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A Pragmatic Evaluation of an Academic Practicum's Knowledge Transfer Process

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Disclaimer

Abstract

Practicums are designed to provide on-the-job learning experience for the students in their chosen occupational field. But do students actually benefit from practicums? This manuscript investigates linkages between knowledge repository systems and knowledge transfer in database technology practicums. It examines the literature on knowledge transfer, develops an Action Research methodology, and presents results of a new study in database academic practicums. The study focuses on a graduate school database technology practicum at Denver-based Regis University. As a member of an academic practicum team with responsibilities involving database administrative support to a group of students and faculty, the researcher seeks to bring some data to bear on the types of methodologies utilized by past and current practicum teams over a twenty month period. The results of this investigation and the conditions that must be enabled for a practicum to effectively transfer knowledge will be presented.

Acknowledgements

I would like to thank my student colleagues and the faculty of Regis University - 2008B Database Practicum for sharing their knowledge with me. Your determination to continue succeeding in your life was apparent and influential for me to complete this important personal and educational milestone. Special thanks to Professor Ernest Eugster, Ph.D. and Professor Denise Duncan for providing the guidance and expertise to achieve this significant event in my life. Especially, I would like to thank my friend Bryan and my sister Damaris for their support, and everyone in my family for being so understanding. Their love and encouragement motivated me to complete this endeavor.

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Chapter 1 – Introduction

1.1 - The Need for Practicums in Higher Education

Obtaining practical experience is a major obstacle for new graduates (Friedman & Friedman, 1989). Increasingly, universities and graduate schools are turning to practicums to give students supervised practical application of previously studied theories, concepts, and practices.

A practicum can be defined as "work experience as part of study: a period of work for practical experience as part of an academic course" (MSN Encarta, 2009). Another definition holds that a practicum is "a school or college course, especially one in a specialized field of study that is designed to give students supervised practical application of previously studied theory" (The American Heritage, 2000).

The common thread in these definitions is that a key objective of a practicum is to provide students with valuable learning experience that is academically rigorous and intellectually challenging. In other words, practicums serve as a culminating experience to the student's previous coursework by allowing students to be involved as practitioners of a real work opportunity in their field of study (Conn, 2004). Under faculty supervision, practicum students work either in teams or individually.

The concept of a practicum is not new. Practicums can be found in many areas including health services, telecommunications, and manufacturing. Today, practicums exist in many academic fields and include observation and on-the-job training. Ideally, practicum students will accumulate knowledge and skills which they can apply to participate more fully in the workplace and society. In addition, a practicum is a tested and valid method of enhancing educational

experiences, especially in applied sciences (Conn, 2004, p. 8). No substitute exists for hands-on experience and practice.

1.2 - Practicums in Database Technology and Management

One area where practicums are being used is the study of database technology and administration. During the remainder of this paper, the researcher will use the term 'practicum' to refer to a group of students in an academic environment with the responsibility to provide services and support to another group of students and faculty, while developing on-the-job experience over a period of six months. At the end of the six months, a new practicum takes over the responsibilities of the previous practicum. This sequence repeats every six months. The objective of the practicum is to restore all service-affecting incidents that occur within the academic environment as quickly as possible and with minimal disruption to users and minimal impact to the business as a whole.

1.3 - Knowledge Repository Systems in Database Technology Practicums

A key component of a database technology practicum is a knowledge repository system. Knowledge repository systems are being used in database technology practicums for the permanent recording of problems; offering a repository of resolutions to problems that someone else has previously solved. Although important to this progress, little research has been done to identify the conditions that support successful knowledge transfer in practicums.

1.4 - Statement of Problem

Although many benefits are associated with knowledge repository systems, they are faced with challenges. In today's fast-paced environment, these systems may not support the level of efficiency and effectiveness necessary to come up with a fast resolution to a problem. For example, the amount of data that may eventually reside in these systems may lead to poor

database query performance. In an effort to gather records related to a current problem that someone else had previously solved, these systems may require a query to a large amount of available records in these systems. Furthermore, data quality can be questionable. If data on a trouble ticket is poorly entered (i.e., lacking specifics), the value to database research practicum members is lowered. The practicum member may have to research multiple records to determine the best course of action to solve the problem at hand.

1.5 - Statement of Goals and Objectives

The goal of this study is to investigate the methodology that supports a current academic database technology practicum's knowledge repository system. Twenty months worth of data from this repository system will be analyzed in an effort to develop an internal structure supporting effective and efficient knowledge transfer between current and future academic practicum members. This effort will include literature review on knowledge transfer and the development of an Action Research methodology, ultimately leading to a new study in database academic practicums.

1.6 - Summary

An obstacle for new graduates to secure employment is the lack of experience in their field of study. As a result, universities are increasingly turning to practicums. By providing students supervised practical application of previously studied theory, practicums allow students to accumulate knowledge and skills in their field of study which they can apply to participate more fully in the workplace and society.

Today, practicums are being used in many areas including the study of database technology and administration. Knowledge repository systems, as a key component of a knowledge transfer strategy, are being used in academic database practicums for the permanent

recording of problems; offering a repository of resolutions to problems that someone else has previously solved. Practicums are a widely used learning tool, but have challenges. For example, the amount of data that may eventually reside in these systems may lead to poor database query performance. Additionally, these systems may allow for poor quality data to be entered by system users eventually leading to duplication of records and fragmentation of data.

This study will attempt to identify the conditions that support successful knowledge transfer to efficiently and effectively manage knowledge repository systems in an academic practicum setting.

In the next chapter, some background information as well as the literature research will be explored.

Chapter 2 – Review of Literature

Knowledge management (KM) has emerged as a critical part of the learning process. In a practicum, students must apply aspects of knowledge management by gathering, organizing and sharing knowledge to real world projects. A lot of literature exists on knowledge management and its processes, but little has been written on the role it plays in database technology practicums.

This chapter will provide working definitions and distinguish between knowledge management, the knowledge transfer process, and the significance of database technology practicums' knowledge repository systems. That is, the chapter explores the value of that technology brings to the knowledge transfer process in addition to the value it brings to knowledge management.

2.1 - Knowledge Management Terminology

Before discussing knowledge management in detail, it may be helpful to first explain the difference between data, information, and knowledge as sometimes these terms are used interchangeably.

Davenport and Prusak (1998) defined data as a set or collection of discrete, objective facts about events. Data may consist of words, numbers, or images, and could be collected, for example, as part of an experiment or observation such as measurements of variables, or simply through personal experience. The researchers further state, "data describes only a part of what happened; it provides no judgment or interpretation and no sustainable basis of action.

Davenport and Prusak (1998) described information as a message. A message could take the form of a visual, audible, or written way of communication. Davenport and Prusak (1998)

further stated, “information is meant to change the way the receiver perceives something, to have an impact on his judgment and behavior. It must inform; it's data that makes a difference” (p. 3). When information makes sense to the receiver, it changes the way the receiver sees something. This, in turn, will create knowledge and enable learning (Nonaka, 1994).

Knowledge can be defined as the meaningful links people make in their minds between information and its application in action in a specific setting (Dixon, 2000). An information-produced belief leads to knowledge. Nonetheless, the information an individual receives faces the contradiction that might exist regarding what an individual has previously learned about related possibilities at the source. While messages are received, the receiver creates organized information grounded on what he or she tends to believe (Nonaka, 1994, p. 15).

To better understand how knowledge is created and managed, it is important to distinguish between tacit knowledge and explicit knowledge.

2.1.1 - Tacit vs. Explicit Knowledge

Dixon (2000) defined tacit knowledge as knowledge that people carry in their minds constructed from their experience in the world. This means that it involves making sense of what they see, touch, feel, and hear. For example, they know how to smell, how to concentrate on a subject, and how to recognize a friend’s face, but they are not aware of the rules or laws, if any, that may be involved in these actions. Nonaka (1994) noted that tacit knowledge is deeply rooted in action, commitment, and involvement in a specific context, and as so, it is hard to formalize and communicate. Often, people are not aware of the knowledge they possess or how it could be of value to others, hence the famous aphorism, ‘We know more than we can tell.’ Tacit knowledge is knowledge which is only known by an individual and is not easily shared. Extensive personal contact and trust is required to effectively transfer tacit knowledge.

Although tacit knowledge arises as a result of some action, it is more easily exchanged, disseminated, or combined among communities of practice by being made explicit (Nonaka, 1994).

Explicit knowledge, also known as codified knowledge, is knowledge that is transmittable in formal, systematic language (Nonaka, 1994). Dixon (2000) stated that explicit knowledge is "knowledge that can be laid out in procedures, steps, and standards. It can be translated into checklists and specifications" (p. 26). In contrast to tacit knowledge, explicit knowledge is easy to communicate.

There are two types of explicit knowledge: structured and unstructured. Structured explicit knowledge involves data elements that are organized in a particular way for future retrieval. Examples of structured explicit knowledge are: spreadsheets, databases, and documents. Unstructured explicit knowledge involves information that is not referenced for retrieval. Examples of unstructured explicit knowledge include images and emails.

2.1.2 - General vs. Specific Knowledge

General knowledge is public knowledge. In other words, general knowledge is available to anyone; thus its context is commonly shared. General knowledge is easy to codify and exchange. Specific knowledge is concerned with detailed facts about a case that is not considered common knowledge. It is what an informed individual is familiar with. Specific knowledge is not easy to codify and exchange as it requires its context to be understood across knowledge communities.

Following, knowledge management will be looked at in more detail.

2.2 - Knowledge Management

2.2.1 - Definition

What is knowledge management? The answer to this question is a motif for this study. Knowledge management is a result of discovering, understanding, and utilizing knowledge to attain organizational objectives. It mainly consists of the knowledge to be shared, with whom this knowledge is to be shared with, and how this will be accomplished. Knowledge management is about discovering new or replacing existing organizational knowledge (tacit or explicit) through social, collaborative processes, or reflection. In addition, knowledge management is about understanding and utilizing knowledge. Knowledge must first be understood or absorbed to be able to use it or act on it.

The definition makes clear that knowledge management helps "attain organizational objectives." An organization may face loss of income when a key employee departs with knowledge that has been obtained over the years. But if an organization's collective knowledge is identified and leveraged, it becomes competent. Additionally, knowledge management extends over time and geographic distance. Knowledge management allows for faster access of the organization's knowledge that is important and required to provide, for example, faster product or service development and innovation by relying on information technology.

2.2.2 - Goals

The New York State – Department of Civil Service (2009) stated, "the goal of knowledge management is not to manage all knowledge, but to manage the knowledge that is most important to the organization. It involves getting the right information to the right people at the right time, and helping people create and share knowledge and act in ways that will measurably improve individual and organizational performance" (p. 4). Knowledge management creates

value when it is shared and utilized effectively. Knowledge management allows people to build upon someone's life experience in a way that strengthens not only the employee, but the whole organization as well (p. 1). In addition, by effectively managing knowledge, organizations claim higher rates of productivity. For example, employee's knowledge becomes easier to access and use to make better decisions, processes are streamlined, re-work is reduced, innovation is welcomed, and data integrity as well as collaboration increases. As a result, cost of operations lower while customer service increases (p. 1).

