THE IMPACT OF IMPROVEMENT TECHNIQUES FROM THE TOYOTA PRODUCTION SYSTEM (TPS) IN A NORTH CENTRAL PENNSYLVANIA HEALTHCARE FACILITY

A Dissertation in
Workforce Education and Development

by

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Abstract

Healthcare organizations are continually looking for ways to improve quality and efficiency through new and innovative initiatives. Along with the quality and efficiency movement, Return on Investment (ROI) has also become a topic of interest across the healthcare system. As policymakers and consumers demand greater value for dollars spent on healthcare, creating and maintaining a culture of quality, efficiency and accountability has never been more important.

This single point embedded case study examines the impact of improvement techniques from the Toyota Production System (TPS) in a north central Pennsylvania long-term care facility. The study utilizes the Phillips Return on Investment (ROI) methodology™ to evaluate the impact of three projects completed during a reVIEW™ (Realizing Exceptional Value In Everyday Work) seven-week training and implementation program.

The research questions align with the five levels of evaluation as defined by the Phillips Methodology:

1) reaction,
2) learning,
3) application,
4) impact, and
5) ROI.

The results of this study begin to show that projects using the techniques taught in the reVIEW program can produce positive and significant ROIs for healthcare organizations.
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Chapter 1

Introduction

Historical Perspective

The need for change in healthcare has never been more apparent than it is today. The fast pace, competitive and uncertain environment is threatening the existence of our healthcare organizations. Each year criticism increases regarding the quality of healthcare in the United States. When the analogy was made that deaths from medical errors were equivalent to one jumbo jet crashing each day, it immediately caught the attention of the public, healthcare providers, and healthcare leadership (Mewshaw, White, & Walrath, 2006).

The Institute of Medicine (IOM) released a landmark report in November 1999 titled To Err is Human: Building a Safer Health System. The report’s authors estimate that preventable medical errors kill as many as 98,000 patients annually (Kenney, 2008; Zidel, 2006). Recent estimates have the numbers as high as 195,000 deaths per year and as many as 750,000 injuries per year due to medical errors (Printezis & Gopalakrishnan, 2007). Beyond the number of deaths and injuries, the report was full of unsettling conclusions about the quality of the United States healthcare system, such as infection control and medication errors (Grunden, 2008).

Healthcare is now the largest industry in the United States. The U.S. is spending approximately 16% of its gross domestic product, about two trillion dollars each year on healthcare. This number is projected to grow to 18.4% or $3.4 trillion by the year 2013 (Graban, 2009; Printezis & Gopalakrishnan, 2007; Zidel, 2006). Healthcare costs have been rising at double-digit rates since the late 1990s, roughly three times the rate of
inflation, claiming a growing share of every American’s income, inflicting economic hardships on many, and decreasing access to care (Reid, Compton, Grossman, & Fanjiang, 2005). When we add the aging baby boomer population, stagnant health insurance reimbursements, 45 million Americans without health insurance and the shortage of nurses and physicians, current business conditions relating to resource and monetary shortfalls for healthcare are somewhat similar to those faced by the Toyota Motor Company when Taichi Ohno led it on its journey to becoming a lean enterprise (Graban, 2009; Womack, Jones, & Roos, 1990).

It was after World War II that Taichi Ohno of Toyota in Japan began to develop lean manufacturing principles. Like many organizations that develop into lean enterprises, it was done out of sheer necessity. Toyota had neither the space nor the resources to hold inventory. Faced with a lack of money and space, small market demand, and a need for product diversification, Toyota could not survive using the Ford style of mass production. This quandary marked the beginning of the Toyota Production System (Womack, Jones, & Roos, 1990). Today, as we find our healthcare system confronted with scarce resources, an economy that cannot afford traditional methods of service provision, and no clear models for how to re-invent the work, lean thinking is beginning to emerge in the healthcare industry (Black & Miller, 2008; Graban, 2009; Grunden, 2008; Jimmerson, 2009).

