves a critical oversight role of the adoption of health information technology. AHRQ (2005) assembled the first joint conference for Patient Safety and Health Information Technology June 6-10, 2005 and awarded $139 million to promote adoption of and access to health information technology and to establish mechanisms for monitoring reform efforts.

Long-standing professional values of each school, i.e., allied health, medical, nursing and pharmacy, as well as clinical arenas housed within separate infrastructures, have resulted in the protection of specific specialties or interests (Enarson & Burg, 1992;

Regan-Smith, 1998). Factors contributing to a lack of coordination and collaboration among health professions' education leadership and faculty members include: differing professional and personal perspectives and values; role competition; turf issues; lack of a common language; variations in professional socialization processes; differing accreditation and licensure regulatory bodies; different payment systems; as well as existing hierarchies that emphasize individual responsibility for decision making and result in hesitancy to solicit input of others (IOM, 2003).

Specific issues relating to curriculum include, but are not confined to, the limited efficacy of a competency-based and/or evidence-based curriculum and the hidden curriculum. Faculty time and the reward system within higher education are issues across the transformational change process, which, however, become reality at the grassroots level in revising the curriculum across disciplines. The reward system within higher education provides incentives to conduct research. The revision of a curriculum across disciplines involves time and conflict, with little or no reward for being involved. Distrust and hostility continues to exist over the scope of practice among the professions (IOM, 2003).

I designed an interview guide (Appendix F) to ask open-ended questions to capture the participants' own stories relating to how each school is addressing the new competency of healthcare informatics. I focused on the respective strategies (critical decisions, improvements, and/or processes) being used, and why these particular strategies were selected. The case study method allowed enough flexibility and openness that participants were encouraged to tell about their experiences and the meanings they attached to the processes of the changes. I will link data collection to the Mobile Model

to answer my fourth research question, “Are these institutions approaching the shift to healthcare informatics as a broad and deep change in values, culture and structures that would characterize a transformational change?”

Cases Selected

The IOM (2003) recommendations included conducting “a best-practice review of universities that have integrated the five competencies into their curricula to understand what they do and how/why it is a best practice” (IOM, page 166). In line with this, I have selected three Schools of Nursing perceived by nursing informatics experts as exemplary in their efforts to meet the core competency for healthcare informatics. These schools are: (a) the University of Iowa, Iowa City, Iowa; (b) University of Kansas Medical Center, Kansas City, Kansas; and (c) St. Scholastica. The University of Iowa did not meet the inclusion criteria, necessitating the need to select a third case site. During my on-site visits, the University of Maryland and Large State University (anonymity requested by Dean of Nursing) were mentioned as potential sites to study. The University of Maryland did not meet the inclusion criteria for my study. The College of Nursing at Large State University did meet the inclusion criteria for this study. All three nursing programs are accredited by the Commission on Collegiate Nursing Education and their respective state boards of nursing.

The University of Kansas is a major public research and teaching facility with an overall 2005-06 student enrollment of 29,272. The baccalaureate nursing program enrolls some 300 students. The website notes that the school is the first to incorporate healthcare informatics into its curriculum. It is ranked 21st in the nation among public

nursing schools funded by the National Institutes of Health (http://www2.kumc.edu/son/centennial.htm).

St. Scholastica is a private college with an overall 2005-06 student enrollment of 3,249. The baccalaureate nursing program enrolls up to 112 students each fall semester. The main campus is located in Duluth, Minnesota (http://www.css.edu/About_St_Scholastica.html).

Large State University is a coeducational public research university with an enrollment exceeding 50,000. A faculty numbering more than 2,000 offers over 170 majors. There are 23 different schools and colleges, including professional schools in dentistry, law, veterinary medicine, medical professions, medicine and public health, nursing, and social work. It has 120 nursing faculty members. In 2007, the college of nursing graduated 225 students (Large State University reference 1).

Qualitative Research Questions

The research questions that will guide this study are:

1. How is healthcare informatics core competency being addressed in three exemplary schools of nursing?
2. What are the institutions' particular strategies (critical decisions, improvements, and/or processes) being used to address the healthcare informatics core competency?
3. Why are those particular strategies (critical decisions, improvements, and/or processes) being used?

4. Are these institutions approaching the shift to healthcare informatics as a broad and deep change in values, culture and structures that would characterize a transformational change?

Research Design and Methods

Yin (1994) identifies three conditions for the case study method: 1) the research questions are 'how' and 'why' questions; 2) the researcher has limited control over events; and 3) the focus is on a contemporary, real-life phenomenon in which context is important. My research questions focus on how each school of nursing is implementing widespread transformational change and why its particular strategies (critical decisions, improvements and/or processes) aimed at addressing the healthcare informatics core competencies are working. The second condition is met because I have no control over the plans and actions of the nursing colleges as they take on the challenge of implementing healthcare informatics. The third condition, a focus on contemporary, real-life phenomena and organizational context is important for fully understanding the patterns of change and change processes in each of the three schools of nursing.

The case study method will allow insider descriptions and interpretations regarding the ways in which the three schools are addressing healthcare informatics. Additional insight may be obtained by identifying the core change strategies employed by college leadership and faculty. This could include responsiveness to internal or external environments, involvement of organizational members, and planned or unplanned components of the change process.

The qualitative research methods employed in this study will allow enough flexibility and openness that the participants can relay the experiences and the meanings

they attach to them during interviews. Case studies of three exemplary schools of nursing will provide insider descriptions and interpretations of the meaning of experience by the participants relating to the inner workings of the change components, core change strategies, including interrelationships among the strategies, the role of sensemaking and the institutional culture.

Inquiry into successful strategies, critical decisions, improvements, and processes should reveal concepts relating to the forces and sources of change (Kezar, 2001). The emerging themes should provide insight into whether the institutions are, in fact, approaching the shift to healthcare informatics as a broad and deep change in values, cultures and structures indicative of transformational change.

Educational Significance of the Study

Providing leaders and faculty within higher education with empirical data can be beneficial in that they will be able to review the study for applicability to their own institutions. Again, Eckel and Kezar (2003, p. xi):

> When institutional leaders (both faculty and administrators) can take the reins of change, they and the institutions they serve are in much better positions to fulfill the important social roles colleges and universities must play in a future highly driven by information and knowledge.

IOM (2001) established an ambitious agenda to transform the educational system and to address serious safety problems within the American health care system. The causes of patient safety problems as cited by IOM (2000) include the inability of the health care graduates to translate knowledge into practice, to use new technology appropriately, and to make effective use of available resources. This study will focus on

capturing the activities of institutions of higher education during the initial years of their response to the IOM (2003) recommendations.

Lincoln and Guba (1985, p. 229) noted that "what is written by organizations is rarely closely related to what is actually implemented." My direct observations and interviews with participants within three schools of nursing are intended to capture independent accounst of what has been implemented and the organizational conditions and processes that contributed to it.

Kezar (2001) asserts there is only limited research examining the role of accreditation and/or professional associations in the change process. This study may expose some professional culture, values, and perceptions related to regulatory and/or governmental agencies mandating and pressuring for change.

Limitations and Delimitations

Locke, Spirduso, and Silverman (2000) define limitations as the 'limiting' conditions or restrictive weaknesses of the research conducted. By nature, qualitative findings are highly context and case dependent. Delimitations describe those populations to which generalizations may safely be made.

The three kinds of sampling limitations which typically arise in qualitative research designs are applicable to this study. The sites I have chosen are exemplary nursing schools as perceived by nursing informatics experts. Clearly delineating the purpose and limitations of the sample studied—and, therefore, being cautious about extrapolating or generalizing the findings —is paramount. Maintaining proper context in reporting both methods and results will avoid the many controversies that result from overgeneralization from purposeful samples (Patton, 2002).

The limitations of the data collected using the interviewing approach may involve any of the following: a) I may affect the situation during the interview in unknown ways; b) my observations focus only on external behaviors which I observe; and c) my observations focus on those limited activities actually observed and responses garnered during one-hour interviews. In addition, responses by faculty members are influenced by any number of factors, including personal biases, subject recall, self-serving motives, openness and honesty. The deans of schools of nursing or their designees will recommend the people to be interviewed. The participants may, therefore, be advocates who represent the administration position on the changes to informatics. My study relies on the participants being open and candid in their discussion of the events and issues.

I intend to connect the broader literature of transformational change, the Mobile Model, the larger lessons about change, and appropriateness of theoretical considerations to the data collected from three schools of nursing. Patton (2002) supports the generalization for case study findings of lessons learned from program improvement processes.

Researcher's Personal Biases

The knowledge of and bias regarding the topic can influence the interview and the analysis of the data collected. My professional experience includes serving as a hospital chief operating officer, chief nurse executive, and independent health care consultant, all roles in which I was involved in major change processes. Additionally, I have recent experience implementing healthcare informatics in hospitals. I do not have any prior experience in nursing education and I have no knowledge of or working relationships with the three institutions that are the sites for the study.

My own personal biases that could impact the study include the following: First, I support a combination of several change models to enhance understanding of the complexity of organizational change. The evolutionary, social cognition, cultural and political/dialectical change models, further described in Chapter 2, are my preference for consideration in any change strategy. I feel the Mobile Model for Transformational Change provides a practicable framework.

A second bias is that I anticipate the Schools of Nursing will be in the 'isolated change' or 'far-reaching' change quadrants versus at the transformational change of high depth and high pervasiveness (See Appendix B). Eckel and Kezar's (2003) research confirmed transformational change takes time to reach fruition. University of Kansas School of Nursing had addressed the core competencies of healthcare informatics six years prior to my on-site visit; and has, by measure of Eckel and Kezar's (2003) Mobile Model, achieved transformational change.

My third potential bias relates to the broad-based versus discipline-specific competencies. I believe the competencies cited in the IOM (2003) recommendations provide the core competencies that each health care professional should possess in order to enhance communication across the disciplines. In addition, discipline specific competencies are needed for each health care profession at various levels of knowledge and experience.

Organization of Remaining Chapters

Chapter Two includes the review of literature relating to the following: (a) Kezar's (2001) overall synthesis of current change theories in higher education; (b) brief overview of transformational change; (c) discussion of Eckel and Kezar (2003) Mobile

Model of Transformation Change for higher education; and (d) the nature and status healthcare informatics organized according to five cross-cutting strategies proposed by the participants in the 2002 Education Summit to transform the American educational system. Chapter Three includes a description of the qualitative method and design of the study.

Chapter Two

Review of the Related Literature

The purpose of this chapter is to provide a brief overview of (a) of Kezar's (2001) synthesis of current change models, (b) transformational change, (c) the Mobile Model for Transformational Change, and (d) the five cross-cutting strategies proposed by the 2002 Education Summit participants relating to healthcare informatics.

Synthesis of the Change Model Literature

Kezar (2001) conducted an extensive review of the change model literature across the multidisciplinary fields. Six models of change exist: a) teleological, b) life cycle, c) evolutionary, d) dialectical, e) social cognition, and f) cultural. A brief explanation of the teleological, life-cycle and evolutionary models of change will provide a more detailed explanation of the models in which the distinctive organizational features of higher education are best interpreted: cultural, social-cognition, and political/dialectical (Kezar, 2001).

Teleological Change Models

Although the teleological change models are the dominant models and the evolutionary models the second most common category in the change literature, the assumptions within these models are counter to the culture within higher education institutions. Teleological models make the assumption that organizations are purposeful and adaptive, and place the least amount of focus on individuals as active participants of

the change process. Teleological models emphasize the critical necessity of planned change in a rational and linear process (Kezar, 2001).

Evolutionary Change Models

The evolutionary models of change focus on the interaction between external forces and the organization (Kezar, 2001). The organization must respond to the demands of the external environment in order to survive (Cameron, 1991; Kezar, 2001). Accreditation agencies, foundations, and legislatures are some of the environmental forces or sources demanding change. The deterministic nature of the evolutionary models limits any human influence, strategic choice, and creativity in response to the environment (Kezar, 2001). According to Collins (1998), evolutionary models fail to provide needed assumptions about human psychology, organization of work, and the way organizations fit into society (Collins, 1998; Kezar, 2001).

Although the evolutionary model assumptions have mixed reviews in the change literature of higher education, they may provide useful insights (Kezar , 2001). Higher education often responds to the external environment by accepting additional responsibilities and functions, and change occurs by differentiation and accretion (Clark, 1983; Kezar, 2001). According to Gumport and Pusser (1999), the organization becomes more fragmented and less coordinated in an already structurally complex and differentiated system. Clark's (1983) analysis of change in higher education over the last few hundred years revealed tremendous amounts of change. The disorder of change within loosely coupled structures often hides the ongoing adaptive change processes within higher education.

Life-cycle Change Models

The major assumptions of these models include the utilization by leadership of pre-determined principles for each stage of organizational development to guide the individuals within the organization. Individual development, training and development, and learning and unlearning habits are some of the key priorities within these models (Kezar, 2001).

Cultural Change Models

The cultural change models assume that change occurs in response to alterations in the internal human environment (Morgan, 1986), including alteration of values, beliefs, myths, and rituals (Cohen & March, 1974; Schein, 1985; Kezar, 2001; Eckel & Eckel, 2003). The cultural models tend to place emphasis on the collective process of change and the significant role of each individual in the change process. Such change is long-term, slow, unpredictable, non-sequential, and seemingly unmanageable (Kezar, 2001). Some cultural models focus on the leaders' ability to shape both organizational and shared culture, while other cultural models focus on all organizational participants' interpretation of creating change (Martin, 1992; Kezar, 2001).

According to Kezar (2001) cultural models provide the following themes to consider in understanding change within higher education:

1. institutional history and traditions need to be understood and incorporated into the planning process
2. symbolism can create change
3. culture affects the change process
4. deep transformational change is uncommon

5. characteristics of the change process include irrationality and ambiguity
6. a frequent lack of interpretive power of the notion of a culture of change. (p. 105)

Social-Cognition Change Models

According to Collins (1998) and Kezar (2001), the social-cognition models follow the cultural theorists and incorporated human behavior. Both cultural and social-cognition models agree that change can be planned or unplanned, can be regressive or progressive, and can contain intended or non-intended outcomes and actions (Smirich, 1983; Kezar, 2001). Change as a result of cognitive dissonance pays greater attention to individual learning and individual sense-making, and alters individual beliefs and construction of reality. The social cognition models emphasize discussion and learning among the participants. According to Weick (1995), the opportunity for participants to discuss, debate, reframe, and make sense of the proposed changes allows for creative results.

Social-cognition models examine the *how* of change rather than merely identifying variables associated with the change process. It examines how leaders shape the change process through framing and interpretation, and how individuals interpret and make sense of change (Harris, 1996; Kezar, 2001). The criticism of social-cognition models is that they have a tendency to lose sight of the larger perspectives, the interconnectedness within the organization and the influence of the environment and external factors on change (Kezar, 2001).

Political/Dialectical Change Models

The political/dialectical models are the final category of change models. These models are deterministic in nature, assuming that inherent conflict will create change. The term dialectical is used interchangeably with political and refers to 'a pattern, value, ideal, or norm in an organization [which is] always…present with its polar opposite' (Schein, 2004, p. 40). Here, change is the result of conflict and clashing of belief systems, and is the natural part of human interactions.

Dominant coalitions manipulate their power to preserve status quo and maintain their privilege. As an elite group or ideology tries to maintain power and authority, tension builds and the two forces eventually clash, resulting in radical change. Inactivity is prevalent, with people flowing in and out of groups, and mobilizing when resources are constrained and changes are pending. Activities are not the focus; rather, it is bargaining, persuasion, and conflict. Environmental influences are not addressed and the change is not always progressive (Kezar, 2001).

Political or dialectical models appear to have strong explanatory power for understanding the way change occurs and in providing strategies for effectively facilitating change. Key findings include:

1. interest groups and power within higher education are important for creating change
2. engagement of persuasion and influence strategies are necessary
3. informal processes are significant to change
4. an assessment of the efficacy of persistence is important

5. the realization that politics can prevent change
6. change frequently requires mediation. (Kezar, 2001, p. 93)

Recommended Change Principles for Higher Education

Several principles emerged from Kezar's synthesis for change agents to consider regarding change within higher education. The understanding of the distinctive characteristics of higher education such as shared governance, as well as the loosely coupled environment of higher education should always be considered. Change must be realized as a human process, encouraging inclusiveness of organizational members. It must be understood that institutional cultures shape the reason change emerges and the way the process occurs, as well as shaping the change outcomes. It is necessary to analyze the existing political groups, political dynamics, and conflicts, as well as the motivations behind each political group and/or conflict. Informal political processes can be used in change processes. Hearn (1996) provides leaders with some applications of change research for use on campuses. In his article entitled *Transforming U. S. Higher Education*, he argues that four overall propositions can be made about change:

1. it is naïve not to recognize the politics within an institution
2. effective change strategies must be successfully integrated into the existing institutional culture
3. organizations must be in accord with their critical sources of funding, prestige, and personnel
4. disruption and accretion are both required in any change effort. (Kezar, 2001, p. 113)

Other Terms Commonly Used In Change Literature

Many higher education leaders think of change in terms of diffusion or institutionalization. Both are parts of particular change models, but are not distinctive change models in themselves. Diffusion and institutionalization have become popular because they respond to different challenges in the change process (Kezar, 2001). Reform is also defined below.

Diffusion. According to Kezar (2001), there is a difference between the terms diffusion and diffusion *models*. When people consider how to make others adopt a particular idea or trend in the environment, they are typically thinking about diffusion. Diffusion is an important change strategy, but is not a change model or an overall approach to change (Kezar, 2001, p. 13). Diffusion models tend to rely on innovation. These models are popular in the area of technology where innovations occur at a rapid pace, and adoption often happens at the individual level.

Institutionalization. Institutionalization is discussed as a process and as a change outcome, examining only a part of the process, and whether the change process alters the work of the individuals over time (Curry, 1992; Kezar, 2001). As a change process, institutionalization includes preparing the organization for the change (mobilization), introduction of the change, implementation of the change, and stabilization of the system in its new state (institutionalization) (Kezar, 2001).

Reform. Reform refers to "an innovation that is typically exerted from the top of a system or organization or from outside the organization" (Kezar, 2001, p. 14). Innovation refers to a 'tangible product, process, or procedure that is new, intentional, not routine,

that is aimed at producing benefits, and is public in its effects. There is less literature on reform in higher education due to its decentralized, autonomous structure' (Kezar, 2001, p. 14).

Summary of Change Model Literature

The Health Professions Education: A Bridge to Quality (IOM, 2003) goal is deep and pervasive change to affect institutional culture within health care professional higher education organizations. The existing professional cultures and the relatively slow evolutionary processes which govern higher education are inadequate to meet the acknowledged patient safety problems. The change literature lacks the broad, conceptual knowledge base necessary to create and sustain change within higher education. Higher education change literature does not fully address the processes needed for leaders within higher education to implement the IOM (2003) transformational change expectations.

Van de Ven and Poole (1995) and Kezar (2001) recommend a combination of several change models, each with key processes, to enhance the understanding of different aspects of organizational change within higher education. Kezar's (2001) synthesis of the change literature reveals six change models, each consisting of writers who believe in only one approach to facilitate change. The distinctive organizational features in which higher education is best interpreted rely more on the cultural, social-cognition, and political change models. The evolutionary change models provide insight into the role of the external environment. Reform of higher education begins with innovation exerted from outside the organization, in this situation, accreditation and licensure, to align incentives to provide a catalyst for both educational institutions and professional associations to transform the higher education of health care professionals.

Kezar (2001) discusses some terms commonly used in the change literature which are part of particular change models, but are not distinctive change models in themselves. I may encounter references to these terms in my research. For example, diffusion models are popular in area of technology where adoption often happens at the individual level. Another term, reform, is used in both my research review and Kezar's synthesis of the literature. Kezar posits there is less literature on reform in higher education due to the latter's decentralized and autonomous structure. Reform of higher education begins with innovation exerted from outside the organizations, in this situation, accreditation and licensure, to align incentives to provide a catalyst for both educational institutions and professional associations to transform higher education of health care professionals.

Transformational Change

Definition

Transformational change is defined by Eckel and Kezar (2003) as a particular type of change associated with intentional strategies to influence deep levels of organizational behavior over a period of time. They assert a lack of empirical data in studies described in the literature about transformational change in higher education. This literature predominately tends to be reflections of university leaders (e.g., Kerr & Gade, 1986; Birnbaum, 1988, 1992, 2000; Bolman & Deal, 1991; Tierney, 1991; Altbach, Gumport & Johnstone, 2001; Rhodes, 2001; Eckel & Kezar, 2003). The conceptual models, cultural, social-cognition, and political, are models for analyzing and understanding change. Research from cultural, social-cognition, and political models demonstrate that transformational change is unlikely at most institutions, incremental adjustment being more likely (Kezar, 2001).

Differentiating Transformational Change

Eckel and Kezar (2003) differentiate transformational change from adjustment, isolated change, and far-reaching change with two characteristics: pervasiveness and depth (See Appendix B). Pervasiveness refers to the extent to which a change crosses unit boundaries and affects a range of units and programs within an organization. Depth of change implies a shift in values and assumptions, with people thinking and acting differently.

Adjustment. Adjustment is located in the low depth and low pervasiveness quadrant of Eckel and Kezar's (2003) description of movement toward transformational change. Adjustments are the modifications or extensions to improve existing practices and current activities. This type of change does not lead to deep change and does not extend very far within the organization.

Isolated change. Isolated change is located in the high depth and low pervasiveness quadrant. The change is deep; however, it is limited to a single program or a particular area. The depth of the change results in a shift in values and assumptions in the ways of doing things: people think and do things differently. The change is limited in its impact on the organization (Eckel & Kezar, 2003).

Far-reaching change. Far-reaching change is located in the low depth and high pervasiveness quadrant. The change is extensive within the institution; however, it is limited in its depth and has little impact on values, beliefs, and practices (Eckel & Kezar, 2003).

Transformational change. Transformational change is located in the high depth and high pervasiveness quadrant. It is isolated change that is far-reaching, and which

affects the underlying assumptions. “These assumptions tell the institution what is important; what to do, why, and how; and what to produce” (Eckel & Kezar, 2003, p. 33).

Other Types of Change Common to Higher Education

Innovation implementation. Innovation implementation as described by Eckel and Kezar (2003) includes new, specific, tangible products, processes, services, or procedures that are intentionally introduced within an organization with expectation of positive and perhaps significant benefits. Innovation pushes the organization to respond beyond its current established processes. Leadership recognizes potential contributions of the new innovation within the organization, and adopts the specific, tangible product, process, service, or procedure.

Adaptation. Adaptation is described as a deliberate modification or adjustment by the organization or its units in response to the external environment. The modification or adjustment may be proactive, anticipatory, or reactionary; it can be intentional, or emergent and unplanned, and typically evolves over time. Adaptation is systemic; it is comprised of interdependent relationships with the external environment which can be at the individual unit level versus organizational-wide; and can allow subunits to adapt to change without widespread organizational disequilibrium. A loosely coupled system can, however, evince lack of coordination, difficulty responding to change in an unified manner, and communication that is inconsistent (Eckel & Kezar, 2003).

Strategic change. Strategic change is the process of making an organization distinct from its competitors. It may require that the organization undertake specific changes that will alter its position within its competitive external market (Eckel & Kezar, 2003). Eckel & Kezar also suggest that strategic change is about reshaping the patterns of

decisions and activities within an organization. Rajagopalan and Spreitzer (1996) describe the purpose of reshaping those patterns as having the intention of testing the external environment and the organization's place within that external environment.

Similarities. Transformational change shares some elements of innovation implementation, adaptation, and strategic change. Innovation implementation and transformational change can be responses to internal desires, pressures from the external environment, or a combination of both; and must be consistent with organizational needs. Adaptation is similar to transformational change in that both include ongoing processes rather than single events and responses to environmental changes. Strategic change and transformational change include change occurring in small steps that add up to large effects. Both require changes in decisions and activities that most likely occur over time and are responses to changing environments (Eckel & Kezar, 2003).

Dissimilarities. Transformational change is dissimilar to innovation implementation in that it focuses on greater breadth and depth of transformation; change is predominantly focused on a specific tangible product, service, or procedure, but may, however, include a variety of innovations. Transformational change is organizational-wide and intentional as compared to adaptation, the latter of which may be local or not necessarily organizational-wide, and may lack intentionality. Transformational change differs from strategic change in that it is intentional, cultural and deep, with a widespread impact. Strategic change may simply be extending current activities to new areas or markets; it may not be comprehensive and may not have the same degree of intentionality (Eckel & Kezar, 2003).

Mobile Model for Transformational Change

Formulation of Model

Eckel and Kezar (2003) formulated their Mobile Model for Transformational Change based on a study of 26 diverse colleges and universities participating in the American Council on Education (ACE) Project on Leadership and Institutional Transformation. The purposes of the ACE Project include assisting institutions to: 1) set and make progress on their own agendas for large-scale change; 2) develop reflective skills to understand their change processes; and 3) learn from project institutions so others may benefit. The project, originally funded for three and a half years by the W. K. Kellogg Foundation, was later extended for two additional years. All institutions were part of the follow-up; however, as an indicator of the difficulty in implementing transformation change in higher education, the book focused on the six institutions actually accomplishing major changes.

The six institutions selected included those institutions making the most progress toward transformational change. Each institution experienced a different type of change and employed different change strategies; however, all included significant change that was both deep (values and culture) and broad (included all or a large portion of the institutions' faculty and staff). The institutions provided important data for understanding which processes helped to effect transformation. Eckel and Kezar (2003) asserted the reason most institution-wide change failed was a breakdown in the processes addressing the 'how' of change. The distinction reflected the authors' belief that leaders do not spend enough time, energy and/or focus in addressing institutional norms, getting the

right people involved, or acknowledging individuals' feelings of value during the change processes (Eckel & Kezar, 2003).

Key Aspects of the Mobile Model

Key aspects of the model include the role of sense-making within organizations, core change strategies, interrelationships among core and supporting strategies, and the critical need to pay close attention to the institutional culture (See Appendix A). Eckel and Kezar (2003) created the metaphor of a mobile to illustrate the interconnectedness of the transformational components. A mobile moves in haphazard swirls, as does the constantly changing environment within institutions. It requires balance and is only functional as a unit. If one part is upset, the whole is impacted. Likewise, the change process consists of various interdependent strategies – independent, yet closely linked, either directly or indirectly.

The Role of Sensemaking

Transformational change creates an uncertainty that asks for a collective interpretation of three key questions: 1) "what is 'out there', what is 'in here', and 'who must we be' in order to deal with these questions"? (Weick, 1995, p. 70). People within an organization attempt to create a subjective reality by continually negotiating meaning and trying to reach a consistent understanding. During significant change periods, this process occurs more frequently. The need for a fresh understanding of the impact of the proposed change has on an individual becomes more important as he/she attempts to fathom the shifting terrain of his/her perceived world. Leaders at the transforming colleges and universities explored the meanings of proposed changes for faculty work

and pedagogies, creating a personal reality by continually negotiating meaning and reaching consistent new understanding within the shifting faculty work environment.

Eckel and Kezar (2003) found 'getting 'people to think differently' is the most important factor needed for transformational change. According to Schein (1992), cognitive redefinition must precede or accompany behavioral change. The institutions forged two types of new understandings. First, they attached new meanings to familiar concepts and ideas; and second, they developed new language and adopted new concepts to describe the changed institution. This process is known in organizational behavior literature as organizational sensemaking (Gioia & Chittipeddi, 1991; March, 1994; Weick, 1995). "Getting people to adopt new mind-sets is a cognitive and intellectual process spurred by a set of activities that can be intentionally designed to leave behind old ideas, assumptions, and mental models" (Eckel & Kezar, 2003, p. 73).

Five Core Change Strategies

The Mobile Model consists of five core change strategies: (a) senior administrative support, (b) collaborative leadership, (c) staff development, (d) flexible vision, and (e) visible action. These core strategies provide leadership guidance through the change process and a structure to conceptualize the transformation process. Initial steps of the change process include the following provisions:

1. to begin dialogue with challenging questions
2. to create collaborative processes
3. to develop strategies to understand campus culture
4. to clearly articulate the criteria and process of charting the change. (Eckel & Kezar, 2003)

Fifteen Supporting Strategies

The process of transformational change is complicated and multifaceted with numerous strategies occurring simultaneously. Eckel and Kezar (2003) identified the necessity of an additional 15 strategies which play a significant role in facilitating transformational change. These supporting strategies do not occur as frequently as the five core strategies; however, they play a critical role in effecting transformation. These 15 supporting strategies are described thusly:

1. Framing the local challenge in a broader context, extending the issues beyond the campus, raises the level of importance and makes the local challenges more legitimate and depersonalizes the issues.
2. Institutional leaders publicly communicated two types of expectations. The first set of expectations addresses the objectives to accomplish and the ways in which the campus would be different and better. The key constituencies must believe the proposed change will address something important. The second set of expectations addresses campus behavior and priorities. These behaviors and priorities are developed through extensive consultation and listening to change leaders, faculty, administrators and various campus subgroups. Once the expectations are articulated and agreed upon, then leaders establish frameworks to hold individuals accountable.
3. Develop extensive internal communication plans with a range of strategies to communicate.
4. Leaders must invite involvement and create intentional diverse

opportunities for involvement with the realization that ‘involvement’ means different things to different individuals.

5. Two components of involvement are critical to transformational change processes; participation and the opportunity to influence results. A process of acknowledging contributions is required.
6. Leaders fostered the creation of bringing people together in new ways to foster communication across the campus. The communication focus on instilling a sense of trust, clarification of potential misunderstandings and rumors and a sense of community.
7. Administrative processes are altered to support the changes, which reinforce the changes as a part of daily operations.
8. Moderate of the pace of change is a significant strategy. Too much change too quickly can overwhelm and exhaust members of the organization. Too little progress and the change processes may stall.
9. New structures are necessary to support the change processes.
10. Financial resources are provided with new sources of revenue and/or reallocation of existing funds.
11. A range of incentives are created to facilitate the change processes.
12. Leadership plan approaches to affecting change as a long-term endeavor while at the same time, employ strategies that capture and hold the organizational members’ collective attention.
13. Leaders facilitate the identification and creation of linkages among various activities on the campus. Communication of the multiple projects

occurring and the connections among them reassures organizational members they are a part of a community, not working in isolation, helping to push the change momentum. Building additional linkages with organizations and activities in the broader context within higher education facilitates the change processes.

14. Leaders constructively used events and activities outside the organization to promote change internally. These external contextual elements provide legitimacy, confirm beliefs and assumptions, and opportunities to reflect on local progress, local action plans, and often provide needed local resources.

15. External linkages provide opportunities to tap outsiders' perspective that help advance change at the local level. Opportunities to explore ideas and assumptions different from local prevailing assumptions helped with developing new ways of thinking, and surface unexplored assumptions and beliefs.

Institutional Culture

Institutions of higher education share a common academic culture as well as have their own culture which makes them behave in unique ways (Eckel & Kezar, 2003). Peterson and Spencer (1991) define culture as "the deeply embedded patterns of organizational behavior and the shared values, assumptions, beliefs, or ideologies that members have about their organization or its work" (p. 142). Eckel and Kezar (2003) use the following elements from a survey of the literature conducted by Kuh and Whitt (1988). Culture involves norms that shape conduct; agreed upon values espoused

throughout the organization; and the philosophy that guides the campus attitudes, understandings, priorities and actions regarding students, staff, faculty, and teaching, research and service (p. 130).

Eckel and Kezar's (2003) summary of the experiences of the institutions they studied suggest that culture plays a significant role as something that is changed as a result of transformation and is a key factor in the process of change. They propose that leaders need to understand the way their institution's culture shapes change processes or strategies.

> The culture is the modifying element rather than the subject of the modification. Leaders must learn to take their institutional culture, in addition to the type of change and the substance of their change agenda, into consideration. Leaders should take the existing culture into consideration and use the culture wisely to shape their change processes as they embark on transformational change. (Eckel & Kezar, 2003, p.131)

Types of Evidence

Two types of evidence, attitudinal and structural, were identified as intrinsic in transformational change.

Structural evidence. Eckel and Kezar (2003) identified seven structural change indicators of the Mobile Model for Transformational Change:

1. changes to the curriculum
2. changes in pedagogies
3. changes in student learning and assessment practices
4. changes in policies

5. changes in budgets
6. new departments and institutional structures
7. new decision-making structures

Structural evidence by itself did not necessarily suggest transformational change. There is a need for an additional set of evidence to identify the cultural impact of the transformation.

Attitudinal and cultural evidence. Eckel and Kezar (2003) identified a second type of evidence that indicates transformational change, namely attitudinal and cultural evidence. The additional indicators/markers are:

1. support of changes in the ways groups or individuals interact with one another
2. changes in the language the campus used to talk about the process
3. changes in the types of conversations by faculty
4. old arguments abandoned
5. new relationships with stakeholders that occurred.

Observations of Transformation Within Organizations

Transforming institutions discovered and reinforced new relationships consistent with stated values and recognized the need for key policies, structures and mind-sets to reinforce these interactions. Relationships included faculty, administrative staff and students interacting both inside and outside the classroom. A different self-image of the entire institution evolved over time until the new language and self-concepts became part of the institutional fabric. Conversations reflected new priorities and commitments. Leadership observed that faculty and staff viewed issues differently and with a fresh look,

signaling important shifts in the institutional norms, beliefs, and culture. New relationships with stakeholders led to new types of relationships with trustees, alumni and donors, community groups, local businesses, foundations, civic groups, and community agencies (Eckel & Kezar, 2003).

Mobile Model of Transformational Change (2003) Cited in Literature

A review of the literature identifies several citations of Eckel and Kezar's (2003) *Taking the Reins*, but contains limited reference to the Mobile Model for Transformational Change. The relevance of these studies does not appear to be strong, and the definition of transformational change seems to differ. This is not surprising, since of the 26 examples cited in Eckel and Kezar's study, only six were identified as making major changes over a period of five years. This may be one reason there are few research studies citing the model, since a mere three years have passed between the introduction of the Mobile Model and the writing of this paper.

Covington and Froyd (2004) address some of the principles of change, for example, asserting that faculty are the principal population maintaining the institutional culture; and the creation of a pervasive, transformational change in higher education, requires change among the faculty. Personal anecdotes related by the participants, along with meaningful dialogue, appear to be the most important catalysts for change.

Barnett, K. (2005) cited *Taking the Reins* in her doctoral dissertation, *Creating Meaning in Organizational Change: A Case in Higher Education.* Her study explores the creation and use of meaning among faculty during the implementation process of a new state master plan for admissions criteria framework.

Morris (2005) cites the five core strategies critical to transformational change. The 2003 Foundation of Excellence project agrees with Eckel and Kezar's description of transformation, *i.e*., it comes from leadership, collaboration and visible action. The Foundation of Excellence project chose 13 institutions for case studies capturing the details of activities, assessments and outcomes during students' first year of college. The details are included in the foundation's report, *Achieving and Sustaining Excellence in the First Year of College*. In 2003, over 200 institutions participated in defining standards of excellence and forms of evidence that validate the presence of the characteristics, resulting in a set of Foundational Dimension™ statements.