2.3 - Knowledge Management Solutions

To capture elements of KM, knowledge management solutions have evolved. Figure 1, taken from a system description of knowledge management, divides knowledge management solutions into four levels: (1) KM processes, (2) KM systems, (3) KM mechanisms and technologies, and (4) KM infrastructure (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, p. 31).

The following paragraphs describe how KM Solutions work.

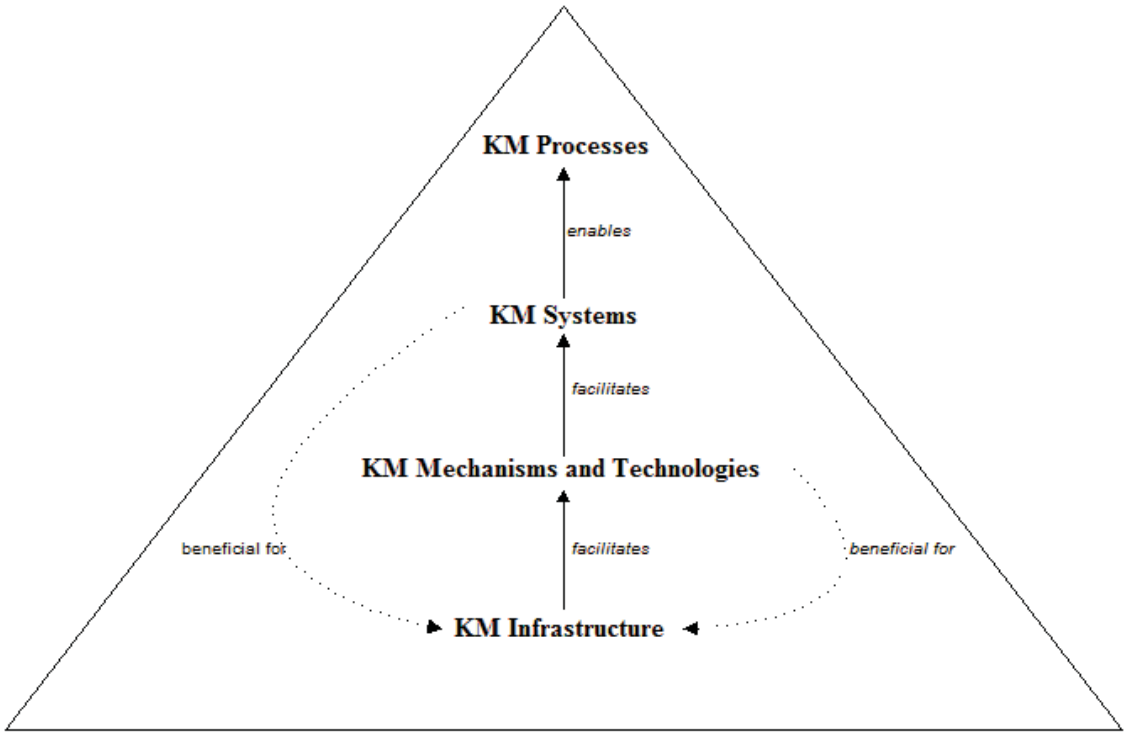


Figure 1: Knowledge Management Solutions

(Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, p. 31)

2.4 - KM Processes

KM Processes are the processes that knowledge undergoes in an organization. As shown in Figure 2, they are: knowledge discovery, knowledge capturing, knowledge sharing, and knowledge application (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, pp. 31-32).

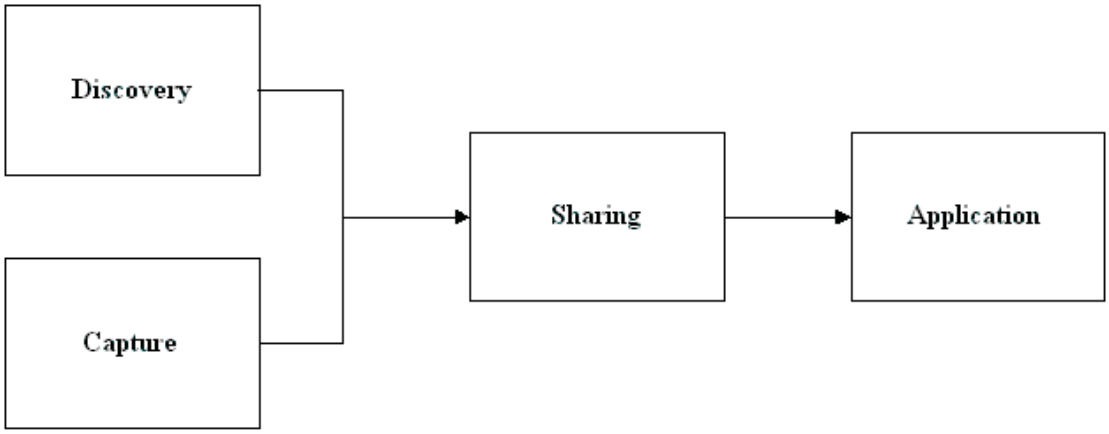


Figure 2: Knowledge Management Processes

(Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, p. 32)

Knowledge discovery and knowledge capturing involve the retrieving of knowledge while knowledge sharing and knowledge application involve the use of knowledge. More specifically, knowledge discovery involves the development of new knowledge (tacit or explicit) from data and information or from deduction of previous knowledge while knowledge capture involves the capturing of knowledge (tacit or explicit) from within people, organizational entities, or artifacts (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, p. 33). For example, knowledge discovery may take place while reflecting on or analyzing data gathered from survey reports while knowledge capture involves learning from social interaction such as a group of organizational peers.

Knowledge sharing involves the communication of knowledge (tacit or explicit) to others. For example, knowledge sharing may occur during the articulating of lessons learned to someone or a group of people.

In contrast, knowledge application only calls for the utilization of knowledge and does not necessarily requires that the recipient internalizes or comprehends the shared knowledge. An

example of knowledge application may take place during the process of utilizing a set of procedural instructions to accomplish a task. All that is required from the recipient is to use the knowledge shared to guide his decisions and actions (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, pp. 34-35).

2.5 - KM Systems

In the second level, KM Processes are backed by KM Systems which are information technologies that support and enhance the discovery, capture, sharing, and application of knowledge management (Alivi and Leidner, 2001, p. 114). The result is new knowledge and better problem solving.

KM Systems have evolved. In its early stages, KM systems focused largely on supporting decision-making. Knowledge was limited and domain-specific. Today, knowledge management systems focus on the sharing of common knowledge (Becerra-Fernandez & Leidner, 2008, p. 7). For example, knowledge representations in earlier systems were visible and explicit (e.g., rules and keywords), whereas representations of knowledge in later systems are increasingly visible and implicit (e.g., data mining or profiles derived from behavior patterns that become part of intelligent agents and filtering technologies). Additionally, as knowledge representations become more implicit, huge amounts of data derived from users' behaviors have been used as indicators of users' knowledge, interests, and competence (Becerra-Fernandez & Leidner, 2008, p. 101-102).

Knowledge management systems can be divided into four groups: (1) knowledge discovery systems (i.e., data mining systems), (2) knowledge capture systems (i.e., knowledge repository systems), (3) knowledge sharing systems (i.e., discussion forum systems), and (4) knowledge application systems (i.e., expert systems).

During the knowledge discovery process, for example, IT can result in new sources of knowledge by using data mining technologies. During the capture process, IT might be involved in developing knowledge repository systems or electronic bulletin boards to capture individual and organizational knowledge and facilitate knowledge access. IT might also be involved in creating discussion forums or providing faster access to available knowledge resources during the knowledge sharing process. During the knowledge application process, IT might be involved in creating expert systems or workflow systems to be able to apply knowledge in many locations and provide faster application of new knowledge through workflow automation (Alavi & Leidner, 2001, p. 125).

With the assistance of information technology's implementation of intelligent algorithms, such as data mining, and inference from data relationships, knowledge discovery systems produce new knowledge. Knowledge capture systems are able to share knowledge with others by preserving and formalizing the knowledge of experts through models, such as concept maps, that facilitate learning the domain (Becerra-Fernandez & Leidner, 2008, pp. 7-8). In contrast, the main purpose of knowledge sharing systems, which will be discussed later, is to organize and disseminate knowledge.

Lastly, the main purpose of knowledge application systems is to aid in problem solving. Becerra-Fernandez and Leidner (2008) stated, "organizations with significant intellectual capital require eliciting and capturing knowledge for reuse in solving new problems as well as recurring old problems" (p. 7).

2.6 - KM Mechanisms and Technologies

In the third level, each knowledge management system uses mechanisms and technologies to enable knowledge management processes (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, p. 31).

Examples of knowledge management mechanisms include on-the-job training, face-to-face meetings, and learning by observation. Knowledge management technologies include decision support systems, expert systems, and electronic discussion groups (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, p. 36).

These mechanisms and technologies depend upon the KM infrastructure (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, p. 31). Over time, the KM Infrastructure can benefit from knowledge management mechanisms and technologies and knowledge management systems. This is depicted by the curved arrows on Figure 1 (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, p. 32).

2.7 - KM Infrastructure

This last knowledge management solution level provides for the long term foundation for knowledge management. It is comprised of five primary components: organizational culture, organization structure, information technology infrastructure, common knowledge, and physical environment (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, p. 40). Following is a description of each KM infrastructure component.

2.7.1 - Organizational Culture

Organizational culture is a significant facilitator of knowledge management. The behaviors of the members of an organization are guided by the beliefs and norms of organizational culture. An organization culture will enable employees to understand the benefits

of knowledge management, and motivate employees leading them to find time for knowledge management (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, pp. 43-44). For example, by having upper management build a culture that encourages knowledge sharing and create incentives to employees that share important knowledge to the organization, employees may feel motivated to take part in knowledge management. To effectively deploy organization-wide knowledge management systems, it is necessary to understand organizational culture and its key relationship to knowledge management (Becerra-Fernandez & Leidner, 2008, p. 3).

A survey of knowledge management practices in U.S. companies pointed that the top four most significant knowledge management challenges were actually non-technical in nature and included, in order of importance: "(1) the organization's employees have no time for KM; (2) the current organization culture does not encourage knowledge sharing; (3) inadequate understanding of KM and its benefits to the company; and (4) inability to measure the financial benefits from KM." (Dyer & McDonough, 2001).

Indeed, the most difficult part of knowledge management is to get individuals to take part in sharing knowledge. Employees are usually hesitant to invest time to contribute to an organization's knowledge management process. They may see it as an additional effort to their already busy schedule. The New York State – Department of Civil Service (2009) stated, "the challenge is to create an atmosphere that fosters knowledge sharing, while simultaneously underscoring that transferring knowledge is a way for employees to leave a legacy that will ultimately help the organization long after they leave" (p. 1). According to Zack (1998), "organizations often do not to challenge the way knowledge is stored, treated or passed on. However, managers should not blindly accept the apparent tacitness of knowledge."