**What is Lean for Healthcare?**

Lean for healthcare is a continuous improvement structure, adapted from the Toyota Production System, which provides a way for healthcare organization to manage change (Graban, 2009; Grunden, 2008; Jimmerson, 2008). The term *lean* was adapted in the mid-1980s by the U.S. manufacturing industry in reference to improving production
capacity and reducing waste in work processes. Lean was specifically modeled after the concepts and practices of the Toyota Motor Company. As an extension of manufacturing's success with this management philosophy, other industries (including healthcare) have made adaptations of the Toyota Production System (TPS) to help establish consistent and reliable work processes that can support excellent delivery of services. Jimmerson (2009) stated that organizations which implement a lean philosophy can expect to experience:

- increased capacity for work,
- decreased cost of operations,
- improved worker and client satisfaction, and
- leadership strength.

Translated for healthcare, this means incorporating continuous improvement into the daily activities of work at every level of the organization, to optimize the science, technology and compassion that comprises healthcare today (Jimmerson, 2009).

Healthcare organizations face many long-standing problems. Lean is not about fixing any one major problem—it is about solving the hundreds of thousands of little problems plaguing healthcare every day (Graban, 2009). According to Jimmerson (2009), the practical and affordable methods that have made Toyota the unquestionable leader of auto manufacturing are available to every organization that is dedicated to similar performance and results.

One organization committed to helping improve healthcare is Lean Healthcare West (LHW). According to Jimmerson (2009), Lean Healthcare West is a group of healthcare professionals who have acquired lean expertise through research and
application. They offer a unique perspective from decades of healthcare practice, refocused with a fresh lean vision. LHW has developed a lean training and implementation program specific to the healthcare profession. Their program is based on the findings of research funded by the National Science Foundation (2001 – 2004), and conducted by Cindy Jimmerson of Lean Healthcare West and Durward Sobek of Montana State University, College of Engineering.

The reVIEW™ (Realizing Exceptional Value In Everyday Work) course was designed with the understanding that improvements must be made by the people who do the work. The reVIEW Education and Implementation Program introduces participants to the powerful principles of the Toyota Production System (TPS). According to Jimmerson (2009) and Sheehy (personal communication, June 9, 2009), by applying TPS principles and practices, healthcare organizations can:

- create a more defect-free product or service,
- reduce/eliminate waste and increase efficiency,
- increase patient and employee satisfaction,
- reduce costs,
- increase patient safety, and
- enhance leadership and communication skills.

The reVIEW course is seven weeks in length. Each course includes sixteen participants. The participants meet once a week for three hours of interactive classroom time, plus additional time for one-on-one coaching. Through the seven weeks of the course, participants are introduced to the following lean principles and tools:

- the Toyota Production System Model and Lean Healthcare,
• the Power of Observation,
• Value Stream Mapping (current state and future state), and
• A3 Problem-Solving.

While taking the program, participants identify a specific area or problem they wish to improve. They can choose to work individually or in teams. Participants will have a homework assignment each week and each week’s assignment builds upon the previous week’s work. Each participant is expected to complete one observation exercise, one current-state and one future-state value stream map (with data), and one A3 Problem-Solving activity. To date, LHW’s unique implementation of introductory lean concepts and methods has been successful in more than 50 hospitals, long-term care facilities and physician practices (Sheehy, personal communication, June 9, 2009).

The Problem

The purpose of this study was to examine the impact (Kirkpatrick & Kirkpatrick, 2005) of improvement techniques from the Toyota Production System (TPS) in a healthcare facility. This case study utilizes the Phillips Return on Investment (ROI) Methodology™ to evaluate the effectiveness of the reVIEW (Realizing Exceptional Value In Everyday Work) seven week training and implementation program.