Mavrinac (2005) reinforces the concept that an organization experiencing transformational change can remain true to its values and roles as stated by Eckel and Kezar (2003). Mavrinac, a librarian, discusses peer mentoring, a learning process in harmony with values-based transformational leadership and change. Transformational change, the deep and lasting change, requires time and energy, intention, congruency, and interrelatedness across departments and employee groups.

Summary of Transformational Change Literature

Eckel and Kezar (2003) formulated the Mobile Model for Transformational Change taking into account the combination of several change models as suggested in Kezar's (2001) synthesis of the change literature. This model provides a template inclusive of the assumptions of the cultural, social-cognition, and political and evolutionary change models. I intend to use this template provided by Eckel and Kezar to observe the key aspects of the change process, that is, core change strategies, interrelationship among strategies, role of sense-making, and the critical need to pay

close attention to the institutional culture. They offer structural and attitudinal and cultural evidence that will assist me in capturing potential themes that may arise from my research.

Eckel and Kezar (2003) note a lack of empirical data about transformational change within higher education literature. They describe the three types of change leading to transformational change: incremental adjustment, isolated change and far-reaching change. Transformational change is differentiated based on two characteristics: pervasiveness and depth of the change and the influence of organizational behavior over a period of time. By this definition, only six institutions from a study of 26 diverse colleges and universities actually accomplished major changes. Kezar (2001) identifies research from the cultural, social-cognition, and political models which demonstrates that transformational change is unlikely at most institutions; instead, incremental adjustment is the more likely result.

Studies which cite the Mobile Model do not appear to demonstrate a particularly strong relevance to the model. I intend for my study of the transformational change processes at three schools of nursing to provide empirical data about the change processes involved during the initial years after the IOM (2003) published recommendations for incorporating the core competency of healthcare informatics.

Healthcare Informatics

Introduction

The five cross-cutting strategies recommended by the 2002 Education Summit members to transform the educational system serve as an outline for the following informatics core competency literature review. These strategies include:

1. establishment of common language and core competencies for informatics across all health care professions
2. integration of informatics core competencies into oversight processes
3. provision for motivation and support to leaders and the monitoring of reform efforts
4. development of evidence-based curricula and teaching approaches
5. development of faculty as informatics teaching and learning experts.

Strategy One: Common Language and Core Competencies

Definitions. A critical first step in aligning the incentives and providing a catalyst for higher education institutions is the creation of a common language with corresponding competencies for healthcare informatics across all health care professions. A common language allows all Health care professional graduates to understand, value and use informatics in all areas of health care for purposes of managing knowledge, making decisions, communicating to one another, and reducing potential medical errors (IOM, 2003). The following definitions are provided:

> All health professionals, regardless of their competencies, need to master… or better yet, … of their discipline: [to] employ… [to] search… [to] communicate… [to] understand… (IOM, 2003, p. 63). Core competencies are defined as specific skills sets, knowledge, or expertise shared across the health professions (IOM, 2003). Professional competencies are defined as the routine and careful use of communication, knowledge, technical skills, clinical reasoning, emotions, values,

and reflection in daily practices of the professional. (Hundert, Hafferty & Christakis, 1996; IOM, 2003).

Debate over broad-based versus discipline-specific language. According to Masys, Brennan, Ozbolt, Corn, and Shortliffe (2000); and IOM (2003), the debate regarding Healthcare informatics core competencies across all health professions, and the distinctions between broad-based and discipline-specific language and competencies, hinders widespread progress within medical education. Medical informatics includes the medical decision-making process of physicians (Hogarth, 1997). Nursing argues the application of technology in nursing decision-making is different from that in medicine. Nursing management of data, information, and the processing of the information is closely tied to specific nursing professional practices. As a consequence, informatics practice, education, competencies, and corresponding curriculum development for the health professions have proceeded slowly and lack consensus regarding essential building blocks (Staggers & Bagley-Thompson, 2002).

Professional competencies for nursing. Attempts at creating a list of competencies for nurses include:

1. Bryson (1991), skills needed for computer training in BSN programs
2. Staggers (1994), a list of skills and knowledge for nurses
3. Staggers, Gassert and Curran (2001), the first research-based master list of informatics competencies for nurses by level of practice
4. Curran (2003), an initial proposed list of informatics competencies essential for nurse practitioner education and practice, adding informatics

competencies related to evidence-based practice. The research reported after 2000 is discussed in depth below.

Staggers, Gassert, and Curran (2002) created the first research-based master list of informatics competencies for nurses by level of practice: beginning nurses, experienced nurses, informatics nurse specialists, and informatics innovators. They extracted categories of computer skills, informatics knowledge and informatics skills from a literature search, and then added unique competencies, for a total of 305 competencies. One of the co-authors later published an article (Curran, 2003) stating that advanced nurse practitioners need to have written professional competencies.

Summary of common language and core competencies. Healthcare informatics is the specific change mechanism I am studying to capture the transformational change processes. It is important in my research to clarify the definition of healthcare informatics and the corresponding competencies across the three schools of nursing. Staggers and Bagley-Thompson (2002) reinforce a common language and corresponding competencies as an essential building block. The processes to reach a consensus involves key aspects of the change process as described by Eckel and Kezar (2003), such as a focus on the existing medical and nursing cultures, values, basic assumptions, and getting faculty to think differently.

Health care professional oversight organizations are the key drivers to facilitate reaching a consensus across all health care professionals for common language and competencies. The benefits of a common language and competencies include reduction of potential medical errors. Each health care professional would use the same language and

similar core healthcare informatics skills; and would understand how to use informatics to manage knowledge, make decisions and communicate with one another.

Some health care professional groups disagree with the IOM (2003) recommendations for a common language and competencies across the disciplines. For example, nursing argues that the application of informatics for management of data processing of information is closely tied to specific nursing professional practices versus medical practice. A healthcare informatics definition and the general informatics competencies are identified in the IOM (2003) report. In general, these competencies include word processing, use of external online databases and the Internet, security protections, and ethical issues relating to informatics. The core competencies to be shared across the health care professionals include specific skills sets, knowledge, and shared expertise. Professional competencies are defined as the routine and careful use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in the professional's daily practices.

The IOM (2003) identifies the process of the health care professions agreeing on a common language and corresponding competencies as a basic foundation to begin transforming the health professions education. My knowledge of the IOM's (2003) recommended strategies are important for any potential references made by the participants during the interviews. For example, participant responses may reference broad-based versus discipline specific language and core competencies in the particular strategies being used, and why these strategies are being used.

It is unclear in the literature if broad based competencies are the same as core competencies, and if discipline-specific competencies are the same as professional

competencies. I suggest that perhaps there should be both broad based or core competencies as well as discipline-specific professional competencies. At least one research-based master list of nursing informatics professional competencies exists inclusive of four levels of nursing expertise.

Strategy Two: Integration of Core Competencies into Oversight Processes

Oversight processes defined. The 2002 Education Summit participants recommended consistency in approach and coordination across oversight agencies for both private and public sector organizations, stating this serves to enhance communication, integration and synergy within and across the varying oversight agencies. The three major oversight processes are licensure, certification, and accreditation (IOM, 2003). Licensure is the assessment of the graduates' understanding and mastering of their formal curricula at the time of their entry into practice. Licensing exams should include healthcare informatics competencies which assess graduates' understanding and mastering of the formal curricula, a critical measurement of whether higher education meets accreditation standards. Accreditation serves as a leverage point for the inclusion of particular educational content in a curriculum.

Nursing oversight agencies. The majority of states require state nursing licensing board approval in the application for accreditation by one of the two nursing accrediting bodies the National League for Nursing Accreditation Commission [NLNAC] (2006) and the Commission on Collegiate Nursing Education [CCNE] (2002). Informatics competencies are not required by either (IOM, 2003). Certification seeks to ensure the licensed practitioner continues to maintain competency throughout his/her career and ensures the testing is competency based.

State nursing licensing laws. Geographical licensure and scope-of-practice acts have an effect on the integration of informatics into practice and education (IOM, 2003). Licensure is implemented at the state level, with local board members permitting regulations to be tailored to meet local needs, resources and public expectations. As a result, variations occur across states not only in who is licensed, but also in the standards for licensure and practice. Nursing does not include informatics on its licensing exams in any state (IOM, 2003).

The National Council of State Boards of Nursing, Inc. (NCSBN) has representatives from the boards of nursing in all states. Its purpose is to provide an organization through which boards of nursing act and counsel together on matters of common interest and concerns affecting the public health, safety and welfare, including development of nursing licensing examinations. This council may serve a role in the promotion of uniformity in relationship to the regulation of nursing practice, dissemination of data regarding licensure of nurses, as well as a forum for information exchange across all states.

Regulating the scope of practice. The IOM (2003) report revealed none of the health professions' licensure exams include informatics. Phillips, Harper, Wakefield, Green, and Fryer (2002) indicate health care is an environment in which responsibilities are increasingly overlapping, leading to tremendous friction among the professions over practice control and compensation. As of June 2006, none of the licensing and accreditation bodies have demonstrated much progress. Inlander (2002) suggests a new look at regulating the scope of practice, which then might encourage focus on the direction in which professional education should proceed.

Summary for integration into oversight processes. Licensure assesses the graduates' understanding and mastery of the curricula at the time of their entry into practice. Since licensure is a critical measurement of whether higher education meets accreditation standards, the schools of nursing will be required to respond to the regulations established by the respective state licensing boards. As of June 2006, informatics is not required for licensure in any of the health care professions in any state. The IOM (2003) recommends strategies which include the use of accreditation as a leverage point for the inclusion of informatics in the curriculum.

Strategy Three: Motivation, Support for Leadership and Monitoring Progress

A council of national educational leaders in academic and practice settings and leading consumer advocacy organizations should be convened by the (IOM, 2003). The purpose of this council would be to develop a joint agenda to lobby for funding for the council, as well as for leadership development activities and partnerships between academic and practice leaderships. The purpose of the council would be trifold:

1) promotion of the overarching vision and need to reform health professions' education on a long-term and continual basis,
2) evaluation of progress toward meeting the vision, and
3) communication of the progress of reform efforts, inclusive of 2002 Educational Summit participants' commitments, and of case presentations to sponsors.

Supporting partnerships between academic and practice settings. The AHRQ (2005), the nation's lead research agency on health care quality, patient safety, efficiency and effectiveness, serves a critical oversight role in the adoption of health information

technology. Its initiatives include contracts with five states and grants to more than 100 communities, hospitals, providers and health care systems examining healthcare informatics. The overall goals of AHRQ (2005) included identification of the most successful approaches and barriers to implementation of the electronic health record; development of patient care processes that are patient-care centered, safer, and of higher quality; and establishment of a cost-benefit analysis of healthcare informatics.

AHRQ (2005) assembled the first annual joint conference for Patient Safety and Health Information Technology in June, 2005. Researchers, federal officials, health care providers, and corporate health care leadership examined accomplishments which created a high quality, safer health care system. AHRQ (2005) awarded $139 million to a number of "real-world laboratories." Overall goals include development of statewide and regional networks to promote access to health information technology and encouraging the adoption of information technology.

The University of Chicago (NORC) was awarded a multi-year contract by AHRQ (2005) to establish and operate the NRC. The NRC will work with providers to prepare and incorporate health information technology into the health care system by serving as a repository for the research findings of AHRQ (2005) projects. The NRC will provide technical assistance and consulting services to those individual projects, with a particular focus on addressing challenges facing rural and small community settings (AHRQ, 2005).

Support provided by professional organizations. Various organizations already in existence are providing resources for nursing and healthcare informatics activities.

1) The (American Medical Informatics Association [AMIA], 2004) is the organization representing the Unites States at the International Medical Informatics Association (IMIA) (http://www.imia.org/).

2) The IMIA was founded in 1989 as a nonpolitical international scientific organization (http://www.imia.org/).

3) The Health care Information Management Society (HIMSS), founded in 1962 as a not-for-profit organization is dedicated to promoting a better understanding of health care information and management systems (http://www.imia.org/).

4) The (Nursing Informatics Collaborative Task Force [NICTF], 2005) was created as part of the (AMIA, 2004) and HIMSS (http://www.allianceni.org/doc/min_20040726.pdf#search='NICTF').

5) The Alliance for Nursing Informatics (ANI) is a committee created in February 2004 under the umbrella of (AMIA, 2004) and HIMSS. ANI represents more than 3,000 nurses and 20 distinct nursing informatics groups in the United States which function separately at local, regional, national and international levels (Thede, 2003).

Summary for motivation, support for leadership and monitoring progress. AHRQ (2005) is the national lead research agency on health care quality, patient safety, efficiency and effectiveness, and oversees the adoption of health information technology. A critical component of the agencies' role is to support partnerships between academic and practice settings. Recent activities include the award of a multi-year contract to University of Chicago to provide technical assistance and consulting services to

individual projects, and the award of $130 million for the development of statewide and regional networks to promote access to health information technology.

Members of the leadership and faculty at each school of nursing may be involved in various national and/or state professional organizations relating to healthcare informatics. Participants may identify strategies used; and those strategies may include activities and/or consulting services funded directly or indirectly by AHRQ (2005).

Strategy Four: Develop Evidence-based Curricula and Teaching Approaches

Overview. In the past it was assumed that health professionals would be able to diagnose and treat ailments and evaluate new tests and procedures with training received through academic preparation and their ongoing practice experience. This assumption is no longer valid. Human memory is becoming increasingly overloaded and unable to keep pace with an ever-expanding knowledge base. Prominent quality expert David Eddy, quoted in the IOM (2003) report, stated "The complexity of modern medicine exceeds the inherent limitations of the unaided human mind" (Millenson, 1998, p.75).

According to Staggers, Gassert and Skiba (2000), attendees at the AMIA 1999 spring conference validated these concerns. Students are now expected to transcend rote learning, to formulate meaningful questions using information technology to answer them, to perform critical thinking about information and technology, and to develop skills to filter and manage vital information. The linkages will provide the student with an emphasis on the way information and clinical care are intertwined. The groups suggested that informatics education be designed in the context of real-world applications and behaviors.

The Tri-Council for Nursing (2000), an alliance comprised of the American Association of Colleges of Nursing [AACN] (2000), American Nurses Association (ANA), American Organization of Nurse Executives (AONE), and the National League for Nursing (NLN), responded to the IOM's (2003) recommendations. The response included the following statements:

> Technology has dramatically altered practice, teaching, and learning environments in nursing, as well as the way in which nurses, educators, and students communicate. While easier to access, information is often harder to control because of the speed at which it is generated and communicated. Indeed, access to comprehensive and up-to-date databases has increased both the speed of clinical decision-making and the responsibility of providers to ensure that such quick decisions are equally demonstratively sound. Moreover, advances in technology have resulted in shortened hospital stays as less-invasive techniques are developed; and the portability of high technology has helped shift the focus of complex care for the acutely ill to sub-acute care centers, skilled nursing facilities, homes, and rehabilitation centers outside the hospital (AACN, 2000, ¶1).
>
> Across all health professions, demand has accelerated for creative thinking, pattern recognition and problem resolution. At the same time, burgeoning technological advances and increased access to information require health professionals who are *knowledge workers*, that is, who are able to manage information and high technology on the one hand, and complicated clinical judgments on the other (AACN, 2000, ¶ 2).

Some reformers advocate curriculum design from a systems perspective, merging meaning, context, and connectedness among all concepts and components (Saba, 2001). Participants in the 2002 Educational Summit reinforced the currently available research to employ evidence-based practice in the reform efforts to revise curriculum and teaching methods. They recommended a best-practice review of universities integrating the five competencies into their curricula, to understand what the universities are doing and how or why it is a best practice.

Defining evidence-based curricula. The IOM (2003) report defines competency-based education but does not define evidence-based curriculum *per se*. Competency-based education is defined as

> educational programs designed to ensure that students achieve pre-specified levels of competency in a given field or training activity, with a focus on making the learning outcomes for courses explicit, and on evaluating how well students have mastered these outcomes or competencies. (IOM, 2003, p. 24)

Carraccio, Wolfsthal, Englander, Ferentz and Martin (2002) and IOM (2003) suggest that these types of approaches have lead to improvement on licensing exams. There is, however, scant evidence supporting this claim.

The undergraduate curriculum. Gaff, Ratcliff and Associates (1997) defined undergraduate curriculum as the formal academic experience of a student's pursuit of baccalaureate and lower degrees, formalized into courses or programs of study comprised of the purpose, design, conduct and evaluation processes of the intended experiences of undergraduate education. The undergraduate curriculum consists of general or liberal

studies, major specialization, minor specialization, and electives (Levine, 1978; Toombs, Fairweather, Amey, & Chen, 1989; Gaff, Ratcliff & Associates, 1997).

Professional education is defined as "a system of formal education that prepares novices for highly skilled occupations through a combination of theory and practice, and that culminates with an award of certification, licensure, or other formal credentials (Gaff, Ratcliff, & Associates, 1997, p. 342). Professional education emphasizes theory and the use of knowledge. Students need to "learn the unique critical thinking skills of their future profession, the social context and values of that profession and how as future professionals they may best communicate with clients, patients and colleagues" (p. 353). Major and minor specializations are prescribed by the department or program, *i.e*. the health care professions of nursing, medicine, pharmacy, and so forth, but often in compliance with state licensing agencies or professional boards. Electives prescribed by the department major or minor may leave limited courses for the student to select. The curriculum is heavily influenced by disciplinary values, educational philosophy, student population, and the social and institutional context. Faculty, working in interdisciplinary committees, must reconcile the conflicting forces, the diverse needs of student learning, expectations of society and employers, policy makers' requirements, and the academic disciplines and applied fields of study in formulating, renewing or transforming the undergraduate curriculum. According to Gaff, Ratcliff and Associates (1997) "academic folklore tells us that it is harder to change the curriculum than it is to move a cemetery" (p. 6).

The IOM (2003) report identified a hidden curriculum and faculty reward system as roadblocks to reform. The training environment for students impacts the values and

attitudes of future health professionals. The hidden curriculum is the observed behaviors, interactions, and overall norms of culture that often contradict what is taught in the classroom (Hafferty & Franks, 1998; Ferrill, Norton, & Blalock, 1999; Maudsley, 2001; IOM, 2003). The faculty reward system presents a major barrier in many academic settings, with its heavy emphasis on research and often, little reward for teaching (IOM, 2003).

Common barriers to informatics curriculum development. Barriers specific for integration of informatics into the health professions curriculum include:

1. lack of clear understanding of the informatics discipline
2. lack of clarity of healthcare informatics in reference to its application to patient care or the information technology to delivery education
3. limited support for informatics education
4. lack of time and dollars to develop faculty informatics skills
5. lack of access to informatics experts. (IOM, 2003)

Existing models for nursing informatics curriculum. The Nursing Informatics Working Group of AMIA convened an educational think tank in 2004. There is no single model for a nursing informatics curriculum, only major variations across programs. Master's degree programs averaged 40 credits, with a range from seven to 27 credits plus six to nine credits for clinical practicum. Half the programs had only one or two faculty appointments associated with an informatics specialty, something which is likely true for many other nursing sub-specialties as well.

The Nursing Informatics Working Group of AMIA (now ANI) recommended a nursing informatics curriculum prototype, to include continued preparation of nursing

informatics faculty, alliances to secure funding for graduate faculty preparation, encouragement for graduate credentialing, and inclusion of nursing informatics content across all education levels. The domain of nursing informatics requires differentiation from other disciplines such as business, management information and IT-focused programs. Nursing Informatics Working Group (2004) suggested ANI should collaborate with the Education Working Group to develop a core curriculum across all disciplines, with a list of generic/core program outcomes.

Collaborative partnerships. The IHI Health Professions Collaborative includes leaders of 16 schools of medicine, nursing and pharmacy that have been implementing school-wide quality curricula. Future arrangements with other health profession schools and partnerships with national organizations such as the Accreditation Council for Graduate Medical Education (ACGME) and the Association of American Medical Colleges (AAMC) are planned. New approaches to the health professional's education include vertically integrated undergraduate curricula, inter-professional learning, redesigned residency programs, development of exemplary clinical settings where optimal patient care and education take place in a seamless fashion, practice-based learning and improvement throughout the entirety of one's professional career, and the creation of an academic base to facilitate these goals (IOM, 2003). The projects in the participating institutions FY05 include:

1. interprofessional learning
2. vertically-integrated improvement curricula
3. exemplary learning sites
4. faculty development

5. student initiated quality improvement

6. organizational infrastructure.

The IHI Professional Collaborative, in which nursing is a member, includes Vanderbilt University and the Universities of Connecticut, Miami, Missouri, Minnesota, Oregon and UT Memphis (as of February, 2006).

Evidence-based teaching approaches for informatics. Due to the lack of performance measures within higher education, at this time, teaching approaches relating to informatics are currently directed mostly at the oversight organization level. The IOM (2003) report strongly encourages a competency-based approach for all core competencies. Although evidence of the efficacy of various educational approaches is slim, there is limited evidence which points to improvements on licensing exams (Caraccio, Wolfsthal, Englander, Ferentz, Martin, 2002, IOM, 2003).

Pedagogy refers to the methods of teaching and interaction by an instructor (Gaff, Ratcliff & Associates, 1997). Teaching approaches such as active learning, problem-based learning, service learning, and lifelong learning were recommended by the 2002 Educational Summit participants. According to Armstrong and Barron (2002), a competency-based curriculum stimulates pedagogical approaches of active learning and problem-based learning that encourage greater faculty-student interaction. Student learning groups are used to provide systematic feedback to faculty. Problem-based learning engenders more self-directed learning and does a better job of providing students with a process for integrating what has already been learned (Rideout, et al., 2002; Juul-Dam, Brunner, Katzenellenbogen, Silverstein, & Christakis, 2001; Krackov & Mennin, 1998; IOM, 2003). Service learning is another education approach which allows students

to apply academic knowledge in a designated practice environment within a relevant community service program or agency. This approach exposes students to cultural diversity and assists in developing and fostering inductive reasoning (Hales, 1997; Callister & Hobbins-Garbett, 2000; Schamess, Wallis, David, & Eiche, 2000; Davidson, 2002; IOM, 2003).

Example of education efforts. Bakken et al. (2004) describes an informatics-based approach to nursing education for the promotion of patient safety at the Columbia University of Nursing. This university designed PDA software to document clinical interventions and to retrieve patient safety information at the point of care. This facilitates clinical documentation and analysis and provides instant access to patient safety resources. The electronic student clinical log, with its related database and knowledge base, documents students' clinical encounters using standardized nursing terminology. Faculty members review the reports to determine whether appropriate experiences are occurring and to provide feedback to the students. The selected group of faculty uses a three-pronged approach to enhance competencies: (a) small workshops and seminars, (b) consultation on appropriate assignments for selected competencies, and (c) guest lectures and co-teaching by informatics faculty members.

Summary for evidence-based curricula and teaching approaches. The old assumption that health professionals would be able to provide ongoing safe quality patient care with the training received through academic preparation, practice experience and continuing education is no longer valid. With the introduction of computerized clinical systems, different cognitive skill sets are required to filter massive data, manage critical information, formulate meaningful questions quickly, utilize information

technology to answer them, and, at the same time, meet the needs of patients and their families.

The undergraduate curriculum consists of general or liberal studies, major specializations, minor specialization, and electives. Many interests must be considered in formulating, renewing or transforming the undergraduate curriculum. Academic folklore provides a clear description of the complexity of this process; it is harder to change the curriculum than it is to move a cemetery. The review of the literature describes recommendations by some of the interest groups. For example: 1) The Tri-Council for Nursing (2000) states the need for *knowledge workers*; 2) Saba (2001) states some reformers advocate for a curriculum design from a systems perspective; 3) IOM (2003) uses two terms, competency-based education and evidence-based curriculum, to describe their recommendations; and 4) Bakken et al. (2004) describe an informatics-based approach. The document reviews and participant interviews may reveal a specific term used in the curriculum, and its corresponding definition as accepted by each school of nursing.

Progress for healthcare informatics curriculum to date includes research into the current status of health informatics curriculum within nursing schools, perceived barriers to change, recommended curriculum constructs, steps toward creating a nursing informatics curriculum model(s), and collaborative partnerships. Several initiatives are occurring to transform the curriculum, and others are being created daily. One example is the IHI Health Professions Collaborative, which includes leaders of 16 schools of medicine, nursing and pharmacy that have been implementing school-wide quality curricula.

Pedagogy, methods of teaching, and interaction between student and professor are impacted by the curriculum models used. The various pedagogical approaches cited in the IOM (2003) literature include active learning, problem-based learning, service learning, and lifelong learning to address competency-based education and/or the evidence-based curriculum.

Perceived barriers for employing healthcare informatics in nursing schools include lack of funds to purchase the computers and necessary software upgrades for students and faculty, funding for staff who are healthcare informatics experts, faculty training, faculty time to develop and revise the curriculum, and excessive emphasis on research with little reward for teaching. The barriers specific to integration of informatics into the health professions curriculum include: lack of clear understanding of the informatics discipline, limited support for informatics education, lack of access to informatics experts, lack of time to develop faculty informatics skills, and the lack of clarity of healthcare informatics regarding its application to patient care versus to delivery education.

Strategy Five: Developing Faculty as Teaching/Learning Experts

Current status of faculty informatics competencies. McNeil et al. (2003) **r**ate nursing faculty teaching information literacy skills at the novice or advanced beginner level in teaching information technology content and in using information technology tools. An online survey in July 2001 used a relatively small sample size of 132 participants to assess the perceptions of information technology competencies among nursing faculty, practicing nurses, and baccalaureate-and master's-prepared students.

Information literacy skills and computer literacy skills taught by the faculty were not tied to clinical practice.

Carty and Rosenfield (1998) surveyed program administrators in selected accredited diploma, associate, baccalaureate, and master's nursing programs using a stratified random sample of National League of Nursing accredited nursing schools. The purpose of the study was to determine the status of computer and information technology in nursing education. The response rate was 55%, or 190 responses from the 347 schools selected. All nursing programs were proportionately represented. The survey revealed that fewer than 13 percent had written plans and specific goals for teaching computer technology. The cost, lack of faculty time and technical support, and the need for faculty development were identified as key issues to be addressed. The group identifies three resources crucial for faculty: (a) faculty development, (b) faculty commitment to use technology and to acknowledge that it is perceived as a resource, and (c) faculty incentives (travel, merit increases, time) for to learn informatics skills. Mentoring is the primary method to guide informatics learning (Staggers, Gassert, Skiba, 2000, p. 558).

A collaborative model. Connors, Weaver, Warren, and Miller (2002) describe a jointly funded partnership between the University of Kansas School of Nursing and the chairman/founder of the Cerner Corporation. The pilot program is designed so nursing students can use Cerner's full clinical data repository, clinician order entry, documentation, clinical decision support tools as well as PowerChart, the application tool for patient charting and order entry. The project, called Simulated E-health Delivery System (SEEDS), is designed for patient care delivery with a clinical information system imbedded into the basic curriculum. A problem based learning strategy is employed as

outlined by Chickering and Ehrmann (1996), using virtual patient case studies. The university employs a full-time, experienced clinical informatician as the project manager who trains faculty and staff. Thirty-four out of 120 basic undergraduate students participated in the pilot group, which began in summer and fall 2001. Evaluations available at the time of publication included the online survey instrument, a 15-item Likert-type scale of selected items from the Flashlight Program Current Student Inventory, and two open-ended questions. Five major areas of learning were selected: critical thinking, student-student interaction, rich rapid feedback, time on task and real-world application. Nineteen of the 34 students responded to the online survey, a 54% response rate. Students reported having a greater sense of collaboration with peers and faculty, enjoyed the opportunity to receive rapid feedback on their work, and found the assignments interesting. The students perceived this process as a learning experience helping them understand the nursing process, clinical documentation and preparation for the real world. Faculty reported difficulty in becoming accustomed to new technology, having to adjust teaching techniques in order to allow for more data-driven case presentations, and the need to rework case studies and teaching strategies (Connors et al., 2002).

McNeil et al. (2003) recommend analysis and replication across the U.S. of successful collaborative models such as the SEEDS project. The gap created by insufficient expertise with informatics tools in daily practice of faculty will transfer to students.

Incentives to encourage faculty expertise. Shaping the Future for Health, Academic Health Center (AHC): Leading change in the 21st century (July, 2003) outlines

the critical role of Academic Health Centers in the higher education reform process. Academic health centers (AHC) play an important part, since they train health professionals, conduct research that advances health and provide care to ill and poor populations. Financial support from Congress is required to support innovation in the education of health professionals, reforming methods, approaches, and settings used in clinical education.

Summary for faculty development. Carty and Rosenfield (1998) survey revealed that fewer than 13 percent of the surveyed accredited diploma, associate, baccalaureate, and master's nursing programs had written plans and specific goals for teaching computer technology. McNeil et al. (2003) **r**ate nursing faculty teaching information literacy skills at the novice or advanced beginner level in teaching information technology content and in using information technology tools.

The analysis and replication of successful collaborative models such as the SEEDS project are highly recommended. The schools of nursing selected for my research may be a part of academic health centers and/or collaborative models. One collaborative model described in the literature includes one school of nursing selected for this study. The SEEDS project at the University Of Kansas School Of Nursing is a problem-based learning strategy using virtual patient case studies.

Summary of Review of Related Literature

Leaders engaged in clinical education of health care professionals are expected to transform clinical training, to shift faculty values and assumptions, and to encourage thinking and acting in new ways and across departmental boundaries. *Health Professions Education: A Bridge to Quality* (2003) describes some of the long-standing issues to be

considered, such as differing professional and personal perspectives and values; role competition; turf issues; lack of a common language; variations in professional socialization processes; differing accreditation and licensure regulatory bodies; different payment systems; and existing hierarchies that emphasize individual responsibility for decision making. These changes involve infrastructure, cultural and attitudinal changes as described by Eckel and Kezar's (2003) Mobile Model for Transformational Change.

My research questions focus on how each selected school of nursing is implementing widespread transformational change, their particular strategies, and why these strategies are being used to address the core competency of healthcare informatics. Eckel and Kezar's (2003) model provides five core change strategies and 15 supporting strategies. The interrelationship among these strategies covers the significant roles of sense-making in the institutional culture, as well as other cultural, structural, attitudinal indicators of progress. The qualitative research methods selected allow me to be flexible and open, so the participants can relay their experiences and the meanings they attach to strategies of significance during their institution's change processes, which may or may not be the same as those described by Eckel and Kezar.

Healthcare informatics is the specific change mechanism I am studying to capture the transformational change processes. Healthcare informatics is a new core competency and is not required for licensure by any state boards in any of the health care professions. The IOM (2001, 2003) reports identify healthcare informatics as the most significant tool that can be used to improve patient safety. Some of the reasons cited, which are related to shift in values and assumptions and acting across department boundaries, include, for

example, enhancing communication among the health care teams and increasing effective coordination of patient care.

The five cross-cutting strategies recommended by the IOM (2003) report serve as the framework for my literature review of the core competency of healthcare informatics. Some themes noted in the literature review may be brought up by participants during my interviews. Knowledge of these issues will assist me to ask probing questions during my interviews.

For example, the debate between broad-based versus discipline specific language, as described in the literature, involves deeply embedded professional values, protection of specific interests, turf issues, and differing accreditation and licensure regulatory bodies between medicine and nursing. Any of my interview questions may elicit a participant response that directly or indirectly identifies broad-based versus discipline specific language and corresponding competencies as a specific strategy (critical decision, improvement, and/or process). Some indirect responses may include for example, faculty are thinking differently about healthcare informatics, there is an increase in collaborative committee structures; new decision-making structures, and/or reallocation of existing funds. As I probe further as to why these strategies have been employed, the participants may reveal differing language and competencies between medicine and nursing are at the core of these strategies.

I intend for my study to provide practical data about the change processes involved during the initial years after the IOM's (2003) published recommendation of the core competency of healthcare informatics. Once the Mobile Model of Transformational Leadership is applied to the three cases studied, I will be in a position to discuss how well

the model works as a framework for analyzing transformational change and whether it maintains its value beyond the six cases studied by Eckel and Kezar.

Chapter Three

Methods

The research questions focused on how each school of nursing is implementing widespread transformational change, what are their particular strategies, and why the strategies were being used to address the core competency of healthcare informatics. The direct observations and interviews of the participants within three schools of nursing captured an independent account of forces and sources of change. Being on site allowed me to capture insider interpretations of change activities and to see things that may routinely escape awareness of the people in the setting (Patton, 2002). The final research question asked: "Are these institutions approaching the shift to healthcare informatics as a broad and deep change in values, culture, and structures that would characterize a transformational change?"

Methods for Research Questions

The case study method allowed insider descriptions and interpretations regarding the ways in which the three schools are addressing healthcare informatics. Additional insight was obtained by identifying the core change strategies employed by college leadership and faculty. This included opportunities to discuss responsiveness to internal or external environments, involvement of organizational members, and planned or unplanned components of the change process.

Qualitative research methods allowed enough flexibility and openness that the participants relayed the experiences and the meanings they attached to the inner workings of the change components. The participants presented core change strategies, including the interrelationships among the strategies, the role of sense making, and the importance of institutional culture. The emerging themes provided insight into whether the institutions are, in fact, approaching the shift to healthcare informatics as the broad and deep change in values, cultures, and structures indicative of transformational change.

This study meets Yin's (1994) criteria for case study as one form of qualitative research. These criteria include the 'how' and 'why' questions being asked, as well as the limited control I, as the researcher, have over the plans and actions of Schools of Nursing as they address implementing Healthcare informatics. Case studies are used in organizational and management studies to focus on a contemporary, a real-life phenomenon, which, in the context of this research, examines how leaders and faculty members within three exemplary schools of nursing are implementing healthcare informatics.

Selection of Case Studies

Ronda G. Hughes, PhD, MHS, RN, Senior Health Scientist Administrator for the (AHRQ, 2005) provided me with names of four nursing informatics experts: Melinda Jenkins and Dr. Sue Bakken (Columbia University), Nancy Staggers (University of Utah), and Pat Brennan (University of Wisconsin). These nursing informatics experts recommended seven experts (listed in Appendix C). I contacted these experts and asked them to identify Nursing colleges doing exemplary work in implementing informatics. The schools most often mentioned were: University of Iowa; University of Kansas; St.

Scholastica; and Case Western Reserve. Case Western Reserve did not respond to repeated efforts to contact them. University of Iowa did not meet the inclusion criteria. During my on-site visits, the University of Maryland and Large State University were mentioned as potential sites to study. I contacted the Dean of University of Maryland who supported my doctoral dissertation research; and Dr. Judy Ozbolt, the Program Director for Nursing Informatics, to discuss the specifics of my research. We determined that the University of Maryland did not meet the inclusion criteria for my study. I subsequently contacted the Dean of Large State University. The College of Nursing at Large State University met the inclusion criteria for this study.

Characteristics of Case Study Sites

All three schools of nursing are accredited by the Commission on Collegiate Nursing Education and their respective state boards of nursing.

The University of Kansas is a major public research and teaching facility with an overall 2005-06 student enrollment of 29,272. The baccalaureate nursing program enrolls some 300 students. The website notes that the school is the first to incorporate healthcare informatics into its curriculum. It is ranked 21st in the nation among public nursing schools funded by the National Institutes of Health (http://www2.kumc.edu/son/centennial.htm).

