

Radiology Administrators' Perceptions of the Hospital's Organizational Learning Environment: A Pilot Study

Nina Kowalczyk, M.S.

Abstract

A pilot survey was conducted to examine if geographic location of a hospital affects the degree to which a medical institution is a learning organization and if the presence of a learning organization affects the adoption of digital imaging and affiliation with an integrated healthcare system. A questionnaire was adapted from the *Dimensions of the Learning Organization Questionnaire* to assess radiology administrator's perceptions of their hospital's learning organization characteristics. The questionnaire used in this survey was a reliable measure of seven dimensions of a learning organization at three levels. Demographic information was collected regarding the adoption and implementation of digital imaging technology and affiliation with an integrated health system. Questionnaires were mailed to a random sample of 50 Appalachian county hospitals and to 50 hospitals identified by U.S. News and World Report as a "most wired hospital" in 2005 with a response rate of 32.7%. Hypothesis testing for differences between populations was conducted using a T-test for independent groups with a $t_{28} = 2.048$. All statistical hypothesis were retained at $\alpha = .05$ because the calculated t values for the means of each dimension and the means of the total learning organization score was less than the critical value.

Introduction

Over the past decade business academics, as well as business and industry leaders have shown an interest in the concept of "learning organizations" as a mechanism to maintain a sustainable competitive advantage. Senge (1990) was instrumental in identifying strategies for companies to transform their companies into organizations in which continuous learning occurs and in the identification of the leadership traits necessary for conversion to a learning organization. Healthcare institutions today are changing at an exponential rate to keep abreast of the technological advancements in medicine. Implementation of a national electronic medical record is a technological advancement of critical importance. In the United States, vital medical record information is fragmented and scattered in many locations because of antiquated paper record keeping posing a threat to patient safety. Implementing an electronic medical record requires the use of digital medical imaging technology. This technology has been widely embraced by the medical community in large metropolitan areas, but a need still exists in rural and underserved areas of this country. Additionally, research indicates that hospitals associated with an integrated health system tend to have a competitive advantage resulting in a higher level of financial stability allowing investments in digital imaging and electronic medical record technology. Research in human resource development has shown that senior leaders must cultivate strategic and informal learning to improve strategic goals and improve performance (Marsick & Watkins, 2003), but some healthcare institutions continue to expect that learning and knowledge creation will take place in individual staff members without the promotion of learning throughout the organization which may inhibit the transition to a national electronic medical record.

Learning Organizations

Interest in the concept of learning organizations arose from theoretical work conducted by Argyris and Schön in 1978 and Brown and Duguid in 1991 regarding the nature of learning at the organizational level. Learning organizations possess both an adaptive capacity and the ability to create alternative futures. Research indicates that learning organizations have five core strategic elements. These include: 1) shared visions, 2) shared leadership, 3) a culture that encourages experimentation, 4) the ability to transfer knowledge across organizational boundaries, and 5) team learning (Senge 1990, Goh 1998, Marsick & Watkins 2003). Although differing definitions of learning organizations have been formulated, all approaches define an organization as an organic entity with the capacity to learn. Organizational researchers also agree that an organization's learning capability will be an important sustainable competitive advantage in the future. Organizational learning is greater than just the sum of the learning of individuals working in a particular organization. It must be captured and embedded in an organization's systems, practices, and structures. A theoretical framework of learning organizations developed by Watkins and Marsick (2003) is basis for this study because it provides a clear definition of the construct of "learning organization" from an organizational culture perspective. Additionally this theory provides measurement domains for scale construction.

Digital Imaging

In May 2004, David J. Brailer, MD, PhD was appointed to serve as the National Health Information Technology Coordinator in an effort to coordinate the nation's health information technology efforts and to support governmental and private sector development of standards and the infrastructure necessary for the development and use of information technology promoting better quality patient care and a reduction in healthcare costs (U.S. Department of Health & Human Services, 2004). In addition, the recent devastation of flooding in the Gulf States by hurricane Katrina has demonstrated a real effect of the maintenance of medical records and health information in a paper format and their subsequent destruction.