Another important challenge for organization managers is to ensure knowledge does not leave an organization once an employee or manager leaves. An effective organizational culture provides management support at all levels of knowledge management, understanding of the value of knowledge management practices, incentives that reward knowledge sharing, and encouragement of interaction for knowledge creation and knowledge sharing (Armbrecht et al., 2001). The New York State – Department of Civil Service (2009) indicated that some organizations recognize employees who have shared valuable knowledge at a recognition function or in some other public event (p. 5). It is not only necessary for managers to impart the importance the KM brings to an organization as well as an employee, but to effectively involve employees in this process. An employee reward system, for example, may be necessary as an incentive for employees to contribute to this effort.

In contrast, Koudsi (2000) noted that cultures that accentuate on individual performance and accumulate information within units encourage limited employee interaction. Furthermore, when top management is not involved at all levels of knowledge management, the organizational culture created inhibits knowledge sharing and retention. In this type of organizational culture, people might even be afraid of asking or posting a question feeling it might reveal their ignorance.

2.7.2 - Organizational Structure

KM also depends upon organizational structure. Two aspects of organizational structure are pertinent. First, the hierarchical structure of an organization affects individuals who frequently interact with other employees whom are likely to transfer knowledge. Traditional reporting and its influence on the flow of data and information together with groups, who might facilitate making decisions together, ultimately affect knowledge creation and knowledge

sharing. By decentralizing or leveraging organizational structures, companies often seek to get rid off organizational layers, thereby setting the tone to place more responsibility with each employee and increasing the proportion of groups reporting to each individual. As a consequence, knowledge sharing is more apt to occur in a larger population of individuals in organizations that are more decentralized (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, pp. 42-43).

Second, organization structures facilitate knowledge management through specified structures and roles that back up knowledge management. Several options exist. Organizations may appoint an individual to be the chief knowledge officer of the organization. This individual has responsibilities for the organization's knowledge management effort. Other organizations may create a knowledge management department headed by the chief knowledge officer. The corporate library also serves to back up business units by functioning as a repository of historical information regarding the organization competitive ventures. In addition, the research and development departments sustain the management of knowledge and keeps organizations appraised of newest developments (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, p. 43).

2.7.3 - Information Technology Infrastructure

The organization's information technology infrastructure also facilitates knowledge management. Infrastructure can include databases, enterprise resource planning (ERP), and customer relationship management (CRM) systems. The capabilities that these enterprise infrastructure technologies can be classified into four categories: reach, depth, richness, and aggregation (Daft & Lengel, 1986; Evans & Wurster, 1999). 'Reach' refers to the connection and access aspects of the IT infrastructure including the efficiency of being able to connect anywhere and with anyone. "Managing knowledge is especially helpful for large organizations

where geographical and functional distances inhibit workers from knowing and benefiting from the work of others" (New York State – Department of Civil Service, 2009). 'Depth' refers to the amount and detail of information that can be passed along communication links effectively. Bandwidth and customization correspond to this category. According to Carlson and Zmud (1999), 'richness' may be represented by communication channels. In addition, 'richness' provides multiple cues (i.e., tone of voice, facial expression, and body language) at the same time while providing quick feedback, personalized messages, and the use natural language to convey subtleties (Daft & Lengel, 1986). Lastly, as technology has allowed the 'aggregation' or capability of large volumes of information to be drawn from many sources at a time. For example, as Becerra-Fernandez, Gonzalez, and Sabherwal (2004) pointed out, **"**data mining and data warehousing together enable the synthesis of diverse information from multiple sources, potentially to produce new insights" (p. 44).

2.7.4 - Common Knowledge

Common knowledge (Grant, 1996b) is another important component of the infrastructure that facilitates knowledge management. Common knowledge encompasses an organization's cumulative experiences in an effort to comprehend knowledge and activities together with organized principles supporting communication and coordination (Zander & Kogut, 1995). Furthermore, an individual expert's knowledge is enhanced when integrated with the common knowledge of others (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004).

2.7.5 - Physical Environment

Although often taken for granted, the organizations physical environment is another important groundwork on which knowledge management lies. The physical environment of an organization, as Becerra-Fernandez, Gonzalez, and Sabherwal (2004) stated, "…includes the

design of buildings and the separation between them; the location, size, and type of offices; the type, number, and nature of meeting rooms; and so on" (p. 45). The physical environment of an organization may nurture knowledge management by facilitating employees the opportunity to gather and share ideas.

Figure 3 summarizes the parts of the knowledge management solutions just described.

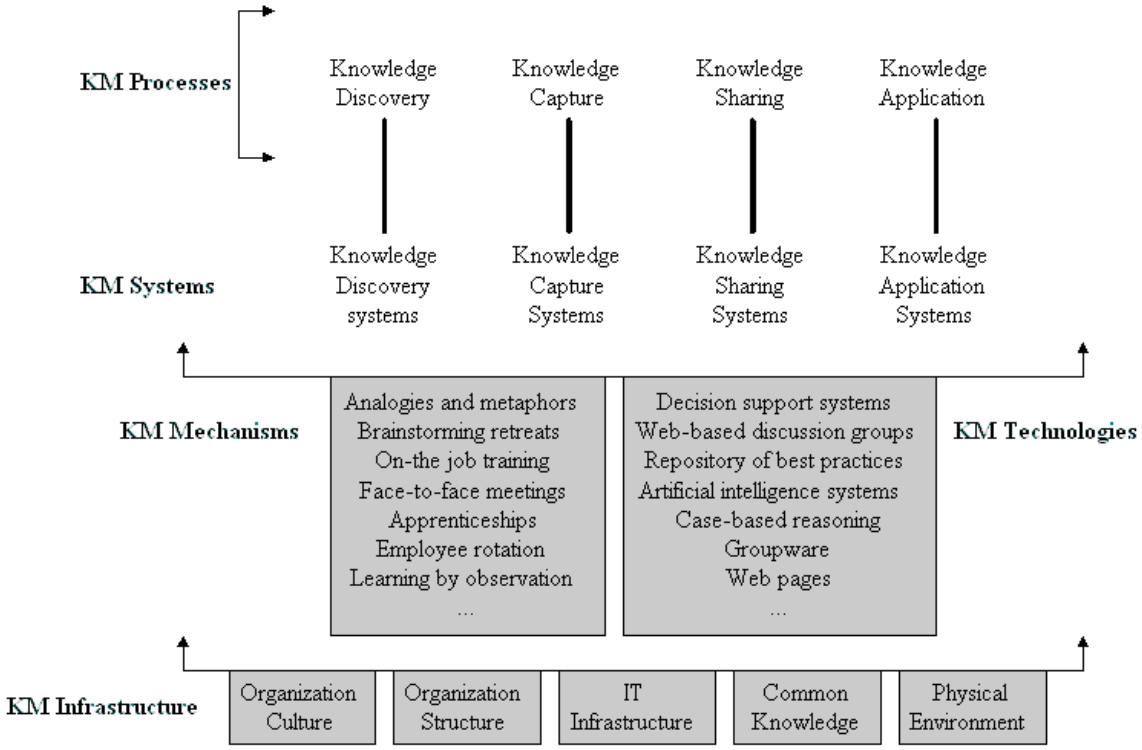


Figure 3: Detailed View of Knowledge Management Solutions

(Becerra-Fernández, González, & Sabherwal, 2004, p. 47)

2.8 - Knowledge Sharing (Knowledge Transfer) Process

This chapter will now focus on the knowledge sharing process of knowledge management which involves the communication of knowledge (tacit or explicit) to others. Knowledge sharing consists of three important activities which can be summarized as act-internalize-flow.

- *Act on knowledge*. Knowledge sharing implies effective knowledge transfer so that the knowledge recipient will not only acquire the knowledge, but will understand it well to be able to act on it (Jensen & Meckling, 1996).
- *Internalize knowledge*. Knowledge sharing is about sharing knowledge, and not providing recommendations based on the knowledge. For example, sharing

knowledge does not only involves the recipient to acquire shared knowledge, but also requires the recipient to have the ability to take action based on the knowledge acquired (e.g., teaching lessons learned to a group of employees), whereas the later simply involves utilization of knowledge without the recipient internalizing the shared knowledge (e.g., a procedure to follow in order to complete a task). (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, p. 34).

- *Flows everywhere*. Knowledge sharing might not only take place across individuals, but across departments, organizations, and groups of people as well (Alivi & Leidner, 2001).

King (2006) defined knowledge transfer as a "…focused, unidirectional communication of knowledge between individuals, groups or organizations such that the recipient of knowledge (a) has a cognitive understanding, (b) has the ability to apply the knowledge, or (c) applies the knowledge" (p. 254). Knowledge transfer is the process of sharing knowledge between people, and as a result, sometimes the terms knowledge sharing and knowledge transfer are used interchangeably.

The New York State – Department of Civil Service (2009) describes knowledge transfer as the actual movement of knowledge from one individual to another (p. 1). If people come to think about it, they use knowledge management and knowledge transfer daily. When they look to accomplish something, either they know the answer, look for an answer, or ask someone else who knows the answer. The goal of knowledge transfer is to increase the value of knowledge thus improving an organization's ability to do things (Davenport and Prusak, 1998, p. 101). The New York State – Department of Civil Service (2009) further mentioned that "managing

knowledge and ensuring its transfer creates value by compounding its use to increase productivity and innovation" (p. 1).

Davenport and Prusak (1998) indicated that knowledge transfer involves two actions or components: transmission and absorption. Knowledge transfer occurs when knowledge is transmitted or presented to a receiver (a person or a group of people) and the receiver is able to absorb that knowledge. Knowledge access is necessary for knowledge transfer to take place, but it is not sufficient for knowledge transfer to occur. In other words, knowledge transfer does not take place by just having knowledge available, such as in a knowledge repository, or by just presenting it to a recipient. To assure knowledge transfer, absorption of that knowledge must take place as well. To summarize:

Transfer = Transmission + Absorption.

But, this equation has no value unless new knowledge ascertains some changes in behavior, or the development of a new idea leading to new behavior is brought about. Davenport and Prusak (1998) stated, "it is fairly common for someone to understand and absorb new knowledge but not put it to use for a variety of reasons" (p. 101). Knowledge may not be put to use due to lack of time or opportunity, but a more important reason is due to the trust or respect of the source of knowledge. For example, if an organization sends an upper management employee to a seminar with the intention of this employee to conduct an organization meeting afterwards to discuss what was learned at the seminar, it is possible everyone at the meeting will learn from this employee and put the knowledge gained to use. This may not be the case if the employee sent to the seminar is an intern that has just joined the organization.

Another reason for not putting knowledge to use may be for fear of taking risks especially in an organization that penalizes mistakes. Pride and stubbornness are other reasons

why knowledge is not put to use. Some people refuse to put knowledge to use if it comes from an employee with a lower rank in the organization, or simply if they just don't like the source of the knowledge. Consequently, Davenport and Prusak (1998) expressed the above equation as:

"Transfer = Transmission + Absorption (and Use)"

(p. 101).

Referring to a situational task of a Help Desk department, Ariffin et al. (2007) stated, "when an expert is called and he provides step-by-step procedure on how to solve the problems to the caller, the expert is transferring the knowledge or giving direction to the caller. And the caller is 'applying' the knowledge by following the instructions given by the expert" (p. 1).