St. Scholastica is a private college with an overall 2005-06 student enrollment of 3,249. The baccalaureate nursing program enrolls up to 112 students each fall semester. The main campus is located in Duluth, Minnesota (http://www.css.edu/About_St_Scholastica.html).)

Large State University is a large coeducational public research university. There are many different schools and colleges, including all the allied health professions and medical schools. It has more than a hundred nursing faculty members. In 2007, the college of nursing graduated more than 200 students (LSU reference 8).

Gaining Access to the Study Sites

I contacted the deans of nursing at each of the three schools of nursing by formal letter. The deans of nursing at University of Kansas, St. Scholastica, and Large State University gave me approval to conduct my research.

Assuring Protection and Addressing Ethical Issues

I followed the University of South Florida Institutional Review Board (IRB) policies and procedures. Confidentiality as a protection was extended to everyone in the study. The interviewees participated voluntarily and were informed of the nature of the study. The participants were not exposed to risks that are greater than those they routinely face at work. I maintained my certification for *Human Participant Protections Education For Research Teams* (2007) through the U. S. Department of Health and Human Services National Institutes of Health and Collaborative Institutional Training Initiative (2008-2009). A copy of the USF IRB approval letter (Appendix D) and approved consent form is attached (Appendix E). Large State University college leaders' requested institutional anonymity. All citations have been coded to protect the identification of the college. The Deans of Nursing at University of Kansas and St. Scholastica Schools of Nursing provided an approval letter for their schools to be identified (Appendix G). The Cerner Corporation provided an approval letter to be identified in this research (Appendix H). The electronic health record company used by Large State University was not identified.

Participant Selection

According to Patton (2002), the purpose of interviewing is to allow a researcher to enter into the study participant's perspective to "collect their stories and discover what is in and on someone else's mind" (p. 341). Participants in this study were nursing college leaders and faculty members who have the appropriate experience, are knowledgeable, and were able to explain what they know. The deans of nursing and/or their designees provided me with a list of the individuals meeting these criteria. As I communicated with various leaders and faculty members about who was involved and contributed to the implementation processes, certain names were repeated. According to Patton (2002), when this occurs, the repeated reference takes on special importance. The people who were mentioned the most often were included to my list of people from whom to request an interview.

By agreeing to participate in the research study, the deans of nursing consented to share documents related to the implementation of informatics and allowed me to arrange and conduct one site visit at my expense, including approximately one hour interview meetings with selected faculty and staff. After I obtained IRB approval, I contacted each participant by e-mail and provided them the purpose of the study, an overview of process, assurance that the participants' privacy and identities will be honored, and the approximate length of the interview (60 minutes). The dates/times of my on-site visit were listed, requesting each participant to select their interview time. Some background/demographic information was requested, such as, validation of name and title of the participant; role and position; length of time in current position; and formal or informal training in healthcare informatics.

Data Collection and Storage

Document review. Documents were requested prior to the on-site visit, and were requested during the interview and/or after the on-site visit as circumstances dictated. Such items included curriculum change proposals, evaluation reports on the curriculum and informatics, accreditation self-study documents, and minutes of meetings. According to Patton (2002), these kinds of documents provide information about many things that cannot be observed, for example, activities prior to my on-site visit, private interchanges, and goals or decisions that might not be known to the participant. Importantly, program documents can provide a behind the scenes look at the processes and how these processes came into being.

Interviews. Patton (2002) identifies three basic approaches to collecting qualitative data: the informal, conversational interview; the general interview guide approach; and the standardized open-ended interview. I used a semi-structured interview approach, a combination of the latter two. I am aware of the importance of being comfortable with ambiguity and uncertainty in a process that is also semi structured (Lincoln & Guba, 1985; Patton, 2002; Yin, 1994; Rubin & Rubin, 2005; Bogdan & Biklen, 2003). I do have a genuine and abiding interest in the perspectives of the leaders and faculty members of these schools of nursing.

According to Patton (2002), control of data collection is facilitated by (a) knowing what it is you want to ascertain, (b) asking focused questions to get answers relevant to the purpose of the research, (c) listening attentively to assess the quality and relevance of responses, and (d) providing appropriate verbal and nonverbal feedback to the participant. Clarification questions were asked during the interview. Participants

were informed of the possibility of a telephone interview for follow-up clarification questions. The interviews were scheduled for approximately 60 minutes; and I let participants know whether the purpose of the interview was being fulfilled, reinforcing high quality and relevant responses through feedback. If additional time was necessary to complete a well-informed interview, I scheduled another time to conclude the meeting.

Design of Interview Questions

Interview questions were thematically and dynamically focused, keeping in mind the later analysis, verification, and reporting of the interviews. Thematically, the questions related to the purpose of the research; and dynamically, they promoted a positive interaction, to keep the flow of conversation going and motivate the participant to talk about experiences and feelings related to the research topic (Yin, 1994; Kvale, 1996; Patton, 2002).

Opening questions. The first series of questions asked at the beginning of the interview initiated the process with topics participants were comfortable in answering. These include background questions regarding their position and time at the school of nursing; their participation on any committee relating to the core competency of informatics; and any formal or informal training in healthcare informatics they may have received.

Initial questions regarding healthcare informatics. The next set of questions turned the focus on healthcare informatics in the participants' own experience. Issues included clarification of the common language used by the school to define informatics and the corresponding core competencies.

First and second research questions. Asking how each school of nursing is implementing informatics served as a lead question for the second research question. I anticipated that getting participants to identify particular strategies (critical decisions, improvements, and/or processes) used to implement healthcare informatics would require open ended questions.

Third research question. This is related to why any specific critical decisions, strategies, improvements, and/or processes were selected to address the core competency of healthcare informatics. Asking the participant to share at least one example of a critical decision, strategy, improvement, and/or process highlighted some of the cultural progress markers identified by Eckel and Kezar (2003). Examples included attitudinal markers such as changes in the ways groups or individuals acted or interacted with one another, changes in language used to talk about the change processes, changes in types of conversations among the faculty, and new relationships with stakeholders.

If any of the top issues related to healthcare informatics were introduced by a participant, additional probing questions were asked. Such issues included broad-based versus discipline-specific common language and core competencies; scope of practice issues in the professional disciplines; rewards for research, preparation for, and/or teaching of informatics; budgetary support for informatics; and/or any new decision-making structures to increase collaborative efforts.

Fourth research question. The final research question focused on whether these institutions were approaching the shift to healthcare informatics as a broad and deep change in values, culture, and structures that would characterize a transformational change. Responses to the previous three research questions provided sufficient

information for me to respond to this question, so I addressed this question myself, without specific input or responses from the participants.

Closing question. It is important in formal interviews to allow participants time to provide additional information on their own. According to Patton (2002), some of the richest data occurs in this phase of interviewing. Examples offered by Patton (2002) include: “That covers the things I wanted to ask. Anything you care to add?” and “What should I have asked you that I didn’t ask?” (p. 379).

Interview Guide Approach

Use of an interview guide is advocated by Yin (1994), Kvale (1996), and Patton (2002). The semi-structured interview process allows the flexibility and openness needed so the participant can introduce and emphasize the experiences and the meanings they attach to the inner workings of the change process. The interview guide served as a critical tool to ensure that I maintained sufficient structure and remained focused on gathering the answers the participants consider most important, and still remained relevant to my study. It also allowed me to concentrate on hearing, seeing, experiencing, and thinking about the critical observations during the interview; and reminded me of the key markers to be captured, i.e., setting, people, actions, and conversations. According to Kvale (1996), the recognition and application of the knowledge gained from the interpersonal experience is what matters in a research interview. The interview guide also provided consistent questions for my collection of reflective data about the interpersonal experience following the interview.

Tape recording of interviews. Tape recording of the interviews is beneficial in data collection. I took field notes during the interview, adding my own reflective

comments immediately following the interview. If participants objected to the taping of the interview, my field notes were necessarily more comprehensive. The taped interviews and field notes were transcribed. I captured multiple perspectives using tape recordings, field notes, reflective notes and documents. I organized participant responses into a separate case record for each school of nursing.

Field notes. Bogdan and Bilken (2003) defined field notes as "the written account of what the researcher hears, sees, experiences and thinks in the course of collecting and reflecting on the data in a qualitative study" (p. 111). Field notes served to supplement the taped recordings by allowing me to document the participants' facial expressions and verbal and non-verbal communication during the interview, linking these behaviors to the question being asked and what the participants are discussing. The field notes were added to the transcripts to document the facts and the intent of the data gathered. I also wrote a brief summary after the interview to relive the events and conversations, and to revise, clarify, or capture my thoughts and perceptions; and included this as an introduction to each transcription. The taped interviews were transcribed using steps recommended by Bogdan and Bilken (2003).

Protection of the participants' identities, responses and observations are critical in every step of any research process. An organized, confidential tracking system protected the identity of the participant. Each participant's specific data, field notes, taped recordings and transcribed documents were collected. Copies of the collected data were stored in a secure location to which only I have access.

Data Analysis

Computer-Assisted Qualitative Data Management and Analysis

HyperResearch™ is the qualitative software package I chose to store, code, and retrieve the data. This software enhanced the processes of grouping coded themes, grouping data into categories, and comparing passages in the transcripts from field notes and typed interviews.

Logical Analysis

I conducted an inductive analysis to discover patterns, themes, and categories in my data. According to Patton (2002), findings would emerge through my interaction with the data. Inductive analysis began with an inventory and definition of key phrases, terms, and practices unique to the participants in the study. Once some inductive dimensions (patterns, themes, categories) were identified, a cross-classified matrix was produced. This involved creating potential categories by crossing one dimension with another, working back and forth between the data and one's logical constructions, completing the matrix, and searching for meaningful patterns. I was careful to avoid manipulating the data by forcing it into categories to make the matrix work.

Content Analysis

Development of a classification or coding scheme is the critical first step of data analysis. I identified, labeled, and categorized the raw data, applying codes to specific pieces of text. The core content of interviews and observations was analyzed for significant research meaning. I referred to these core meanings as patterns, themes, pattern analysis, or theme analysis. Pattern is usually a descriptive finding, while theme connotes a more categorical or topical form (Patton, 2002).

Convergence

Convergence is determining which things fit together (Patton, 2002). Recurring regularities in the data were examined and sorted into categories based on internal homogeneity, or the extent to which the data in a certain category holds together in a meaningful way; and external heterogeneity, the extent to which differences among categories are bold and clear. When a large number of unassigned or overlapping data occurred, I worked back and forth between the data and the classification system to verify meaningfulness and accuracy of the categories. When different possible classification systems emerged, I established priorities to determine which were more important and illuminative. The establishment of priorities was accomplished, according to Patton (2002, p.466), "according to utility, salience, credibility, uniqueness, heuristic value, and the feasibility of the classification schemes."

Test for Completeness

The set of categories were tested for completeness. Patton's (2002, p. 466) four steps served as a guide to test for completeness.

1. Each set of categories was viewed for internal and external plausibility. When viewed internally, the individual categories should appear to be consistent; viewed externally; they should be seen as comprising a complete picture.
2. Each set of categories was reasonably inclusive of the data and information collected.
3. The data was reviewed to ensure it was appropriately categorized.
4. The set of categories were credible to the individuals interviewed.

Divergence

Patton (2002) recommended 'fleshing out' the categories by building on information already known; making connections among different items, and proposing new information that ought to fit and verifying its existence. Divergence includes careful and thoughtful examination of data that does not seem to fit into the dominant identified patterns.

Determining Substantive Significance

I addressed the following questions in making an argument for substantive significance:

1. How solid, coherent, and consistent was the evidence in support of the findings?
2. To what extent and in what ways did the findings increase and deepen my understanding of the topic?
3. To what extent were the findings consistent with other knowledge?
4. To what extent were the findings useful for some intended purpose, such as contributing to transformational change processes? (Patton, 2002)

Creative and critical judgment about what is significant and meaningful in the data is required. I relied on my own intelligence, experience, and judgment; I took seriously the responses of those who studied or who participated in the inquiry; and also considered potential responses and reactions of those who will read and review the results. Interviewing with open-ended questions in a familiar environment provided comfortable conditions for the participants, allowing the interviews to unfold naturally. Although the research design was pre-established, components of the design were

redirected to capture the dynamic real world environment that impacted or influenced processes, programs, or interventions over the time period of the study (Lincoln & Guba, 1985; Patton, 2002; Yin, 1994; Rubin & Rubin, 2005; Bogdan & Biklen, 2003).

Trustworthiness and Transferability of Study Data and Findings

Limitations, delimitations, and my personal biases were addressed in Chapter 1. There I discussed steps taken to demonstrate trustworthiness of data collection and subsequent analysis of the data. According to Firestone (1987), trustworthiness is about convincing the reader that procedures have been faithfully followed and providing the reader with a depiction in sufficient detail to demonstrate that conclusions make sense. The data collection and analysis methods were designed to be consistent and appropriate with my research questions.

Patton (2002) listed four components of trustworthiness: dependability, authenticity, reflexivity, and triangulation. These elements were demonstrated in my research as follows:

Dependability relates to systematic data collection procedures (Lincoln & Guba, 1986). My taped interview recordings documented the detailed responses to the questions asked of each participant. The recordings also captured participants' answers to any clarifying questions during the interview, ensuring that descriptions and context were accurate and complete. In as far as was possible, I clarified any statements that could imply multiple interpretations, and/or any contradictory statements made during the interview process. Member checking also occurred after the interview when additional clarification questions were necessary. Each participant was given an opportunity to

review and offer comments regarding the written analysis of the summary for the case site.

Authenticity, as described by Lincoln and Guba (1986), is being “balanced, fair and conscientious in taking into account multiple perspectives, multiple interests, and multiple realities” (Patton, 2002, p. 575). I adopted a neutral stance, committed to understanding the change processes through stories shared, was open to multiple perspectives as they emerged, and was conscientious in reporting both positive and unfavorable information with regard to any conclusions reached as suggested by Patton (2002).

Reflexivity involves recognizing that how one acts during data collection may affect the data collected (Patton, 2002). I wrote reflective notes immediately after the interview and included them with the field notes. They captured possible effects my actions may have had on the data collected, and also my reflexive consciousness of my own perspective, thus encompassing my appreciation for the perspectives of others during the interview.

My research journal described my own thoughts during the data collection and analysis, indicating how I was thinking about the topic and how my analytic ideas were growing and merging. In this way I documented how I reached my conclusions and was ready to review my thought processes.

Triangulation, capturing and respecting multiple perspectives (Patton, 2002), provided diverse ways for me to look at the implementation of healthcare informatics, and offered greater illumination of various aspects of the change processes. Triangulation of data sources included comparing and cross-checking the observations with the

interviews, comparing field notes with the other data collected, and using assembled research documents and other written evidence to augment the interviews. This process added credibility by strengthening confidence in the conclusions that are drawn as suggested by Patton (2002).

The transferability of the research findings depends on the trustworthiness of data collection, as well as on the explanation of lessons learned and their potential application to those who will read the research findings at some future date. Those readers will have to make their own determinations as to the extent to which the findings apply to their own circumstances (Merriam, 1998). Tying my data collection from specific sites to the broader literature of transformational change and to the mobile model enabled me to demonstrate larger lessons regarding change and the applicability of the theoretical considerations beyond the few cases studied here. This demonstrated that my findings could be applied to other instances of transformational change in other institutions of higher education.

Chapter Four

Research Findings

Findings at University of Kansas School of Nursing

Introduction

The University of Kansas is a comprehensive educational and research institution. It enrolls 30,644 students and employs nearly 2400 faculty members, including 79 nursing faculty. The School of Nursing is one of the 14 schools of the university. Programs are offered through the doctoral level. In 2007, the School of Nursing graduated 195 students: 145 at the undergraduate level, 43 at the graduate level, and seven at the doctoral level (http://www2.kumc.edu/aa/ir/reports/students/degreesAY06_07.html).

During my research into the transformation to informatics, I interviewed 11 individuals at the KU School of Nursing. Eight were PhD prepared; one was a PhD candidate; one was masters' prepared; and the remaining individual was a staff member. Their longevity at the college ranged from one to 40 years; the majority had over six years. Only four of the 11 participants stated they had received formal training in informatics; the rest received informal training. To preserve confidentiality, all leadership participants will be referred to as administrators in this chapter, and faculty members will be referred to as just that.

In describing the complexity of the transformation process, Eckel and Kezar (2003) employ a metaphor, a mobile with various hanging parts to illustrate change

processes. Their mobile model captures various interdependent strategies which, although they may be somewhat independent, are influencing one another either directly or indirectly. In this paper, I have organized participants' independent accounts regarding the strategies used by the University of Kansas School of Nursing as they addressed the core competencies of healthcare informatics.

First, I provide an overview of what is occurring in the undergraduate nursing curriculum, classroom, and laboratory settings. Second, I present participants' perceptions of change processes regarding 'what' specific methods were used, and why these particular key strategies (critical decisions, improvements, and/or processes) were selected. Third, I will present how I believe University of Kansas School of Nursing has approached its shift to healthcare informatics as the broad and deep change in values, culture and structures that characterize a transformational change.

Research Question One: How is Healthcare Informatics Core Competency Addressed?

University of Kansas School of Nursing used the electronic health record developed by Cerner Corporation for sale and use in medical facilities, and specifically created an electronic record for educational purposes. University of Kansas School of Nursing reported major revisions to the nursing forms used by hospitals in the creation of the educational version of the electronic health record. They noted the electronic health record was somewhat lacking in the areas of terminology and definition of terms, forms to follow the nursing process, and evidence-based information links behind the icons. As a result, forms were re-designed to provide students with more clinical information than the electronic health record. In addition, these forms were organized to assist students in

forming a cognitive structure in which to learn and understand the information in the electronic health record.

Established patient case scenarios, previously used by undergraduate nursing faculty members, were loaded into the electronic health record. These case scenarios were enhanced to include more data and to follow a variety of teaching and/or learning activities throughout the undergraduate curriculum. Faculty members use the scenarios with all undergraduate nursing students – in the classroom, in clinical group seminars, and in a simulated virtual health care delivery laboratory.

In the classroom, the electronic health record is available for students to document and analyze clinical data in case studies. Faculty members are able to project the electronic health record with all student documentation onto a screen, allowing them to point out trends and discrepancies. They are thus able to offer immediate student feedback, facilitate classroom discussion, and assign data-driven teaching cases for online presentation and instruction. Since the electronic health record is accessible to both faculty and students through the internet at all times, students can submit patient care plans and other clinical course assignments on these electronic forms for faculty members to review on-line.

Each undergraduate nursing program is required to provide a number of clinical practice hours, hours in which direct clinical care is provided to individuals, families, and populations, for students in clinical fieldwork settings. These include acute hospital settings, clinics, health departments, and other medical-surgical environments. These guided experiences by faculty in selected settings are designed to help students develop clinical nursing competencies.

Nursing schools traditionally have used procedurally-based clinical simulation labs with mannequins to practice clinical skills before students encounter live patients. University of Kansas School of Nursing has integrated the electronic health record into the simulation lab. Nursing students can use the electronic health record to document the procedures, and can access the web for evidence based practice standards and answers to questions.

During my on-site visit in April 2007, University of Kansas School of Nursing faculty and staff tested the electronic health record with SimMan®, the institution's computerized human simulator. Such patient simulators are another technology linked with the capabilities of the electronic health record, along with internet access to reports of evidence based practices. Students are introduced to the clinical information system (CIS) through a virtual health care delivery environment such as an acute care hospital. They are given patient scenarios that are pre-programmed into the computerized simulator.

Key strategies (critical decisions, improvements, and/or processes) used by deans of nursing are the focus of the following section.

Research Questions Two and Three: What Strategies Were Used, and Why They Were Selected?

Culture of innovation An administrator indicated that many innovations at the university often starts in the school of nursing, and then migrates into the medical school and allied health curricula. Several faculty members commented on the innovative reputation of the school of nursing:

> The world of healthcare is really one of the most exciting places to be right now. Our school is wonderfully receptive for a school in the Midwest. I think we are definitely ahead of the curve and I am pleased to be here. Most of [what we are doing] has never been done before, so you get to be on the cutting edge.

Another faculty member added: "The dean…has created a culture of innovation.…The School of Nursing adopts the newest technology first to figure it out, work[s] the bugs out and get[s] it to working before it goes anywhere else on campus." A faculty member described how the college leadership team entices faculty to be open to innovation.

> Our leadership team understands our culture, sets expectations and then provides us the necessary support to accomplish those expectations. The School of Nursing here has always been identified as being on the cutting edge. This school has been known for pushing things. In the last few years it's been about pushing technology.

Between 1993 and 1998, the university received five grants of $800,000 to $1 million each. With these grants University of Kansas School of Nursing had been the first school to offer nurse practitioner classes on compressed video, and this proficiency in long distance education was transformed over time into a state-of-the-art, web based program. During the initial stage of the program's web-based education development, several faculty members were invited to create their own asynchronous, web-based courses, each paired with an individual specializing in educational technology. This led to the creation of an educational technology department on the medical center campus. Remaining faculty members were able to master this technology themselves, rather than delegating it to a technology person. An administrator spoke about the initial doubt:

> There was a lot of skepticism among the faculty that this was not good, it wasn't educationally sound and so forth; but once we started creating the asynchronous methodology, it became apparent that this was very attractive to the students. It allowed us to have a pretty far reaching outreach effort and increase our graduate student numbers. Faculty figured out pretty quickly that the quality could be there, and our students did very well on their certification exams. I would say now that we have a hundred faculty members and almost every single person has taught on-line.

Academic-business partnership. In 1999 University of Kansas School of Nursing began its journey to address the healthcare informatics core competency when a school of nursing administrator and the CEO of Cerner Corporation, both involved in the IOM's (2003) Health Professions Educational Summits, committed to exploring academic solutions together. Cerner, founded in 1979, is a leading U.S. supplier of healthcare information technology solutions that optimize clinical and financial outcomes (www.cerner.com/academic). The School of Nursing was selected to take the lead on this front because of its reputation for innovation and proven track record of success. Two years later, their collaboration resulted in the creation of an academic-business partnership involving the colleges of nursing, allied health professions, and medicine.

The university affiliated with Cerner to create an environment in which people from both academia and business could help in putting an educational product together. An administrator explained the relationship:

> Cerner provided a person, the technology and tech support; the school provided the intellectual capital (a nurse informatics expert), as well as faculty time. Cerner

> owns the platform and runs and supports the hardware and software through their remote hosting center. We (the School of Nursing and Allied Health and the Medical School) have the equipment and the software on campus. The system is live, which means we have the same electronic health record in our School of Nursing that is used in the clinical environment, in the clinical laboratory, and other places. This live production environment provides us the latest software updates and latest releases to faculty and students.

In January 2000, several events were happening simultaneously: First, the IOM report on medical errors was released. Discussions between the college administration and Cerner representative commenced, and Cerner Corporation hired a vice president of nursing. At the same time, the school of nursing was preparing to move into a new building and wanted the building to be wired for technology. An administrator takes up the story:

> We invited their new VP of Nursing to tour our new building and to discuss our innovative activities in education at the time. We began to brainstorm about educating students from the very start in terms of healthcare informatics. The first legal agreement was … in place … nine months following the initial discussions. Our first agreement with Cerner was to negotiate for the electronic health record system used in acute care settings. Our undergraduate nursing curriculum was closely aligned to the in-patient hospital acute care setting, which the electronic health record format was developed to follow. An outpatient physician office-based electronic health record system was also available. We decided to launch the electronic health record system [first] within the undergraduate nursing

curriculum, with plans to extend to other health profession schools on the academic health campus. In order to extend the electronic health record within the School of Medicine, we would need to negotiate for the 'PowerChart Office® software, which is the name of the physician office-based electronic health record system.

Another administrator continued:

> Doctors are their [Cerner Corporation's] 'bread and butter' for their office product, so they wanted to figure out a way to reach out to medical students. We wanted to involve medicine, the vendor wanted to extend to the school of medicine, and the school of medicine wanted it. The strategies include the launching of the project with the nursing curriculum and then expansion of the partnership to include other health professional specialty schools on the academic health center campus. We have 10 allied health professions on this campus. Cerner wanted exposure to future health providers who might some day choose their product.

Attention to academic culture. The school of nursing's culture of innovation - specifically their early mastering of web-based education - enabled the school to respond quickly when the IOM (2003) called for the integration of clinical informatics into nursing curricula. The leadership team made a conscious and purposeful selection of the person to lead the integration of healthcare informatics core competencies into the nursing curriculum. A faculty member noted overall acceptance of the final choice:

> No one questioned the selection of our new Director of the Center of Informatics. She has solid academic credentials as a well-known nursing informatics expert,

> [an] academic published researcher. Medicine [also] thought the selection was very appropriate.

In addition, the leadership team gave considerable thought to the characteristics needed in the lead project person, who would also serve as a connecting link between the college and the business partner, Cerner Corporation. College administrators recognized the importance of integrating Cerner Corporation's unfamiliar business-centered culture and the university's established academic culture into the change process. The lead project person needed to have a high energy level and the ability to handle the unexpected without undue stress. Interpersonal and communication skills were essential, as there would have to be considerable consultation with faculty and in communication of academic concepts to Cerner staff. An administrator remarked on this cultural issue:

> The academic-business partnership brings together two very different cultures that needed to be bridged to recognize equity and assure success. [The lead] had to be an RN with informatics competencies, eligible for a faculty position, and have knowledge and expertise in how clinical information systems work in the real world.

The lead faculty member played a significant role in education and training of faculty members who had limited knowledge of healthcare informatics. This individual worked closely with the leadership team to establish realistic expectations for an 'educationally designed' electronic health record with both the Cerner Corporation staff and faculty members. As part of this process, the leadership team provided on-going administrative oversight and support. A critical component of support included addressing faculty resistance. A faculty member described faculty resistance:

> After the introduction of the nursing informatics process, some faculty members chose to leave the school of nursing. Some of those who remained were still highly skeptical, and others seemed to ignore the process. Leadership employed different training methodologies, invoked constant awareness of the newness of the technology, and found new ways to phase it in.

Another faculty member explained how the leadership team responded to faculty resistance:

> Leadership's acknowledgment of the resistance validated concerns and provided an opportunity to reiterate that change [is] a vital component of the curriculum and must be accepted. Acknowledging resistance …and addressing ways of dealing with faculty negativity and resistance was incorporated into the training.

The role of sensemaking. According to Eckel and Kezar (2003), "getting people to adopt new mind-sets is a cognitive and intellectual process spurred by a set of activities that can be intentionally designed to leave behind old ideas, assumptions, and mental models" (p. 73). In the organizational behavior literature, this process is known as organizational sensemaking (Gioia & Chittipeddi, 1991; March, 1994; Weick, 1995).

My observations lead me to conclude that University of Kansas School of Nursing leadership team employed sensemaking in their change strategies. The project leader served in a significant role as an informatics mentor. In addition, the leadership team facilitated the exploration of possible meanings of proposed changes for faculty work and pedagogies.

The following strategies employed at University of Kansas School of Nursing provide additional examples of their commitment to academic culture and/or sensemaking.

Academic template created prior to involving faculty. The electronic health record software provided by Cerner required the faculty informatics expert and the business employees to work together to build a basic template that included academic terminology, forms and evidence based links. An administrator described the initial development of the system:

> At the beginning, the electronic health record was pretty rudimentary. Cerner's employees had prior experience creating systems used in practice, not in academia. They needed help to understand the educational process. Our nursing informatics expert and a representative from Cerner created system terminology and definition of terms; forms to follow the nursing process; and evidence based information links behind the icons. The learning activities [were] structured to follow the novice to expert pathways; [the forms were] kept simple, easy to follow, and grouped by learning concepts.

Electronic health record designed as a teaching platform. Administration clearly articulated that the technology was to be viewed as a tool, a teaching platform transparent to the pedagogy, rather than the driver of the established curriculum. They wanted the system to follow the educational work flow and the competencies of the curriculum. An administrator explained that a formal curriculum revision was not considered:

> We had previously revised the curriculum in 1996 to include an outpatient focus, because at the time, patient care was moving to an outpatient arena. We wanted

> the electronic health record to be up and running quickly, and felt there was no real need to change the curriculum to make that happen. We have always said technology should be transparent to the pedagogy. I'm not sure faculty would like to have seen the technology being the driver of the curriculum.

Students were not taught the specific functions of the Cerner system. Instead, they were taught how to use the electronic health record as a tool. A faculty member described the decision:

> From the very beginning, we decided not to teach the software to the students… We show them where to look and what to click on to go to the assessments; show them where to go to identify problems; and we link this up with the nursing process, which is what we're trying to teach them to do. They learn conceptually where to go to look for things. …We have 'cherry picked' those functions that support the educational domain, [and] defined an educational work flow instead of a clinical work flow. They come immediately into a seminar where they're learning how to assess a patient and beginning to identify problems. The hospitals in town who are clients of Cerner are ecstatic we are using the same company. That makes me a little nervous because they are thinking we are teaching them all the bells and whistles of the system. We are not. We have adapted it to what the students really need.

Existing case scenarios computerized. Existing patient cases were uploaded into electronic health record. The project manager used established educational work flow processes and worked with faculty members to integrate the case scenarios into their courses, Faculty members then developed case scenarios and created choices around

them. Through assignments using these patient case scenarios, students were taught conceptually where to look for patient data in the electronic health record.

A faculty member remembered discussions as these cases were uploaded into the electronic health record:

> Cases had [initially] been kept simple because faculty [wanted] to keep from overloading students with massive amounts of data; [however, faculty] observed that the simple case studies they had been using did not translate well to the electronic system, [and] students requested additional data.

Another administrator described faculty responses to these situations:

> Faculty found that second- and third-week students were seeking more data. This caused faculty some initial frustration. Cases that had been used for years without problems were now being viewed as inadequate. The new concerns were addressed in various ways. For example, one faculty member decided she would be the patient and provide the data directly to students; another had one student be the patient and provide the needed data to the other; and a third returned to her office to amend the case study.

Participants did not refer to any specific learning strategy they employed; however, in a published chapter by one of University of Kansas School of Nursing's administrators in the book, *Nursing and Informatics for the 21st Century: An International Look at Trends, Cases and the Future (2006),* she uses the phrase "problem based learning using virtual patient case studies" to describe their learning strategy employing virtual patient case studies.

Pilot program began Fall, 2001. An administrator explained the initial plan was to launch the electronic health record in the undergraduate nursing program. She reported the following:

> The initial implementation of the electronic health record as a teaching platform was… in three first semester clinical groups of about 10 students each. Thus, only one-third of the total class was part of the pilot study; the remaining two-thirds provided a control group for comparison. Using fewer students initially meant any implementation difficulties would affect a smaller population. The foundation course was chosen to introduce the electronic record concept from the beginning of the students' training to eliminate any pre-conceived ideas on record keeping.

The original plan was to conduct a two-year pilot program beginning with the Fall 2001, junior students. During the first year, faculty-student focus groups assessed the progress, and that plan was soon changed. At the end of the 10-month pilot, the students recommended immediate extension of the program to all students. Faculty worked together to address the needed changes.

In general, faculty reported that students seemed to appreciate that the electronic system allowed them to see an entire picture of the nursing process. Faculty observed that students demonstrated an increased ability to handle and utilize more data, decision making tools, and evidence based practice standards in support of the nursing care process. Critical thinking skills were enhanced, and students showed a more comprehensive understanding of the overall nursing process. This was especially true in students with English as a second language, where feedback from these students was consistently positive. According to an administrator:

> At faculty meetings, we would discuss the changes and encourage faculty members to share their observations of student responses. Analysis of student behaviors was pointed out to faculty, such as the connection of critical thinking skills and particular student observations. We collected lots of data, [including] student observations, audio taped focused student groups, and surveys… sent out to students. This data was triangulated. We conducted a power analysis and discovered that if we had twice the sample size, we would have gotten significant findings. Since we do not enroll enough students, we needed to conduct a multi-site site study and replicate the study.

The remaining faculty worked steadily, though perhaps with differing degrees of comfort, to acquire the computer skills for the new program. Then, along with faculty from the pilot, they evaluated the process and moved to make the needed changes. One faculty member recalled the response to a suggestion:

> Initially, [not all] faculty members [had desktop] access to the electronic health record. We [felt] that faculty needed access in their own office in order to become comfortable with using the electronic health record. The suggestion was adopted.

During the evaluation of the pilot project, several faculty members pointed to a significant factor in the pilot's success: "The ability for a faculty member to have quick response from an information technology resource person reduced faculty's stress levels and negativity when faced with computer problems."

Once the initial learning process had been successfully implemented in the classroom and in clinical settings, faculty began requesting more functionality. The flow sheet, a form which captures critical patient data and student decisions, was one of the

most useful aspects, enabling faculty to observe how all students were working with the same patient. At a glance, each student's documentation of the same patient was evident, so data errors and documentation errors could be immediately corrected.

While the faculty project manager and staff continued one-on-one interaction with faculty and responded immediately to ideas and suggestions, the system was so successful they soon found that priorities needed to be established for making changes and additions. Some requests could be incorporated while others proved unrealistic; however, all suggestions were given consideration. Since students needed to have a variety of responses available, the cooperation of several faculty members was required to provide the necessary data. In addition, the complexity of course content required faculty members to assist the project manager by providing the necessary clinical data to make the suggested changes. Although all suggestions were given consideration, only some requests could be incorporated; others proved to be unrealistic. An administrator noted: "There was some initial confusion regarding automation of course content, "Faculty… did not understand when you automate content [the system requires] …detailed and precise content."

Electronic health record combined with patient simulator. The school of nursing combined three key components to create a virtual health care world for all health care students: prior success in the use of videos, the financial investment in computerized patient simulators, and the electronic health record. A faculty member described the process:

> We created videos as a challenge exam and used [this] to evaluate how well the students performed. Now [that] we are using patient simulations with the

> electronic health record …we are seeing positive results. The clinical scenarios are pre-established with different protocols; the students work in pairs, and two faculty members watch from behind a window to evaluate and provide immediate feedback.

A faculty member explained some of the ways in which the new system is beneficial for students:

> This process provides every student some continuity. It offers a better way to evaluate the effectiveness of the clinical instruction. As faculty member[s], we can assess the students' needs at any time, identify some learning needs… It also helps to determine what worked. Our students are better prepared when they interact face-to-face with patients on the clinical unit.

Common language and core competencies. The literature review identified a significant academic cultural issue relating to a common language and core healthcare informatics competencies across all health professions. According to Masys et al. 2000; and IOM (2003), the debate regarding healthcare informatics core competencies across all health professions hinders widespread progress within health professions education; and the distinctions between broad-based and discipline-specific language and competencies add to the problem. Medical informatics includes the medical decision-making process of physicians (Hogarth, 1997). Nursing argues the application of technology in nursing decision-making is different from that in medicine. Nursing management of data, information, and the processing of the information is closely tied to specific nursing professional practices. As a consequence, informatics practice, education, competencies, and corresponding curriculum development for the health

professions have proceeded slowly, and lack consensus regarding essential building blocks (Staggers & Bagley-Thompson, 2002). Participants at University of Kansas School of Nursing made no mention of any formal or informal processes used to reach a consensus of a common language for healthcare informatics.