A review of literature was conducted to identify barriers to the adoption of digital imaging technology. Digital imaging is a necessity in today's healthcare environment to maximize efficiency, improve workflow processes, and to provide quality patient care. This is one of the fastest growing technological advancements in medicine and many hospitals located in rural counties have been forced into the electronic age to maintain patient services. Literature suggests that many rural hospitals join larger hospital systems to achieve economies of scale to shield against economic uncertainty inhibiting the implementation of computerized medical record systems (Health Information and Management Systems Society, 2002). A study of rural hospitals in the state of Florida indicated that approximately 40% of the rural hospitals surveyed were using teleradiology systems and 47% had implemented PACS systems (Menachemi, Burke, Clawson, & Brooks, 2005), however, all of the hospitals who had implemented digital image management were affiliated with a larger healthcare system.

The use of digital imaging, teleradiology, and PACS has been shown to improve radiologic services to rural sites and improve patient care in both Florida and New Mexico (Telepak, Freede, Jaramillo, Alverson, 1998; Menachemi, Burke, Clawson, & Brooks, 2005). Additionally, a study conducted linking rural sites in Pennsylvania with an academic medical center also demonstrated an increase in the education of radiology staff working in the rural areas (Van Slyke, Egli, Prior, Salmon, Pappas, Vanatta, Goldfetter, & Hasham, 1996).

Purpose of the Study

Many medical organizations seek to become “learning organizations” to improve performance; however more research is needed to identify hospital characteristics which may increase the organizational learning environment and to identify barriers to embracing the concept of a learning organization. Do medical institutions with an environment more conducive to learning implement technological advancements more frequently than medical institutions that with an environment less conducive to learning? Do medical institutions affiliated with an integrated system demonstrate an environment more conducive to learning more frequently than medical institutions that are not affiliated with an integrated system?

In an attempt to answer these questions, this study examines the relationship of radiology administrators’ perceptions of the learning environment of their medical institution with: 1) the adoption and implementation of digital imaging, 2) affiliation with an integrated healthcare system.

Method

Variables

According to research conducted by Marsick and Watkins (2003) a learning organization can be measured by evaluating seven dimensions at three distinct levels, individual, team, and organizational. This study evaluated the seven dimensions of learning organizations at all three levels through assessing the radiology administrators’ perceptions of the following organizational attributes:

- a. continuous learning opportunity (the summated average of responses to items 1 through 8)
- b. inquiry (the summated average of responses to items 9 through 14)
- c. team learning (the summated average of responses to items 15 through 22)
- d. learning capture systems (the summated average of responses to items 23 through 29)
- e. shared vision (the summated average of responses to items 30 through 36)
- f. organizational connection (the summated average of responses to items 37 through 42)
- g. strategic leadership for learning (the summated average of responses to items 43 through 49)

Instrument

The *Dimensions of the Learning Organization Questionnaire* (DLOQ) developed by Marsick and Watkins (2003) was adapted to create a forty-nine (49) item summated rating scale questionnaire to assess radiology administrator’s perceptions of the seven dimensions of a learning organization. Nine (9) additional demographic questions were included. The DLOQ (Marsick & Watkins, 2003) was designed to measure seven dimensions of a learning organization at the individual, team, and organizational level in combination with organizational financial and knowledge performance. Participants were asked to think about how their hospital supports and uses learning and were requested to rate their hospital using a six point summated rating scale (one equals “never” and six equals “always”) for each statement.

The content validity of the original DLOQ was determined through three stages of field testing by managers and human resource developers and item analyses were conducted on the responses from the three field tests. Construct validity of the DLOQ was determined by

confirmatory factor analysis and structural equation modeling was used to assess the relations between the dimensions identified on the DLOQ.

In terms of reliability, the original DLOQ has been used in over 200 companies and the scales have proved consistently reliable with alpha levels above 0.70. An analysis of internal consistency using Cronbach's alpha was performed for each construct on this specific survey with the following results: perceptions of continuous learning $\alpha = 0.818$; perceptions of inquiry $\alpha = 0.714$; perceptions of team learning $\alpha = 0.883$; perceptions of learning capture systems $\alpha = 0.725$; perceptions of shared vision $\alpha = 0.730$; perceptions of organizational connection $\alpha = 0.740$; and perceptions of strategic leadership $\alpha = 0.703$.

Data Collection

The target population of this study is radiology administrators in Appalachian county hospitals and radiology administrators in U.S. hospitals identified as "most wired" in 2005 by *U.S. News and World Report*. A questionnaire was mailed to a random sample of fifty (50) hospitals located within an Appalachian county and to fifty (50) hospitals identified by U.S. News and World Report as a "most wired hospital" in 2005. Hospitals were randomly selected utilizing a random numbers chart. In order for a questionnaire to be considered usable, a total of fifteen (15) or more items must have been completed. Of the one hundred surveys mailed, two were returned as undeliverable. Thirty completed surveys were returned, resulting in a response rate of 32.7%.