In summary, knowledge transfer is the process of sharing knowledge between individuals. Before new knowledge can be used by an individual, it must first be transmitted to and absorbed by the individual. To absorb knowledge implies to learn from it. If knowledge is not absorbed, knowledge transfer cannot take place. To transfer knowledge effectively, it is necessary to have both willing senders and interested receivers.

Figure 4 shows that the knowledge management sharing process is supported by two knowledge management sub-processes: socialization and exchange. Either the socialization or exchange processes is used depending upon whether explicit or tacit knowledge is being shared (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, p. 32).

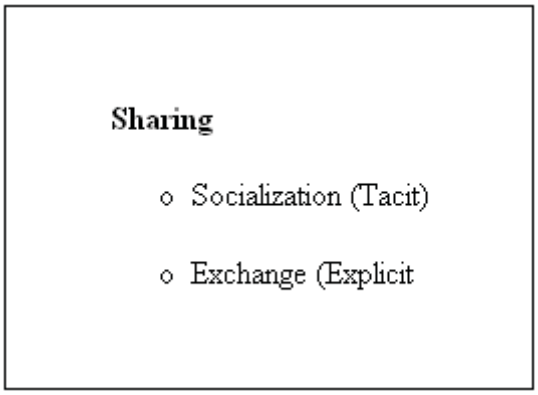


Figure 4: Knowledge Sharing Process and Sub-Processes

(Becerra-Fernández, González, & Sabherwal, 2004, p. 70)

According to Nonaka (1994), socialization facilitates the sharing of new tacit knowledge. Socialization synthesizes tacit knowledge between individuals, through either written or verbal instructions or through joint activities. For instance, by transferring images and ideas, apprenticeships programs assist new employees visualize how others think. Furthermore, Davenport and Prusak (1998) described how discussions at the water cooler assisted in sharing knowledge among groups of employees at a corporation.

Exchange focuses on the sharing of explicit knowledge (Grant, 1996a; Grant, 1996b; Nahapiet & Ghoshal, 1998). Its main purpose is to communicate or transfer explicit knowledge among organizations, groups, and individuals (Grant, 1996b). Fundamentally, the process of exchanging explicit knowledge is not any different than the process by which information is communicated. For example, exchange occurs when a product design manual is transferred from one employee to another in an effort to use the explicit knowledge that is contained in the manual (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004).

2.9 - Knowledge Sharing Systems

The main purpose of knowledge sharing systems is to organize and disseminate knowledge. The majority of knowledge management systems currently in place involve knowledge repositories. There are different types of knowledge repositories that support capturing and reusing knowledge in different circumstances. Knowledge repositories include: lessons-learned systems, best practices databases, alert systems, corporate memories, incident report databases, and expertise locator systems (Becerra-Fernandez & Leidner, 2008, pp. 7-8). These knowledge repositories differ on characteristics such as: origin (Is their content originated from experience?), application (Do they describe a complete task/decision/process?), results (Do they describe successes/failures?), or orientation (Do they support an organization as a whole?) (Weber, Aha, & Becerra-Fernandez, 2001).

Knowledge sharing systems support the process by which knowledge (implicit or explicit) is shared to others. The socialization (sharing of tacit knowledge) and exchange (sharing of explicit knowledge) sub-processes are required to accomplish this (Becerra-Fernandez, Gonzalez, and Sabherwal, 2004, p. 39).

2.9.1 - Benefits from Knowledge Management Mechanisms and Technologies

Knowledge sharing systems benefit from knowledge management mechanisms and technologies (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004). Several mechanisms that enable socialization are: apprenticeships, initiation process for new employees, brainstorming sessions, and conferences. Chat groups or discussion groups enable knowledge sharing by engaging individuals in conversation to explicate their knowledge to the rest of the group (pp. 37-39). Technologies can also enable socialization. Some of these technologies that facilitate socialization are: electronic support and video-conferencing for communities of interest.

Furthermore, knowledge sharing systems use mechanisms and technologies to facilitate exchange as well. Some of these mechanisms are: presentations, memos, letters, and manuals. Technologies that facilitate exchange are: team collaboration mechanisms / groupware; repositories of information; web-based access to data / databases; and repositories of information (Becerra-Fernandez, Gonzalez, & Sabherwal, 2004, pp. 37-39).

2.9.2 - Knowledge Repository Systems

It is common for modern organizations to store data in some sort of technology system such as a database (Davenport & Prusak, 1998). The use of a shared knowledge repository is one of the strategies available to knowledge management for actively managing knowledge. A shared knowledge repository allows individuals to explicitly encode their knowledge as well as search for knowledge they need that has been previously provided to the repository by other individuals.

2.9.2.1 – Benefits.

Higher educational institutions as well as many other types of organizations benefit from knowledge repository systems. Zack (1998) stated, "actual problems can be presented to students who, after deliberating on their own, can view how they were actually dealt with at the time. And formal training can now take place in the field, giving the students the ability to directly apply or integrate the training materials with their own day-to-day problems. This way, those materials become more relevant and interwoven into the student's tacit experience and the learning more meaningful and lasting" (p. 15). In addition, a knowledge management system can shorten the learning curve to junior staff on training by making this knowledge always available (Ariffin et al., 2007).

2.9.2.2 – Challenges.

Achieving such benefits, however, can be challenging. A knowledge management system, for example, must have the ability to ensure that access and use of its information is provided in a timely manner (Ariffin et al., 2007, p. 3). Furthermore, in most organizations, knowledge repository systems' structure is not well defined or widely shared. Zack (1998) agreed that this is essential to effectively manage explicitly encoded knowledge. Zack (1998) further mentioned that "this requires defining what is meant by a knowledge-unit and how that collection of knowledge units should be meaningfully indexed and categorized for ease of access, retrieval, exchange and integration" (p. 14).

Another challenge is that, as time goes by, the amount of knowledge contained in these repositories increases. This, in turn, may lead to obsolete as well as redundant information. Zack (1998) indicated that as organizations become complex, their knowledge may become fragmented, difficult to locate and share, and therefore redundant, inconsistent or not used at all (p. 1). Zack (1998) further mentioned that "even knowledge and expertise that can be shared is often quickly made obsolete" (p. 1).

To eliminate this problem, knowledge repositories must be managed. This requires either deleting obsolete knowledge or archiving knowledge that even though may still be useful, has become less active (Zack, 1998). Zack (1998) further stated, "reorganizing requires eliminating those redundancies, combining similar contributions, generalizing content for easier reapplication, and restructuring categories as needed" (p. 14).

Ariffin et al. (2007) stated, "knowledge is a minimization of information gathering and reading, but not to increase access to information (p. 5). By eliminating or avoiding what the users do not want, knowledge becomes effective. Qualifying this statement, Davenport and

Prusak (1998) added, "…too much data can make it harder to identify and make sense of the data that matters" (p. 3).

To summarize, for an organization to effectively manage its knowledge, it must proactively manage and reorganize its repositories on an on-going basis instead of waiting for these challenges to set in before acting (Zack, 1998).

2.10 - Summary

This chapter reviewed the literature on knowledge management. It defined knowledge management and also reviewed the related concepts of KM Solutions, knowledge sharing and knowledge repositories systems. It explained why knowledge management is a fundamentally useful concept in education and learning, in terms of helping people create and share knowledge as well as act in ways that will measurably improve individual and organizational performance. Our discussion also showed that while many benefits exist, the challenges are great. An organization must proactively manage and reorganize its repositories on an on-going basis instead of waiting for these challenges to set in before acting.

Although the literature on knowledge management is rich, little exists when it comes to applying KM to practicums. Practicums seem to offer a university and its students the opportunity to create, capture and disseminate knowledge and information. A KM strategy and plan could enable effective interactions within an academic community, stimulate knowledge creation among practicum participants and provide real world knowledge and skill to the broader community.

This study attempts to redress this situation by examining the role of practicums in knowledge management. The next chapter explores the methodology that will be used to research the linkages between a practicum and knowledge management.

Chapter 3 – Methodology

In Chapter Two, it was emphasized that the goal of knowledge management is to efficiently and effectively manage the knowledge deemed most important to the organization by getting the right information to the right people at the right time. This enables the knowledge recipient to not only acquire the knowledge, but to act on it. For this to happen, organizations must proactively manage and reorganize data repositories on an on-going basis and not wait for challenges to set in before acting.

This chapter will present the methodology used to study the efficiency and effectiveness of the selected database technology and administration practicum. The following sections will show how the five phases of Action Research complement each other to provide a complete picture of how KM takes place.

3.1 - Methodology

This research utilized the ontology of a qualitative research study. Interpretive research was used as the underlying epistemology of this qualitative study, with Action Research as the primary research methodology.

3.2 - Action Research

Since the end of 1990, Action Research (AR) has increased in importance for information systems research (Baskerville, 1999; Conn, 2004). It functions as a research method that can be easily incorporated into practice (Conn, 2004, p. 5). The objective of this research is to have both an action (change) and a research (learning) outcome (Conn, 2004; Dick, 2000). In other words, it means 'learning by doing' (O'Brien, 2001). For instance, a student (or group of

students) identifies a problem, plans and takes action to resolve it, evaluates the efforts, and if not satisfied, tries again.

The work of Gerald Susman and Roger Evered laid much of the foundation for Action Research. They identified a five-step process for comprehensive Action Research.

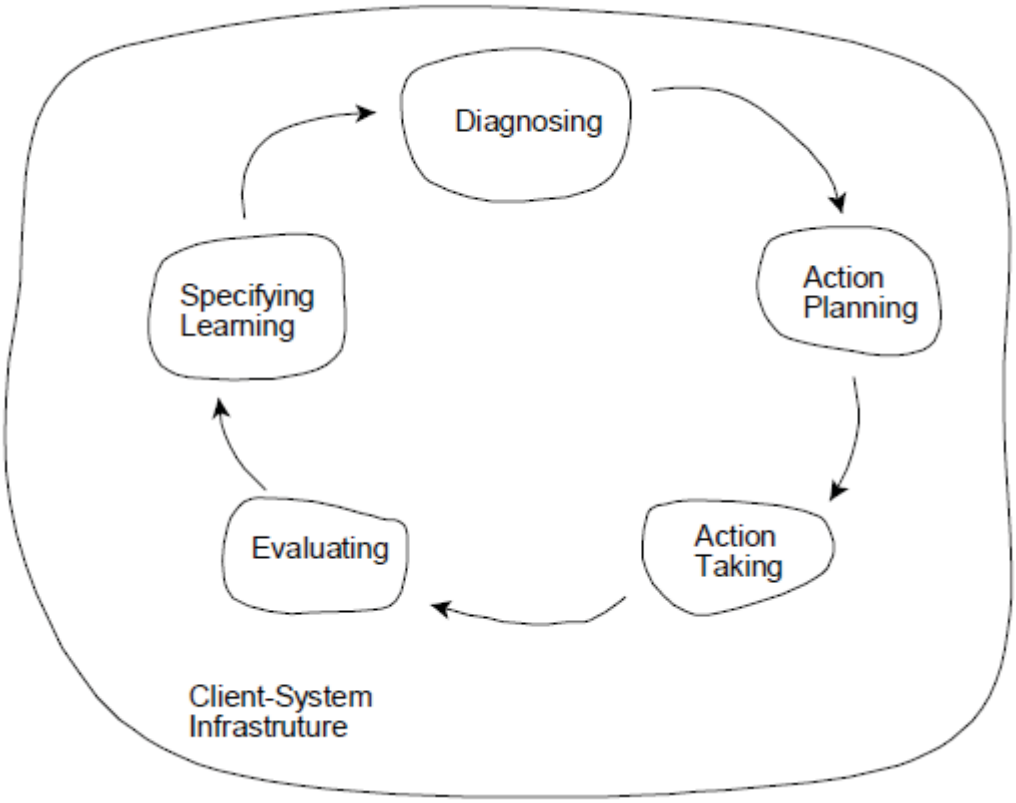


Figure 5: The Action Research Structural Cycle

(Susman and Evered, 1978, Figure 1. The cyclical process of Action Research)

Step 1: Diagnosing. Action Research starts off by identifying the primary problem(s) that are causing an organization to seek change, and the specific outcomes that are expected to be achieved. The diagnosis phase should answer "What specific outcomes am I trying to achieve?" (Conn, 2004).