A description of how University of Kansas School of Nursing is addressing core (broad-based) and professional (discipline specific) healthcare informatics competencies is found in *Nursing and Informatics for the 21st Century: An international look at trends, cases and the future (2006)*. In general, the competencies recommended by the IOM (2003) are broad-based; and include word processing, use of external online databases and the internet, and security protections, as well as the ethical issues relating to informatics. Examples of the competencies taught within University of Kansas School of Nursing's undergraduate program include an appreciation for the use of standardized clinical terminology; promotion of the integrity of nursing information within an integrated electronic health record; an understanding of the use of networks for electronic communication; and the development of competencies in information management, knowledge management, and evidence-based nursing. The professional [nursing specific] informatics competencies for beginning nurses identified by Staggers, Gassert; & Curran (2001, 2002) are used for the undergraduate nursing program (Weaver, C., Delaney, C; Weber, R; & Carr, R (2006).

A faculty member captured an insight into the informatics language philosophy at University of Kansas School of Nursing:

> Healthcare informatics is the gathering and retrieving and analyzing of data for its use in decision-making and creating quality patient care. When you talk with

> anyone about our nomenclature, I think we're pretty committed to using *healthcare informatics* as the rubric to describe all the activities that would go on in our center around informatics. We rarely use the term nursing informatics as a distinction. We don't really talk much about medical informatics either.

Another faculty member elaborated:

> Informatics as a specialty is a way of looking at knowledge representation in whatever technology you use, whether it is paper, a hand held device, or a computer… something a human can interact with that captures the knowledge and presents the knowledge to them for decision-making. So, it is …an algorithm of how we think and how we communicate.

An administrator described some of the reluctance perceived toward using a common language for healthcare informatics:

> Nursing wants to hold onto its own vocabulary because it defines us as a discipline. But it makes it very difficult in electronic formats if we are not all using the same words. I think nursing and medicine need to talk about patients in an integrated way.

Center for Healthcare Informatics announced. The Center for Healthcare Informatics was established in 2004, with the four-fold purpose of advancing information technology, facilitating cultural changes towards this technology, attracting grants, and selling the educational electronic health record to other schools of nursing (http://www2.kumc.edu/healthinformatics/). The center is an interdisciplinary structure involving nursing, medicine and allied health professions. An administrator described the

center's role as that of providing both the financial resources and the new structure necessary to continue the change processes related to healthcare informatics:

> Our Center for Healthcare Informatics is broader than the academic health center on campus. It offers many components, including continuing education; consultation and staff development workshops/seminars; development and integration of clinical care tools for all aspects of patient care, including inpatient, outpatient, public health, home health and extended care. In addition, it serves as an alpha and beta testing site for information technology companies and product development.

Comments by administrators indicate an altruistic desire to promote the benefits of their educational model to other schools of nursing. One administrator described discussions with Cerner about their pricing structure:

> We rent the product and the outside schools buy platform time and contribute and build the product. We reminded the business partner that their original driving force was to have a greater number of professionals using the electronic medical record, as well as to get both experienced and new health professionals familiar with the system. In our discussions, we insisted that [their] regular charging structure can't be used with academic institutions, especially nursing schools. Nursing schools do not have that kind of money and most places do not have the interactive software platform.

The financial status of the center at the end of its third year provided positive reinforcement for this approach. Noted one administrator:

> In three years we were able to double the Center's income through grants and contracts including agreements with other schools to support the Academic Education Solution. Administrators of the center and faculty members are active in state and national initiatives, which often provide additional financial support.

In summary. The school of nursing's culture of innovation and the financial support from Cerner Corporation enabled the college leaders to respond quickly to address the core competency of healthcare informatics. The undergraduate nursing curriculum was aligned with Cerner Corporation's in-patient electronic health record, making this an ideal platform from which to launch University of Kansas Healthcare informatics program. Their Center for Healthcare Informatics was established in 2004. The center is an interdisciplinary structure involving nursing, medicine and allied health professions. Cerner Corporation owns the Academic Education Solution (AES) and markets it to other schools of nursing. The University of Kansas School of Nursing supports the implementation in the academic environment through an annual agreement for consultation and remote monitoring. The language and core competencies of healthcare informatics are both broad-based and discipline specific.

Cultural considerations were an integral part of the change processes employed by the leadership team members. The academic qualifications and interpersonal skills of the lead faculty member were essential to successful implementation within the academic culture as well as between the college and the business partner. The faculty project leader

and Cerner representatives first created a fundamental education template using the Cerner's hospital-based health care record. A group of undergraduate nursing faculty, along with the project leader, further developed this into a teaching platform for the undergraduate nursing program. Each faculty member worked with the lead faculty member to integrate the electronic records into their course. As part of this process, data driven patient case scenarios previously used by faculty were carefully supplemented to follow a variety of teaching and/or learning activities. The electronic health record was clearly identified to serve as a tool and a teaching platform. The system was designed to follow the educational work flow and the competencies of the curriculum. The learning strategy employs virtual patient case studies in a problem based learning environment. Activities are grouped by learning concepts, and are structured to follow novice to expert pathways.

The faculty lead person facilitated purposeful discussions at faculty staff meetings to encourage open sharing of experiences and observations of student responses with other faculty members. This process provided opportunities for faculty to explore the meaning of the proposed changes for both faculty work and pedagogies.

In the following section, I will explain how strategies used at University of Kansas School of Nursing coincide with elements of Eckel and Kezar's (2003) Mobile Model for change.

Core and Supporting Strategies

Eckel and Kezar (2003) explained the interconnectedness of transformational strategies according to their mobile model. Core strategies tend not be linked as often to one another; and some supporting strategies tend to cluster with specific core strategies.

University of Kansas School of Nursing employed all five core strategies with 14 of the 15 supporting strategies. I have organized Eckel and Kezar's five core strategies with their suggested supporting strategies according to Eckel and Kezar (2003), and shown how this school of nursing incorporated the strategies in its change process.

Core strategy: senior administrative support. Supporting strategies most often linked to this core strategy include: altering administrative and governance processes; establishing support structures; providing financial resources; offering incentives; and using external factors.

According to Eckel and Kezar (2003), administrative and governance processes are altered to support the changes, which reinforce the changes as a part of daily operations. Establishing a new center was considered by Eckel and Kezar as an administrative and governance process. In addition, these authors identified the creation of new units such as a new center as a supportive structure. The point made by Eckel and Kezar is that "new positions, new centers, new offices served to send the message that the change was important enough to receive staff, budgets, and office space" (p. 117).

Eckel and Kezar (2003) observed that senior administrators in successful change situations established support structures to assist with the changes processes, and also provided new sources of revenue and/or reallocation of existing funds to support the changes processes. At University of Kansas, the Center for Healthcare Informatics exemplifies such approaches. It offers continuing education, consultation and staff development workshops, and generates and integrates clinical care tools for all aspects of patient care, thereby providing both financial resources and the new structure necessary to continue the change processes related to healthcare informatics. Cerner provided staff,

technology and technician support; the school provided the intellectual capital (a nurse informatics expert and an application analyst), as well as faculty time. Cerner's support for the project is provided through the software applications as well as the administration and technical support.

Eckel and Kezar (2003) also noted that college leaders provided financial resources to support the transformational processes. University of Kansas School of Nursing leaders found new sources of revenue through the partnership with Cerner Corporation and in the marketing of their product, the AES, to other schools of nursing. Faculty and staff are provided financial support to attend conferences. In addition, the Center for Healthcare Informatics provided additional funding for faculty and staff involved in consultation and staff development workshops/seminars for other schools.

Eckel and Kezar (2003) identified another supporting strategy of senior administrative support, the offering of incentives to facilitate the change processes. Faculty described the reward processes under the current administrative leadership at the School of Nursing. One faculty member compared current and previous administration:

> Our previous administration did not value clinical faculty. There was an acceptance of high turnover and an attitude that clinical faculty are easily replaceable; [that] anyone can serve in these positions. Now we are using Boyer's model, a clinical and a tenure track process. This model recognizes teaching as being one of the four areas of scholarship: research, synthesis, practice, and teaching. Most of us who teach in the undergraduate program are on the clinical track. The activities I am involved in with the electronic health record is considered scholarship.

> For example, I am involved in the creation of the family case studies, coordinating classroom learning activities, linking to other courses throughout the curriculum. These activities would not have been considered scholarship in the traditional model. The Boyer model makes me feel proud to be in the clinical teaching track.

This faculty member referred to Ernest Boyer (1990), who described a model of scholarship consisting of teaching, integration of knowledge, application, and discovery. Boyer argued for equal consideration of all four forms of scholarship in promotion and tenure decisions. Eddy (2007) described Boyer's model as one that celebrates the richness in scholarship demands that teaching, integration, and application be embraced in the same manner as the scholarship of discovery. Eddy summarized Boyer's model as follows:

> The controversy around teaching as scholarship is not so much about whether teaching matters as it is about how much it matters. The work of educators matters if it is communicated to others, and if teaching inspires lifelong learning (p. 78).

Several faculty members noted that they [faculty] are appreciated, recognized and rewarded for their efforts in curriculum innovation; and that involvement with the electronic health record academic solution is considered scholarship-related. Another faculty member described faculty recognition in curriculum innovation: "The project director and faculty find a variety of opportunities for scholarship [presentations and publications] which result in recognition and rewards in terms of merit increases

based on scholarly productivity." An administrator explained release time as another faculty reward:

> For example, they may not have a clinical group or [may] have one less class to teach. They have a chunk of time at work where they could [work on] developing the new technology. That, to me, is showing appreciation for the development, and I like that approach.

Eckel and Kezar (2003) define external factors as those events and activities outside the institution used internally by leaders to promote change; and I noted examples of college leaders using external factors: The IOM's (2003) recommendations and their subsequent reports have influenced University of Kansas School of Nursing. The academic-business partnership with Cerner, and later the creation of the Center for Healthcare Informatics are additional examples of University of Kansas School of Nursing's leadership team using external factors to promote change at the University of Kansas.

In summary. The core strategy of senior administrative support and all of the Eckel and Kezar (2003) supporting sub-strategies were employed by the leadership team.

Core strategy: collaborative leadership. Eckel and Kezar (2003) explained that collaboration entails a set of strategies focused on the human dynamic. Supporting strategies for this core strategy include: inviting participation; providing opportunities to influence results; establishing support structures; encouraging new interactions; and facilitating communication. Establishing support structure was previously addressed under the senior administrative support core strategy.

The leadership team invited faculty involvement and worked to create diverse opportunities for involvement. According to participant responses, administrators at University of Kansas School of Nursing began the electronic health record change process with challenging questions. They took into account the college culture as strategies were developed, created collaborative processes, and clearly articulated the processes of change. One administrator viewed her leadership role as that of a facilitator, prompting open discussion of innovative ideas and motivating individual faculty members to take the lead. Another administrator shared her approach to requesting faculty involvement:

> Faculty knew we were a little ahead of the times, making this [informatics] challenge an unusual leap of faith. I think our innovative faculty, especially, could see the value of it. If faculty members are challenged to think about what they need, they come up with a realistic plan to make it happen. I acknowledged this probably will not work smoothly from the beginning, [and] asked the faculty, "what is it you need to develop this unique system, something no one else has tried? We know this isn't going to be easy; we want to provide support for your great ideas."

In the case of healthcare informatics, the nursing informatics expert and information technology staff provided one-on-one support for faculty members as they implemented the electronic health record for each course. A small group of faculty piloted creative concepts, revising processes as needed and then sharing results with other faculty. Purposeful faculty discussions identified advantages and disadvantages, new

ideas, and components that would be needed to ensure success of these emerging ideas. A faculty member commented on the leadership team's style and facilitation of faculty group discussions as a critical component of success:

> [College leaders] held dynamic conversations, listening actively and patiently to all ideas; then leadership made the final decision. This process worked because faculty members perceived leadership as open-minded, nonjudgmental and fair.

Another faculty member continued:

> Our administrator is patient, and listens while faculty process ideas. Some people are very process oriented and … engage everybody. The conversations are fairly dynamic, but at some point … she chooses a direction. The faculty accepts her decision because she is very open-minded, nonjudgmental, and extremely fair. She always picks those kinds of people who are willing to take risks, look at change and modify fairly quickly when it's not working. I think it was her leadership and her vision, and the way she explains things. She makes sense.

In summary. Participants consistently identified the collaborative approach of college leaders and the faculty informatics lead person as critical to the transformational change processes. Each faculty member was provided one-on-one support by the information technology staff and/or the faculty project leader as the electronic health record was introduced in their course. College leaders held purposeful discussions with faculty members about the change processes, listened to their ideas, and openly discussed the key processes needed for success. A small group of faculty members piloted the

creative ideas and shared the results with other faculty. If the leadership team needed to make a decision to move the project forward, faculty accepted the decision because of the consistently open-minded, fair, and nonjudgmental approach to the change project.

Core strategy: staff development. This core strategy was linked to the supporting strategies of tapping outside perspectives, facilitating communication, finding and creating connections and synergy. The support strategy of facilitating communication overlaps with the collaborative leadership core strategy and has been previously addressed.

Tapping outsiders' perspectives helped to advance change at the campus level by providing opportunities to explore ideas and assumptions, by developing new ways of thinking, and by surfacing unexplored assumptions and beliefs. Inviting outsiders can, in many instances, allow for questions that may be difficult for campus leaders to raise (Eckel & Kezar, 2003). An example is provided by an administrator:

> One speaker defined healthcare informatics as the entire adoption of information technology within the American healthcare delivery system and practice. Some faculty members were not aware of this differentiation. They thought instructional technology like Angel, Blackboard or WebCT, or on-line courses, was healthcare informatics. …[S]essions with outside experts discussing the national agenda [in order] for the electronic health record to be fully implemented by 2010 made the faculty realize this is not just an internal issue.

Visits to other institutions by faculty and administration, and their attendance at national and regional meetings and conferences, is another example of how University of Kansas School of Nursing tapped into outside perspectives. This also demonstrates the

leadership team's commitment to involving faculty in development and implementation activities.

Cross-departmental teams and common tasks charged to a particular group created connections (Eckel & Kezar, 2003). Creating and sustaining energy is necessary for successful transformation. The support strategy of 'finding and creating connections and synergy' arose from various on and off campus activities. The activities at University of Kansas School of Nursing created new energy because multiple projects led to new connections among individuals from different parts of the institution. These new connections also served to reassure people they were not working in isolation.

The interdisciplinary approach to healthcare informatics extended across allied health, nursing, and medicine, and beyond, to other schools of nursing, created vibrant connections and synergies on campus. The relationship between the nursing school and the information technology department is another example of internal cross-departmental teams and common tasks which created and sustained energy and promoted synergy. A faculty member remarked about the significance of the IT department:

> Our information technology staff at the school of nursing and Center for Healthcare Informatics has been very facilitative in terms of getting us to attend educational sessions to make sure that we stay updated. We're usually on the top in terms of our computers, [and] all of those things help keep us modernized so our students are technologically updated.

Additional on-campus examples involved the role of the project leader, who worked with individual faculty to address specific pedagogical issues relating to their individual course. Faculty discussions took place to 'make sense' of what faculty

members were seeing in their classrooms. Staff meetings included discussions of what the system could provide, how critical thinking skills were connected, and what faculty members were encountering in the classroom. Observations were documented through video and audio tapes of focus groups and scored surveys sent to students; and these were then discussed during faculty meetings.

Faculty observed that students demonstrated an increased ability to handle and use more data, decision making tools, and evidence based practice standards in support of the nursing care process. Critical thinking skills were enhanced, and students showed a more comprehensive understanding of the overall nursing process. This was especially true in students with English as a second language, where feedback from these students was consistently positive.

In summary. The core strategy of staff development and the supporting sub-strategies were employed by the leadership team at University of Kansas School of Nursing to facilitate including healthcare informatics core competencies in the curricula. College leaders purposefully connected faculty and staff from other departments within the university as well as tapping outside perspectives. The faculty project leader addressed educational needs of each faculty as their course and pedagogical issues were being developed and facilitated open discussion related to faculty-student interactions and analysis of student observations.

Core strategy: flexible vision. Supporting strategies linked most often to Eckel and Kezar's (2003) core strategy of flexible vision include: tapping outside perspectives, promoting long-term orientation, facilitating communication, sustaining momentum, setting expectations and holding people accountable, making connections, and putting

issues in a broader context. Many of these strategies are interconnected. There was no evidence that the leadership team publicly communicated objectives to be accomplished and established frameworks to hold individuals accountable. However, participants described other support strategies linked to flexible vision in various aspects of their interviews. Examples of tapping outside perspectives and facilitating communication and connections have already been addressed. The following support strategies were used at University of Kansas School of Nursing: encouraging a long-term orientation, sustaining momentum, and putting issues in a broader context.

The support strategy of encouraging a long-term orientation involves the leadership team's approach to change processes as long-term endeavors, while at the same time employing strategies that capture and hold the organizational members' collective attention. The school of nursing's reputation for a culture of innovation - specifically it's early mastering of web-based education in the nineties - enabled the school to respond quickly when the IOM (2003) called for the integration of clinical informatics into the curricula of health professions. The commitment to create a national academic solution was discussed initially in 1999, and the first nursing undergraduate pilot began in 2001.

An administrator summarizes her hope for a long-term orientation in healthcare informatics competencies:

> My hope is that we graduate students…who are well-versed in clinical information as a basis for decision making in patient care, [who have] the compassion that we want to have our students use with patients and

> families; [and who] can translate clinical information into the best possible, safe patient quality of care.

At the time of my visit in April 2007, all nursing undergraduate courses except community health and the senior practicum had incorporated the electronic health record. A faculty member described another impetus, remarking that the celebration of the university's 100th year provided an opportunity for faculty to assess their legacy and consider the directions in which they wanted to build the university's future.

According to Eckel and Kezar (2003) sustaining momentum during the change processes is another supporting strategy relating to flexible vision. Too much change too quickly can overwhelm and exhaust members of the organization, while too little progress can stall the change processes. Moderating the pace of change is a significant strategy used within organizations undergoing transformational change processes. Participants at University of Kansas School of Nursing approached leadership regarding their concerns over the pace of change:

> We have a faculty retreat in May. Last year, administration began the retreat by discussing some of the "stumbling blocks to change." A major stumbling block was fatigue. When administration openly shared their own personal stories of the impact of change, faculty members began sharing … their own struggles. A major focus of our retreat was about taking care of ourselves, using technology to work smarter. We agreed that we do not have to have everything perfect for all of our classes. We celebrated our incredible information technology department and were encouraged to use their expertise.

Another faculty member is more succinct: “Last year the faculty said to the leadership, could we slow down a bit? That was heard loud and clear.”

Putting issues in a broader context is related to the core strategy of flexible vision. An example of this is revealed in one faculty member’s comment:

> We are very fortunate to have leadership who has a very broad perspective, one that looks outside the university and appreciates nationally as well as globally what is occurring in health care.

In summary. The core strategy of flexible vision and all but one of the supporting sub-strategies were employed by the leadership team at University of Kansas School of Nursing to implement the healthcare informatics core competency. College leaders addressed faculty resistance as part of the expected processes of change. Educational sessions included acknowledging resistance, identifying ways to deal with it, and taking the time to actively listen to faculty. Faculty and college leaders’ interactions at the annual retreat included acknowledging fatigue level as a major stumbling block to the change processes. Personal impacts of the changes processes were linked to the broader context of the realization of what was being accomplished. College leadership celebrated the success to date and connected the accomplishments to the legacy currently being built for a sustainable future. The support strategy of publicly communicating expectations and holding faculty members accountable was not evident at University of Kansas School of Nursing.

Core strategy: visible action. Eckel and Kezar (2003) link visible action to support strategies such as establishing supportive structures, encouraging communication, setting expectations and holding people accountable, facilitating connections and

synergy, providing financial resources, and incentives. All of these supporting strategies have been discussed. Taking visible action by college leadership moved the change processes forward. Participants connected their acceptance of leadership decision making to the consistent collaborative approach of leaders.

Demonstrating Balance

Eckel and Kezar (2003) identified the importance of striking numerous balances between the five core and 15 supporting strategies and the long-term orientation to the change processes at a deep and pervasive level. Moderating the pace of change required leaders to balance speed of the change with patience. In addition, other types of balance were critical to transformational change. Some of the types of balance identified by Eckel and Kezar (2003) were apparent in University of Kansas School of Nursing's change processes, for example, balancing participation of various faculty members and staff, non-tenured and tenured faculty, faculty from different disciplines, faculty and staff, and leadership and faculty.

The leadership team was aware of the need for balance between internal and external perspectives and involvement. Although they wanted the change processes to move faster, they acknowledged that faculty needed time to try out the new technology, to 'play' with it and have some personal successes before moving on to additional change. Finding ways to create short-term gains while laying the foundation for long-term needs was necessary. They engaged in periodic retreats and a range of new pedagogies that generated the desired student learning outcomes.

Research Question Four

Is University of Kansas School of Nursing approaching the shift to healthcare informatics as the broad and deep change in values, culture and structures that would characterize a transformational change?

Eckel and Kezar (2003) define transformational change as both deep and pervasive. Depth of change affects those underlying assumptions the organization acknowledges: what is important; what to do, why, and how; and what to produce. Such pervasiveness suggests that transformation is a collective, institution-wide phenomenon (p. 33).

In addition, Eckel and Kezar's (2003) research noted that transformational change takes time to reach fruition. University of Kansas School of Nursing began addressing healthcare informatics in 2001, two years prior to IOM's (2003) *Health Professions Education: A Bridge to Quality* publication, and six years prior to the time of this research.

Transformational change is associated with particular strategies and activities directed toward implementation of new processes inclusive of structural, cultural and attitudinal markers of progress. The structural evidence markers are familiar concrete measurements that can be counted and compared to baseline sets of data. The additional evidence of attitudinal and cultural shifts suggests more depth to the change (Eckel and Kezar, 2003).

Eckel and Kezar (2003) refer to new departments, institutional structures, and new decision-making structures as structural evidence markers. At University of Kansas School of Nursing, creation of the new Center for Healthcare Informatics confirms the

presence of this marker. Creation of the center as a link between other schools and as a unit to support the project is a structural change.

I presented change processes identified by the participants and source documents regarding what specific methods were used, and why those particular key strategies were selected. I observed a number of Eckel and Kezar's (2003) structural evidence markers of change in the University of Kansas School of Nursing program. These markers include changes in pedagogies, in student learning and assessment practices, in policies, budgets, new departments, and in both institutional structures and new decision-making structures. Funding of the project manager, and later additional staff to support the project manager's mentoring of faculty to change pedagogy, demonstrate changes in budget.

Successful partnerships resulted in the creation of this interdisciplinary center, and in business arrangements to offer the product to other schools of nursing. Faculty from other schools of nursing across the country are involved in revisions of the academic electronic health record, evidence-based practice reviews, forms, and reports to measure student learning activities. The partnership of University of Kansas School of Nursing and Cerner provided an established system for shared use. In 2001, the School of Nursing and Allied Health and School of Medicine created a position as the project manager to explore an interdisciplinary approach to the integration of electronic technology into their respective curricula. The following year the undergraduate nursing program conducted a nine-month pilot program using the electronic health record in the foundations course. Working with select undergraduate nursing faculty, additional courses were introduced one at a time. Rather than shifting the total structure of course requirements, the school of nursing chose to change class activities and teaching methods

within the curriculum structure. Faculty members designed educational experiences for their students, using the electronic record as a teaching platform in the classroom and in the simulation lab. The problem-based learning strategy used patient cases previously developed by faculty.

Eckel and Kezar (2003) found that in addition to structural evidence, another set of evidence was needed to identify the cultural impact of transformation. These cultural indicators signaled attitudinal and cultural shifts that suggested the institution had developed new capacities and a new set of beliefs and assumptions about the changes. Their examples include changes in the patterns of interactions between individuals or groups, changes in the campus self-image, changes in the types of conversations, and in new attitudes and beliefs. The most significant strategy that has served to change the patterns of interactions between the health professions was an interdisciplinary approach to the change processes.

One of the IOM (2003) recommendations includes use of a common language with corresponding core competencies. Chapter Two, review of the literature, discussed the debate concerning the use of broad-based versus discipline specific language, which is part of the national conversation about the electronic health record. The debate involves deeply embedded professional values, protection of specific interests, turf issues, and differing accreditation and licensure regulatory bodies in medicine and nursing. In general, University of Kansas School of Nursing participants referred to healthcare informatics as an automated process to capture, store, and represent patient data in the same way clinicians think and communicate across disciplines. The specific process (formal or informal) used here to reach a consensus was not mentioned in the

interviews; however, individual participants did share their own beliefs, values, or basic assumptions relating to the definition of healthcare informatics. As a group, these reinforce the need for both a common vocabulary (broad-based) and profession-specific competencies. University of Kansas School of Nursing participants considered healthcare informatics an algorithm of how health care professionals think and how they communicate with each other. They considered it simply a platform that captures knowledge and presents it for clinical decision making. The other different behavior I see is that teaching is much more problem centered and interactive and focused on critical thinking and the use of information resources.

Finally, I suggest that University of Kansas School of Nursing has approached a shift to healthcare informatics as the broad and deep change in values, culture and structures that would characterize a transformational change. Change at this school of nursing has affected underlying assumptions, as faculty are now thinking and acting differently. Faculty members are designing a different kind of educational experience for students. Use of the electronic record is much more extensive, and the educational alternatives and opportunities it provides require more thoughtful planning and design. Faculty members work with the healthcare informatics project manager to integrate case scenarios into their courses, using established educational work flow processes. The process takes extensive design and faculty expertise. As one administrator explained "when you automate content, that content must be detailed and precise".

Findings at Large State University College of Nursing

Introduction

Large State University is a large coeducational public research university. There are allied health professional schools and a medical school on campus. It has more than a hundred nursing faculty members. In 2007, the college of nursing graduated more than 200 students (Large State University reference 2).

My research interviews included 11 participants, from administration, staff, and faculty: six who were PhD prepared, and five masters' prepared. I talked to members of the administration and faculty who had longevity of between two to 15 years. Three of the 11 participants stated they had received formal training in informatics; the rest received only informal training. To preserve confidentiality, all leadership participants will be referred to as administrators for the duration of this chapter while faculty members will be referred to as such.

I have organized participants' independent accounts regarding the strategies used by the college of nursing to address the core competencies of healthcare informatics. First, as with University of Kansas School of Nursing, I provide an overview of what is occurring in the Large State University undergraduate nursing curriculum, classroom, and laboratory settings. Second, I present participants' accounts of change processes regarding what specific methods were used, and why these particular key strategies were selected. Third, I will present the reasons I believe Large State University College of Nursing has not yet approached its shift to healthcare informatics as the broad and deep change in values, culture and structures that characterize a transformational change. Large State University College of Nursing began its processes of change five years ago

from a adaptive perspective, when the dean of nursing hired a part-time PhD nursing informatics expert shared with the medical center's Department of Nursing. The major impetus to move the integration of nursing informatics into the undergraduate nursing curricula did not occur until a grant was awarded. The grant was awarded for a three year period, which had ended approximately three months prior to my on-site visit. The change is deep but it is limited to the medical-surgical and critical care clinical nursing faculty members. There was evidence of a shift in values and assumptions in that the small group of faculty members did appear to be thinking and acting differently.

Research Question One: How is Healthcare Informatics Core Competency Addressed?

The Large State University College of Nursing used an electronic health record developed by a national electronic health record (EHR) company for sale and use in hospitals, and based on this, created an electronic health record specifically for educational purposes. Although the electronic health record is loaded on all of the computers in the college of nursing, its use in the classroom is limited. The use of the personal digital assistant (PDA), another technology employed at this Large State University College of Nursing was described by participants as being used frequently in the classroom.

A PhD prepared nursing informatics project leader and a small group of undergraduate clinical nursing faculty enhanced patient case scenarios previously used by nursing faculty and loaded them into the electronic health record. These patient cases were enhanced with additional clinical data pulled from pre-identified cases in the medical center's data warehouse, internet, or in a textbook. Faculty members use these patient case scenarios in the medical-surgical and critical care clinical simulation

laboratory. In addition, they created for comparison, a “gold standard” case, in which everything in the patient’s electronic health record is accurate.

According to Large State University reference 3, the simulation skills laboratory is a structured experience which simulates patients encountered in a hospital environment. These patients, referred to as a virtual community of patients, are woven into the medical-surgical and critical care course content. Students draw on these as they consider multiple types and sources of patient information on which to base their clinical decisions and rapid critical thinking during patient simulations. As a result of designed course content and assignments, students master at minimum the beginning level of nursing informatics competencies as described by Staggers, Gassert, and Curran (2002). Patient data such as laboratory results and medication orders can be accessed remotely through the use of personal digital assistants (PDAs) (Large State University reference 4).

According to Large State University reference 5, there are several examples of student performance in the simulation laboratory. Sophomore students gain experience using the electronic health record as they perform procedures in the simulation clinical lab with low fidelity mannequins. In their junior year, students are given patient scenarios pre-programmed in the high-fidelity computerized human simulator as they use the electronic health record to manage a single patient. Students can use their PDAs to access the web for evidence based practice standards and answers to questions. During their senior year, students in clinical leadership roles are assigned a group of electronic patients. For example, one may be assigned a quality improvement exercise involving an eight-patient unit. In this scenario, the student develops a tracking tool to complete the

audit, analyze patient charts, and make recommendations on how to improve nursing practice and patient care to the mock nursing unit manager.

Key strategies at this college of nursing's are the focus of the following section. I will include intentional strategies by college leaders employed to get faculty members to think differently about their daily work and consideration of the institutional culture in their change strategies.

Research Questions Two and Three: What Strategies Were Used, and Why They Were Selected?

Nursing informatics expert recruited. The dean of the college of nursing and the chief nursing officer at the Large State University Hospital Medical Center jointly recruited a nursing informatics expert in 2002. An administrator described her initial strategy to employ informatics within the undergraduate nursing curriculum:

> The department of nursing at the hospital medical center and I jointly recruited a PhD prepared nursing informatics expert. Both organizations agreed to fund joint positions, one as associate professor in the college of nursing, and the other as director of nursing informatics and research at the medical Center. We wanted a major change agent. The person we recruited preferred the medical center clinical informatics environment [rather than] a teaching one. Our college of nursing needed expertise for our students, our faculty, and [for] identification of the informatics competencies needed here.

The leadership team at Large State University College of Nursing decided to employ the nursing informatics expert to serve as a 'change agent' to implement

healthcare informatics within the college of nursing. An administrator stated her philosophy of change processes and the role of change agents:

> I believe it is critical that the person in a leadership role be a champion of the change process. I have observed that successful academic projects have a point person to lead the change effort with a small group of faculty to create the idea. Once the group is successful, then you introduce the project to other faculty who can react to the project.

College of Nursing receives federal grant. The nursing informatics project leader wrote a grant for funding implementation of an electronic health record in the College of Nursing Technology Learning Simulation skills lab. Large State University College of Nursing received a federal grant of approximately one million dollars (Large State University reference 6).

An administrator explained: "We were funded [by] a federal grant on resubmission. This grant was the major impetus to move us forward towards our plans to implement informatics." She further stated:

> At the time, our faculty members did not have a good understanding of healthcare informatics. The grant project would help to increase the knowledge of informatics among the faculty. We needed faculty members who understand informatics and were excited about it to promote to other faculty members who were not as interested.

A faculty member supported this: "Most faculty members have no idea what healthcare informatics is about. In fact, most of the faculty members do not even want to know what [informatics] is truly about."

The college of nursing already had the Technology Learning Simulation skills lab and, through other funding sources, updated the lab with computerized human mannequins. The same small group of faculty who were involved with laboratory skills simulation in the Technology Learning Center was chosen to implement the core competency of informatics. One member was selected specifically because of her experience with the computerized mannequin. According to a faculty member:

> [This] person was hired to work exclusively with simulation. She [already knew] how to program the mannequins, and worked with faculty to develop and program scenarios. When we decided to implement the electronic health record into the undergraduate nursing curriculum, this lab setting was already successful and [was] an easy fit for any nursing informatics tools.

Beginning in 2002, the nursing informatics change agent worked part-time at the hospital and part-time within the college of nursing. She wrote a federal grant for which, in 2004, the state University College of Nursing was awarded approximately one million dollars.

Faculty response to healthcare informatics initiative. Leadership team members described faculty members within the college as lacking clear understanding of healthcare informatics. College leaders reported communicating the application for the grant to faculty members. However, according to faculty members, the informatics initiative was introduced to faculty after the grant dollars were awarded. One faculty member stated: “it [the informatics grant] was announced one day in a meeting that this [the grant objectives] is what we’re going to do and it [electronic health record] will be applied in the undergraduate curriculum.” The grant application process was not a part of

the faculty governance structure. One faculty member described how these 'cultural breaches' led to significant problems in the beginning:

> We have a faculty governance structure that drives the curriculum. The grant had no faculty involvement in its creation. Faculty felt it should have been discussed with them, since [implementing the grant had] a major impact on faculty workload. The majority of faculty, even those not teaching in the undergraduate program, was dead set against the project. [In] the first two years, there was not good buy-in. The three faculty members involved began to buy in [only after they had learned] about the programs, processes, and discussions surrounding the implementation.

Several Large State University nursing faculty commented on the cultural clashes in the implementation of healthcare informatics core competencies. For example, one faculty member said her perception was that the resistance originated from the grant project leader's initial, unsatisfactory presentation of the project:

> The project leader was not a full-time member of the faculty. Her style, her approach, was counter to academia. Buy-in was [only] sought after the fact, [and was presented as] *her* project, *her* priorities. She did not tolerate any questions or dissention, [although the] grant must be everyone's priority.

Another described faculty members as detailed oriented and expecting mutual respect and appreciation of their academic role and workload from the informatics project leader. Neither faculty members nor the project leader were willing to negotiate to reach a mutual understanding. She continued:

> Our faculty is renowned for being able to wallow themselves in the minutia. We had an immovable force against a rock, and neither one was going to give. I think more faculty members would have bought in earlier, if [the director or informatics expert] had sought their input and placated a little, or at least recognize the increased workload and showed some appreciation for the faculty.

Another faculty member admitted that some resistance still exists:

> We are at our fourth year of the project, and [some] are still resistant. There are some faculty members who have embraced it and really gone up a level in their ability to use these tools to more effectively convey concepts. There are other faculty who are still very computer shy and have not spent time to really get to know the system. It's like pulling teeth to get them to put [the system] into their curriculum. [Acceptance] varies all across the spectrum.

According to Kezar (2001), the existing structures such as shared governance in higher education should always be considered. Change must be recognized as a human process, and inclusion of organizational members must be encouraged. At Large State University, nursing faculty members reported they were not initially invited to participate in the writing of the grant proposal. Once faculty members were included in the grant activities, they perceived the project leader as disrespectful of their academic role, and the project as an addition to their workload. Faculty members were expected to approve the grant application through their academic shared governance model. Even though the project leader met major resistance from faculty members, she continued to work exclusively with the small group of faculty members selected to implement the grant objectives.