In recent years, Return on Investment (ROI) has become a topic of interest across the healthcare system, with policymakers and consumers demanding greater value for the dollars spent on healthcare. Medicaid, state officials, legislators, health plans and other stakeholders are increasingly being challenged to identify programs with the potential to both improve quality of care and control health care costs (Chen, Au, & Hamblin, 2007).
A large part of the quality problem in healthcare can be traced to the surprising and counterintuitive fact that performance is rarely measured. Although nearly everything else of significance in the world is measured, healthcare is the surprising exception (Kenney, 2008). Ovretveit and Gustafson (2003) concluded that scant research has been conducted into the effectiveness of quality initiatives in healthcare. Some Total Quality Management (TQM) studies have been completed which have produced useful information for decision makers. However, few other quality initiatives in healthcare have been systematically studied or evaluated.

This has become the challenge for Lean Healthcare West (LHW) and the reVIEW program. As LHW becomes more engaged with healthcare organizations across the nation, they are being asked to provide ROI data to support their claim of a successful program. LHW is experiencing impressive results with their program, but much of the cost benefit data is anecdotal since it is collected without a standardized process such as that found with the Phillips ROI Methodology.

The use of evaluation processes and models, including the Phillips’ framework, continues to grow (Phillips, 2003b). The Phillips ROI Methodology has been replicated hundreds of times, with more than thirty books published to support the methodology. The Phillips process is used by more than two thousand organizations in 44 different countries. The methodology has been the basis for many published studies, providing a step-by-step guide from initial planning through data collection and evaluation. The four-phase, ten-step process generates six types of data and is one of the only documented ROI methodologies to include a step for isolating the impact of the program.
The Phillips methodology is a time-tested, consistent and credible approach for ROI studies and one with a track record of success in both profit and non-profit organizations.

**Significance of the Study**

The literature review concluded for this study revealed significant gaps, which this research sought to address (Chen, Au, & Hamblin, 2007; Graban, 2009; Grunden, 2008; Ovretveit & Gustafson, 2003; Zidel, 2006). This research adds to the literature on the application of lean manufacturing principles in a healthcare environment, a completely different setting from manufacturing, where most of the empirical research and literature is currently found. Those studying healthcare improvement programs have indicated that there is no shortage of theories about how to improve healthcare, but few are empirically based. For both practical and scientific reasons, this study tested the financial implications of implementing TPS principles in a healthcare environment.

This study provides common definitions and measures for the evaluation process of healthcare improvement programs. Most studies to date have used their own definitions and measures of effectiveness for quality programs in healthcare. This limits the ability to compare and contrast results between different studies and to build a body of knowledge.

This study began the building of a longitudinal database that can be used not only to measure effectiveness of TPS principles in healthcare, but also to provide valuable information for decision makers to use in predicting the outcomes of future programs. Few researchers have assessed the resources consumed by quality improvement programs in healthcare, which is a vital component to determining a true return on investment. This study conducted a thorough cost benefit analysis by using the Phillips ROI process.
Research Questions

The research questions (RQ) were aligned with the Phillips’ Five Levels of Evaluation and the program objectives at each level:

**RQ1.** (Level 1) To what extent did the program participants have a favorable experience with the reVIEW program?

**RQ2.** (Level 2) To what extent did the participants learn the skills taught in the reVIEW program?

**RQ3.** (Level 3) To what extent are the participants applying the skills learned in the reVIEW program on the job?

**RQ4.** (Level 4) What is the business impact as a result of utilizing the skills learned in the reVIEW program?

**RQ5.** (Level 5) What is the return on investment associated with implementing the skills learned in the reVIEW program?

Limitations

This study had several limitations, including sample size and the population, stemming from its scope during a limited time period. There are many different types of healthcare organizations, and accordingly the composition of their workforce varies. This study collected data from projects within one long-term care organization with five locations in rural north central Pennsylvania. The results cannot be generalized to other healthcare organizations without more extensive research.

The quality of a study depends heavily on the steps the researcher takes to ensure the credibility and reliability of the findings. A detailed description of the methods used in this study appears in chapter three. Although a variety of methods were used to enhance
quality, interpretations of the results may vary among people who read this study. Lastly, a possible limitation of this study involved the use of self reported data gained from the questionnaire and the Action Plan.