Step 2: Action Planning. This step specifies alternative courses of action that should solve the primary problem(s) declared during the diagnosing step above. It should address the question, "What actions will most likely achieve the outcomes?" (Conn, 2004).

Step 3: Action Taking. A single plan of action is selected from the alternative courses of action and is implemented. By observation and collection of actual data from the Client-System Infrastructure, a deeper understanding of the diagnosis takes place.

Step 4: Evaluating. Data based on the results of the action taken is collected and analyzed, and the findings are interpreted in light of how successful the action has been (O'Brien, 2001). It should address the question, "Did the action achieve the desired outcomes?" (Conn, 2004).

Step 5: Specifying Learning. Based on the evaluating step above, the researcher engages in reflection and feedback, and an evidence based decision is made (Central Texas College, n.d.).

Following these five steps, the problem is re-evaluated. Critical reflection is essential at the end of each cycle (Dick, 2000). Action Research flexibility allows learning and reaction. Critical reflections of what people do and how they do it achieves a better understanding and practical improvement of a problem at hand. Dick (2000) stated, "it is the balance between critical reflection and flexibility which allows adequate rigor to be achieved even in confused field settings." During critical reflection, the researcher first recollects and then critiques what has already happened. The increased understanding emerging from this critical reflection becomes useful in designing the later steps (Dick, 2000). The Action Research cycle may continue, whether the action proved successful or not, until enough understanding of the problem or an implement able solution for it is achieved (O'Brien, 2001; Baskerville, 1999; MacIsaac, 1996).

One of the benefits of Action Research is the additional knowledge an organization discovers about its nature and environment. Furthermore, "the constellation of theoretical elements of the scientific community continues to benefit and evolve" (Baskerville, 1999, p. 17).

3.3 - Action Research Implementation (Diagnosing, Action Planning, and Action Taking)

3.3.1 - Establishment of a Client-System Infrastructure or Research Environment

This research focused on the transfer of explicit knowledge across academic database practicum members. To transfer knowledge to practicum members, an online knowledge repository system had been previously established as the communications link. From here on, the researcher will refer to this knowledge repository as the TrackIt! system which makes the communication, exchange and dissemination of knowledge possible. It also allowed the knowledge to be available to users anywhere and anytime the users needed.

3.3.2 - Step 1: Diagnosing

In this type of environment, the practicum was faced with the challenges that a knowledge repository brings, as discussed in Chapter Two. With the database practicum at Regis University, two main problems were evident:

(1) What may be some of the reasons for poor query performance of the TrackIt! system?, and

(2) Why is it that sometimes the amount and quality of information displayed on each record gathered pertaining to a specific problem differ from one another; resulting in having the user research each record to determine the best course of action previously found to apply it to a problem at hand?

The researcher believed these problems were important and sought solutions that can benefit students and other system users in the future. A knowledge management system needs to have the ability to access and use the information in a timely manner. In this regard, the expected outcome was a knowledge repository system that will support the level of efficiency and effectiveness necessary to come up with a faster resolution to a future problem at hand.

3.3.3 - Step 2: Action Planning

3.3.3.1 - Alternative course of action #1.

The TrackIt! system must be managed and reorganized. This involves the following two actions:

(1) Delete obsolete records and archive those that even though may still be useful, has become less active, then

(2) Reorganize and eliminate redundant records and combine similar contributions (fragmented records).

3.3.3.2 - Alternative course of action #2.

Generalize content for easier reapplication, and restructure categories as needed. Once a category contains a high number of records, query performance on that category degrades and consideration should be given to further divide that category into sub-categories for easier retrieval of records.

3.3.3.3 - Alternative course of action #3.

Redefine system's structure. Current system's structure may not be well designed or widely shared. This requires defining what is meant by a knowledge-unit and how that collection of knowledge units should be meaningfully indexed and categorized for ease of access, retrieval, exchange, and integration (Zack, 1998, p.14).

3.3.4 - Step 3: Action Taking

The researcher discarded the *Alternative Course of Action #2 and the Alternative Course of Action #3* above as they implied the development and implementation of a new approach and may not have been feasible for the timeframe allowed to complete this research.

Consequently, the researcher selected the *Alternative Course of Action #1* above and believed the stated actions would improve database performance while continuing existing practices.

3.3.4.1 - Data collection.

The data for this study were obtained from the TrackIt! system. A total of 215 records were retrieved covering a period from January 1, 2007 to August 31, 2008. Of the 215 records, 24 unique categories separating unique record types from one another (e.g., Oracle instance problem, server problem) were retrieved for reference.

(No physical changes were actually performed to the live TrackIt! system).

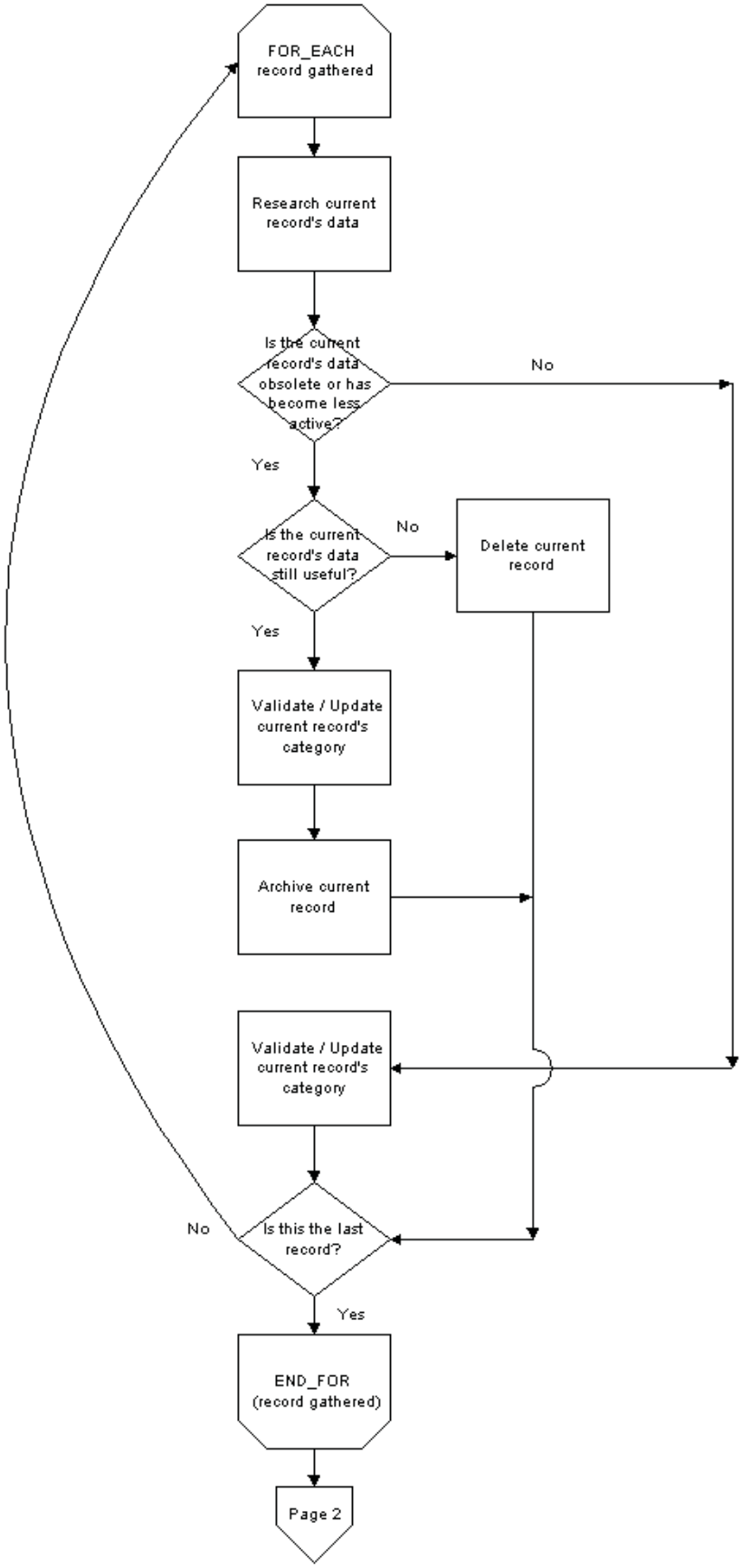
3.3.4.2 – Framework.

To manage and organize the TrackIt! system, a framework was established to drive the data collected. Figure 6 depicts this framework.

This framework involved two main processes that related to the alternative course of action selected: (1) removal of obsolete records and archival of those records that even though may still be useful, has become less active, and (2) reorganization and elimination of redundant records, and combination of similar contributions (fragmented records).

The first process involved researching each record collected to determine if the record contained data that was either obsolete or had become less active. If this was the case, the record's category was validated/updated and the record was archived, if the record's data would still be of use in the future. Otherwise, the record was deleted. On the other hand, if it was found that the record contained data that was currently active and useful; the record's category was validated/updated.

The second process involved dividing all remaining records into categories. For each group of records in a category, records were reorganized and redundant records eliminated. Finally, similar contributions (fragmented records) were combined.