Next, I will present how the role of sensemaking, or getting people to think differently, was employed at the large state university College of Nursing.

The role of sensemaking. According to Eckel and Kezar (2003), "getting people to adopt new mind-sets is a cognitive and intellectual process spurred by a set of activities that can be intentionally designed to leave behind old ideas, assumptions, and mental models" (p. 73). In organizational behavior literature, this process is known as organizational sensemaking (Gioia & Chittipeddi, 1991; March, 1994; Weick, 1995). There was evidence that the informatics project leader attempted to explore the meanings of proposed changes for faculty work and pedagogy. Those attempts were, however, met with resistance from faculty members. An administrator described faculty responses:

> The lead faculty member presented the electronic health record as a tool to help them. Faculty who were not involved in this process dug in their heels. They said this process was too complicated and time consuming [even though it was emphasized that] it does not drive content, [that] it is a device to help communicate content and critical thinking.

In an effort to make sense of their personal journey, several faculty members and administrative staff reflected upon the resistance to the nursing informatics change processes. According to one faculty member, faculty resisted any new technology. "Faculty work loads are heavy and there isn't much time to learn new technology, which takes a lot of energy and time."

Another faculty member who admitted her initial resistance noted that after some exposure, she was glad she was involved, even though she was appointed rather than invited.

> I didn't have a choice about being involved with the grant process. At first, I didn't know anything about informatics, and this [grant] was extra work for me. It seemed like a monstrous project. Now, it makes sense that I was a part of the project. I am glad I wasn't left out. It has been very exciting and motivating.

An administrator shared her belief about resistance from tenured faculty: Some of the tenured faculty members seemed to have the attitude that, even though the small group was doing a good job, they [tenured faculty] "didn't want a darn thing to do with" the nursing informatics processes of change. She continued:

> There are two things happening. One, those faculty members who love [the electronic health record] are moving it forward and have their core members involved. They are presenting at conferences, publishing and getting recognition. Other faculty members, especially new faculty, are slowly entering this group. Second, there is a strong group of faculty members who will be against any technology. Technology is not their 'thing' and they do not want to be pushed to use it. Some faculty members are holding out for retirement.

In the next section, I will cover the processes of change employed by the Large State University College of Nursing healthcare informatics project leader and her small group as they worked toward implementing healthcare informatics. I will list the strategies implemented in each year of the grant, and include any activities that supported the adoption of new ideas and assumptions about faculty work and pedagogies as a result of implementation of the electronic health record.

Grant Year One

The infrastructure to support the project was established during 2005, the first year of the grant. Critical decisions included selection of the electronic health record provider and subsequent clinical decisions supporting its use, and establishment of the committee structure to oversee grant activities.

Electronic health record provider chosen. In its quest to develop an educational version of the electronic health record, the Large State University College of Nursing selected a national electronic health record company, the same vendor used by the university's medical center. This electronic health record company is a privately held corporation that creates clinician documentation and electronic medical record solutions for hospitals, integrated delivery networks, academic medical centers, and other acute care providers (Large State University reference 6). The Large State University College of Nursing chose to operate its own educational version of the EHR company electronic medical record independent of the hospital system. Since the medical center must comply with patient privacy requirements, the educational version is on a separate server (Large State University reference 7).

Structure to oversee grant activities. According to an administrator, separate committees were established to supervise different divisions of the grant activities. A steering committee directed planning and fiscal activities, while an academic committee focused on clinical information and academic content. Another administrator further explained the role of the steering committee:

They discussed the types of equipment needed and how the nursing informatics project would interface with other initiatives, and [planned] faculty development based on the programs selected. Our IT department was involved in this group.

During my visit in 2007, a faculty member expressed regret on the apparent demise of the clinical information and academic content committee: "Our last meeting was June 2007, and the members did not want to disband the committee. They wanted this committee to oversee the next phase of the nursing informatics initiative." These committee members were instrumental in driving the change processes of nursing informatics.

Grant Year Two

During 2006, the committees decided to implement healthcare informatics in the following ways: 1) informatics content and technology would be implemented in the medical-surgical and critical care [high acuity] courses; 2) patient case scenarios previously used by faculty members would be loaded into the electronic health record; 3) nursing informatics competencies would be extracted from the Staggers, Gassert, and Curran (2002) master list of informatics competencies for nurses; and 4) faculty members would be taught the informatics knowledge and skills necessary as the electronic health record was implemented in their courses. I will now describe the specifics of how these decisions were enacted.

Informatics content and technology implemented in medical-surgical and critical care courses. An administrator noted that the entire curriculum had been revised in 1998 based on the AACN Essentials documents (2000); and another total revision is planned to begin in 2008/2009. The Large State University College of Nursing opted not to revise

the entire curriculum, instead revising each course as the corresponding nursing informatics core competencies were introduced. A faculty member explained one reason:

> We decided to embed [informatics] content into the individual courses and not revise the curriculum [because] if you change course objectives, [or] change curriculum, you have to get it approved. We preferred to revise our course syllabi without a major change to objectives [since] changing the objectives is a major struggle within our university.

Patient case scenarios loaded into the electronic health record. Faculty members crafted data-driven patient case scenarios based on those already being used in the classroom. A faculty member described the process:

> We reviewed the cases and mapped them on a grid, [examining] the concept that faculty [wanted] to teach in each of the scenarios. Interestingly, between [the cases submitted], we had nine CVA (stroke) cases. Each was unaware that other faculty had created these cases.

Another faculty member continued:

> We built 15 core cases, [and a separate] gold standard case, where everything in the patient's electronic health record is accurate so faculty can show students a case that is a good example. Cases created on paper are not as data rich; electronic health record cases have much more information. For example, vital signs for a three-day period have to be loaded into the system, social service notes are added, respiratory therapy notes, rehab notes, etc. This additional data was pulled from pre-identified cases [in] the medical center's data warehouse, [in] cases published on the internet, or in a textbook.

A faculty member noted that enhancing existing cases was popular with faculty, since they could integrate nursing informatics competencies without having to rewrite the scenarios or develop new ones. She continued:

> What makes an expert nurse is getting to know the patient over time, getting to interpret information in context within the continuity of care. By building the cases, standardizing the cases within the CIS, we were able to [include] all of the educational principles we set out to accomplish. Students are assigned the same person across different levels of their curriculum. This way, students get to know their patients across a continuum. For example, in their sophomore year, they may [meet] a young patient in a routine history and physical exam; then again as a senior, [meet the same] patient [who] is admitted with an illness. Students learn the value of baseline data and making clinical decisions, [and] get to know patients over time throughout the curriculum.

Nursing informatics competencies established. The Large State University College of Nursing informatics project team extracted its competencies from Staggers, Gassert, and Curran's (2002) master list of informatics competencies for nurses by level of practice. The team reviewed the categories of computer skills, informatics knowledge, and informatics skills, then added their own unique competencies. A total of 305 competencies were established by this team. A faculty member explained the process:

> [First, we] had to understand the various levels of nursing informatics competencies, how to measure the competencies, and how to implement the changes. Then we began to review each course syllabi to integrate the levels of informatics competencies as appropriate.

Another faculty member continued:

> Faculty teaching the medical-surgical courses selected those competencies they thought BSN graduate nurses should possess by the end of their curriculum. The responses were combined and charted on a grid. If 80% of the faculty agreed, the competency was automatically included. If there was less than 80% agreement, the [involved] faculty had [to explain] why [they] viewed the competency as an important. We identified the rest of the competencies by consensus, then selected those competencies we wanted to be prerequisites. We identified the competencies currently being taught and determined how those competencies *not* being taught would be integrated into the curriculum. We chose the specific courses [in which] the competencies [would be] introduced. Together, [we] developed a homework assignment or [class] exercise -- whatever it took to put that content into the curriculum -- then looked at whether students were actually getting the content.

Faculty education and development. Educational sessions were provided for faculty members involved in the project. A faculty member described how informatics competencies were introduced to faculty:

> [One] strategy [used was on] faculty development days, generally once a quarter. We focused on different informatics competencies that we were trying to achieve. For example, we did presentations on how you evaluate web sites. We brought in outside speakers for the hand held devices, [talked about] how they were being used in other colleges, and gave them time to play [with the devices]. We [had] faculty talk about how [each was] using it in different aspects of the courses, so

> they could share and learn from each other. There were times when we would observe a faculty member teaching a course and [then] we were coached through the next time [as we taught it].

Educational opportunities were provided for any faculty member who wanted to attend. In addition, a faculty member stated, "We have six instructional technology staff, a clinical project leader, staff from a national EHR company, who have provided education as part of their role and as part of the grant."

The nursing informatics project leader provided on-going education for the faculty. Several faculty members specifically acknowledged the College of Nursing Information Technology staff as being critical to their education and development. The six individuals within this department were cited by faculty members as service oriented and always eager to assist them immediately with their needs.

Grant Year Three

By 2007, the conclusion of the grant period, nursing informatics competencies were fully integrated in the medical-surgical and critical care clinical courses. A faculty member outlined the next phases: "The plan is to bring up the obstetrics course this coming year [2008], the pediatrics course the following year [2009], and the psychiatric course in the third year [2010]."

Medical-surgical and critical care clinical faculty members had begun using the electronic health record in the technology center, the simulation labs, and in student assignments, and an assessment of the project's effectiveness was needed. A faculty member described how she measured students' critical thinking skills using pre- and post- measurements, and what this revealed:

> [When] I used the Health Science Reasoning Test (HSRT), [I found] a significant increase in critical thinking skills for the sophomore and junior students, but not [in] senior students. Seniors were given the test two weeks before graduation [and] feedback from [them indicated] they did not take the test seriously, since they were [already] graduating.

Pedagogy. Some participants were uncertain as to the type of pedagogical practices being used. The descriptions of methods of teaching and learning were problem based and active learning pedagogies. One faculty member stated: "In the past, we tried problem based learning in its purest form, which is very inefficient. I believe we abandoned [it]." Another faculty member supported this statement that the college of nursing was not using problem-based learning. One faculty member described their process as 'participative.' No other reference to pedagogical practices was mentioned during the interviews.

Student learning and assessment practices. According to Armstrong and Barron (2002), a competency-based curriculum stimulates pedagogical approaches of active learning and problem-based learning that encourage greater faculty-student interaction. Student learning groups are used to provide a systematic feedback to faculty. Problem-based learning engenders more self-directed learning and does a better job of providing students with a process for integrating what has already been learned (Rideout, 2002; et al., 2002; Juul-Dam et al., 2001; Krackov & Mennin (1998); IOM, 2003). Student learning and assessment practices used in the clinical simulation laboratories included student learning groups, self-directed learning, and various processes to integrate what students were learning. A faculty member described student learning groups and student

roles during a simulation: “We usually have five students in a high-fidelity simulation. Student play various roles, a charge nurse; a recorder, an observer, a primary nurse, and a family member. These learning groups also included laboratory RN staff and clinical faculty members. According to a faculty member, “We have two RN staff members [in the clinical simulation laboratory]. One works with the medical record to send orders and results across the electronic health record [and] the other runs the high-fidelity simulator.

Self learning opportunities are provided as students demonstrate their knowledge and skills as a member of the pre-programmed simulation team. One faculty member would facilitate student interactions within their assigned roles, and also facilitate feedback between students. Another faculty member explained, “Once the students completed the simulation, we [faculty members] debriefed with the students about [their] responses to the pre-programmed patient simulation. Then, we repeated the simulation so students could apply what was discussed.”

A faculty member said that her observation indicated that clinical information systems enhance student education: “Clinical information systems such as the electronic health record provide students with much richer and deeper data about patients. Students have greater context and knowledge about the patient, [allowing them] to make more informed decisions.”

Faculty members provided other observations relating to student learning and assessment practices, which they believed was linked directly to the simulation lab experiences and immediate faculty feedback to students. One shared discussions with colleagues:

> Faculty members have [noticed] student benefits from the implementation of nursing informatics competencies in the simulation skill labs. We have observed enhanced critical thinking, improved organizational delegation, and communication skills. Students are able to assimilate the clinical picture in a more comprehensive and integrated way. We used to see students get a good clinical picture and comfort level in week nine; now it is in week five or six. I think it is a combination of the role playing that occurs in the simulation labs and immediate feedback between clinical instructors and students.

In summary. In 2002, the Large State University Hospital Medical Center's Department of Nursing and the College of Nursing partnered to recruit a PhD prepared nursing informatics expert to be the 'champion of change' in implementing the core competencies of informatics. In 2004, the college of nursing received a federal grant of approximately one million dollars. The small group of clinical undergraduate nursing faculty already involved in the development of the Technology Learning Simulation [skills lab] was selected to implement nursing informatics in the medical-surgical and critical care course simulation lab.

Faculty members were unhappy with the administration's decision to implement the healthcare informatics core competencies within a small group of faculty and later, to introduce the findings to other faculty members. According to some faculty members, the faculty governance structure that drives the curriculum was not included as a part of the change process for the approval of the grant, and this also was met with resistance. The project leader was not a full-time faculty member, and her personal approach was counter to the existing academic culture. Once faculty members outside the initial pilot group of

undergraduate nursing faculty did become involved, neither they nor the project leader were willing to compromise in negotiating resolutions to problems. This conflict continues to impact the implementation of nursing informatics at the Large State University College of Nursing, with one faculty remarking that "[acceptance] varies all across the spectrum."

The nursing informatics project leader and the small group of faculty did, however, consider academic cultural issues, and encouraged the adoption of new ideas about faculty work and pedagogies as they implemented nursing informatics in the medical-surgical and critical care courses simulation skills lab. Examples included the examination of teaching and learning concepts faculty members wanted in their respective courses. Each course was further reviewed for specific nursing informatics competency and for methods to imbed this content into the curriculum.

The small group of undergraduate faculty members on the academic committee and the nursing informatics expert used the Staggers, Gassert, and Curran's (2002) list of informatics competencies for nurses by level of practice: beginning nurses, experienced nurses, informatics nurse specialist, and informatics innovators. This group reviewed all of the healthcare informatics competencies at the prerequisite level, as well as those competencies currently being taught or not being taught to the undergraduate nursing students. They reviewed each medical-surgical and critical care course for the appropriate introduction of healthcare informatics competencies, and devised homework assignments to introduce the content into the curriculum. By the third year of the grant, the electronic health record was fully integrated into skills lab in the Technology Learning Simulation Center.

Large State University faculty used a different EHR company to create an educational electronic health record. Case scenarios previously created by faculty were reviewed and mapped on a concept grid. This process of mapping case scenarios to teaching/learning concepts provided an opportunity for the faculty to revisit the concepts of each class. Because the electronic health record requires more data than is found in paper medical records, the nursing informatics expert to pulled information from pre-identified cases in either the medical center's data warehouse, published cases, or textbook cases.

Large State University College of Nursing has addressed the core competencies of healthcare informatics as nursing specific. The nursing competencies implemented with the undergraduate nursing program (with the exception of obstetrics and pediatrics which will be introduced in coming years) follow the competencies for beginning nurses identified by Staggers, Gassert, and Curran (2001). Based on their approach to implementing nursing informatics competencies within the undergraduate medical-surgical and critical care courses, as well as on faculty members' descriptions of the simulation laboratory experiences, I conclude that Large State University College of Nursing is employing a competency-based approach, and using problem-based and active learning pedagogical practices.

Student learning assessment practices were observed by some participants as changing within the simulation laboratory. Faculty members described self-directed learning, student learning groups and debriefing sessions which included a repeat of the simulation. This process helped students to integrate what they learned. The small groups

of faculty members within the simulation lab were having conversations regarding their observations of student learning and assessment practices.

In the following section, I will explain how strategies used by Large State University coincide with elements of the Eckel and Kezar's (2003) Mobile Model for change.

Core and Supporting Strategies

As previously with the University of Kansas School of Nursing, I have organized the core strategies with the supporting strategies suggested by Eckel and Kezar (2003). In their model, some supporting strategies are linked to more than one core strategy. Four of the five core strategies for the implementation of nursing informatics were evident at state university's college of nursing. The exception was use of collaborative leadership strategies. Only seven of the 15 supporting strategies were evident. I will provide examples identified as present at the Large State University College of Nursing, and will comment on those strategies which were not employed.

Core strategy: senior administrative support. The five supporting strategies most frequently linked to this core strategy were in evidence. These strategies include altering administrative and governance processes, establishing support structures, providing financial resources, offering incentives, and using various external events and activities to promote internal change.

According to Eckel and Kezar (2003), the supporting strategy of altering administrative and governance processes is intended to ensure that the desired changes ultimately become part of daily operations. These authors identified the creation of new positions and new units as both a supportive structure and a financial resource. This sends

a message that “the change was important enough to receive staff, budgets, and office space” (p. 117). They believe that support structures are designed to assist with change processes by providing new sources of revenue and/or reallocating existing funds to support them. This strategy was evident at the Large State University College of Nursing in their partnership with the Department of Nursing at the Large State University Hospital Medical Center, through which they jointly funded an informatics expert to lead the change processes. Initial funding of the national EHR company platform came from the grant, and the College of Nursing has continued to fund both this expense and an information technology support person after grant monies were exhausted. In addition, the College of Nursing has six IT staff available for faculty members. Grant monies allowed for some incentives in addition to the funding of faculty to work on the project. A faculty member noted the core faculty group were “presenting at conferences, publishing their work, [and] getting recognition they well deserve.”

External factors are those events and activities outside the institution used internally by leaders to promote change. External factors cited by participants at the Large State University College of Nursing included the use of outside speakers to educate faculty about healthcare informatics. (IOM, 2003) reports and a seminal work on nursing informatics core competencies were also mentioned.

In summary. The core strategy of senior administrative support was employed by the Large State University College of Nursing, along with all five of the most often cited supporting strategies.

Core strategy: collaborative leadership. This core strategy is about developing extensive internal plans to facilitate communication, inviting participation and providing

opportunities to influence results, and bringing together people in new ways to foster communication and encourage new interactions. Establishing support structures was previously addressed under the senior administrative support core strategy and was evident at the Large State University College of Nursing.

Collaborative activities such as invited participation, opportunity to influence results, and facilitating communication between the grant project leader and the faculty members at large were not part of the change process at the Large State University College of Nursing. Faculty members reported not being informed of the grant until after it was awarded and the application was not submitted through the faculty governance structure. The informatics project leader expected faculty members to make the grant their priority and was not open to their suggestions. However, there was evidence of these support strategies being employed within the core group of undergraduate faculty charged with implementing nursing informatics within the medical-surgical and critical care clinical courses. According to a faculty member:

> There were two separate committees which supervised grant activities. One oversaw the day-to-day grant activities while the other (academic) committee focused on clinical information and academic content. The academic committee determined philosophical issues relating to the design of the electronic health record format, such as types of nursing notes and plans of nursing care used; the patient case scenarios to be loaded into the electronic health record system; nursing informatics competencies for the beginning undergraduate nursing student; and homework assignments for each course.

Another of the supporting strategies of Eckel and Kezar's (2003) model, encouraging new positive interactions was not evident here as part of addressing the core competency of healthcare informatics. As previously noted, faculty members were not involved in the grant application, and they described the change agent as being outside of academia and difficult to work with. There was no evidence of any extensive internal communication plan with a range of strategies to communicate the activities of the pilot group to faculty at large.

In summary. Establishing support structures was previously addressed under the senior administrative support core strategy, and was evident at the Large State University College of Nursing. The remaining support strategies relating to this core strategy were not evident. According to Eckel and Kezar (2003), the intent of this core strategy is to instill a sense of trust, to clarify misunderstandings and rumors, and ultimately to foster a sense of community across the campus. The faculty's shared governance process was not included in writing the grant application. Faculty member perceived the opportunity to influence results of the informatics grant initiative as 'after the fact.'

Core strategy: staff development. Eckel and Kezar's (20003) linked this strategy to the support strategies of tapping outside perspectives, facilitating communication, and identifying and creating linkages among various campus activities. The supporting strategy of facilitating communications has already been addressed and was not evident at the Large State University College of Nursing.

Inviting outsiders can, in many instances, allow for questions that may be difficult for campus leaders to raise (Eckel and Kezar, 2003). Tapping outside perspectives helps to advance change at the college level by providing opportunities to explore ideas and

assumptions, by developing new ways of thinking, and in surfacing unexplored assumptions and beliefs. At the Large State University, the nursing informatics leader initiated faculty development days on a quarterly basis, focusing on different informatics competencies such as the use of the hand held device (PDA). Outside speakers were often used during this time, and the national EHR company staff presented the electronic health record system to faculty.

In summary. Only one of the supporting strategies, specifically, the tapping of outside perspectives, was evident for the core strategy of staff development. Eckel and Kezar (2003) identify the importance of communicating the multiple projects and the connections among change activities to reassure organizational members they are a part of a community and are not working in isolation. There was no evidence that college leaders attempted to facilitate communication among faculty members at large, or to identify and create connections linking various activities.

Core strategy: flexible vision. Supporting strategies linked most often to the core strategy of flexible vision include several of the supporting strategies already discussed, such as, tapping outside perspectives (evident), facilitating communication (not evident), and making connections (not evident). I will discuss the remaining support strategies of promoting long-term orientation, sustaining momentum, setting expectations and holding people accountable, and putting issues in a broader context.

The commitment to nursing informatics core competencies to be integrated into the curricula began in 2002, five years prior to my on-site visit. Leadership representatives of the college of nursing demonstrated continued administrative commitment to the project in their decision to continue funding the national EHR

company CIS platform and an IT support person for this system. It was evident that the leadership team communicated a long term commitment to the faculty members with plans to select another nursing informatics expert lead to replace the original expert, who resigned.

According to Eckel and Kezar (2003), sustaining momentum during the change process is a strategy relating to flexible vision. Too much change can exhaust members within an organization while too little progress can stall the change processes. There was concern about the sense of urgency regarding actions taken to sustain the progress. For example, one faculty member remarked that "we may be okay [in waiting to select the next informatics project leader] one or [even] two semesters, but not any longer." The core strategy of setting expectations and holding people accountable was noted only within the core faculty group. The structure of grant awards requires documentation of objectives and regular reporting of activities accomplished; however, there was no evidence of this being employed by the leadership team for the faculty members at large. Eckel and Kezar's (2003) model suggested two types of expectations that should be publicly communicated by leadership: how the objectives are to be accomplished and how the campus will be different and improved. Part of this change strategy includes addressing campus behavior and priorities. These are developed through extensive consultation and listening to change leaders, faculty, and various campus subgroups, ensuring that faculty members believe they are part of something critical. Most of the supporting strategies discussed by Eckel and Kezar (2003) under this core strategy were not applied in the Large State University College case study. There was evidence of only two, tapping outside perspectives and promoting a long-term orientation.

There was no evidence that the leadership team framed the implementation of nursing informatics in a broader context by extending the issues beyond Large State University College of Nursing. This support strategy, according to Eckel and Kezar (2003), helps leaders to raise the level of importance of the processes of change, makes the local challenges more reasonable when compared to state-wide or national happenings, and helps to depersonalize the issues for the individual faculty members.

In summary. Three of the seven supporting strategies for the core strategy of flexible vision had already been previously addressed. Tapping outside perspectives and promoting long-term orientation were the supporting strategies evident at Large sState University College of Nursing. There was no evidence of sustaining momentum (yet), setting expectations and holding people accountable, or putting issues in a broader context.

Core strategy: visible action. All supporting strategies linked to Eckel and Kezar's core strategy of visible action have been discussed. The evident supporting strategies include: establishing supportive structures, providing financial resources, and offering incentives. The supporting strategies *not evident* include: encouraging communication, setting expectations and holding people accountable, and facilitating connections and synergy. There were some substantial (but incomplete) efforts by college leaders to demonstrate visible action during the change process at the Large State University College of Nursing.

In summary. Seven of the 15 supporting strategies were employed during implementation of the electronic health record at the Large State University. These supporting strategies were: 1) altering administrative structures; 2) establishing support

structures; 3) offering incentives; 4) using external events to promote change internally; 5) providing financial resources; 6) tapping outsider perspectives; and 7) promoting a long-term orientation to the change processes. Other supporting strategies were employed only within a small group of undergraduate nursing faculty. I chose not to include these supporting strategies since they were evident only in the pilot group but not throughout the college.

Demonstrating Balance

Eckel and Kezar (2003) identified the importance of striking numerous balances between the five core and 15 supporting strategies and the long-term orientation to the change processes at a deep and pervasive level. Moderating the pace of change required leaders to balance speed of the change with patience. Faculty members expressed dissatisfaction in not being involved in the grant application and not being invited to discuss the amount of work that would be needed to implement the grant. As discussed in the core strategy of flexible vision, sustaining momentum was a concern mentioned by faculty. I also did not observe additional types of balance identified by Eckel and Kezar (2003), for example, balancing participation of various faculty members and staff, non-tenured and tenured faculty, faculty from different disciplines, faculty and staff, and leadership and faculty.

There was a concern by faculty members that too little change was occurring after the grant was completed and there was not a named person to lead nursing informatics. The use of only seven of the fifteen supporting strategies, also demonstrate a lack of balance by employment of too few of the supporting strategies. Four of the eight neglected supporting strategies included the core strategy of collaborative leadership.

Demonstrating balance by college leaders includes the balance of faculty participation between junior and seasoned faculty, and faculty members from different disciplines, which was not evident here. There was evidence of a long-term approach to nursing informatics by college leaders in their on-going financial support of the electronic health record usage costs.

Research Question Four

Is the Large State University approaching the shift to healthcare informatics as the broad and deep change in values, culture, and structures that would characterize a transformational change?

Eckel and Kezar's (2003) research confirmed transformational change takes time to reach fruition. The Large State University College of Nursing began to address the core competency of healthcare informatics in 2002, with the hiring of a part-time nursing informatics expert. However, the major impetus to move the integration of nursing informatics into the simulation lab and parts of the curricula occurred only after the grant was awarded. The grant was awarded for a three year period, which had ended approximately three months prior to my on-site visit.

I have presented the processes of change employed at the Large State University College of Nursing, along with the evidence or lack of evidence that the key aspects of the Mobile Model were or were not employed at the Large State University College of Nursing. These included the role of sense-making, the attention to the academic culture, and the interrelationships among core and supporting strategies.

There was no evidence that the leadership team engaged faculty in intentional conversations designed to leave behind old ideas, assumptions and mental models about

nursing informatics. However, I did find evidence that the small group of clinical faculty and the nursing informatics project leader engaged in sensemaking. There was only limited evidence the leadership team had paid close attention to the academic culture. For example, some faculty stated that the shared governance structure within the college of nursing was not included in the grant application process. They said that faculty members were not informed of the grant until the grant was actually awarded. Participation by faculty members outside of the core group involved in the grant has been spotty.

In reviewing the interrelationships among Eckel and Kezar's (2003) core and supporting strategies, I determined the major core strategy evident at the Large State University College of Nursing was support from senior administration. I also found evidence of the supporting strategies most often linked with this core strategy. Financial support was provided, administrative structures were altered, support structures were established, outside events and activities to promote internal change were employed, and incentives were offered to the faculty members involved in the grant project. The core strategy of staff development and flexible vision included the tapping of outside perspectives. In addition, there was evidence of a long-term orientation and commitment to continue the change processes related to nursing informatics. The core strategies of collaborative leadership, staff development, flexible vision and visible action all focus upon the breadth of the change. For example, the core strategy of collaborative leadership focuses on developing extensive internal communication plans, inviting participation, and providing opportunities to influence results to instill a sense of community. Staff development also relates to facilitating communication between the multiple projects and establishing connections among activities to reassure members they are not working in

isolation. Flexible vision included sustaining momentum, setting expectations and holding people accountable, or putting issues in a broader context. Visible action included such behaviors as extensive consultation with and listening to faculty members. Participants mentioned none of these activities during my interviews.

The importance of striking numerous balances between the five core and 15 supporting strategies and the long-term orientation to the change processes at a deep and pervasive level is seminal to transformational change; and these types of balance, identified by Eckel and Kezar (2003), were also not observed. For example, there was no evidence of leadership team's consideration of balancing participation of various faculty members and staff, non-tenured and tenured faculty, faculty from different disciplines, faculty and staff, and leadership and faculty.

Eckel and Kezar (2003) also suggest structural and cultural evidence markers of change to determine the depth of change processes within an organization. Such markers are concrete measurements that can be counted and compared to baseline sets of data, for example, changes in curriculum, in pedagogies, in student learning and assessment practices, policies, budgets, new departments, and in both institutional structures and new decision-making structures. I did find evidence of budgetary changes within the Large State University College of Nursing, such as the part-time PhD nursing informatics expert, first funded in 2002. The leadership team supported the grant project and has continued to support the national EHR company information system and the nursing IT specialist for this system. There were structural evidence markers of change in pedagogies and in student learning and assessment practices. The nursing informatics expert and the small group of faculty members accomplished the integration of the

competencies for beginning nurses as identified by Staggers, Gassert, and Curran (2001) in the medical-surgical and critical care courses and the clinical high-fidelity simulation labs. Based on faculty members' descriptions of the simulation laboratory experiences, I conclude that this Large State University College of Nursing is involving a nursing competency-based approach, problem-based and active learning pedagogical practices. Faculty responses, however, were not clear as to any formal description of these processes. The participants observed student learning assessment practices as changing within the simulation laboratory.

Structural evidence by itself did not necessarily suggest transformational change. There is a need for an additional set of evidence to identify the cultural impact of the transformation. These cultural indicators signaled attitudinal and cultural shifts that suggested the institution had developed new capacities and a new set of beliefs and assumptions about the changes. The examples of these indicators at Large State University College of Nursing were only observed within the small group of clinical nursing faculty.

In conclusion. Large State University College of Nursing leaders did not approach nursing informatics as a transformative change, but as an adaptation. According to Eckel and Kezar (2003) adaptation is described as a deliberate modification or adjustment by the organization or its units in response to the external environment. Adaptation is systemic; it is comprised of interdependent relationships with the external environment which can be at the individual unit level versus organizational-wide; and can allow subunits to adapt to change without widespread organizational disequilibrium. A loosely coupled system can, however, evince lack of coordination, difficulty responding

to change in an unified manner, and communication that is inconsistent. Adaptation is similar to transformational change in that both are ongoing processes and not single events. Both include responding to environmental changes. Transformation is also distinct from adaptation in that adaptation lacks the breadth of transformational change.

Eckel and Kezar (2003) note two characteristics that differentiate transformational change from adjustment, isolated change, and far-reaching change -- depth and pervasiveness. My research demonstrates that the Large State University College of Nursing did not experience a shift in healthcare informatics as the broad and deep change in values, cultures and structures that characterize a transformational change. Based on Eckel and Kezar's definition, I conclude the Large State University College of Nursing did experience deep change; however, it is limited in to the medical-surgical and critical care clinical nursing faculty members who were also involved in the computerized simulation lab. There was evidence of a shift in values and assumptions in that the small group of faculty members did appear to be thinking and acting differently. I also documented intentional conversations relating to the daily work environment of the faculty members and the nursing informatics expert.

The Large State University College of Nursing's experience of high depth and low breadth as identified by Eckel and Kezar's (2003) model is in line with the leadership team's initial strategies to introduce nursing informatics into the curriculum. In 2002, they employed a nursing informatics expert to serve as a change agent to provide expertise for faculty members and to identify nursing competencies to be integrated into the simulation lab and medical, surgical and critical care course content. In 2004, the award of a grant was a major impetus to move the processes of change forward, at least within the small

group of faculty members who were involved in the computerized human simulation lab. During my on-site visit, these faculty members expressed excitement at their successful integration of nursing informatics into the curricula. They now have a good understanding of nursing informatics and are promoting their experiences and conveying their enthusiasm to other faculty members.

Findings at St. Scholastica School of Nursing

Introduction

St. Scholastica is a private college comprised of a main campus and four extended sites. Total college enrollment exceeds 3,000 students. The School of Nursing, one of seven schools of the college, has an undergraduate nursing faculty of 19. The school of nursing offers programs through the doctoral level, and graduates approximately 112 baccalaureate trained nurses each year. Within the college, the School of Health Sciences has students in physical therapy, occupational therapy, social work, exercise physiology, and health information management (http://www.css.edu/About_St_Scholastica.html).

Seven participants were interviewed: four were PhD or EdD prepared, and three were MA or MS prepared. Participants included both administrators and faculty, with longevity of three to 26 years: Three had been with the institution in excess of 17 years; four had been there four years or less. Three of the seven participants received formal training in informatics; the rest received only informal training. To preserve anonymity, all participants in this chapter will be referred to as an administrator or faculty member.

I have organized participants' independent accounts regarding the strategies used by their school of nursing to address the core competencies of healthcare informatics in the same format for all three cases. First I will provide an overview of what is occurring

in the undergraduate nursing curriculum, classroom, and laboratory settings. Second, I present participants' perceptions of change processes regarding what specific methods were used, and why these particular key strategies (critical decisions, improvements, and/or processes) were selected. Third, I will present the reasons I believe St. Scholastica School of Nursing has not yet approached its shift to healthcare informatics as the deep change in values, culture and structures characterizing a transformational change as defined by Eckel and Kezar (2003). As of 2007, St. Scholastica has addressed healthcare informatics in an interdisciplinary approach. Breadth of the change was limited to a small group of undergraduate nursing faculty members who made important changes in their ways of thinking and teaching.

Research Question: How is the Healthcare Informatics Core Competency Addressed?

St. Scholastica College of Nursing used the electronic health record developed by Cerner Corporation for sale and use in medical facilities, and loaded college alumni medical records (personal identifiers erased) into the electronic record for educational purposes. These electronic health record case studies are categorized to conform to the nation's top 10 disease prototypes. Faculty members can use the scenarios with undergraduate nursing students in the classroom, homework assignments, and in a simulation laboratory (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Advance_March_2004.html).

In the classroom, the electronic health record is available for students to document and analyze clinical data in case studies with the disease prototypes. Faculty members have automated capability to project all student documentation onto a screen, allowing

them to point out trends and discrepancies. They are thus able to offer immediate student feedback and facilitate classroom discussions. A faculty member explains the use of case scenarios in the classroom: "The learning process is one of discovery. Patient cases can be reviewed in the classroom across time periods to evaluate [skills such as] nursing interventions, actions, and assessment."

An administrator observed changes in homework assignments following implementation of the electronic health record: "Student homework assignments are carefully planned with questions that encourage students to think, and to discover answers as they discuss with other students in the classroom." Since the electronic health record is accessible through the Internet at any time, students can access clinical course assignments for faculty members to review on-line.

A faculty member explained that even those faculty members who do not like the electronic health record in the classroom accept its use in the simulation lab. Nursing schools have traditionally used procedural-based clinical simulation labs with mannequins to practice clinical skills before students encounter live patients. St. Scholastica purchased high-fidelity computerized human simulators in academic year 2005-2006, and the electronic health record has been integrated into the simulation lab. Nursing students can use the electronic health record to document the procedures, and can access the Web at the point-of-care for evidence based practice standards and answers to questions. Students are also assigned to follow specific patients in the high-fidelity simulation lab (http://www.css.edu/resources.css.edu/athensproject/Images/Frontpage.ppt).