Results

Using SPSS 14.0, frequency statistics were performed to evaluate the mean, standard deviation, skewness, and kurtosis for each question relating to a learning organization construct (see operational definitions above) prior to further statistical analysis. Results demonstrated normal distribution of all responses. Following this analysis, means were calculated for each variable construct as well as the overall learning organization scores and an independent sample T-test was conducted to in reference to the following statistical hypotheses:

1. There is no difference in the strength of the presence of a strong learning organization between medical institutions in different geographic locations. ($H_0 = \mu_1 - \mu_2 = 0$)
2. There is no difference in the strength of the presence of a strong learning organization between medical institutions part of an integrated system and independent medical institutions. ($H_0 = \mu_1 - \mu_2 = 0$)
3. There is no difference in the strength of the presence of a strong learning organization between medical institutions utilizing digital imaging technology and medical institutions not utilizing digital imaging technology. ($H_0 = \mu_1 - \mu_2 = 0$)

The demographic characteristics indicated that 60% of the respondents were from "wired" institutions and 40% were from institutions located within an Appalachian county. Most respondents (80%) were employed in a digital imaging department and 66% of the respondents were employed in a medical institution which was a member of an integrated health care system.

Hypothesis testing for differences between populations was conducted using a T-test for independent groups with a $.975t_{28} = 2.048$. The statistical hypothesis of no difference in the strength of the presence of a strong learning organization between medical institutions in different geographic locations was retained at alpha = .05 because the calculated value of 1.180 is less than the critical value. The statistical hypothesis of no difference in the strength of the

presence of a strong learning organization between medical institutions part of an integrated system and independent medical institutions was retained at $\alpha = .05$ because the calculated value of 0.917 is less than the critical value. The statistical hypothesis of no difference in the strength of the presence of a strong learning organization between medical institutions utilizing digital imaging technology and medical institutions not utilizing digital imaging technology was retained at $\alpha = .05$ because the calculated value of 1.305 is less than the critical value.

Conclusion

The T-test for independent groups indicated no differences could be found among any of the variables tested. However, since this was a pilot study of a small population, it is difficult to generalize these findings to a larger population. The small sample increases the sampling error, so a larger sample size would yield more precise results due to a decrease in the measure of variability. However, this pilot study was of value in assessing the internal consistency of the questionnaire. Based on the analysis, each construct resulted in a Cronbach's alpha of greater than 0.7 so this instrument could be used to conduct a similar study on a larger population.

References

- Goh, S.C. (1998). Toward a learning organization: The strategic building blocks. *S.A.M. Advanced Management Journal*, 63I(2), 15-20.
- Health Information and Management Systems Society (2002). 14th Annual Leadership Survey Sponsored by Superior Consultant Company, Chicago, IL
- Marsick, V.J., Watkins K.E. (2003). Demonstrating the value of an organization's learning culture: The dimensions of the learning organization questionnaire. *Advances in Developing Human Resources* 5(2), 132-151.
- Menachemi, N., Burke D., Clawson A., Brooks, R.G. (2005). Information technologies in Florida's rural hospitals: Does system affiliation matter? *Journal of Rural Health* 12(3), 263-268.
- Senge, P.M. (1990). The leader's new work: Building learning organizations. *Sloan Management Review* 23(1), 7-23.
- Telepak, R.J, Freede, E., Jaramillo, R.E., Alverson, D.C. (1998). Five years' experience in a (really) rural teleradiology practice. Was it worth it? The successes and failures. *Medical Imaging* 3339, 192-199.
- Van Slyke, M.A., Egli, D.F., Prior, F. W., Salmon, W., Pappas, G., Vanatta, F., Goldfetter, W., Hashem, s. (1996). Model for collaboration: a rural medicine and academic health center teleradiology project. *Medical Imaging* 2711, 345-353.
- U.S. Department of Health & Human Services (2004). Secretary Thompson seeking fastest possible results, names first health information technology coordinator. Accessed 9/22/05 at <http://www.hhs.gov/news/press/2004pres/20040427a.html>

Nina Kowalczyk, M.S. , Clinical Instructor, School of Allied Medical Professions, College of Medicine, The Ohio State University, 340B Atwell Hall, 453 West 10th Avenue, Columbus, Ohio 43210, kowalczyk.1@osu.edu

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