FOR_EACH record gathered
Research current record's data
Is the current record's data obsolete or has become less active?
No
Yes
Is the current record's data still useful?
No
Delete current record
Yes
Validate / Update current record's category
Archive current record
Validate / Update current record's category
Is this the last record?
No
Yes
END_FOR (record gathered)
Page 2

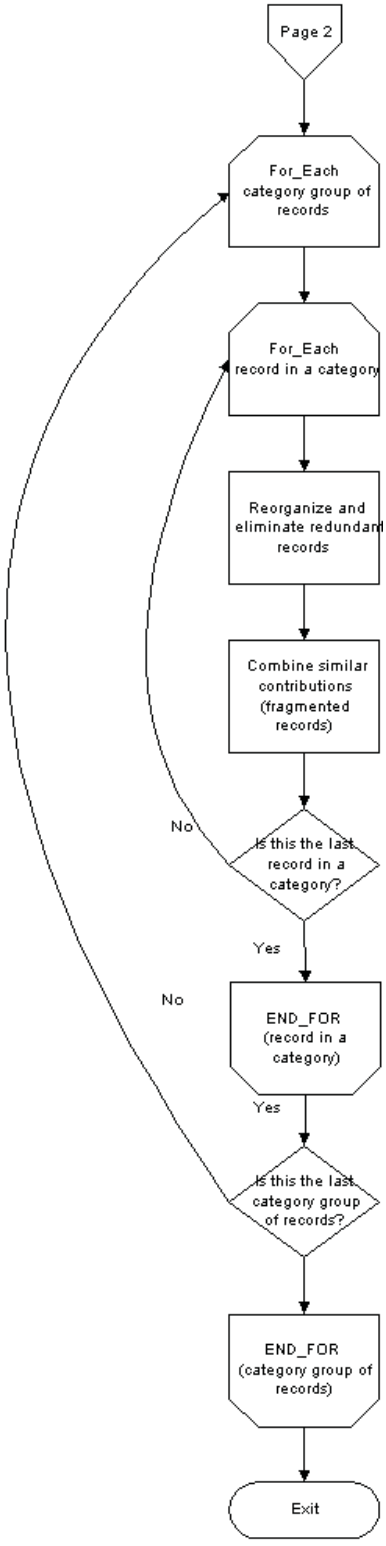


Figure 6: TrackIt! system Data Maintenance Framework

3.3.5 - Step 4: Evaluating

This step will be covered in Chapter Four.

3.3.6 - Step 5: Specifying Learning

This step will be covered in Chapter Five.

3.4 - Summary

The five-step cyclical process of Action Research is a robust method for researching information systems. It works by specifying an action on a research environment with the expectation that it will prove beneficial to the organization.

The first three steps of Action Research - Diagnosing, Action Planning, and Action Taking - lays the foundation for this study. During these three steps, the primary problem that is causing an organization to seek change and the specific outcomes that are expected to be achieved are identified. Alternative courses of actions that should solve the primary problem are then identified from which a single plan of action is selected and implemented.

The next chapter will explore *Step 4: Evaluating* of Action Research. Evaluation takes place by collecting and analyzing data based on the results of the action taken. Chief among the findings is the determination of success or failure of the action taken.

Chapter Five will cover *Step 5: Specifying Learning* of Action Research. By engaging in reflection and feedback, an evidence based decision is reached.

Following these five phases, the problem is re-evaluated. By recollecting and critiquing what has already happened an increase understanding emerges and becomes useful in designing later steps. The Action Research cycle may continue until enough understanding of the problem or an implement able solution for it is achieved. Consequently, one of the benefits of Action

Research is the additional knowledge an organization discovers about its nature and environment.

Chapter 4 – Project Analysis and Results

Having accomplished the first three steps in the Action Research methodology (Diagnosing, Action Planning, and Action Taking), this chapter will focus on the collection and analysis of results. This chapter will also identify if the action taken achieved the desired outcomes.

4.1 - Data Analysis

Before this study began, the TrackIt! system held 1,277 records dated from March 15, 2002 to August 31, 2008. From this total, 215 records were retrieved; dated from January 1, 2007 to August 31, 2008. In addition, 24 unique categories were identified from the collected data. The number of records per category ranged between 1 and 105 records. Table 1 shows the initial records retrieved from the TrackIt! system arranged by month and category.

Table 1: Initial Records Retrieved from the TrackIt! system

				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Month #	Month	Initial Records Retrieved																									
1	Jan 2007	**5**						1		1					1						2						
2	Feb	**11**		1	1			2	2	2											1				2		
3	Mar	**18**			1	1	1	2		1						1	1				7			1	2		
4	Apr	**12**			1		2			3					2						1			3			
5	May	**19**									1	2	1	1							14						
6	Jun	**17**						1		1				1	1		3			1	8				1		
7	Jul	**8**												1	1					3	3						
8	Aug	**12**			1											1	2			1	6						1
9	Sept	**8**			1				2								1	1	1	1	1						
10	Oct	**15**							1	2										2	9				1		
11	Nov	**5**													2						3						
12	Dec	**3**																			3						
13	Jan 2008	**15**						1													13				1		
14	Feb	**13**																		1	7	1	1	1	2		
15	Mar	**19**						3								1	1			1	8		3	2			
16	Apr	**9**			1			1	1	2											4						
17	May	**13**			1			1		1							1			1	7				1		
18	Jun	**6**																			3			2		1	
19	Jul	**5**							1												4						
20	Aug	**2**																		1	1						
			Categories:	Service Level	Student cannot logon to Oracle	Capacity	Change	Other	DBA Assignments	<Blank>	Galway	Test	Dev Lab	Configuration	ARN Network Problem	TrackIt	SharePoint	Student cannot logon to Citrix	Lab Testing	Availability	Citrix	Curriculum	Oracle Lab Setup	Server Problem	Oracle Instance Problem	MSDN	Oracle Installation Problem
	Totals:	**215**		**1**	**7**	**1**	**3**	**12**	**7**	**13**	**1**	**2**	**1**	**3**	**7**	**3**	**9**	**1**	**1**	**12**	**105**	**1**	**4**	**9**	**10**	**1**	**1**

A validation/update of each record's category followed to make sure the records reflected the actual record content type. For instance, record number 1843 displayed a category (type) of 'Oracle instance problem' while actually the content of the record represented the testing of a work order. The category for this record was updated to 'test'. Figure 7 displays TrackIt! system record number 1843. (The requestor's name has purposely been omitted.)

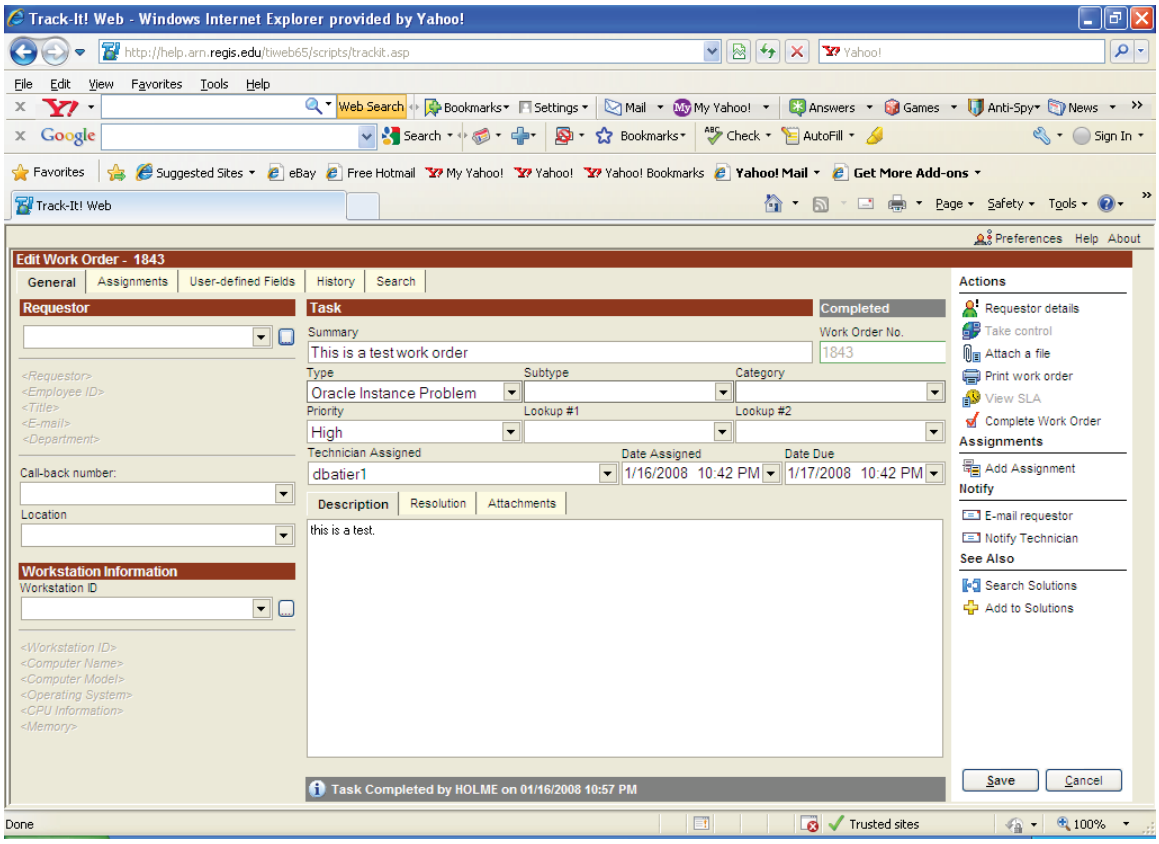


Figure 7: TrackIt! system Record Number 1843

As another example, TrackIt! system record number 1686 displayed a category (type) of '<Blank>' while actually the content of the record represented the need for a Citrix login. The category for this record was updated to 'Citrix'. Figure 8 displays TrackIt! system record number 1686. (References to personal information have purposely been omitted.)

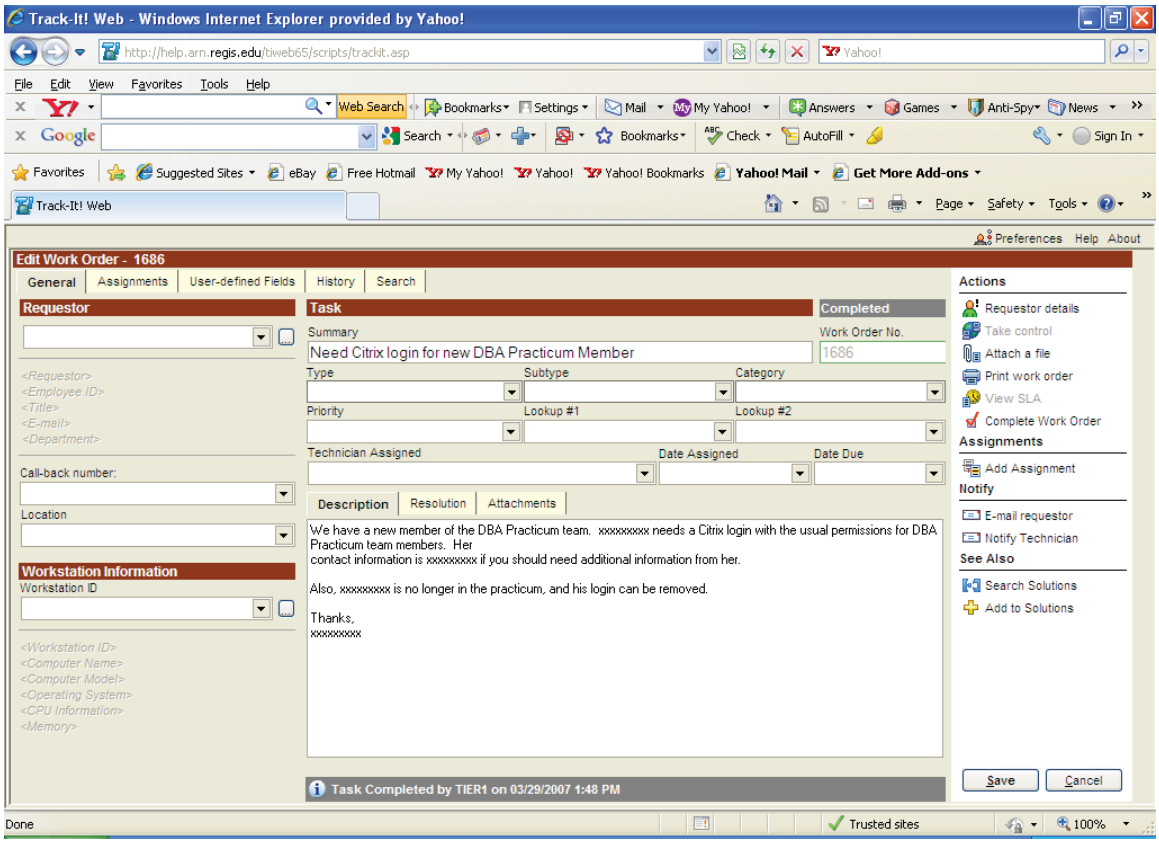


Figure 8: TrackIt! system Record Number 1686

A total of 14 records had their category updated leading to two empty categories: 'Service Level' and 'Galway'.