Students are introduced to the clinical information system (CIS) through a virtual health care delivery environment such as an acute care hospital. Students are given patient scenarios that have been pre-programmed into the computerized simulator. As the student progresses through his/her coursework, the simulation lab experience becomes more sophisticated. Faculty members are observing students' interactions with the mannequin (patient) and with each other. Student learning groups are used to provide a systematic feedback to faculty. A faculty member described laboratory simulation:

> Simulation is a critical piece of our teaching methodology because it is active learning. A computerized simulator, which is programmed by the top ten diagnoses, responds like a human being. Students are given patient scenarios to demonstrate nursing procedures, interdisciplinary communication, and critical thinking within a controlled, virtual clinical environment. The electronic health record provides necessary patient data and web-based clinical resources on the select diagnosis.

The simulation lab promotes active learning and provides a controlled environment that guarantees the clinical experience of a select disease according to the semester syllabus. A faculty member added: "We guarantee students will experience select patient scenarios in the simulation lab. In an [actual] clinical setting, there can be no such guarantee." Another faculty member reported feedback from hospital staff concerning their students who have used the computerized simulation setting:

The hospital staff has reported that our students ask better questions and interact with

> other members of the health care team in a more confident manner. I attribute the enhanced professionalism to our computerized simulation lab, which also has an

electronic health record at the bedside. The simulation requires our students to interact face to face and give constructive feedback to each other.

Next, I will discuss the key strategies (critical decisions, improvements, and/or processes of change) used at St. Scholastica to address the core competency of healthcare informatics.

Research Questions Two and Three: What Strategies Were Used, and Why They Were Selected?

College leaders had general concerns with enrollment and financial strength that are common to most private colleges. The school of nursing was also concerned about the passing rate of its graduates on the nursing exams. These concerns led college leadership to undertake two related but distinct change processes— one incorporating informatics and another reforming the undergraduate curriculum. St. Scholastica School of Nursing began its change processes from a strategic perspective, using faculty subgroups that worked simultaneously on both change projects. The subgroups began merging their strategies in academic year 2004-2005. I will discuss the overall objectives of, then the specific change processes implemented by each group, by academic year.

Faculty subgroup one: revision of the undergraduate nursing curriculum. A small group of faculty members began revising the undergraduate nursing curriculum in 2002. A faculty member explained their objectives: "We revised the curricula for the following reasons: to create a new curriculum, to decrease clinical faculty time in hospital setting [because we had] limited clinical faculty, and to enhance student preparation for clinical experiences." Additional objectives of the curricula faculty subgroup were identified when an outside consultant was engaged in 2004 to assist this faculty subgroup to

enhance pedagogical practices and increase student pass rates on the National Council License Examination-Registered Nurse (NCLEX) exam.

Faculty subgroup two: implementation of healthcare informatics competencies. Based on the recommendation of a member of the Health Information Management (HIM) department, an administrator from the school of nursing agreed to explore the concept of employing healthcare informatics within the nursing and allied health professions programs. Several college representatives visited the Cerner Corporation to view their electronic health record and, later, to discuss a partnership as part of a grant application. An administrator described the selection process:

> A member of the Healthcare Informatics and Information Management [HIIM], who had professional contacts among health information management professionals employed by the Cerner Corporation, convinced other college representatives they needed to learn more about the electronic health record. I was absolutely wowed…. My whole focus was using this system to teach the health professions. Cerner Corporation was willing to partner with us to create an electronic health record designed [specifically] for educational purposes.

In 2001, St. Scholastica, through a partnership with the Cerner Corporation based on an Application Service Provider (ASP) model, received a $1.8M Title III grant from the U.S. Department of Education. Title III-A grants are awarded to eligible institutions of higher education to increase self-sufficiency and to strengthen their capacity to make a substantial contribution to the nation's educational resources (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_

Room/Annual_Report_2004-2005.html). An administrator described the thought processes behind the application:

> The Title III grant is used to help institutions that are vulnerable, and [we] made the case that enhancing our curricula with progressive technology content such as the electronic health record would contribute to increased enrollments in these programs and to increased financial stability for the college. A small group of faculty engaged in the vision that we could be distinctive in the market by using our HIIM department and our relationship with Cerner Corporation to implement the electronic health record in our curricula.

A small group of faculty members representative of each of the health professions programs were selected to address the Title III healthcare informatics grant award. Their overall objective was to integrate the electronic health record into the allied health professions and undergraduate nursing curriculum. The results expected from this objective were to increase enrollment in *all* health professions, enhance financial stability, and increase academic quality (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Annual_Report_2004-2005.html).

Attention to academic culture. The Title III-A grant application included all health professions and nursing with a representative of the Healthcare Informatics and Information Management department to serve as the lead healthcare informatics person. This lead healthcare informatics individual, a technology person, a health profession administrator, and one lead faculty member from each of the health professions served as the faculty subgroup to plan and implement the healthcare informatics grant

http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Dr_Brailer_press_release.html).

The reputation of the HIIM Department provided a cultural foundation on which to base the facilitative lead for healthcare informatics core competency across the health professions. Faculty members respected these professionals, who already had an established degree of trust prior to the introduction of healthcare informatics. The HIIM department was a natural fit for St. Scholastica's culture as the leader for healthcare informatics core competencies. According to a faculty member, the Healthcare Informatics and Information Management department is nationally recognized for their innovation. "They have a long history of providing outstanding professional services and always ready to assist the faculty with whatever we need." St. Scholastica's website described the department's reputation:

> The Health Information Management (HIM) profession was 'born' at CSS in 1934 when the college established the first baccalaureate program in the nation in this discipline, then known as "medical record science." For decades this program has sustained a national reputation for leadership and innovation among the HIM education community (http://www.css.edu/Academics/School_of_Health_Sciences/Health_Information_Management.html)

A faculty member spoke about St. Scholastica's model to address change processes: "The leadership team selected a combination of early adopters and steady, well respected faculty who are open to new ideas, [but who] give due consideration before taking action." An administrator added that, in her mind, lead faculty are the ones

"who bring the vision [healthcare informatics] to life." She continued:

> Faculty must have a sense of ownership. The strategy was to select opinion leaders whom the faculty respects and [who] could convince others to be involved with the change processes. We communicated the change challenge to identify ways to use the electronic health record in a more creative and robust way. We asked questions: Would you? Could you? What do you think? Why not? Then we got out of the way. We would meet with the lead faculty members periodically with ideas and motivate, encourage, cheerlead, and bring enthusiasm to the change processes.

According to the website, St. Scholastica had eight lead faculty members– at least one designee from each academic program – who served as the "point persons" for project related initiatives in their department - and two IT project staff (http://www.css.edu/resources.css.edu/athensproject/Images/Frontpage.ppt). An administrator explained the careful selection of lead faculty:

> We have 19 undergraduate faculty members with diverse opinions. Faculty members align with different faculty, [so] we chose two nursing faculty members to serve as project leads. We identified faculty members who demonstrated energy and enthusiasm for the vision [of healthcare informatics]. One member's strengths included respect, credibility, and longevity among faculty. The other was an energetic adopter of innovation and was very creative.

In the next section, I discuss the strategies employed by each faculty subgroup. The following table 1 lists the processes of change by academic year for each faculty subgroup.

Table 1

St. Scholastica Timeline by Year of Strategies of Two Separate Faculty Groups

Year	*Healthcare Informatics*	*Undergraduate Nursing Curriculum*
2002-2003	Established infrastructure	Organized to revise undergraduate nursing curricula
2003-2004	Selected lead faculty and trained them on the electronic health record system, created electronic documentation templates for allied health professions	Engaged outside consultant, began active learning pedagogy approach to curricula revision
2004-2005	Requested undergraduate nursing curricula faculty group to use the electronic health record in one course, requested patient cases to be loaded into electronic health record, and established a Center for Leadership and Innovations in Health Care	Selected a 'generalist curricula' approach using nation's top ten disease prototypes
2005-2006	Loaded alumni personal health records into electronic health record, signed first contract for the ATHENS subscription service	Linked electronic health record, computerized mannequins, problem-based curricula approach and active learning pedagogy
2006-2007	Integrated two technologies, accomplished Title III-A grant objectives	Began phasing in the new undergraduate nursing curricula

Strategies Employed in Academic Year 2002-2003

Healthcare Informatics

Infrastructure established. The first year of implementation of the Title III-A grant objectives required the establishment of infrastructure. This infrastructure included development of the project website for internal and external communication of activities; a project evaluation plan, including data collection, tools and sources needed for the project; and fund raising efforts to support curriculum development projects. The project was named Advancing Technology and Health Education Now at St. Scholastica [ATHENS] (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Annual_Report_2004-2005.html).

Undergraduate Nursing Curriculum

Review of undergraduate nursing curricula. Several participants disclosed that revision of the undergraduate nursing curriculum, which began in 2002, took five years to complete. However, the review of the minutes did not document any meeting minutes until 2004.

Strategies Employed in Academic Year 2003-2004

Healthcare Informatics

Faculty lead selected and trained. During this time, the lead faculty was trained on Cerner's computer information systems applications for nursing and for the five health science professions. The lead faculty members were from exercise physiology, health informatics and information management, occupational therapy, physical therapy, nursing, and social work

(http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Annual_Report_2004-2005.html).

Electronic documentation tools created for allied health professions. The healthcare informatics grant project leader met with each faculty member from the allied health professions colleges to create basic documentation templates in the Cerner electronic health record. Since the grant objective was "to provide students the opportunity to use the electronic health record as a legitimate professional practice tool" (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Annual_Report_2004-2005.html), a faculty member noted the critical role of HIM staff in this area: "A huge amount of work was required for physical and occupational therapy, [since] the existing electronic health record had very little [in the way of templates, data, and forms] designed for these health professions."

Undergraduate Nursing Curriculum

Outside consultant engaged. An administrator reported the college paid for "an outside consultant [who] was engaged to discuss faculty teaching and student learning practices." She elaborated on the consultant's role:

> The consultant assisted faculty members in prioritizing the changes and the processes of revising the undergraduate curriculum, [and] assisted us with pedagogies, test writing, and student evaluation processes. Our NCLEX scores were low the year before the consultant was engaged.

Active learning pedagogy approach to curricula revision begun. According to a faculty member, "Our focus was integration of active learning throughout the undergraduate nursing curricula." According to Bonwell and Eison (1991), active

learning pedagogies are methods of teaching and interaction whereby an instructor allows students to learn in the classroom and/or laboratory with the help of the instructor and other students. The student is actively involved in the learning process, rather than a passive listener to the professor.

Strategies Employed in Academic Year 2004-2005

Healthcare Informatics

Electronic health record used in one course. The healthcare informatics faculty subgroup asked the undergraduate nursing faculty to introduce electronic health record in one of their courses (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Project_Update_Spring_2006.html). According to the March, 2004, junior course syllabi faculty meeting minutes, application of the electronic health record project was to be incorporated into a single undergraduate nursing course in fall 2004, and was scheduled for a second nursing course in spring 2005. A faculty member recalled the discussion:

> The grant required faculty to choose a course in the undergraduate nursing program, [so] at first we felt like we had to implement the electronic health record into the undergraduate curriculum [only] because of the grant. We were changing the curriculum at the time, so we decided to use the electronic health record in the health assessment class.

According to an administrative representative:

> The nursing faculty selected the health assessment course because it is the first course at the sophomore level in the undergraduate nursing program. The course

focuses on clinical assessment skills, and seemed to be the right place to begin the student's introduction to the electronic health record as a teaching and learning tool.

Cerner's electronic health record had basic templates already built into its structure for use in acute care hospitals. The introduction of the electronic health record in the health assessment class was not successful. A faculty member described the students' negative reaction:

> We allotted three hours for students to use the electronic health record. This class did not go very well because of Internet connectivity glitches between our college and Cerner Corporation. The system didn't work right and students didn't know how to use hand-held computers. Students want to get as much as they can from a class and [were] frustrated by sitting at computers when they experienced the connectivity glitches. The next semester, those students didn't want to use the electronic health record. [This] caused some difficulty, but we persisted. The electronic health record project started [the following semester] with some bad publicity because of the glitches during the first semester. [But,] by the time we moved it into more courses, students who had been in the [original] classes were gone.

Request to load case scenarios into electronic health record received. Once several faculty members used the electronic health record in one undergraduate nursing course, nursing faculty members asked that patient case scenarios be loaded into the system. An administrator explains: "Nursing faculty [wanted] patient case scenarios loaded into the system. Nursing used the electronic health record in a more creative,

robust way than the other health professions, which used it [only] as a documentation system."

Center for Leadership and Innovation in Healthcare established. As previously stated, in academic year 2002-2003 the healthcare informatics project at St. Scholastica was named ATHENS. In March 2005, a separate structure within the college was created to be the organizational home for the subscriptions services for other schools to purchase the Cerner EHR. The integrating of the EHR into other schools and classes remain within academia. It was named the Center for Leadership and Innovation in Healthcare. (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Year_5_Annual_Report_.html.

The center's strategic theme is to be entrepreneurial and proactive in executing efficient and effective ways to improve health care education. The goal of the center is to be a revenue-generating organization that identifies trends within both health sciences education and the healthcare industry, and uses expertise and innovative approaches to help address these trends (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Annual_Report_2004-2005.html). An administrator shared her perspectives about the Center:

> The center provides a business structure to experiment, innovate and create new ideas to address quality issues with the health care delivery system and the educational preparation of healthcare professionals. The business structure allows us to capture revenue as well [serving] as a structure which is outside the day-to-day academic processes. The electronic health record is one of the major

technological tools to change the future of healthcare. Academia must be a part of innovative approaches to create new processes to enhance that future.

The center offers a subscription service to other colleges and universities, which includes the academic version of the electronic health record, for a fraction of the time and cost they would incur in developing and maintaining a similar program on their own. Ongoing technical support and immediate access to all system upgrades are packaged with the service. Other schools can purchase additional services, such as consulting faculty to help with designing course integration activities and creating specialized forms for the client school (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Annual_Report_2004-2005.html). An administrator offered an update on the Cerner relationship:

> We continue to have a contractual relationship with Cerner that involves an established, on-going annual licensing fee for the continued use of their electronic health record platform for College of St. Scholastica [as well as for the] other colleges/universities that are partnering with us. This contractual relationship is administered by the Center for Leadership and Innovation in Healthcare.

Undergraduate Nursing Curriculum

Generalist curricular approach selected. According to junior course syllabi faculty meeting minutes (2004, March), faculty made plans to introduce case studies representing prototypes of leading US health issues into the course content. These prototypical cases were to be threaded throughout clinical courses in order of increasing complexity.

Strategies Employed in Academic Year 2005-2006

Healthcare Informatics

Alumni health records loaded into the electronic health record. The HIIM Department responded to nursing faculty's request to incorporate actual patient case data into the electronic health record. Alumni were asked to authorize use of their medical records to abstract clinical case data so the electronic health record could be populated with current, relevant cases. At least 25 such cases were added to the system over the summer of 2005 (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Project_Update_Spring_2006.html). According to an administrator:

> We received over 50 cases from our alumni, and selected 25. [After] patient identifiers were erased, we had data rich day-to-day records of all kinds of health problems from these donated records. The sample electronic health records have day-to-day notes and therapies provided. We decided to call these 'pristine cases,' rich with information. [We loaded them] into the system and selected cases that related to our curriculum. This process was a motivator for faculty, since they didn't have to develop their own cases. Faculty could use these cases, modify them and create assignments from real live patient scenarios.

A clinical data abstractor was hired on a temporary basis to support the clinical case building. This person assisted the HIIM Department in loading alumni medical records into the electronic health record. The position was funded through grant monies (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Project_Update_Spring_2005.html).

First contract for ATHENS subscription service signed. The College of St. Scholastica initiated its first ATHENS Subscription Service to two clients in Minnesota and in Arizona in spring, 2006 (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Project_Update_Spring_2006.html).

Undergraduate Nursing Curricula

Electronic health record and other components linked. At this point, the undergraduate nursing faculty subgroup was evaluating use of the electronic health record in a second course, and developing problem-based curricula with active learning pedagogies.

As discussed in the literature review in Chapter 2, problem-based learning engenders more self-directed learning and does a better job of providing students with a process for integrating what has already been learned. This faculty group was working on a robust family of case scenarios by disease prototypes with the electronic health record when another technology caught their attention. The group realized the new high-fidelity simulation mannequins in their simulation lab should be included. A faculty member recalled: "A group of faculty attended a national conference about active learning, [and] discovered simulation lends itself to active learning." Another faculty member summed it up, remarking that "it all just seemed to come together." She continued:

We were asked by the healthcare informatics subgroup and leadership team to incorporate the electronic health record in one of our courses. We were designing our

'generalists' curriculum as problem-based, problem-driven, with the use of case studies based on the nation's top ten disease prototypes. Our focus was integration of active learning throughout the curricula. ATHENS gave us the idea that we could have this robust family of problem-based case scenarios by disease prototype. This is when we realized the electronic health record could be the tool to run our laboratory simulations with the disease prototypes.

The undergraduate nursing faculty subgroup began to notice the complimentary aspects of the generalist curricula approach using the nation's top ten disease prototypes and high-fidelity simulation to active learning pedagogy. The School of Nursing purchased computerized patient simulation equipment and linked that technology with the electronic health record to promote active learning. An administrator supported the integration of high-fidelity mannequins in their simulation laboratory. "Lab simulation needed to be integrated into our curriculum in a different way, and we knew the electronic health record by itself wouldn't get us where we wanted to be." Nursing faculty began using the high-fidelity simulator with students using the ATHENS electronic health record (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Project_Update_Fall_2005.html).

Strategies Employed in 2006-2007

Healthcare Informatics

Two technologies integrated. The healthcare informatics subgroup responded to the curricula faculty subgroup, assisting with the integration of two technologies

supporting nursing education: the electronic health record as a tool to run the clinical simulations with the computerized human mannequins. Now, students and faculty members can access the electronic health record at the bedside of the simulation case using wireless laptop devices connected to a web-based, remote-hosted service. (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Year_5_Annual_Report_.html) The electronic health record began in the nursing program in conjunction with high-fidelity simulator http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Project_Update_Spring_2006.html

Title III-A grant objectives accomplished. According to St. Scholastica's website (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Annual_Report_2004-2005.html), "The purposes of the grant were to increase student capacity; to increase self-sufficiency [of the college]; to increase financial stability [of the college] and to strengthen capacity [of the college] to make a substantial contribution to the nation's educational resources." According to the Title III third year grant report:

> Nursing enrollment increased over 50% by end of year 3 [2005]. By leading to the development of a new model for health professions education, this program allows the college to make a substantial contribution to higher education resources of the nation. Our students gain competencies in using the electronic health record as a legitimate professional practice tool (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Project_Update_Spring_2006.html).

This report also included a status report on the goal to increase the financial stability of the college:

> [The] ATHENS Project funded by this grant served as the impetus for seeking resources for two additional projects: an Electronic Health Record (EHR) Implementation Best Practices research effort, and a Personal Health Record (PHR) Implementation effort. Both proposals received funding in late 2004, and the projects were implemented in 2005. The EHR project was funded by a local foundation (Blandin Foundation), and the PHR project by a state foundation (Minnesota Community Foundation). The outcomes of these two projects are also fueling new discussions related to improving the electronic health information infrastructure on campus. Over the past year, the Title III grant has clearly contributed to bringing additional resources to the college by raising the visibility of the organization throughout the state and the region and by stimulating new ideas and the energy to pursue them among college faculty and staff. (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Year_5_Annual_Report_.html).

Undergraduate Nursing Curricula

New undergraduate nursing curricula phased in. The undergraduate nursing curriculum group began planning for the revision of the undergraduate nursing curriculum in 2002, and began a phasing-in process in academic year 2007-2008. A faculty member described the new curriculum:

> Our students are prepared as 'generalists.' Students no longer spend a semester in specialty areas. For example, [current] students may spend [only] one day on the

obstetrics unit in their clinical rotation. Our new curriculum is built on prototypes. Each course has six prototypes, and six faculty members teach in an active learning environment.

This was accompanied by a reduction of clinical time in a hospital nursing unit. As a faculty member explained, “Students are spending one day per week [instead of] a day and a half in clinical settings such as the hospital. The other four clinical hours are in the lab.” Another faculty member described decreased clinical faculty time in the hospital setting:

> A portion of the requisite clinical hours are now observed in a virtual hospital environment, where the clinical instructor/student ratio is 1:14 versus 1:8 on an actual clinical unit or site. There are three credit hours for the clinical course and one credit hour for the simulation laboratory.

The electronic health record stores a number of prototypical patient cases that are available to faculty for planning lessons and assignments, and to students for homework and laboratory exercises. These cases, which include the cases donated by alumni, are threaded throughout clinical courses in order of increasing complexity. Since the new undergraduate curriculum was implemented so recently, there has not been enough time to determine how the strategies affect the graduate’s NCLEX scores. The NCLEX scores was one of the goals set by the faculty and administrative teams. According to the Minnesota Board of Nursing Education Annual Report, College of St. Scholastica NCLEX-RN first-time success rate percentages, do point to a positive trend, starting in 2004 at seventy-seven percent, and increasing to eighty-five percent in 2005, eighty-three percent in 2006, and eighty-nine percent in 2007. Several participants suggested student

improvement had occurred based on their own observations and/or on comments by faculty members or hospital clinical staff.

In summary. Two small groups of faculty members began their journey to accomplish their strategic objectives during academic year 2002-2003. In academic year 2004-2005, the two separate groups of faculty worked separately, then together, responding to the others' requests. For example, the healthcare informatics interdisciplinary faculty group requested that the undergraduate nursing faculty introduce the electronic health record in one of their courses. The undergraduate curricula faculty group responded tentatively; however, as they began integrating active learning pedagogies into the generalist nursing curricula approach, they began to realize the educational benefits of the electronic health record. The HIIM Department began loading patient case scenarios donated by college alumni into the system following the top ten disease prototypes. Later, as the integration of high-fidelity computerized mannequins into the simulation lab in conjunction with the electronic health record progressed, their ideas became reality. An administrator explained the synergistic results of the two faculty groups:

> We wish we could say we had a grand scheme and knew what our vision was for our nursing program. One word we would use to describe our change processes is synergy. The combined efforts of the two faculty groups have resulted in an impressive undergraduate nursing curriculum. We were involved in major change processes, the holistic revision of the undergraduate nursing curriculum, and integration of the electronic health record and then the high-fidelity simulation. Our accomplishments thus far have been great serendipitous events.

The contractual relationship with Cerner Corporation is administered through the Center for Leadership and Innovation in Healthcare. The center administers a subscription service to other colleges and universities which includes an established on-going annual licensing fee for the use of the electronic health record. Consulting services are provided to other college and universities, which is a revenue source for St. Scholastica. These consulting services provided opportunities for St. Scholastica faculty members to interact with other faculty members. The center also promotes a long-term orientation to the processes of change related to healthcare informatics.

In the next section, I provide examples of discussions among faculty members which demonstrate sensemaking activities among the two faculty subgroups. Then, I discuss the core strategies and the support strategies employed by St. Scholastica School of Nursing leadership.

The Role of Sensemaking

According to Eckel and Kezar (2003) "Getting people to adopt new mind-sets is a cognitive and intellectual process spurred by a set of activities that can be intentionally designed to leave behind old ideas, assumptions, and mental models" (p. 73). This process is known in organizational behavior literature as organizational sensemaking (Gioia & Chittipeddi, 1991; March, 1994; Weick, 1995). Leaders at the transforming colleges and universities intentionally explored the meanings of proposed changes for faculty work and pedagogies, creating a personal reality for college faculty and staff by continually negotiating meanings and reaching consistent new understandings within the shifting work environment. Eckel and Kezar (2003) found that during significant transformational change periods, this process occurs more frequently. The need for a

fresh understanding of the impact of the proposed change on individuals becomes more important as they attempt to fathom the shifting terrain of their world.

Nursing college leaders were supporting the processes of change 'behind the scenes' to motivate and encourage the lead faculty members within the two faculty subgroups. There were reports of sensemaking within the two faculty subgroups, and between these faculty members as they explored the combination of active learning, pedagogy, and the electronic health record as a tool within the computerized simulation lab. I found evidence that the health care informatics faculty subgroup engaged in sensemaking in conversations relating to the impact on the daily work environment of the people involved. An administrator spoke about the dynamics among the lead faculty:

> These two faculty members have taken the electronic health record innovative concept and driven it through the curriculum processes. They learned how to use the electronic health record, its possibilities, problem solved together, and worked as members of an interdisciplinary team.

There was additional evidence of the undergraduate nursing faculty subgroup engaging in conversations relating to the impact of the curricula changes on faculty and students. The engagement of an outside consultant to assist this faculty group to prioritize the curricula changes was one example of intentional discussions to adopt new mindsets, such as active learning pedagogy. An administrator reflected: "She [the consultant] may have opened a little bit of a door in some people's minds to doing things a different way, because we [hadn't been achieving] the results we wanted."

There was also evidence of sensemaking among faculty as they used the simulation lab. One faculty member explained:

> We have a full-time RN simulation lab coordinator. She's always there to help faculty set up the lab, and supports them with various learning strategies. She serves as a faculty mentor and helps them to see the common threads and linkages [between classroom and lab simulation].

My review of documents from the undergraduate nursing curricula faculty subgroup identified some discussions regarding student performance as a result of the computerized simulation lab. Student improvement in the second year was documented in the February, 2007, traditional (entry-level professional nursing practice) undergraduate nursing faculty committee meeting minutes:

> [They] students were much better prepared. For example, students in the gerontology class have demonstrated higher levels of critical thinking. Faculty members attribute this improvement to the clinical skills and simulation lab experience using the SimMan and electronic health record.

Several faculty members described observations of student performance in discussions among themselves. A faculty member stated: "Clinical instructors have reported the junior class students are better prepared to handle their first complex medical-surgical patient. The students' problem solving and critical thinking skills are noticeably improved."

In summary. The faculty subgroups engaged in sensemaking activities as they implemented various strategies with new understandings and the building capability to use the electronic health record and simulation pedagogies to teach in a different way.

There was limited evidence of college leadership personal involvement in getting faculty to think differently. Next, I discuss the five core strategies employed by St. Scholastica School of Nursing leadership and the evidence or lack of evidence of the fifteen supporting strategies.

Core and Supporting Strategies

St. Scholastica School of Nursing leadership employed all five of the core strategies which support sensemaking activities. Eckel and Kezar (2003) defined core strategies as "intentional mechanisms, processes, and tools available for campus leaders to effect major change that is deep, pervasive, and cultural, and that occurs over time" (p. 75). The underlying connection between the five core strategies, according to Eckel and Kezar (2003, p. 78) is that they are intended to assist people to think and to act differently. These strategies include: 1) senior administrative support; 2) collaborative leadership; 3) staff development; 4) flexible vision; and 5) visible action. Eckel and Kezar (2003, p. 109) found a need for additional strategies to augment the five core strategies in their Mobile Model. These 15 additional strategies occur less frequently, and play smaller, but still important, roles in facilitating transformational change. Some supporting strategies are linked to more than one core strategy. All five of the core strategies, and 13 of the 15 supporting strategies, were evident at St. Scholastica School of Nursing during their implementation of healthcare informatics.

Core strategy: senior administrative support. The five supporting strategies most frequently linked to this core strategy were in evidence. These strategies include altering administrative and governance processes, establishing support structures, providing

financial resources, offering incentives, and using various external events and activities to promote internal change.

According to Eckel and Kezar (2003), the supporting strategy of altering administrative and governance processes is intended to ensure that the desired changes ultimately become part of daily operations. These authors identified the creation of new positions and new units as both a supportive structure and a financial resource. This sends a message that "the change was important enough to receive staff, budgets, and office space" (p. 117). They believe that support structures are designed to assist change processes by providing new sources of revenue or reallocating existing funds to support them. The Center for Leadership and Innovation in Healthcare, previously discussed under strategies implemented in academic year 2004-2005, is an example of altering administrative and governance processes. St. Scholastica college leaders found new sources of revenue through the partnership with Cerner Corporation and in the marketing of their ATHENS product to other schools of nursing. St. Scholastica moved the business aspects of the health care informatics revenue producing functions outside the academic structure. The website cited critical process themes for the center, which include leveraging of existing college assets and resources, maintaining a business sense for all center initiatives, and providing the necessary structure to make decisions at a rapid pace. The center provides both financial resources and the new structure necessary to continue the long-term orientation of change processes related to health care innovation (http://www.css.edu/Academics/Special_Academic_Programs/ATHENS_Project/News_Room/Annual_Report_2004-2005.html). A faculty member noted:

> We just signed two contracts, [so] the center provides the college with a new source of revenue. This is an opportunity for faculty to apply their expertise and parlay this knowledge into other venues that will provide revenue. It's a Research and Development arm [of our college].

Eckel and Kezar (2003) identified another supporting strategy of senior administrative support, the offering of incentives to facilitate the change processes. The grant did provide some stipends for faculty members and several faculty members mentioned St. Scholastica's School of Nursing tenure and clinical track processes. One faculty member acknowledged the college's position that scholarship includes projects such as the implementation of healthcare informatics:

> We have a tenure track and a clinical track. Scholarship is looked at in a variety of ways, not just publishing, but also contribution to practice and presentations. If people are out for tenure, they're expected to meet a variety of [criteria]. Being involved in projects like the electronic health record is respected.

Another faculty member added: "We have a five-year rolling clinical track. The ATHENS project, revising the curriculum, integrating active learning and the simulation lab are all considered scholarship."

External factors are those events and activities outside the institution used internally by leaders to promote change. The annual updates required for the grant provided status reports of progress made within the health sciences and nursing schools. These updates cited the (IOM, 2003) recommendations on numerous occasions. The partnership with Cerner influenced the implementation of the health care competency of

informatics within the School of Nursing. Representatives of Cerner Corporation provided ongoing education to the faculty.

In summary. The core strategy of senior administrative support was employed by the St. Scholstica School of Nursing, along with all five of the most often cited supporting strategies of altering changes in administrative and governance processes; establishing support structures; providing financial resources; offering incentives; and using external events and activities outside the organization to promote change internally.

Core strategy: collaborative leadership. This core strategy is about developing extensive internal plans to facilitate communication, inviting participation, providing opportunities to influence results, bringing together people in new ways to foster communication and encouraging new interactions. Collaborative activities such as invited participation, opportunity to influence results, and facilitating communication between the two project groups was evident. School of nursing leaders fostered an interdisciplinary approach in the implementation of the electronic health record, with lead faculty members from each of the health professions participating in this group of faculty.

There was evidence of internal communication within the health informatics subgroup, announcement of accomplishments by the faculty group, and references to the planned actions for the next semester. These documents were cited on the ATHENS project website and in announcements in the college's internal newsletters.

Four faculty members described the processes of communication with faculty regarding activities within the two faculty subgroups. Faculty members at large were kept abreast of changes in individual sessions or small group discussions during which the two lead faculty members gave presentations. The lead faculty members also worked with

individual faculty to demonstrate ways in which ATHENS could be beneficial to faculty and students. One faculty member recalled day-long faculty meetings where ATHENS' pedagogy, active learning, and interactive teaching were discussed: "At one faculty meeting, there was a lengthy discussion about how to evaluate active learning." Another faculty member noted that the size of the faculty made it easy to have individual or small faculty group meetings to discuss the concerns, to teach, or to demonstrate ATHENS. "These types of discussions, whether at a luncheon or an open [meetings] are becoming more intentional," a faculty member remarked.

Another of the supporting strategies in Eckel and Kezar's (2003) model, that of encouraging new positive interactions, was evident here as part of addressing the core competency of healthcare informatics. In academic year 2004-2005, the health informatics faculty group began to interact with the undergraduate nursing curricula group when it was time for nursing to select a course to implement the electronic health record. The health informatics subgroup responded to the undergraduate nursing faculty group's request to load patient case scenarios into the electronic health record. In addition, the outside consultant for the undergraduate nursing curricula group, who was assisting with enhancing the curricula and introducing active learning pedagogies, stimulated additional ideas such as a generalist approach to curricula and use of top ten disease prototypes. All of these concepts encouraged new interactions and discussions regarding use of the high-fidelity simulation laboratory, and how the electronic health record could become a critical tool to integrate all these learning processes.

In summary. Establishing support structures was previously addressed under the senior administrative support core strategy, and was evident at St. Scholastica School of

Nursing. The remaining support strategies relating to collaborative leadership include developing extensive internal plans to facilitate communication; inviting participation and providing opportunities to influence results; and bringing together people in new ways to foster communication and encourage new interaction. All were part of the change process at St. Scholastica. According to Eckel and Kezar (2003), the intent of this core strategy is to instill a sense of trust, to clarify misunderstandings and rumors, and ultimately to foster a sense of community across the campus. The ATHENS Project web site provided ongoing communication regarding the activities of the healthcare informatics faculty subgroup (http://www.css.edu/resources.css.edu/athensproject/Images/Frontpage.ppt).

Core strategy: staff development. Eckel and Kezar (2003) linked this strategy to the support strategies of tapping outside perspectives, facilitating communication, and identifying and creating linkages among various campus activities. The support strategy of facilitating communication overlaps the collaborative leadership core strategy and has been addressed previously. The engagement of an outside consultant, discussed earlier under strategies employed in academic year 2003-2004, demonstrates the support strategy of tapping outside perspectives, in which faculty members explored different pedagogical practices and engaged in several sensemaking activities. Faculty members discovered the linkage between high-fidelity simulation and the electronic health record while attending a national conference on active learning pedagogies and the simulation lab. Nursing faculty engaged in intentional conversations relating to the impact of the curricula changes on faculty and students. An administrator reflected: “She [the

consultant] may have opened a little bit of a door in some people's minds to doing things a different way, because we [hadn't been achieving] the results we wanted."

At St. Scholastica, the lead person within the HIIM department provided on-going classes for faculty members. Documentation of numerous on-site classes was evident on the ATHENS website and in the grant activities report. Throughout the healthcare informatics implementation process, the HIIM department provided the faculty with both a hands-on, one-on-one orientation to the electronic health record and additional technological courses when needed (http://www.css.edu). A faculty member commented on the critical role of HIIM staff: "The HIIM staff provided classes, one-on-one mentoring and responded rapidly when we needed assistance. They helped faculty integrate the electronic health record and course assignments."

Creating and sustaining energy is necessary for transformation, according to Eckel and Kezar (2003), who describe the support strategy of finding and creating connections and synergy as including activities both on and off campus. New energy was created at St. Scholastica because the multiple projects brought together individuals from different parts of the institution. Cross-departmental teams and common tasks charged to a particular group created new connections. These connections also served to reassure people they were not working in isolation. There was evidence of the faculty subgroups requesting assistance from one another. One administrator felt her role was to be a 'cheerleader,' working with the faculty leads to encourage and motivate them during the processes of change. She believed it was the role of the lead faculty to 'own' the change processes and convince other faculty members to get involved. A faculty member observed:

> We celebrated each successful activity, and quickly gathered together to problem solve whenever that was necessary. Project staff and lead faculty members consciously make an effort to interact with each other in positive ways – to create a "we are in it together" attitude from beginning to end.