**Definition of Terms**

A-3: A tool of the Toyota Production System and the reVIEW program. Named for the size of the 11” X 17” paper on which the A3 report is drawn (Grunden, 2008, p. 91). “A3’s are segmented into quadrants to help teams: a) map out problems, b) define the ideal situation, c) design solutions to the problems, and d) test the solutions” (Jimmerson, 2008, p. 40).

Action Plan: “A tool used to track the steps and capture the results of a program” (Hubble, 2008, p. 1).

Chain of Impact: “The process that occurs when participants react positively to a program, acquire knowledge and skills, apply the knowledge and skills, and, as a consequence, positively affect key business measures” (Hubble, 2008, p. 1).

Benefits/Cost Ratio (BCR): “The relationship between monetary return of an investment and the cost associated with the investment. BCR became prominent in the United States in the early 1900’s, where it was first used to determine the feasibility of public projects, and later used to evaluate the effectiveness of training and education” (Phillips, Phillips, Stone, & Burkett, 2007, p. 26).

Intervention: “A planned change effort to improve performance. If the effort does not take place the existing condition will not change. An intervention can be applied to one activity or to a series of activities” (Rothwell & Sredl, 2000, p. 303).

Return on Investment (ROI): “A monetary calculation which compares the net benefits divided by program cost. The net benefits are the program benefits minus the cost. ROI is always expressed as a percentage” (Phillips, Phillips, Stone, & Burkett, 2007, p. 11).

Stakeholders: “An individual or group with an interest in the success of an organization; they influence programs, products and services” (Hubble, 2008, p. 3).

Training: “A short-term learning intervention. It is intended to build upon individual knowledge, skills and attitudes to meet present or future work requirements” (Rothwell & Sredl, 2000, p. 9).

Training evaluation: “A step in the training cycle where data is collected to determine if the training program is achieving its objective(s)” (BusinessDictionary.com, 2009).

Workplace Learning and Performance (WLP): “The integrated use of learning and other interventions for the purpose of improving individual and organizational performance” (Rothwell & Sredl, 2000, p. 5).

Assumptions

Several assumptions guided the researcher throughout the study. The first is that the mission and value statements of healthcare organizations often say that two of their most important priorities are patient safety and employee engagement. These are key elements to a successful lean implementation using the reVIEW program. This study
assumed that these values exist within the target organization. Without such values, a successful lean implementation becomes much more difficult.

With any successful training intervention, support must begin at the top and permeate the entire organization. The reVIEW program offers a comprehensive executive overview to help ensure that the leadership understands the process and provides organizational support for each participant. Due to resource limitations, this study focused on the business impact and ROI. It was assumed that leadership and organizational support exist for course participants.

When referring to the healthcare industry here, the author included healthcare and all the organizations, companies and policies that make-up the healthcare industry. Some of the components of the healthcare industry include: a) healthcare organizations, policies and systems, b) insurance companies, c) government policies, and d) all other supporting industries and systems. Finally, the researcher used the words program and course interchangeably throughout the document.

**Conceptual Framework**

The conceptual framework for this study was the applicability of human capital theory (Becker, 1993), with regard to the impact of TPS principals in a healthcare environment. Human capital theory is based on the idea that individuals, employers, and society derive economic benefits from investments in people (Becker, 1993; Gray & Herr, 1998; Sweetland, 1996). This study was based on a comprehensive review of quality initiatives in healthcare, and the impact of training on an organization’s ability to increase quality, productivity, safety, cost, employee and patient satisfaction.
The study continued with a brief review of the need for research related to healthcare quality initiatives, followed by an introduction to the most common models used to measure training and performance improvement initiatives. The topic of return on investment in healthcare was described while highlighting some of the barriers to applying evaluation tools within a healthcare environment. The literature review concluded by describing the Phillips Methodology and the impact of this evaluation tool on the world of Workplace Learning and Performance (WLP).