Once the validation/update of each record's category phase ended, it was concluded that 192 records had a resolution attached to them while 15 records had no stated resolution. In addition, the data showed that a total of eight records were used for testing purposes. As a result, 23 records including those that had no resolution attached to them as well as those that were used for testing purposes were deleted. Testing records or records that provided no resolution were of no use to a knowledge repository system as they offered no valuable information on how to address a similar problem in the future.

The deletion of the above records resulted in an additional four empty categories: ‘Test’, ‘Student cannot logon to Citrix’, Lab Testing’, and ‘MSDN’. Consequently, the 192 records left (records with a resolution attached to them) were grouped into 18 categories. Table 2 shows the results of the validation/update of categories and the deletion of records.

Table 2: Results of the Validation/Update of Categories and the Deletion of Records

	Categories	Initial Records Retrieved	Problems with Resolution	Problems with no Resolution (Deleted)	Records in Test Category (Deleted)
1	Service Level	1	(empty)		
2	Student cannot logon to Oracle	7	4		
3	Capacity	1	1		
4	Change	3	2		
5	Other	12	9	1	1
6	DBA Assignments	7	6		1
7	<Blank>	13	11		1
8	Galway	1	(empty)		
9	Test	2	(empty)		2
10	Dev Lab	1	1		
11	Configuration	3	2	1	
12	ARN Network Problem	7	7		
13	TrackIt	3	2		1
14	SharePoint	9	9		
15	Student cannot logon to Citrix	1	(empty)	1	
16	Lab Testing	1	(empty)	1	
17	Availability	12	10	4	
18	Citrix	105	103	6	
19	Curriculum	1	1		
20	Oracle Lab Setup	4	4		
21	Server Problem	9	8	1	
22	Oracle Instance Problem	10	11		1
23	MSDN	1	(empty)		1
24	Oracle Installation Problem	1	1		
	Totals:	**215**	**192**	**15**	**8**

Furthermore, under this study, there were no records archived as the oldest was 20 months old.

During the reorganization and elimination of redundant records and combination of similar contributions phases, nine additional categories were replaced by five new categories for a total of 14 categories in use. During these two phases, 192 records containing resolutions were consolidated into 99 records. Table 3 shows the results of the reorganization and elimination of redundant records and combination of similar contributions phases.

Table 3: Results of the Reorganization and Elimination of Redundant Records and Combination of Similar Contributions Phases

	Categories	Initial Records Retrieved	After Last Phase
1	Service Level	1	
2	Student cannot logon to Oracle	7	(empty)
3	Capacity	1	(empty)
4	Change	3	(empty)
5	Other	12	1
6	DBA Assignments	7	(empty)
7	<Blank>	13	(empty)
8	Galway	1	
9	Test	2	
10	Dev Lab	1	(empty)
11	Configuration	3	1
12	ARN Network Problem	7	1
13	TrackIt	3	1
14	SharePoint	9	7
15	Student cannot logon to Citrix	1	
16	Lab Testing	1	
17	Availability	12	1
18	Citrix	105	30
19	Curriculum	1	2
20	Oracle Lab Setup	4	(empty)
21	Server Problem	9	(empty)
22	Oracle Instance Problem	10	8
23	MSDN	1	
24	Oracle Installation Problem	1	(empty)
new	Acadunix (new)		1
new	Oracle (new)		18
new	Server (new)		12
new	Server Resources (new)		14
new	Terminal Services (new)		2
	Totals:	**215**	**99**

4.2 - Findings

As a result of this study, the unique categories identified from the initial collection of data were reduced from 24 to 14 categories at the end for a 42% reduction in categories.

In addition, the initial number of records in the ‘Citrix’ category was reduced from 105 to 30, for a 71% reduction of records in that category.

Recalling from Chapter Four, two main problems from the TrackIt! system identified.

(1) What may be some of the reasons for poor query performance of the TrackIt! system?,

(2) Why sometimes the amount and quality of information displayed on each record gathered pertaining to a specific problem differ from one another, resulting in having the user research each record to determine the best course of action previously found to apply it to a problem at hand?

The researcher believes that the main reason for poor query performance of the TrackIt! system was due to the amount of data accumulated in the system over six years. The greater the number of records in a database, the longer it will take to perform a query. For this reason, it is important to manage the data users enter in the TrackIt! system on a regular basis by using the framework provided in Figure 6. As a result of this study, the original 215 records collected from the TrackIt! system were consolidated or reduced to 99 records for a 54% reduction of records. Consequently, improvement of database query performance and thus better system efficiency was achieved.

In addition, every user of the system must be aware of the categories that are available to them to make sure the appropriate category is selected for the problem at hand. If a problem at hand is placed under a different category, the system will not be able to pull this record when querying on the category. Once again, the data must be managed to make sure each record relates to the correct category to improve effectiveness of the system.

In answering the second question above, and as mentioned earlier, it is important to realize that the TrackIt! system may allow for poor quality data to be entered by system users producing inefficient and ineffective ways for higher education database research practicum

members to engage in the learning process. This is another reason why the data contained in the database must be managed regularly.

By managing the data in the TrackIt! system, this study has lead to a knowledge repository database that supports the level of efficiency and effectiveness necessary to come up with a faster resolution to a future problem at hand ultimately benefiting students and other system users in the future.

4.3 - Summary

Knowledge repositories are likely to succeed only if there are well managed. System performance and conformance to data quality standards play a critical role in a digital repository, such as the TrackIt! system, for they underpin the search and discovery, as well as the preservation capabilities of a repository. The original 215 records collected from the TrackIt! system were consolidated or reduced to 99 records for a 54% reduction of records. Consequently, improvement of database query performance and thus better system efficiency was achieved. If a new record of a problem at hand is placed under a different category, the system will not be able to pull this record when querying on the category. The update/validation of records category assured that each record related to the correct category. The unique categories identified from the initial collection of data were reduced from 24 to 14 categories at the end for a 42% reduction in categories. Furthermore, the initial number of records in the 'Citrix' category was reduced from 105 to 30, for a 71% reduction of records in that category. Both of these efforts lead to an improved effectiveness of the system.

By managing the data in the TrackIt! system, this study has lead to a knowledge repository database that supports the level of efficiency and effectiveness necessary to come up

with a faster resolution to a future problem at hand ultimately benefiting students and other system users in the future.

Chapter Five will present lessons learned and recommendations to future practicum teams.

Chapter 5 –Conclusions

Reaching our last step in the Action Research investigation (*Step 5: Specifying Learning)*, this chapter discusses the findings of the study. It will examine areas where things are not as the researcher would wish and point out areas where the management of the selected practicum and the research community can do more work. A conclusion is presented at the end of this chapter.

5.1 - Lessons Learned

The TrackIt! system was not supporting the level of efficiency and effectiveness necessary to come up with a fast resolution to a problem. The researcher believes that the main reason for poor query performance of the TrackIt! system was due to the amount of data accumulated in the system over the years. Current practicum practices showed that over time almost no effort had been placed in maintaining the knowledge contained in the TrackIt! system. As a result, in an effort to gather records related to a current problem that someone else had previously solved, the TrackIt! system required a query to a large amount of available records leading to poor database query performance.

Furthermore, it is important to realize that the TrackIt! system is susceptible to poor data entry. For example, users may end up assigning the wrong category to a new record preventing it from displaying when querying on that category, or users may forget to enter a record resolution for a current solved problem thus offering no valuable information on how to address a similar problem in the future. In addition, users may enter records in the system that are of no value to a knowledge repository such as records pertaining to test cases, or they may enter data that already exist in the system, both cases adding unnecessary records to the system.

These issues produced inefficient and ineffective ways for higher education database research practicum members to engage in the learning process by eventually leading to knowledge that was obsolete, fragmented, difficult to locate and share, and therefore redundant, inconsistent or not used at all. Consequently, the amount and quality of information displayed on some records gathered pertaining to a specific problem differed from one another, resulting in having to research each record before being able to determine the best course of action previously found to apply it to a problem at hand.

Currently, no framework was found for maintaining the knowledge in the TrackIt! system. A TrackIt! system data maintenance framework was developed to assist in maintaining the knowledge contained in the TrackIt! system (see Figure 6). The application of this framework to the data collected proved successful as shown in Chapter Four.

5.2 - Recommendations

For a practicum to effectively transfer knowledge, some conditions must be enabled by practicum administrators and practicum members.

5.2.1 - Administrators

Academic and practicum administrators must understand the value of knowledge management practices to support the way knowledge is stored, treated and passed on. In addition, administration should appoint an individual to be the technical chief knowledge officer of the practicum with the responsibility to maintain the knowledge accumulated by practicum members in the TrackIt! system.

Administration must also enable practicum members to understand the benefits of knowledge management by conducting training to impart the importance knowledge management brings to the practicum as well as a practicum member. A metric tool could be

established and tested to gather, collate, and analyze KM activities that would be employed at the end of a practicum. Another possibility is for a main project to be added to the practicum to provide useful experience in applied KM as well as applicability to general database management experience.

To ensure knowledge does not leave the current practicum team before a practicum member leaves or transitioning to the next practicum occurs, administration must create an atmosphere that fosters knowledge sharing and encourage interaction for knowledge creation and knowledge sharing so practicum members do not become afraid of asking or posting a resolution to a problem feeling it might reveal their ignorance.

Most important, administration must motivate practicum members leading them to find time for knowledge management. To effectively involve practicum members in this process, a practicum member reward system may be necessary as an incentive for practicum members to contribute to this effort. For example, incentives that reward knowledge sharing can be created by acknowledging practicum members who have shared valuable knowledge at a recognition function or in some other public venue.

5.2.2 - Technical Chief Knowledge Officer of the Practicum

The main responsibility of the technical chief knowledge officer is to manage and reorganize the knowledge accumulated by practicum members in the TrackIt! system.

Obsolete records must be deleted from the TrackIt! system and those records that even though may still be useful, but has become less active should be archived. The additional records left should be reorganized to eliminate redundant records and combine records with similar contributions (fragmented records). This includes the validation/update of each newest

record's category (type) field to make sure the records reflect their actual record content type and improve effectiveness of the system.