Another example of finding and creating connections and synergy at St. Scholastica is its interdisciplinary approach, which addresses healthcare informatics across the health professions and nursing. Faculty members have engaged in webinar sessions with faculty from other colleges and universities in Wisconsin and Minnesota as they began using the ATHENS system. In this way St. Scholastica is advancing the quality of the nation's educational resources by extending the model for curricular innovation in health professions' education into the broader academic community.

Faculty members presented at six conferences, published two ATHENS-related articles in nursing journals, and collaborated on a textbook to support the introduction of electronic health records in curricula for associate degree level allied health programs. The first article, *Innovative Strategies for Nursing Education: Enhancing Curriculum with the Electronic Health Record* (2008) was written by Donahue and Thiede. The second article, *CIN Plus: An Academic Industry Partnership for Advancing Technology in Health Science Education (2008)* was written by Fauchald and Thiede. The book, *Using the Electronic Health Record in the Healthcare Provider Practice* was written by Eichenwald Maki, and Petterson.

College leaders also encouraged faculty members to mentor other staff. According to an administrator, "we encouraged faculty who have experienced success and feel good about ATHENS to mentor other staff." According to a faculty member,

"our nursing leaders expected all faculty members to utilize simulation in the undergraduate program, since it is a teaching method which encourages active learning pedagogy." An administrator explained some of the reluctance: "For some, it is an issue that [they are] expected to use ATHENS. We have encouraged faculty members to give ATHENS a try to see if it [electronic health record] fits in their course."

In summary. The core strategy of staff development and its five related supporting strategies were evident at St. Scholastica School of Nursing as they addressed the healthcare informatics core competencies. Eckel and Kezar (2003) identify the importance of communicating the multiple projects and the connections among change activities to reassure organizational members they are a part of a community and are not working in isolation. There was evidence of faculty members communicating between the two faculty subgroups: healthcare informatics and the undergraduate nursing curriculum. The ATHENS project updates were posted on the college website to communicate the activities of the grant objectives, which included the undergraduate nursing curriculum project.

Core strategy: flexible vision. According to Eckel and Kezar (2003) a flexible vision by college leaders is one that has a targeted direction, yet allows variations to emerge. Supporting strategies linked most often to the core strategy of flexible vision include several of the supporting strategies already discussed, tapping outside perspectives, facilitating communication, and making connections, all of which were evident at St. Scholastica. Promoting a long-term orientation to the change processes is included under this core strategy. The Center for Leadership and Innovation in

Healthcare was renamed The Center for Healthcare Innovation. The center promotes long-term orientation to the change processes.

I will discuss the remaining support strategies of moderating momentum, setting expectations and holding people accountable, and putting issues in a broader context.

According to Eckel and Kezar (2003), moderating momentum during the change process is a strategy relating to flexible vision. Too much change can exhaust members within an organization, and too little progress can stall the change processes. While Eckel and Kezar identify leadership's role of intentionally moderating the pace of change, at St. Scholastica, participants reported feeling overwhelmed and exhausted or described other faculty members as such. A faculty member remarked that faculty leaders and administration should allow adequate time to prepare the framework for new technology, noting that "[projects] always take at least twice as long as originally planned." Another faculty member added, "Just as important is adequate time for the faculty learning curve associated with the new technology. The introduction of [any] new technology requires a period of time for faculty to adjust."

Vacancies in nursing faculty further complicated implementation of the processes of change. A faculty member commented on the four vacant nursing faculty positions at the time of my interview: "Several faculty members are carrying extra workloads due to faculty vacancies." In addition, there are only two lead healthcare informatics nursing faculty members working with individual nursing faculty. Another faculty member commented on the pace of change observed with the undergraduate faculty members:

> The undergraduate faculty have been adding a lot of things and running two curricula. They need a break, a period of time where they do not have to do

> anything new. They need to stop for a while and [have time to] make the changes common practice, and then look at where they need to go.

Another faculty member agreed:

> Adequate time is needed for faculty members to experience success with the change process. When faculty members are not able to meet the ultimate vision, they begin to feel guilty. When the semester doesn't go as planned, faculty often feel a sense of failure and want to throw in the towel.

Eckel and Kezar's (2003) model suggested two types of expectations that should be publicly communicated by leadership: how the objectives are to be accomplished, and how the campus will be different and improved. Part of this change strategy includes addressing campus behavior and priorities. These are developed through extensive consultation and listening to change leaders, faculty, and various campus subgroups and by ensuring that faculty members believe they are part of something critical. As I explained previously, there was an issue regarding public communication by college leadership. Several participants reported that nursing leadership did not communicate their expectations as to when individual faculty members should begin using ATHENS or mentor other faculty; neither did they establish any sort of monitoring process.

Participants noted that college leadership expected faculty to engage in active learning pedagogies and, at minimum, to use the electronic health record in the simulation laboratory. However, neither participants nor related documents mentioned a process to hold faculty members accountable to this expectation. A faculty member noted: "Unless there's a structure [to hold individuals accountable], change processes really won't move beyond the two lead faculty members. This is what has happened

here." However, the Title III grant included a complete set of objectives and expectations and timetables. The communication of the grant activities is readily available by semester and year-end on the ATHENS website. Results of the requests by the undergraduate nursing curricula subgroup are also documented on this website. For example, the progress by semester of the alumni donated personal medical records into the electronic health record and the integration of the high-fidelity mannequins in the simulation laboratory are cited. These regular reports of grant activities served as an accountability tracking of the healthcare informatics goals and the progress towards meeting these expectations.

In summary. The presence of three of the seven supporting strategies for the core strategy of flexible vision had already been previously addressed: tapping outside perspectives, facilitating communication, and making connections. Promoting long-term orientation and putting issues in a broader context were also evident. The supporting strategies of college leaders moderating momentum, and setting expectations and holding people accountable were not evident. Although the supporting strategy of setting expectations and holding people accountable relate to the grant written progress reports, some participants perceived a need for college leadership to communicate the expectations and a structure for holding individual faculty accountable to use the electronic health record, mentor other faculty members, and learn the pedagogy linked to the ATHENS project. St. Scholastica participants reported feeling overwhelmed or described other faculty members as such. Participants perceived college leadership's role in moderating the pace of change as limited or not evident.

Core strategy: visible action. Eckel and Kezar (2003) link visible action to support strategies such as establishing supportive structures, encouraging communication, setting expectations and holding people accountable, facilitating connections and synergy, providing financial resources, and incentives. All supporting strategies linked to the core strategy of visible action have been discussed previously and were evident with the exception of setting expectations and holding people accountable.

In summary. The leadership team at St. Scholastica School of Nursing understood the way their institutional culture shapes their change processes. Innovative and respected faculty members were selected for both the healthcare informatics lead person as well as the lead faculty members for each health profession. The leadership team's role was to empower, encourage and motivate the members of the subgroup throughout the change processes. Together, the administrator explained, "we fostered interdisciplinary meetings among all the health care professions." I found evidence that the healthcare informatics faculty subgroup engaged in sensemaking in intentional conversations relating to the impact of change on the daily work environment of the people involved.

All five of the core strategies and 13 of the 15 supporting strategies were evident in both faculty subgroups at St. Scholastica School of Nursing. The grant project reports provided definite objectives for each report period, along with reports of faculty progression. The grant provided the frame work for accountability, but it is more a report for an external funder than a driving internal change mechanism. College leaders did communicate their expectation that individual faculty members try ATHENS to determine if it fit in their courses, and, at minimum, to use it in the simulation lab.

However, several participants perceived the communication of a time frame or accountability processes as inadequate.

As these five core and 15 supporting strategies are employed, Eckel and Kezar (2003) found that leaders that experienced transformational change within their organizations, consciously considered the impact of these strategies on the faculty members. They refer to this process as college leaders "demonstrating balance.

Demonstrating Balance

College leaders need to balance participation in many ways, realizing too much change too fast can overwhelm the members of the organization and on the other hand, too little change can stall the processes of change (Eckel and Kezar, 2003). First, college leaders need to balance the implementation of the five and 15 supporting strategies. St. Scholastica Schools of Nursing implemented all five of the core strategies and 13 of the supporting strategies. The faculty members at St. Scholastica School of Nursing reported being overwhelmed with the change processes. Only a few faculty members were leading the change processes and the lack of an accountability process to hold other faculty members to greater participation overwhelmed those faculty members involved. In addition, this college was experiencing faculty vacancies which placed greater demand on faculty.

A diverse group of faculty members were carefully selected by college leaders at St. Scholastica School of Nursing in the healthcare informatics change initiative. These leaders balanced faculty participation between junior and seasoned faculty, and faculty members from different disciplines. Second, there was evidence of attempts to strike "workable balances between internal and external perspectives and involvement" (p.

126). The healthcare faculty subgroup presented to other faculty members the electronic health record, the patient case scenarios and methods of teaching. In addition, Cerner Corporation staff provided on-site training and preparation of faculty members. Third, Eckel and Kezar (2003) identified the importance of creating short-term gains at the same time laying a foundation for long-term objectives. The healthcare informatics grant initiatives provided regular reports of the objectives met, as well as the plans for the next steps of implementation of healthcare informatics at St. Scholastica.

Finally, Eckel and Kezar (2003) observed that transformational change may be perceived as overwhelming, inciting fears the changes might result in a completely different institution, perhaps losing the characteristics that made the institution unique. They recommend balancing the new change processes with established goals and traditions. At St. Scholastica this was evident on the college website, which celebrated the new changes along with those aspects for which the college was already noted.

Research Question Four

Is St. Scholastica School of Nursing approaching the shift to healthcare informatics as the broad and deep change in values, culture, and structures that would characterize a transformational change?

I have presented the processes of change employed at St. Scholastica School of Nursing, and the evidence or lack of evidence of the key aspects of the Mobile Model that were or were not employed. These included the attention to the academic culture, the role of sensemaking, and the interrelationships among core and supporting strategies. In this section, I will discuss Eckel and Kezar's (2003) structural and cultural evidence markers of change used to determine the depth of change processes within an

organization. Such markers are concrete measurements that can be counted or compared to baseline sets of data. For example, changes in curriculum, in pedagogies, in student learning and assessment practices, policies, budgets, new departments, and in both institutional structures and new decision-making structures. Attitudinal and/or cultural evidence includes changes in patterns of interactions between individuals or groups, changes in the campus self-image, changes in the types of conversations, and in new attitudes and beliefs.

Structural evidence markers. St. Scholastica completely revised its undergraduate nursing curriculum, a process that took at least five years to complete. An outside consultant was employed to assist faculty leaders in changing pedagogical practices, creating new student learning and assessment practices, and engaging in active learning strategies. This project did not originally include healthcare informatics. However, in 2004, faculty leaders decided to integrate active learning and the simulation lab with the electronic health record as the tool to run simulations using the automated SimMan™. A new Center for Healthcare Innovation was established in 2005. Creation of the Center for Health Care Innovation demonstrates the long-term orientation to healthcare informatics already discussed. The goal of the center is to be a revenue-generating organization which identifies trends within both health sciences education and the healthcare industry and to use expertise and innovative approaches to address these trends. The purchase of automated patient simulators (SimMan®), and two additional staff for the simulation labs demonstrates budgetary commitment.

Attitudinal and cultural evidence markers. Eckel and Kezar (2003) note that structural evidence markers do not, by themselves, suggest transformational change.

Since transformational change is about changing cultures, such attitudinal and cultural evidence markers are needed to identify the cultural impact within the organization. There was evidence the two faculty subgroups experienced changes in patterns of interactions between themselves, in the types of their conversations, and in new attitudes and beliefs.

The strategies to implement the core competencies of healthcare informatics were interdisciplinary. However, each allied health profession created its own electronic health record templates and nursing used the Cerner system documentation templates. The addition of the patient care scenarios provided a platform all health professions could utilize. One of the (IOM, 2003) recommendations addresses the use of a broad-based language for healthcare informatics with corresponding core competencies. In general, St. Scholastica participants referred to healthcare informatics as the application of computers to manage information supporting the entire spectrum of users of health care information. Their shared concepts of healthcare informatics support the broad-based language; however, healthcare informatics core competencies as such were not defined.

In Conclusion

The initial approach to healthcare informatics was strategic in nature, based on general concerns of the college regarding enrollment and financial strength, and specific concerns of the school of nursing leaders in reference to the lower than desired pass rate on nursing exams, and a shortage of clinical nursing faculty. These concerns led college leadership to undertake two distinct but related change processes: Introduction of healthcare informatics and revision of the undergraduate nursing curriculum. St. Scholastica School of Nursing embarked on these two major change processes in 2002.

As the lead faculty members and select faculty involved in implementation of the projects worked together, they discussed the different ways in which faculty could use the electronic health record with their students. Using the same technology and the same program created many occasions for conversations between disciplines. Changes in the two projects (healthcare informatics and a new curriculum based on active learning pedagogies and problem based pedagogies) occurred in pockets, with people committed to each change participating on a voluntary basis.

The nursing program at St. Scholastica chose to address healthcare informatics in an interdisciplinary approach involving other allied health professions. There was evidence that change in the healthcare informatics subgroup extended beyond the nursing program into the allied health professions, however, the change at this time is limited in its breadth. Although the nursing faculty requested alumni medical records that were loaded into the electronic health record, the full understanding of pedagogical practices of this approach was, as of 2007, limited to the subset of the most involved faculty members.

Based upon these findings, I classify St. Scholastica processes of change as deep however, breadth of the changes is, as of my on-site visit, limited to only a few faculty members. According to Eckel and Kezar's (2003) Mobile Model of Transformational Change the college leadership must commit to long-term transformational change processes within the school of nursing. This will require college leaders' to act to develop intentional strategies that will influence deep levels of organizational behavior across the nursing school.

Chapter Five

Conclusions and Discussion

This study provides empirical data on the processes of change at three baccalaureate level nursing programs as they implemented the core competency of healthcare informatics. The sites I chose were considered exemplary as perceived by nursing informatics experts in 2006. Since qualitative findings are highly contextual and case dependent, caution must be exercised regarding application of assumptions and generalizations to other nursing programs.

Tying my data collection from the three nursing programs to the broader literature of transformational change and to the mobile model enabled me to demonstrate larger lessons regarding change and the applicability of the theoretical considerations beyond the few cases studied here. The data collection and analysis methods are designed to be appropriate to and consistent with my four research questions. To ensure rigor, I followed the qualitative research strategies outlined in Chapter 3. I used multiple sources of evidence to create converging lines of inquiry; constructed a database of information for each case, and linked the analysis to specific instances in the case database and the research questions. I sought to maintain all of Patton's (2002) components of trustworthiness: dependability, authenticity, reflexivity, and triangulation.

Transformational Shift to Healthcare Informatics

After reviewing the data collected at the three research sites, I concluded that University of Kansas School of Nursing experienced transformational change based on the components of the Eckel & Kezar's (2003) Mobile Model for Transformational Change, and that the other two nursing programs at the time of my site visits, had not. In arriving at these conclusions, I used Eckel & Kezar's (2003) template to determine the extent to which St. Scholastica and Large State University are progressing towards transformation. These authors suggest that institutions are well on their way to transformation when most, if not all, of the structural and cultural evidence markers are easily recognizable. The evidence markers have to be aligned, mutually reinforcing, and reflective of progress in a common direction.

Eckel and Kezar (2003) identified seven structural change indicators in the Mobile Model for Transformational Change. These markers cover 1) changes to the curriculum, 2) changes in pedagogies, 3) changes in student learning and assessment practices, 4) changes in policies, 5) changes in budgets, 6) the presence of new departments and institutional structures, and 7) new decision-making structures. Presence of the structural evidence by itself, however, does not necessarily mean transformational change has taken place. An additional set of evidence is needed to establish the cultural impact of the transformation. The presence of attitudinal and cultural shifts suggests greater depth to the change. They indicate that an institution has developed new capacities and a new set of beliefs and assumptions. Attitudinal and cultural markers are: 1) changes in the ways faculty members interact with one another; 2) changes in the campus image, the language used to describe the organization; 3)

changes in the types of conversations with different players from inside the institution and new partners from without; 4) willingness to abandon old arguments; and 5) new relationships with current stakeholders and with nontraditional stakeholders.

Research Findings

University of Kansas School of Nursing displayed all of the structural and cultural evidence markers six years after the college leaders began to address healthcare informatics core competencies. The evidence markers were aligned and mutually reinforced, and reflected progress toward the creation of an educational version of the electronic health record designed to enhance pedagogical practices within the undergraduate nursing curriculum and to expand to the allied health and medical schools.

At St. Scholastica School of Nursing, there was evidence of structural markers within the healthcare informatics faculty subgroup, in changes in policies and budgets, in the creation of a new center, and in new decision-making structures. The remaining structural markers, changes to the curriculum, pedagogies, and student learning and assessment practices, were evident in the computerized human simulation lab. Each faculty subgroup began its processes of change in 2002; however, they did not merge their activities into a combined focus until academic year 2004/2005. At that point, the two faculty subgroups began to integrate their activities, learning pedagogies, patient case scenarios, the electronic health record, and the computerized human mannequins in the simulation labs. There was evidence of the cultural and attitudinal evidence markers between and among the two faculty subgroups. The introduction of the new curriculum, with all of the above changes was scheduled to begin in academic year 2007-2008. At the time of this study, St. Scholastica School of Nursing had not as yet applied the

changes broadly enough within the nursing school to be considered transformational. The alignment of these evidence markers was not a reality at St. Scholastica School of Nursing after five years. College leaders' recognition of the progress of changes by both faculty subgroups convinced them to align, mutually reinforce, and communicate a common direction toward transformational change.

At Large State University School of Nursing, there was evidence of structural markers in changes in policies and budgets, in pedagogies, and in student learning and assessment practices. There was no evidence of new departments or new institutional or decision-making structures. There was some evidence of cultural and attitudinal change markers signaling shifts that suggested a new set of assumptions among the small subset faculty members involved. Alignment and mutual reinforcement of the evidence markers was initially aimed in 2004 toward educating the small group of faculty members involved in the computerized simulation lab about nursing informatics, and toward integrating nursing informatics competencies within their respective courses. By 2007, these faculty members were positioned to extend their new knowledge and experience to other faculty members, but the understandings and behaviors were not broadly enough distributed in the college for the change to be considered transformational.

Implication of Findings

Examining structural, cultural and attitudinal markers and their alignment, mutual reinforcement, and reflection of progress in a common direction, as discussed by Eckel and Kezar, proved to be an applicable and practical way to determine the depth and breadth of change and to distinguish different levels of transformation in colleges and universities.

Eckel and Kezar (2003) say that transformational change takes longer than five years, even with intentional strategies by college leadership to address both the breadth and depth of change within their organization. The results of this research support the fact that transformational change takes a considerable amount of time. As with the case for University of Kansas School of Nursing, these college leaders addressed the processes of change in a pervasive and deep way. This school of nursing was in its sixth year and all nursing undergraduate courses except community health and the senior practicum had incorporated the electronic health record. St. Scholastica was in its fifth year of addressing healthcare informatics and the new curriculum was not scheduled to be fully implemented until fall 2007. Large State University began their implementation of nursing informatics core competencies three years prior to this study.

Suggestions for Further Research

My study offers one case that experienced transformational change and two others where change processes have led to knowledge and behaviors that have the potential for transformational change. Kezar's (2001) analysis of the conceptual models of cultural, social-cognition, and political change notes that in most institutions of higher education, incremental adjustments are more likely than transformational change. All three nursing programs did begin with incremental adjustments, that is, with pilot groups designed to modify existing practices. Faculty members began altering existing practices, leading to changes in thinking and actions. Implementation of these incremental adjustments to faculty members at large was a challenge even at University of Kansas School of Nursing, where transformational change took place. I suggest further research relating to

incremental adjustments, such as pilot group and grant activities, and what it takes for these activities to result in transformational change.

The Mobile Model offers practical strategies for institution-wide change as systemic, concurrent, and interdependent. Using conceptual frameworks that illustrate the dynamism, like this model, that occurs within and among organizational phenomena can be powerful (Eckel & Kezar, 2003). Based on my own professional experience as a healthcare leader, healthcare systems have attempted to use various types of continuous quality improvement (CQI), processes that have proved inadequate for the desired effects. I agree with Mintzberg (1994, p. 13) that "organizational [change] strategies cannot be created by the logic used to assemble automobiles." The Mobile Model provides a theoretically-based model on which to build a transformational change model for healthcare systems. I suggest further research of the processes of change within hospitals, again using the Eckel & Kezar (2003) Mobile Model for Transformational Change for both informatics change and other types of change, modifying its components to reflect institutional purpose and culture.

Research Question One: Teaching Methods, Assignments and Labs

In this section, I discuss what is happening within the classroom, with homework assignments, and in the computerized human simulation laboratories at the three nursing programs.

Research Findings

All three nursing schools used patient case scenarios loaded into electronic health records in their respective classrooms and homework assignments, and in their computerized human simulation laboratories. In the classroom, faculty members are able

to project the electronic health record with student documentation onto a screen, allowing them to point out trends and discrepancies. They are thus able to offer immediate student feedback, facilitate classroom discussion, and assign data-driven teaching cases. University of Kansas School of Nursing made greater use of the electronic health record in the classroom than did the other two nursing programs, where only a small group of faculty used the electronic health record in the classroom.

In homework assignments, faculty had the option of using the electronic health record to grade care plans and assess student progress online. I determined that University of Kansas School of Nursing also made the most use of the electronic health record for this purpose. Again, at Large State University and St. Scholastica schools of nursing, this use of the electronic health record was limited to a small group of faculty.

Use of simulation labs is not new to nursing schools. The electronic health record and computerized human mannequins do offer new technologies; and all three nursing programs used them to create computerized simulation labs. As addressed in Chapter 2, participants at all three nursing programs reported increased use of the pedagogical approaches of active learning and problem-based learning in these simulation labs. These approaches encourage greater faculty-student and student-to-student interaction, engender more self-directed learning, and do a better job of providing students with a process for integrating previous learning.

Implication of Findings

The data suggests that implementation of healthcare informatics requires new ways of teaching, which, if implemented broadly and deeply, could produce transformational change within traditional nursing education. The combined

technologies of the electronic health record and the computerized human simulator have created “new ways to package, explain, and deliver information and new avenues to communicate between instructor and students” (Eckel & Kezar, 2003, p. 7).

Combination of the electronic health record with the patient case scenarios and the computerized human simulator has created a more robust educational environment at all three schools. These simulation laboratories allow faculty members to guarantee that students will experience real patient experiences that replicate clinical settings in a safe, interactive manner. Simulation techniques can be repeated and altered to enhance educational value. The electronic health record provides opportunities for students to document, review patient clinical reports, communicate with other health care providers, and access the internet for additional information. Proper preparation and application of skills and knowledge in a virtual healthcare environment that includes healthcare informatics core competencies allows students to enter an actual hospital setting with greater poise and confidence.

Suggestions for Further Research

The findings of this study provide several opportunities to expand research in pedagogical practices relating to the integration of healthcare informatics within the undergraduate nursing curriculum. Further research into the impact of the pedagogical practices of using the electronic health record with patient case scenarios in conjunction with the computerized human simulator may be beneficial. I suggest a study of graduates from the schools of nursing using the computerized human simulation labs versus those graduates who experience the traditional clinical setting expectations. The increased use of the EHR in the classroom provides a further opportunity for faculty to offer immediate

student feedback, facilitate classroom discussion, and assign data-driven teaching cases. What is required to be in the EHR in order for faculty members to enhance active learning pedagogies in the classroom? I suggest a study of the potential use of the computerized human simulation labs within the healthcare systems for orientation of new employees and continuing education.

Research Questions Two and Three: Strategies Used and Why

In this section, I describe the critical decisions employed by college leaders at three baccalaureate nursing programs as they addressed healthcare informatics. I present the research findings, the implications of those findings, and suggestions for further research to answer research questions two and three. First, I discuss what led college leaders to embark on major change; selection of faculty members to lead the healthcare informatics implementation; resources to fund informatics, and three of the five cross-cutting strategies recommended by the IOM (2003). These IOM (2003) strategies include: 1) healthcare informatics core competencies; 2) development of competency-based curricula and teaching approaches; and 3) faculty development. Next, I discuss the use of strategies that correspond to Eckel & Kezar's (2003) core and supporting strategies; and the attention college leaders gave to cultural issues and balance.

Research Findings

Why College Leaders Embarked on Major Change

College leaders at the University of Kansas School of Nursing wanted to create an electronic health record designed for educational purposes. Their plan was to test the educational version of the EHR first in the undergraduate nursing program, then to extend to the School of Medicine and the 10 allied health professions on campus. The

undergraduate nursing curriculum was aligned with Cerner Corporation's in-patient electronic health record, making this an ideal platform from which to launch the University of Kansas Healthcare informatics program. Similar to their previous successful processes of change, nursing college leaders chose a small group of innovative faculty members who could see the value of an academic electronic health record. The University of Kansas School of Nursing's culture of innovation and the financial support from Cerner Corporation enabled the college leaders to respond quickly to address the core competency of healthcare informatics. Transformational change was not reported as college leaders' intent in the beginning of the change; however, their approaches to the change processes targeted both the depth and breadth needed for transformational change. These college leaders generated purposeful and desirable outcomes with conscious decisions to act, and purposefully chose the direction of those actions.

Leaders at St. Scholastica School of Nursing approached their change processes as a strategic response to enhance the school's position. They wanted to become distinctive in the market by enhancing the undergraduate nursing curriculum with the electronic health record, which would contribute to increased student enrollments and to increased financial stability for the college. Leaders were also concerned with its graduates' passing rate on nursing exams. They undertook two related but distinct change processes: one focused on incorporating informatics, and the other on revising the undergraduate nursing curriculum. The intentionality of the change processes did not meet Eckel and Kezar's (2003) Mobile Model for transformational change. The two faculty subgroups were not intended to work together and to reinforce each others' activities and those activities were described in interviews as serendipitous events.

Large State University college leaders pursued an adaptive approach, a deliberate modification by the organization in response to the external environment. College leaders and the university's hospital personnel jointly recruited a nursing informatics expert. This expert served as a change agent for the college of nursing, introducing nursing informatics to the small group of undergraduate nursing faculty involved in the computerized simulation labs. The expert and the faculty group designed the competencies they wanted the undergraduate nursing students to attain. Large State University School of Nursing met Eckel and Kezar's (2003) description of intentional change. Intentional change, according to Eckel and Kezar (2003, p. 30) is undertaken to "generate purposeful and desirable outcomes; not changes that are serendipitous or unintended." These college leaders however, did not aim for or create transformational change.

Selection of Change Leaders

Two of the schools (University of Kansas and Large State University) chose a Ph.D. prepared nursing informatics expert to lead the implementation of healthcare informatics within the undergraduate nursing curriculum. St. Scholastica chose its change leader from the Health Informatics and Information Management (HIIM) Department. The project leaders from University of Kansas and St. Scholastica Schools of Nursing were well respected and accepted by faculty members, supporting the concept that people can lead from different positions and places in an organization. However, the leader for Large State University met with faculty resistance, which impacted the breadth of the changes.

It was obvious at all three schools of nursing that college leaders' careful selection of pilot groups provided credibility and stability for the project resulting in depth to the change processes within these groups. The MIS staff involved was also noted as highly significant to the successful implementation of change processes at all three nursing schools.

Sources of Funding

Both Large State University and St. Scholastica schools of nursing received grants to implement the healthcare informatics competencies. Large State University received grant dollars to implement nursing informatics competencies within the undergraduate nursing program. St. Scholastica received its grant from the U.S. Department of Education to implement healthcare informatics within the nursing and allied health professions. This grant included a contractual relationship with the Cerner Corporation based on an Application Service Provider (ASP) model. The University of Kansas School of Nursing college leaders chose to partner with Cerner Corporation in an exchange of resources. Cerner funded a staff position, the technology and tech support; the school provided the intellectual capital (a nurse informatics expert), as well as faculty time.

Large State University College of Nursing selected a different electronic health record company, and instead of partnering with them, pays an annual fee for use of its system. Both St. Scholastica and University of Kansas School of Nursing have a contractual relationship with the Cerner Corporation, which involves an established, on-going annual licensing fee for the continued use of Cerner's electronic health record platform.

In this study there are two examples of academic-business partnerships with Cerner Corporation. St Scholastica and University of Kansas Schools of nursing rent the electronic health record from Cerner Corporation. Other schools can buy platform time at a lesser fee than purchasing alone. The schools of nursing provide consulting services to other schools to assist with their integration of the EHR into their curricula.

Healthcare Informatics Core Competencies

This study offers two examples of an interdisciplinary approach with the allied health professions. University of Kansas included its medical school. St. Scholastica does not have a medical school, so their interdisciplinary approach was, by necessity, somewhat limited. Although Large State University has a medical school and a school of allied health professions on campus, the college opted to address healthcare informatics using a nursing-specific method. The interdisciplinary approach to healthcare informatics affected the overall pervasiveness of the change processes at University of Kansas School of Nursing. Although St. Scholastica School of Nursing also employed an interdisciplinary approach, pervasiveness of the implementation of healthcare informatics was limited among the undergraduate nursing faculty.

Development of Competency-based Curricula and Teaching Approaches

Two of the nursing programs (University of Kansas and Large State University) chose to modify individual course activities and teaching methods within the existing curriculum structure. A faculty subgroup at St. Scholastica, separate from the healthcare informatics implementation group, revised the curriculum to a generalist approach with enhanced use of active learning pedagogies. St. Scholstica did not identify specific healthcare informatics core competencies; however, its approach to use the EHR as a

documentation tool for students to gain competencies implied broad-based competencies. Both University of Kansas and Large State University used the Staggers, Gassert and Curran (2001) research-based master list of nursing competencies. Large State University School of Nursing employed nursing informatics competencies. University of Kansas also used nursing informatics core competencies as well as a broad-based set of core competencies.

All three nursing programs employed a problem-based approach using the patient case scenarios loaded into the EHR. These patient case scenarios were a significant component in the processes of change at all three nursing schools. University of Kansas and Large State University used cases scenarios created by faculty members for their pre-EHR courses. Additional data were needed to enhance these cases since the EHR provides students with deeper and much richer data than the traditional written patient scenarios used by faculty members. St. Scholastica School of Nursing used donated alumni medical records for their electronic health record, and did not report needing additional data. Students are able to make better decisions about their patients due to the enhanced knowledge and context provided by the enhanced patient case scenarios. At all three nursing schools, students can be assigned the same patient, or a family member, throughout different levels of their curriculum. This enables students to become acquainted with patients across a period of time allowing them to interpret information in a broader context.

All three nursing schools reported enhanced student performance, especially in the simulation labs. Faculty observed that students demonstrated an increased ability to handle and use more data, decision making tools, and evidence based practice standards

in the nursing care process. Critical thinking skills were improved, and students showed a more comprehensive understanding of the overall nursing process. Improved organizational and delegation skills, and communication skills were also reported.

Faculty Development

Faculty at the three nursing programs identified one-on-one mentoring as critical to their successful mastery of healthcare informatics core competencies. This supports Staggers, Gassert, Skiba's (2000) research. Satisfaction among faculty members was also engendered by quick response to use of the EHR by information technology staff. Faculty admitted the technology was challenging, even fearful at times. Technological glitches occurring in the presence of students were an area of great concern, and resolution of these issues improved faculty learning curve and comfort level. Adequate resources and allotment of time for faculty members to learn to use the electronic health record also proved necessary.

All three nursing schools selected a small group of undergraduate nursing faculty to pilot the electronic health record in their courses and/or computerized simulations labs. Involvement in projects such as healthcare informatics was, therefore, respected and supported for those faculty members on the clinical track.

Core and Supporting Strategies

The Mobile Model (See Appendix A) consists of five core change strategies and an additional 15 supporting strategies, which do not occur as frequently as the five core strategies. These change strategies are connected directly or indirectly to one another. In this section, I compare the ways the three schools of nursing used the core strategies and supporting strategies.

University of Kansas and St. Scholastica Schools of Nursing used all five of the core strategies. Large State University School of Nursing did not employ collaborative leadership strategies, which limited breadth of the change processes. This core strategy is about developing extensive plans to facilitate persuasive and effective communication, inviting participation and providing opportunities to influence results, and bringing together people in new ways to foster communication and encourage new interactions. When used by college leaders, this strategy instills a sense of trust, clarifies misunderstandings and rumors, and fosters a sense of community. Large State University School of Nursing did not employ eight of the 15 supporting strategies. Four of these eight related to collaborative leadership.

Table 2 provides the supporting strategies and a brief explanation of the impact on the breadth of change processes for each school.

Table 2

Supporting Strategies Evident in the Three Cases

	KUMC	*SS*	*LSU*	*Impact on Breadth of Change Processes*
Changes in administrative and governance processes	X	X	X	Ensures change becomes part of daily operations, provides support for groups to work faster
Supportive structures	X	X	X	Provides structures to facilitate change
Financial resources	X	X	X	Supports change with new funds
Incentives	X	X	X	Motivates key faculty to commit time and energy to change
Long term orientation	X	X	X	Captures and holds campus-wide attention
External factors	X	X	X	Provides legitimacy, confirms beliefs, provides needed funds
Outside perspectives	X	X	X	Taps outsiders' perspectives that advance change
Setting expectations and holding people accountable				Addresses campus behavior and priorities, uses frameworks to hold people accountable
Moderated momentum	X			Prevents overwhelming members or stalling change processes
Persuasive and effective communication	X	X		Requires extensive and intentional communication plans
Invited participation	X	X		Involves faculty and creates diverse opportunities to meet the interests of various individuals
Opportunities to influence results	X	X		Recognizes participation, reinforces flexibility to changes
New interactions	X	X		Sparks creative thinking and approaches, fosters communication across campus
Connections and synergy	X	X		Creates new energy, reassures people are not working in isolation
Putting issues in broader context	X	X		Demonstrates proposed changes are not an attack on a particular campus subgroup
	14	13	7	

University of Kansas School of Nursing used 14 of the 15 supporting strategies and St. Scholastica School of Nursing used 13 of the 15. None of the schools employed the setting of expectations and holding individual faculty members accountable to the processes of change. The grants received by St. Scholastica and Large State University did contain specific objectives as well as accountability for those objectives.

One important supporting strategy, moderation of the pace of change, was an issue neither St. Scholastica nor Large State University addressed. Only two nursing faculty members at St. Scholastica were involved in the change processes, and they were the same faculty who taught the classes to other faculty members. Faculty members who were taught to use the EHR were not held accountable in using the system. Leadership encouraged faculty to try the EHR, but there was no monitoring to see if this took place. At Large State University, there were concerns about sustaining the momentum of change after the lead nursing informatics expert left the college.

Another contributing factor to the lack of breadth at Large State University was that college leaders failed to make connections and synergies linking the various activities across the campus; and did not put the issues in a broader context. New connections among individuals from different parts of the organization can spark new energy and serve to reassure people that they are not working in isolation. Framing the issues in a broader context helps college leaders to elevate the importance of the processes of change. This makes local challenges more reasonable when compared to external happenings, and helps to depersonalize the issues for individual faculty members.