This study also contains a detailed outline of the method of evaluation, data collection and analysis of the reVIEW training program as implemented within a long-term care facility. The methodology included a description of the training outcomes and a list of business impact measures that were converted into monetary values. The questionnaire, A3 problem-solving form, action planning forms, instructor input and researcher on-site follow-up were used to collect data. The study concluded with an analysis of the data collected and final recommendations. This framework assisted the researcher in answering the research questions, identifying gaps, and providing a structure to clarify and inform the overall study.
Chapter 2

Review of Related Literature

This chapter provides a review of the related literature that supports the conceptual framework and foundation for this research. The review process revealed three primary avenues of research related to the key areas under investigation. The primary focus areas serving as the basis for this study are human capital theory, the quality movement in healthcare, focusing on TPS in healthcare, and training evaluation, focusing on the Phillips ROI Model. The conceptual framework and structure of this review are illustrated in the map in Figure 2.1.

![Figure 2.1. Literature Review Map](image-url)
Human Capital Theory

Human capital theory is based on the idea that individuals, employers, and society derive economic benefits from investments in people (Becker, 1993; Gray & Herr, 1998; Sweetland, 1996). The many forms of human capital investment include schooling, on-the-job training, medical care, and other related information about pricing and income (Becker, 1966; Schwartz, 1995). Though the theory includes health and other forms of investment, education typically emerges as the prime human capital investment topic for empirical analysis. The principal reason for this is that education can be measured quantitatively in dollars (Sweetland, 1996).

Gary S. Becker, the 1992 winner of the Nobel Prize in economic science, related investments in an individual's education and training to a business investing in equipment. His award-winning research maintains that human capital theory offers a unified explanation to a wide range of phenomena which include:

1) Earnings typically increase with age at a decreasing rate. The rate of increase tends to be positively related to the level of skill.
2) Unemployment rates tend to be negatively related to the level of skill.
3) Firms in underdeveloped countries appear to be more paternalistic toward employees than those in developed countries.
4) Younger persons change jobs more frequently and receive more schooling and on-the-job training than older persons.
5) The distribution of earnings is positively skewed, especially among professional and other skilled workers.
6) Abler persons receive more education and training than others.
7) The division of labor is limited by the extent of the market.

8) The typical investor in human capital is more impetuous and thus more likely to err than is the typical investor in tangible capital (Becker, 1993, p. 30).

Sweetland (1996) argued that since most economics of education studies incorporate principles of human capital theory, many scholars believe it to be a branch of economics rather than a specialty within the economics of education. Sweetland went on to say that, “It is difficult, if not impossible, to separate a body of human capital theory literature from a body of economics of education literature” (Sweetland, 1996, p. 342).

Employees with specific training have less reason to quit and companies have fewer reasons to fire or lay them off. This, according to Becker, implies that employees leaving an organization and layoff rates are inversely related to the amount of specific training an individual has received (Schwartz, 1995). According to Rothwell and Sredl (2000), approximately 33% of employees who receive formal training while working for their current employer receive some form of benefit shortly after training. They go on to state that the employer also benefits since many employees report they learned a valuable skill which improved their job performance. Education can provide useful knowledge to help increase productivity in individuals. Stolovitch and Maurice (1998) stated that, “Education and training, specifically targeted to meet an organization’s needs, can increase the value of its human capital. Both the organization and the individual employee benefit from the increased value” (p. 12). Stolovitch et al. further stated that human capital is central to calculating Return on Investment (ROI). Gray and Herr (1998) pointed out that, “When trainers seek to provide cost/benefit proof of training effectiveness, or Return on Investment (ROI), they are, in fact, attempting to prove that
the human capital investment theory applies to their setting” (p. 64). In her book, *The Economics of Education*, Daniele Checchi pointed out that the future benefits of acquiring education are conditional on exerting adequate effort in the labor market (2006, p. 19). In 1999, Stephen Spear and H. Kent Bowen wrote a paper for the Harvard Business Review titled, “Decoding the DNA of the Toyota Production System”. In it, Spear et al. wrote, “all the organizations we studied that are managed according to the Toyota Production System share an overarching belief that people are the most significant corporate asset and that investment in their knowledge and skills are necessary to build competitiveness” (Spear & Bowen, 1999, p. 103).