Maintenance of the TrackIt! system should be done in a regular basis. Just as one practicum is close to finishing their commitment and before transitioning to the next practicum team (every six month) would be a good time to manage and reorganize the data entered on the TrackIt! system per the TrackIt! system data maintenance framework developed in Chapter Four (see Figure 6).

5.2.3 - Practicum Members

System users must first ensure that an existing record does not already exists in the TrackIt! system for a problem at hand before a new record is added to the system, thus preventing duplication.

In addition, system users must be familiar with the categories available in the TrackIt! system and have a good understanding of what they encompass to make sure the appropriate category is selected for the problem at hand. If a problem at hand is placed under a different category, the system will not be able to pull this record when querying on the category. Furthermore, system users must make sure the information entered on the TrackIt! system includes a resolution to the problem solved. If a record offers no valuable information on how to address a similar problem in the future, it should not be included in the TrackIt! system. System users must understand that knowledge is a minimization of information gathering and reading but not to increase access to information. In other words, there is no need to add more information than what is needed to address a similar problem in the future. Too much data can make it harder to identify and make sense of the data that matters. Knowledge becomes effective when system users eliminate or avoid what they do not want.

Further recommendations include managing and reorganizing the rest of the data in the TrackIt! system by performing additional cycles of Action Research. For the purpose of this report, only data dated from January 1, 2007 to August 31, 2008 was included. Any data outside this range must be considered for maintenance and reorganization as specified in this study to gain an even higher system performance. Older data not included in this report is more apt for deletion of obsolete records and archiving of records that even though may still be useful, has become less active than the data included in this report. In addition, only 215 records out of 1,277 records dated from March 15, 2002 to August 31, 2008 became part of this report. There is also a possibility that data dated after August 31, 2008 could has been added to the TrackIt! system as well.

The researcher also suggests that the *Alternative Course of Action #2* and the *Alternative Course of Action #3* from Chapter Three be further looked at, as they may also add to the improvement of the TrackIt! system performance.

5.3 - Conclusion

The researcher believes this project contributes to the KM literature. The findings help towards the benefits of KM in a practicum. The Regis Practicum provides students with valuable learning experience that is academically rigorous and intellectually challenging while allowing them to accumulate knowledge and skills which they can apply to participate more fully in the workplace and society by transferring explicit knowledge across academic database practicum members.

Knowledge sharing systems support the process by which knowledge is shared to others. The main purpose of knowledge sharing systems is to organize and disseminate knowledge. The majority of knowledge management systems currently in place involve knowledge repositories.

The Regis Practicum utilizes a knowledge repository system as a key component of a knowledge transfer strategy, for the permanent recording of problems; offering a repository of resolutions to problems that someone else has previously solved. Zack (1998) stated, "actual problems can be presented to students who, after deliberating on their own, can view how they were actually dealt with at the time. And formal training can now take place in the field, giving the students the ability to directly apply or integrate the training materials with their own day-to-day problems. This way, those materials become more relevant and interwoven into the student's tacit experience and the learning more meaningful and lasting" (p. 15).

Some of the challenges the Regis Practicum knowledge repository system faces are: (1) as time pass by and database records become older, their knowledge becomes fragmented, difficult to locate and share, and therefore redundant, inconsistent or not used at all; (2) too much data can make it harder to identify and make sense of the data that matters; (3) reorganizing requires eliminating redundancies, combining similar contributions, generalizing content for easier reapplication, and restructuring categories as needed; and (4) deleting knowledge that has become obsolete and archiving knowledge that even though may still be useful, has become less active. In addition, it is essential that the Regis Practicum knowledge repository system's categories be widely shared to effectively manage explicitly encoded knowledge. Practiums knowledge repository systems play an important part in learning and education, but can misfire if not properly managed. For the Regis Practicum to effectively manage its knowledge, it must proactively manage and reorganize its repository in an on-going basis.

In designing the research, the researcher carried a variety of Action Research phases including:

1) Diagnosing – During this phase, two primary problems underlying the causes of the desire for change of the Regis Practicum knowledge repository system were identified, as stated in Chapter Three. The researcher sought solutions that could benefit students and other system users in the future. The Regis Practicum knowledge repository system needs to have the ability to access and use the information in a timely manner. The expected outcome was a knowledge repository system that would support the level of efficiency and effectiveness necessary to come up with a faster resolution to a future problem at hand.
2) Action Planning – During this phase, three alternative courses of actions were identified as actions that would achieve the expected outcome sought during the above diagnosing phase.
3) Action Taking – During this stage the researcher selected one of the three alternative courses of actions stated, during the action planning phase above, as the researcher believed the stated action would improve database performance while continuing existing practices. The data for this research was retrieved from the Regis Practicum TrackIt! system. To manage and organize the TrackIt! system, a framework was designed to drive this data.
4) Evaluating – At this state the data collected from the TrackIt! System was analyzed and evaluated.
5) Specifying Learning – As a result of the action taken in this study under Action Research, a knowledge base data repository tool was created from the data extracted from the Regis Practicum knowledge repository system and improvement of database

query performance; thus, better system efficiency was achieved. In addition, the conditions that support successful knowledge transfer in practicums were identified.

This study was designed to fill a gap in the KM literature, namely the need for studying the role of academic practiums in KM. Despite the short comings of the findings, this study is an early attempt and encourages other researchers to study the linkage between KM and practiums. The literature would benefit from studies in other industries with other methodologies. The results of the study generally support KM literature but a broader range of perspectives would, in the long term, produce a more complete measure of the impact of KM activities such as practiums on academic program outcomes.

References

Alavi, M., & Leidner, D. (2001). Knowledge management and knowledge management systems: Conceptual foundations and research issues. *MIS Quarterly*, 25(1), 107-136.

Ariffin, M., Arshad, N., Shaarani, A., & Shah, S. (2007, May). Implementing knowledge transfer solution through web-based help desk systems. *Proceedings of World Academy of Science, Engineering and Technology*, 21, 415-419.

Armbrecht, F.M.R., Chapas, R.B., Chappelow, C.C., Farris, G.F., Friga, P.N., Hartz, C.A., McIlvaine, M.E., Postle, S.R., & Whitwell, G.E. (2001). Knowledge management in research and development. *Research Technology Management*, 44(4), 28-48.

Baskerville, R. (1999, October). Investigating information systems with Action Research. *Communications of the Association for Information Systems*, 2(19).

Becerra-Fernandez, I., Gonzalez, A., & Sabherwal, R. (2004). *Knowledge management: Challenges, solutions, and technologies*. Upper Saddle River, NJ: Pearson/Prentice Hall.

Becerra-Fernandez, I.; Leidner, D. (2008). Knowledge management: An evolutionary view. *Advances in Management Information Systems*, 12, 63-85.

Carlson, J.R., & Zmud, R.W. (1999). Channel expansion theory and the experiential nature of media richness perceptions. *Academy of Management Journal*, 42(2), 153-170.

Central Texas College (n.d.). *An introduction to Action Research for the purposes of quality enhancement planning.* Retrieved January 23, 2009, from http://www.ctcd.edu/qep/documents/action_research.pdf

Conn, S.S. (2004). Implementation and management of an information systems practicum in a graduate computer information technology curriculum. *The proceedings of the Information Systems Educators Conference 2004*, 21.

Daft, R.L., & Lengel, R.H. (1986). Organization information requirements, media richness, and structural design. *Management Science*, 32(5), 554-571.

Davenport, T., & Prusak, L. (1998). *Working knowledge: How organizations manage what they know*. Boston, MA: Harvard Business School Press.

Dick, B. (2000). *A beginner's guide to Action Research*. Retrieved on April 23, 2009, from http://www.scu.edu.au/schools/gcm/ar/arp/guide.html#a_g_intro

Dixon, N. (2000). *Common knowledge: How companies thrive by sharing what they know*. Boston, MA: Harvard Business School Press.

Dyer, G., & McDonough, B. (2001). The state of KM. *Knowledge Management*, May, 31-36.

Evans, P., & Wurster, T.S. (1999). Getting real about virtual commerce. *Harvard Business Review*, November/December, 85-94.

Friedman, H.H., & Friedman, L.W. (1989, September). Myths, unethical practices, personnel requirements: What do computer professionals really believe? *Journal of Systems & Software*, 10(2), 151-153.

Grant, R. (1996a, July - August). Prospering in dynamically-competitive environments: Organizational capability as knowledge integration. *Organization Science,* 7(4), 375-387. Retrieved December 15, 2007, from http://links.jstor.org/sici?sici=1047-7039%28199607%2F08%297%3A4%3C375%3APIDEOC%3E2.0.CO%3B2-J

Grant, R. (1996b, Summer). Toward aknowledge-based theory of the firm. *Strategic Management Journal*, 17, 109-122. Retrieved December 15, 2007, from http://links.jstor.org/sici?sici=0143-2095%28199624%2917%3C109%3ATAKTOT%3E2.0.CO%3B2-D

Jensen, M.C., & Meckling, W.H. (1996). Specific and general knowledge, and organizational structure. *Knowledge Management and Organizational Design*, 17-38.

King, W.R. (1996). Knowledge transfer. *Encyclopedia of Knowledge Management*, 538-543.

Koudsi, S. (2000). Actually, it is like brain surgery. *Fortune*, March 20, 233-234.

MacIsaac, D. (1996). *An introduction to Action Research.* Retrieved January 23, 2009, from http://physicsed.buffalostate.edu/danowner/actionrsch.html

MSN Encarta® Dictionary. (2009). Retrieved April 22, 2009, from http://encarta.msn.com/encnet/refpages/search.aspx?q=practicum

Nahapiet, J., & Ghoshal, S. (1998). Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 23(2), 242-266.

New York State - Department of Civil Service - Workforce and Succession Planning. (2009). Why knowledge management/transfer. Retrieved February 4, 2009, from http://www.cs.state.ny.us/successionplanning/workgroups/knowledgemanagement/whyknowledge.cfm

Nonaka, I. (1994, February). A dynamic theory of organizational knowledge creation. *Organization Science*, 5(1), 14-37. Retrieved December 15, 2007, from http://www.jstor.org/stable/2635068

O'Brien, R. (2001). An overview of the methodological approach of Action Research. In Roberto Richardson (Ed.), *Theory and Practice of Action Research*. Retrieved April 23, 2009, from http://www.web.net/~robrien/papers/arfinal.html

Susman, G. & Evered, R. (1978). An assessment of the scientific merits of Action Research. *Administrative Science Quarterly*, 23(4), pp. 582-603.

The American Heritage® Dictionary of the English Language, Fourth Edition. (2000). Retrieved April 22, 2009, from http://www.bartleby.com/61/89/P0498900.html

Weber, R., Aha, D.W., & Becerra-Fernandez, I. (2001). Intelligent lessons learned systems. *Expert Systems with Applications*, 20(1), 17-34.

Zack, M. (1998). Managing codified knowledge. *Sloan Management Review,* 40(4), 45-58. Retrieved January 23, 2009, from http://web.cba.neu.edu/~mzack/articles/kmarch/kmarch.htm

Zander, U., & Kogut, B. (1995). Knowledge and the speed of the transfer and imitation of organizational capabilities: An empirical test. *Organization Science*, 6, 76-92.