Attention to Culture and Sensemaking

The underlying connection between the five core strategies, according to Eckel & Kezar (2003) is that they are intended to encourage people to think and act in new and different ways. According to Weick (1995), the opportunity for faculty to discuss, debate, reframe, and make sense of the proposed changes allows for creative results. Change as a result of cognitive dissonance pays greater attention to individual learning and individual sense-making, and alters individual beliefs and construction of reality. Social cognition models emphasize discussion and learning among the participants. As individual discussions and learning occur, new ideas are created and acceptance of at least some aspects of the processes of change began to create incremental adjustment within the organization. As faculty members become more knowledgeable and gain experience with the modifications of existing practices, new ideas are created.

Another major difference between the three schools of nursing was college leaders' approach to culture and planned sensemaking. Limited consideration by college leaders to these strategies resulted in limited pervasiveness of the change processes at both St. Scholastica and Large State University Schools of Nursing.

College leaders at University of Kansas engaged in purposeful sensemaking activities with groups of faculty members, encouraging open discussion of conflict and the impact of healthcare informatics on daily work responsibilities. The project leader played a significant role as an informatics mentor, facilitating exploration of impacts of the proposed changes for faculty work and pedagogy. These discussions reinforced the adoption of new mind-sets in a cognitive and intellectual process among faculty members. The leadership team at University of Kansas made a conscious and purposeful

selection of the person to lead the integration of healthcare informatics core competencies into its nursing curriculum. They gave considerable thought to the characteristics needed in the lead project person, since this individual would also serve as a connecting link between the college and the business partner. Interpersonal and communication skills were seen as essential, as there would have to be considerable consultation with faculty and communication of academic concepts to Cerner staff. The leader's knowledge and experience within both academia and the business culture was vital in her role as an interpreter and a facilitator between the two distinct cultures.

College leaders at University of Kansas School of Nursing played a significant role in the processes of change. They planned for faculty resistance, scheduling meetings and educational sessions to address any issues and/or conflict with faculty regarding the processes of change. They also took into account the probable responses of faculty to the change processes, and planned for sensemaking discussions with faculty members to clear the air. The lead informatics person discussed linkages between the changes and students' reactions to those changes during faculty meetings. Analyses of student behaviors, such as the connection of critical thinking skills and particular student observations were presented. These observations by faculty members were discussed with peers and became a way to think about and reinforce the change processes. The discussions fed into the success of the processes of change in important ways, providing a reason for staying with the changes and broadening interest in the changes among other faculty members.

There were components of cultural consideration by college leaders at St. Scholastica in their initial selection of the faculty members, but evidence of any on-going

consideration was limited. Sensemaking discussions occurred among the faculty; however, there was no evidence that college leaders encouraged faculty members to discuss the impact of the change processes on their daily work activities. St. Scholastica's informatics lead was a representative of the Health Information Management Department who was respected by faculty members. In addition, college leaders carefully chose two nursing faculty to work with the interdisciplinary team. One was a well-respected tenured faculty member, and the other a faculty member who was an innovative thinker. College leaders at St. Scholastica worked behind the scenes with faculty members involved in the healthcare informatics and curriculum faculty subgroups. They hired an outside consultant to work with curriculum subgroup to integrate active learning pedagogies within the curriculum. I did not find that college leaders here became personally involved in implementing the change processes or in addressing faculty resistance to change. There was evidence of sensemaking discussions within and between the two faculty subgroups, but no evidence that college leaders were involved in these discussions. Although St. Scholastica School of Nursing used five core strategies and 13 of the supporting strategies, this did not result in transformational change. Subgroups of faculty members were driving different changes independently of one another in the first years of the change efforts, and leadership oversight of these core and supporting strategies was limited. These strategies were not implemented sufficiently for transformational change to occur.

Large State University college leaders made a thoughtful selection of those clinical faculty members involved in the computerized simulation lab who were to work with the lead informatics person. Leaders here were to be the 'champions' of change, but

not involved in day-to-day change activities. They nominated a point person who led the change efforts in a small group of faculty. Once this group was successful, the changes were to be introduced to the faculty at large. The aim here was to implement nursing informatics within the specific courses and the computerized human simulation lab. Participants indicated the expert, a part-time employee of the college, was perceived as an outsider who did not understand the academic culture. Perceptions of college leaders and faculty member differed in the initial approach to including faculty participation in the grant proposal. Faculty felt the faculty governance structure was not being included in the grant process, and that their participation was sought only after the grant was awarded. Collaborative activities such as invited participation, opportunity to influence results, and facilitating communication between the grant project leader and the faculty members at large were not part of the change process at the Large State University College of Nursing. The project leader was not a full-time faculty member, and her personal approach was perceived by faculty members as autocratic and demanding, and unappreciative of their academic position. The project leader expected faculty members to make the grant their priority, and was not open to their suggestions. Once faculty members outside the initial pilot group did become involved, neither they nor the project leader was willing to compromise in negotiating resolutions to problems. This conflict continued to impact the implementation of nursing informatics at the Large State University College of Nursing at the time of my visit, with one faculty remarking that "[acceptance] varies all across the spectrum." Evidence of sensemaking discussions and cultural considerations by college leaders was not apparent. Faculty members were

reported as being opposed to using the electronic health record within the classroom or choosing to ignore the processes of change altogether.

Next, I compare the ways in which the three nursing college leaders demonstrated balance to the change processes employed.

Attention to Balance

Attention to balance means college leaders must consider the momentum of change, making certain people are not overwhelmed or stall the processes of change. College leaders must also consider the critical components identified by Eckel and Kezar (2003) to balance the multiple strategies being employed, and also to personally demonstrate their use. The results of this research validate the importance of these actions.

University of Kansas School of Nursing. College leaders at University of Kansas School of Nursing demonstrated balance in pushing the processes of change forward, while at the same time listening and observing for any signs the processes of change needed to be slowed. Although they would have liked the change processes to move faster, they acknowledged that faculty needed time to get used to the new technology, to 'play' with it and have some personal successes before moving on to the next phase.

At University of Kansas School of Nursing, 14 of the 15 supporting strategies were employed, along with all of the types of balance identified by Eckel and Kezar (2003). College leaders' careful balance of participation of various faculty members tenured and non-tenured faculty, faculty from different disciplines, leadership, and staff contributed to the breadth of the change

processes. The leadership team was aware of the need for balance between internal and external perspectives and involvement, and putting issues in a broader context. A retreat was held annually to celebrate their successes and to pay tribute to these accomplishments for future generations. Faculty and college leaders' interactions at these retreats included acknowledging fatigue levels as a major stumbling block to the change processes. The personal impact of the changes processes was linked to the broader context of the reality of what was being accomplished. Behavior-changing activities were offered, using technology as a highway to greater efficiency, and leaders encouraged faculty to accept that they did not always have to be perfect. College leadership celebrated the success to date and connected the accomplishments to the legacy currently being built for a sustainable future.

St. Scholastica School of Nursing. St. Scholastica used all five core strategies and 13 of the 15 supporting strategies; however they were mostly employed within the subgroups leading healthcare informatics and undergraduate curriculum revision. College leaders at this school worked behind the scenes to support the lead faculty, and did not demonstrate careful attention to the bigger picture of the processes of change and the institutional impact.

Faculty members at St. Scholastica School of Nursing reported being overwhelmed with the change processes. Only a few faculty members were leading the change processes, and the lack of an accountability process to hold other faculty members to greater participation frustrated those faculty members involved. Leaders balanced faculty participation between junior and seasoned faculty, and faculty members from

different disciplines in their interdisciplinary approach. The minimal number of nursing faculty involved resulted in less pervasiveness within the undergraduate nursing program. There was evidence of attempts to reach workable balances between internal and external perspectives and involvement among the two faculty subgroups. The healthcare informatics grant initiatives provided regular reports on the objectives as they were met, and on the plans for the next steps of implementation and the other health professions. These reports noted short-term gains towards meeting their long-term objectives.

Large State University College of Nursing. Faculty members here were concerned that too little change was occurring after the grant period ended and there was no specific individual appointed to lead the processes of change for nursing informatics. The use of only seven of the 15 supporting strategies also demonstrated a lack of balance. Demonstrating balance by college leaders includes the balance of faculty participation between junior and seasoned faculty, and faculty members from different disciplines, neither of which were evident in this case. There was evidence of a long-term approach to nursing informatics by college leaders in their on-going financial support of the electronic health record usage fees.

Implications of Findings

College leaders do not have to target both the depth and breadth at the beginning of the change processes in order for transformational change to occur. The results of this study suggest, however, that college leaders must, at some point, make a careful and purposeful choice to address the breadth of the change if transformational change is to occur.

College leaders at all three nursing programs employed pilot groups that addressed the depth of the processes of change. Pilot process using a small group of innovative faculty willing to create and test new ideas can be an effective path for implementing change within higher education. Such pilot groups, with careful design and selection of participants, serve as a mechanism to encourage members within an organization to modify their own practices, and then to explore their findings with the larger group of members in that organization. In this study, the credibility of those selected for the pilot groups was critical to the acceptance of faculty members, and by extension, to the overall success. Also noteworthy was the realization that leaders can come from different positions and places in an organization, as was the case at St. Scholastica. The use of the pilot groups to implement healthcare informatics course by course attained positive results in all three nursing programs; however, course by course curriculum changes is clearly not sufficient to promote transformational change.

The faculty members involved in the pilot groups at all three nursing programs also identified and selected the healthcare informatics core competencies. University of Kansas School of Nursing chose both broad-based core competencies, applicable to all the health professions, and nursing-specific informatics competencies. This interdisciplinary approach had a positive effect on the overall breadth of the change processes. Both University of Kansas and Large State University, where nursing-specific informatics was the sole approach, used the Staggers, Gassert and Curran (2001) research-based master list of nursing competencies to redesign their courses. My study suggests this master list of competencies can be beneficial for the other health professions implementing a broad-based approach to healthcare informatics.

Although St. Scholastica and Large State University used pilot small-group programs, it appears they did not focus intently on expanding the change and conversation beyond the small group. The resulting change, while obvious and commendable, failed to achieve transformational status. As noted in this study, college leaders' meticulous attention to cultural aspects of the organization was critical to the successful transformational change at University of Kansas.

The core strategy of collaborative leadership was demonstrated at St. Scholastica School of Nursing, but lack of involvement by college leaders adversely impacted the breadth of the processes of change. Faculty resistance at this nursing school appeared to be more covert. Large State University college leaders did not employ the core strategy of collaborative leadership, and faculty resistance there was overt, with open conflict between the lead informatics person and some faculty members. College leaders at University of Kansas School of Nursing planned for faculty resistance by scheduling educational sessions to discuss change and meeting with faculty to listen to their issues and ideas. Participants here reported their nursing college leaders intervened to make decisions needed to advance the processes of change.

I found that transformational change does not necessarily require college leaders to establish formal structures for holding individual faculty members accountable to the processes of change. University of Kansas School of Nursing experienced transformational change without use of this strategy. Their success without using this strategy may be related to the tradition of innovation in the college which would contribute to the willingness of faculty to engage in new activities. At colleges without

the reputation for innovation and change, the need to establish expectations and hold people accountable for them could be a more important change strategy.

This research suggests moderating the pace of change is an important factor in transformational change processes. The limited number of faculty members involved with change processes at St. Scholastica was overwhelmed with the scope and pace of the change. Large State University School of Nursing participants, in contrast, were concerned that too little progress was being made.

The need for college leaders to demonstrate balance, attend to culture, and engage sensemaking discussions is critical to successful transformational change. College leaders must frequently monitor the processes of change to determine the overall institution-wide impact on faculty members. One major difference between University Kansas School of Nursing and the other two nursing programs was the attention college leaders gave to the change processes. College leaders and faculty members engaged faculty in sensemaking discussions with genuine collaborative intent, providing opportunities to be 'in touch' with the impact of change on organizational members. They observed and participated in sensemaking discussions to offer linkages between the changes or activities; provided educational opportunities, and took immediate action when needed.

Opportunities for sensemaking, that is, helping faculty members to think differently about their daily work activities, were common as faculty members prepared to implement the electronic health record. Purposeful sensemaking activities in faculty group meetings served to enhance the transformational change processes at University of Kansas School of Nursing. This was especially true in planned discussions linking

observations about student progress with the processes of change. These discussions incorporated cultural aspects, such as the exploration of impact of the proposed changes for faculty work and pedagogy, and linkages to the observations of enhanced learning by students. These types of discussions also provide an impetus for staying with the changes, and for broadening interest in the change.

Finally, this research implies that schools of nursing will need to seek additional funding to implement healthcare informatics and/or to tap into the type of existing academic-business partnership model explored in this study. The academic-business partnership assisted college leaders in offsetting the cost of the electronic health record system, and enabled them to offer a more economical EHR to smaller colleges unable to afford the system at commercial rates.

Suggestions for Further Research

I would suggest further study of how transformational change occurs within organization where the processes of transformation become intentional later, but were not necessarily intended from the start. As changes occur within an organization and begin to cascade and build on one another, ideas may begin to coalesce into a larger purpose. Further research of case study sites that have 'backed' into transformational change may provide greater insight into what methods may result in altering the intention or direction in the processes of change. Linking modifications of existing practices with transformational change processes may reveal that transformational change is actually taking place with greater frequency than recent literature in higher education suggests.

Research into the role of college leaders where pilot groups are used to impact organizations in a transformational way should also be useful. All three nursing schools

used innovative faculty pilot groups to integrate healthcare informatics into their respective courses, and all experienced major modifications to existing practices that had faculty thinking and acting differently.

Since University of Kansas School of Nursing has embarked on a transformational change journey with nursing, allied health, and medicine, a study of the critical decisions required and strategies employed to accomplish this interdisciplinary approach to health professions education would be beneficial.

Implications for Theory

I have addressed the theoretical implications for Eckel and Kezar's (2003) Mobile Model of Transformational Change under each research question. I now provide a summary of these implications, focusing on how the Mobile Model offers an effective method for evaluating transformational change efforts. In addition, I present several suggestions for enhancing the model.

Eckel and Kezar (2003) use the analogy of a mobile to illustrate the interconnectedness of the change strategies, providing a useful way to visualize the complexity of transformational change. Demonstrating balance, participating in sensemaking, and paying close attention to the institutional culture were significant strategies that resulted in transformational change for University of Kansas School of Nursing. College leaders' use of the supporting strategies is essential for the breadth of the change processes. If only a few interested people engage deeply in the changing processes, other members of the institution may not feel the need to follow, as was the case at Large State University College of Nursing. University of Kansas and Large State University Schools of Nursing demonstrated results that substantiate the viability of the

model: One school used almost all the suggested methods and achieved transformation; the other, which used some of the methods, was not transformed.

St. Scholastica School of Nursing is an exception and suggests areas in which the model could be further developed. All of the structural and cultural markers of change were present, but the school did not experience transformational change. St. Scholastica School of Nursing leaders actually employed many of the strategies; however, the intensity seemed to be limited to those faculty members in the subgroups. I suggest the model would benefit from specific ways of detecting the breadth in the application of the change markers and from the addition of strategies for creating a breadth of intensity. My research indicates that all markers can be present, but the institution may have focused too narrowly for transformational change to have occurred. This leads me to suggest that the components of the model relating to the structural and cultural markers of change need to be further developed to focus on the breadth of change.

Finally, I suggest the Mobile Model needs greater emphasis on and clarification of the role and nature of intentionality in the change process, as well as a greater focus on the relationship between the core strategies, support strategies, and the breadth of change. The intent of college leaders is important, in part because without it the breadth of change required for transformational change is not likely to be achieved.

Conclusion

Through this research experience, I have gained a deeper, wider, and more complex understanding of transformational change within higher education, and of the processes of change as used to implement the core competencies of healthcare informatics. In Chapter One, I stated a personal bias toward supporting a combination of

several change models to enhance the understanding of the complexity of transformational change. I feel the Mobile Model for Transformational Change provides a model for changing a college or university in the deep and broad way that is necessary for changes as important as implementing health care informatics and new modes of teaching in a nursing school. My anticipation that none of the undergraduate nursing programs would experience the transformational change of high depth and pervasiveness was a second bias. I was pleasantly surprised and motivated when I experienced firsthand observation of a nursing program undergoing successful transformational change.

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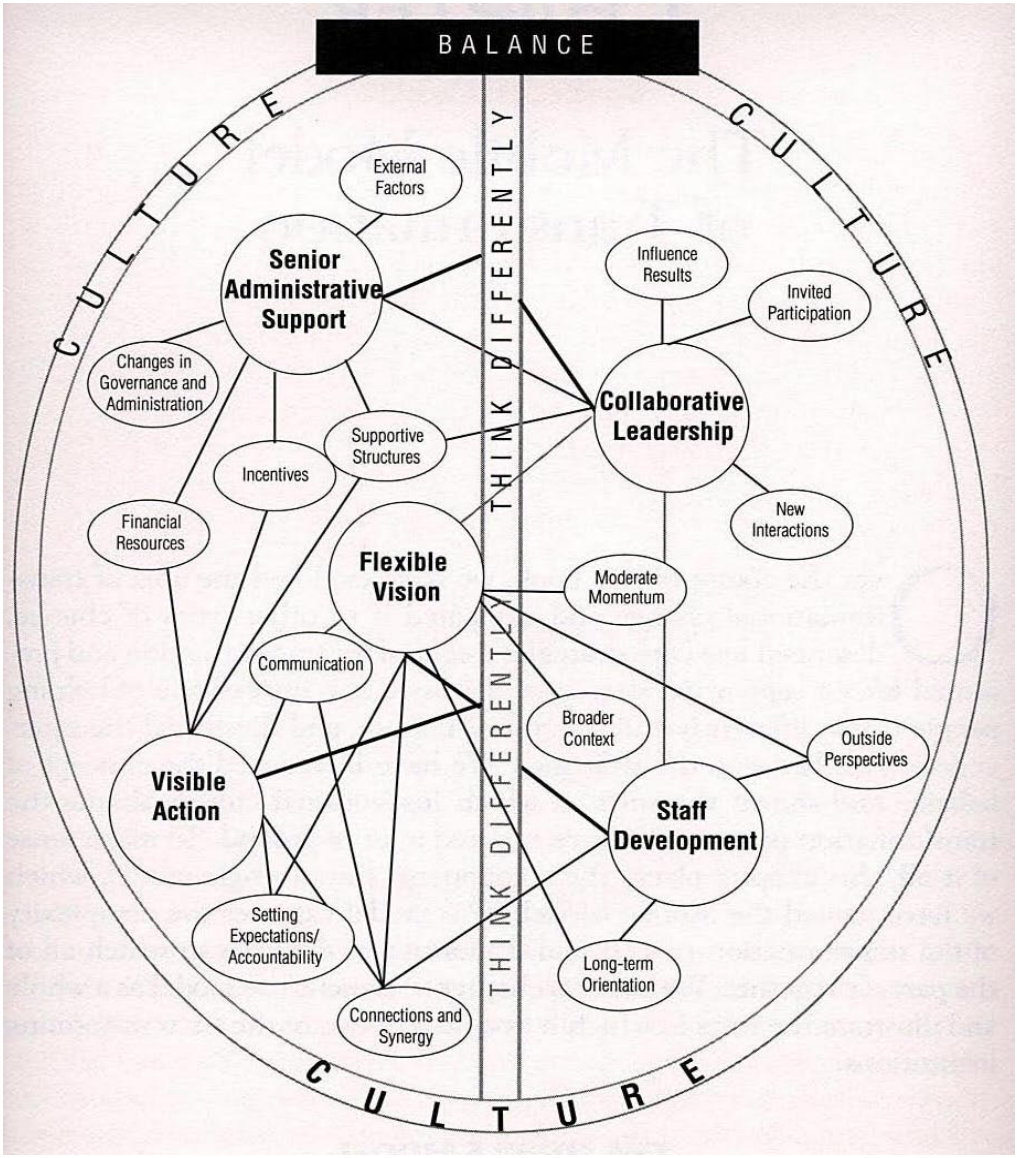
Appendices

Appendix A

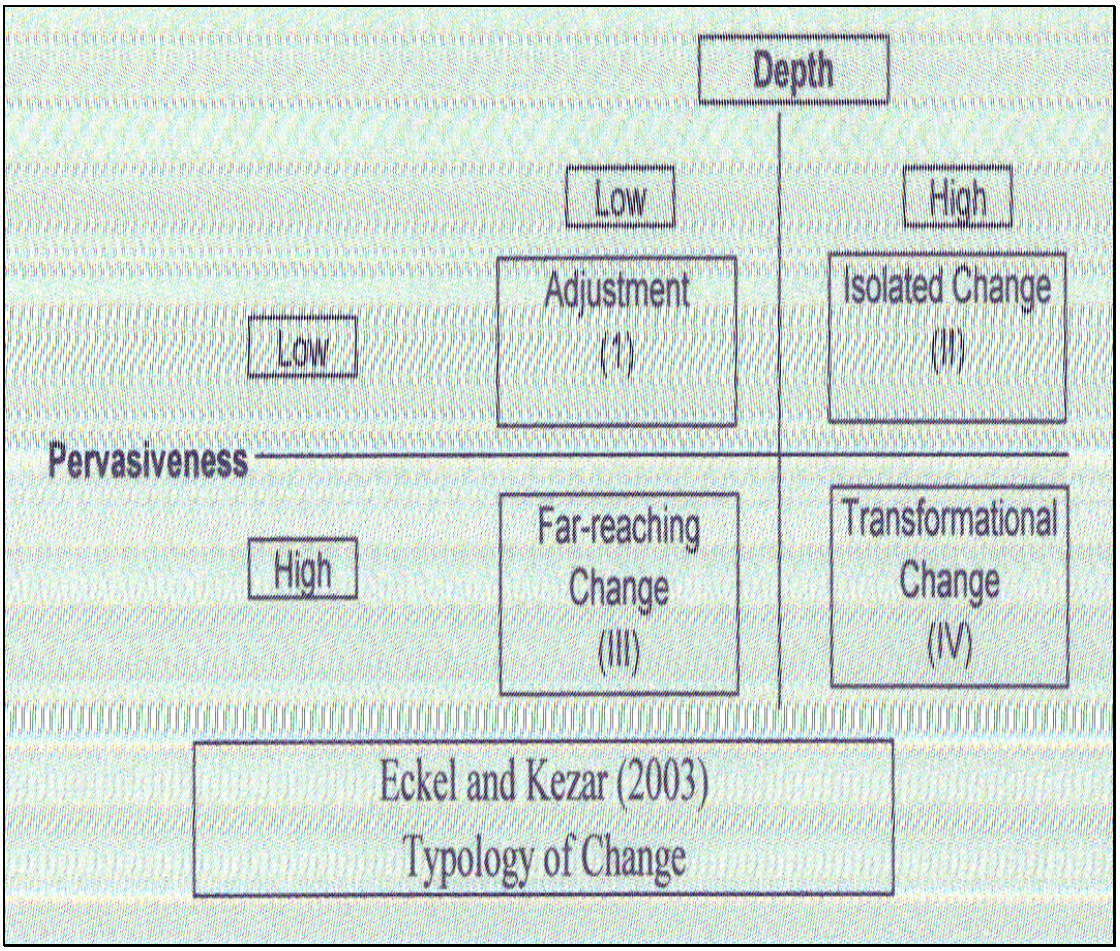
Eckel and Kezar's (2003) Mobile Model for Transformational Change



Appendix B

Eckel and Kezar's (2003)Typology of Change

Top



Appendix C

Nursing Informatics Experts Recommended

Ronda G. Hughes, PhD, MHS, RN, Senior Health Scientist Administrator for the (AHRQ, 2005) provided me with names of four nursing informatics experts:

1. Melinda Jenkins (Columbia University)
2. Sue Bakken (Columbia University)
3. Nancy Staggers (University of Utah)
4. Pat Brennan (University of Wisconsin)

These nursing informatics experts recommended seven experts:

1. Helen Connors, Dean of University of Kansas
2. Patti Abbot, Johns Hopkins University
3. Susan Newbold, NLN representative
4. Diane Skiba, UCDHSC
5. Ramona Nelson, HIMSS and Slippery Rock University
6. Angela Lewis, Manager, Informatics, HIMSS
7. Connie Delaney, Professor at University of Minnesota

Appendix D

USF IRB Approval Letter

USF
UNIVERSITY OF
SOUTH FLORIDA

March 15, 2007

Revonda Leota Cornell Shumaker, BSN, MS
8475 Macoma Drive, NE
St. Petersburg, FL 33702

RE: **Expedited Approval** for Initial Review
IRB#: 105550E
Title: *A Study of Transformational Change at Three Schools of Nursing Implementing Health Care Informatics*
Study Approval Period: March 14, 2007 to March 12, 2008

Dear Ms. Shumaker:

On March 14, 2007, Institutional Review Board (IRB) reviewed and **APPROVED** the above protocol **for the period indicated above.** It was the determination of the IRB that your study qualified for expedited review based on the federal expedited category number six (6) and seven (7).

Your Informed Consent Form was also approved.

Please note, if applicable, the **enclosed informed consent/assent documents are valid during the period indicated by the official, IRB-Approval stamp located on page one of the form.** Valid consent must be documented on a copy of the most recently IRB-approved consent form. Make copies from the enclosed original.

Please reference the above IRB protocol number in all correspondence regarding this protocol with the IRB or the Division of Research Integrity and Compliance. In addition, we have enclosed an Institutional Review Board (IRB) Quick Reference Guide providing guidelines and resources to assist you in meeting your responsibilities in the conduction of human participant research. Please read this guide carefully. It is your responsibility to conduct this study in accordance with IRB policies and procedures and as approved by the IRB.

We appreciate your dedication to the ethical conduct of human subject research at the University of South Florida and your continued commitment to human research protections. If you have any questions regarding this matter, please call 813-974-9343.

Sincerely,

Paul G. Stiles, J.D., Ph.D., Chairperson
USF Institutional Review Board

OFFICE OF RESEARCH • DIVISION OF RESEARCH INTEGRITY & COMPLIANCE
INSTITUTIONAL REVIEW BOARDS, FWA NO. 00001669
University of South Florida • 12901 Bruce B. Downs Blvd., MDC035 • Tampa, FL 33612-4799
(813) 974-5638 • FAX (813) 974-5618

Enclosures: (If applicable) IRB-Approved, Stamped Informed Consent/Assent Documents(s)
IRB Quick Reference Guide

Cc: Angie Reagan, USF IRB Professional Staff
Dr. Michael Mills

SB-IRB-Approved-EXPEDITED-0601

Appendix E

USF IRB Approved Consent Form

USF
UNIVERSITY OF
SOUTH FLORIDA

IRB Approval
FWA 00001669
IRB Number: 105550I
From 1-23-09
Thru 2-13-09

Informed Consent to Participate in Research

Information to Consider Before Taking Part in this Research Study

---

Researchers at the University of South Florida (USF) University of Iowa, University of Kansas, St. Scholastica, and Large State University study many topics. To do this, we need the help of people who agree to take part in a research study. This form tells you about this research study.

We are asking you to take part in a research study that is called:
A Study of Transformational Change at Three Schools of Nursing Implementing Health Care Informatics

The person who is in charge of this research study is Revonda L. Shumaker.
Other research personnel who you may be involved with include: A transcriber

The research will be done at the Schools of Nursing at University of Iowa, University of Kansas, St. Scholastica, and Large State University..

Purpose of the study

The purpose of this study is to study the change processes involved in implementing the core competency of health care informatics.

Study Procedures

If you take part in this study, you will be asked to participate in a 60 minute audiotaped interview conducted on-site at your School of Nursing.

Alternatives

You have the alternative to choose not to participate in this research study or not to be audio tape recorded.

Benefits

We don't know if you will get any benefits by taking part in this study. However, by taking part, you may increase our overall knowledge of

Risks or Discomfort

You will not be exposed to risks that are greater than those you routinely face at work.

Compensation

We *will not* pay you for the time you volunteer while being in this study

---

Confidentiality

- We must keep your study records confidential. The audio tape recording, signed consent form, and field notes will be labeled to protect confidentiality. They will be stored in a locked fireproof file cabinet. Any material on the computer will be password protected for the researcher only. All materials will be maintained for 3 years from the date of USF IRB closes the study. They will be destroyed by shredder.

However, certain people may need to see your study records. By law, anyone who looks at your records must keep them completely confidential. The only people who will be allowed to see these records are:

- The Principal Investigator.
- Certain government and university people who need to know more about the study. For example, individuals who provide oversight on this study may need to look at your records. This is done to make sure that we are doing the study in the right way. They also need to make sure that we are protecting your rights and your safety. These include:
  - the University of South Florida Institutional Review Board (IRB) and the staff that work for the IRB. Other individuals who work for USF that provide other kinds of oversight may also need to look at your records.
  - The Department of Health and Human Services (DHHS).

We may publish what we learn from this study. If we do, we will not let anyone know your name. We will not publish anything else that would let people know who you are.

Voluntary Participation / Withdrawal

You should only take part in this study if you want to volunteer. You should not feel that there is any pressure to take part in the study, to please the investigator or the research staff. You are free to participate in this research or withdraw at any time. There will be no penalty or loss of benefits you are entitled to receive if you stop taking part in this study.

Questions, concerns, or complaints

If you have any questions, concerns or complaints about this study, call Revonda L. Shumaker at 727-744-7533.

If you have questions about your rights, general questions, complaints, or issues as a person taking part in this study, call the Division of Research Integrity and Compliance of the University of South Florida at (813) 974-9343.

Consent to Take Part in this Research Study

It is up to you to decide whether you want to take part in this study. If you want to take part, please sign the form, if the following statements are true.

I freely give my consent to take part in this study. I understand that by signing this form I am agreeing to take part in research. I have received a copy of this form to take with me.

_____ _____

Signature of Person Taking Part in Study Date

_____

Printed Name of Person Taking Part in Study

Statement of Person Obtaining Informed Consent

I have carefully explained to the person taking part in the study what he or she can expect.

I hereby certify that when this person signs this form, to the best of my knowledge, he or she understands:

- What the study is about.
- What procedures will be used.
- What the potential benefits might be.
- What the known risks might be.

I also certify that he or she does not have any problems that could make it hard to understand what it means to take part in this research. This person speaks the language that was used to explain this research.

This person reads well enough to understand this form or, if not, this person is able to hear and understand when the form is read to him or her.

This person does not have a medical/psychological problem that would compromise comprehension and therefore makes it hard to understand what is being explained and can, therefore, give informed consent.

This person is not taking drugs that may cloud their judgment or make it hard to understand what is being explained and can, therefore, give informed consent.

_____ _____

Signature of Person Obtaining Informed Consent Date

_____

Printed Name of Person Obtaining Informed Consent

Appendix F

Interview Guide

1. Can you share with me how you became involved with implementation of informatics at your school of nursing?
2. Can you tell me your reasons to be involved?
3. Who do you see as being involved and contributing to the implementation process?
4. Can you describe how your school of nursing has addressed informatics
    - A. Infrastructure related
        1. New policies
        2. New departments
        3. New decision-making structures
        4. Reallocation of existing funds
        5. Curriculum revision
        6. New student learning and assessment practices
        7. Faculty education
    - B. Cultural and attitudinal
        1. Explore the meaning of the informatics change has upon faculty
        2. Negotiating of new understandings within the shifting work environment of those involved
5. Why do you think these particular strategies and/or decision were selected?
6. How have the changes impacted your daily work?
    - A. Interactions with other individuals or groups have changed
    - B. Interaction with students is different
    - C. Shift in values and assumptions
    - D. People are thinking and acting differently
    - E. Greater involvement with other departments and/or programs
    - F. Teaching mode differences
7. Please share with me some of the barriers experienced during the informatics change processes?
    - A. Existing professional cultures (differing values)
    - B. Role competition
    - C. Turf issues (protection of specific specialties' or interests)
    - D. Lack of a common language; core competencies

E. Internal hierarchies
F. Time involved

8. How were these specific barriers addressed?

9. In your opinion, what has been campus leadership involvement in the change processes?

10. What has been the greatest lesson(s) learned during the implementation of informatics changes processes?

11. In your opinion, what should be the next steps towards implementation of the informatics core competency? How and why?

Appendix G

Deans of Nursing Approval Letter to Identify Institution

KU THE UNIVERSITY OF KANSAS Medical Center

December 3, 2008

Revonda Shumaker

Dear Ms. Shumaker:

We give permission for you to identify the University of Kansas School of Nursing in your dissertation titled:

Transformational Change within 3 Schools of Nursing Employing Healthcare Informatics.

Should you have questions, please do not hesitate to contact Dr. Helen Connors.

Sincerely,

Karen Miller, RN, PhD, FAAN — Date: 12.09.08
Senior Vice Chancellor and Dean

Helen Connors, RN, PhD, FAAN — Date: 12-09-08
Executive Director/KU Center for Health Informatics and
Associate Dean for Integrated Technologies

Karen Miller, RN, PhD, FAAN
Senior Vice Chancellor and Dean
KU School of Nursing
KU School of Allied Health
kmiller@kumc.edu
913/588-1665 (Tel)
913/588-1605 (Fax)

Helen R. Connors, PhD, RN, FAAN
Executive Director/KU Center for
Health Informatics and Associate
Dean for Integrated Technologies
KU School of Nursing
913-588-1617
hconnors@kumc.edu

Office of the Dean | School of Allied Health
Mail Stop 2006 | 3901 Rainbow Blvd. | Kansas City, KS 66160 | (913) 588-5235 | Fax (913) 588-1605 | TDD (913) 588-7963
www.alliedhealth.kumc.edu

Letter Granting Permission to
Identify College of Saint Scholastica and SS School of Nursing
In Revonda Shumaker's Dissertation Titled
Transformational Change within 3 Schools of Nursing Employing Healthcare Informatics

January 27, 2009

Marty Witrak, Ph.D., R.N.
Professor
Dean, School of Nursing
College of St. Scholastica
1200 Kenwood Ave.
Duluth, MN 55811
mwitrak@css.edu

To: Revonda Shumaker:

We give permission for you to identify College of Saint Scholastica and the School of Nursing in your dissertation titled:

Transformational Change within 3 Schools of Nursing Employing Healthcare Informatics

Respectfully submitted,

Marty Witrak

02/18/09

Dr. Marty Witrak DATE

Appendix H:

Cerner Corporation Approval Letter to Identify Company

December 15, 2008

Sent Via Email
Revonda Shumaker

RE: Permission To Use Name of Cerner Corporation ("Cerner") In Doctoral Dissertation

Dear Mr. Shumaker:

Cerner is in receipt of your request to reference the name of Cerner and usage of Cerner's electronic health record by various nursing schools in your doctoral dissertation, entitled *Transformational Change Within 3 Schools of Nursing Implementing Healthcare Informatics*. Accordingly, with this limited use in mind, Cerner grants you permission to reference and identify Cerner within your doctoral dissertation.

Please contact us if you have any questions about the permission granted herein.

Sincerely,

CERNER CORPORATION

Jeffrey Williams
Corporate Counsel

About the Author

Revonda Leota Cornell received a Bachelor of Science in Nursing from University of North Carolina at Greensboro in 1978 and a Master's of Science Degree in 1983. I entered the Ed.D. program for Higher Education in Leadership Development at University of South Florida in 2000.

Revonda has worked as a Chief Executive Officer/Chief Operation Officer and as a Chief Nurse Executive in medium to large size healthcare systems. During the past several years, she has worked as an executive and clinical healthcare consultant.