Fitz-enz (2000), in the book *The ROI of Human Capital*, made the case that, “Human knowledge or skill is of no organizational value until it is applied to a business situation” (p. 8). This is essentially why the majority of the literature on evaluation discusses the need for an assessment prior to training. In their book, *The Value of Learning*, the Phillips’ state that in many programs, the learning objectives need to be enhanced to include application and implementation (Level 3) and business impact (Level 4) objectives (Phillips & Phillips, 2007). In *Beyond Learning Objectives: Developing Measurable Objectives That Link to the Bottom Line*, Jack and Patti Phillips discussed the importance of aligning program objectives with the organization’s strategic objectives. When addressing business impact, the Phillips’ pointed out the importance of Level 4 objectives, particularly for senior executives. They went on to say that, “Some executives lack enthusiasm about a project or program unless the results reflect key business measures” (Phillips & Phillips, 2008, p. 89). Later in this chapter, the researcher reveals that the first step in the *Phillips ROI Methodology Process Model* is to align
program objectives with business objectives. First, we discuss the quality initiative in healthcare over the last several decades.

**Quality Initiatives in Healthcare**

Healthcare organizations around the world share a common need to bring about a paradigm shift in the quality of healthcare delivery. The *Quality Revolution*, as it is sometimes referred, is nothing more than putting the patient at the heart of healthcare and wrapping the care around it, rather than the other way around. This realization, though long in coming, is beginning to take root in healthcare where quality has been a buzzword for some time (Garud, 2004).

The Institute of Medicine (IOM) released a landmark report in November 1999 titled, *To Err is Human: Building a Safer Health System*. The report’s authors estimated that preventable medical errors kill as many as 98,000 patients annually (Kenney, 2008; Zidel, 2006). Recent estimates have the numbers as high as 195,000 deaths per year and as many as 750,000 injuries due to medical errors (Printezis & Gopalakrishnan, 2007). In addition to the number of deaths and injuries, the report contained many unsettling conclusions with regard to the quality of the United States healthcare system. At the time, Richard Wade, spokesman for the American Hospital Association, did not dispute the problem. In fact, he said, “What this report acknowledges is a need for better safeguards and systems for doctors and nurses and others to minimize the possibilities of errors. Is the system we have now adequate? No, it is not” (Wade, quoted in Kenney, 2008, p. 87).

Fifteen months after releasing *To Err is Human*, the Institute of Medicine published another report titled, *Crossing the Quality Chasm* (2001). The report was less sensational than the patient safety report, but it was more comprehensive and, with regard
to quality, more important (Berwick, 2002). The Committee on the Quality of Health Care in America was formed in June 1998 and charged with developing a strategy to improve the quality of healthcare.

In carrying out this charge, the committee commissioned a detailed review of the literature on the quality of care; convened a communications workshop to identify strategies for raising the awareness of the general public and key stakeholders of quality concerns; identified environmental forces that encourage or impede efforts to improve quality; developed strategies for fostering greater accountability for quality; and identified important areas of research that should be pursued to facilitate improvements in quality (America, Institute of Medicine, 2001, p. 1).

The committee focused on the health care delivery system. It specifically looked at the provision of preventive, acute, chronic, and end-of-life health care for individuals. The report called for improvements in six dimensions of healthcare performance: a) safety, b) effectiveness, c) patient-centeredness, d) timeliness, e) efficiency, and f) equity (Berwick, 2002).

Over the years, healthcare has adopted various process improvement initiatives such as Total Quality Management (TQM) and Six Sigma to help reduce cost and waste as well as improve performance and quality of care. However, according to Ovretveit and Gustafson (2003), little research has been done on the effectiveness of these programs.

**Total quality management in healthcare.** Printezis and Gopalakrishnan (2007) concluded that with the few TQM programs that have been assessed, it appears that success has remained elusive in the majority of cases (p. 228). They specifically pointed
to two studies. The first, “A Report Card on Continuous Quality Improvement” (Blumenthal & Kilo, 1998), is a qualitative study consisting of 19 one-hour interviews which included six senior leaders from healthcare organizations and 13 experts involved in national quality improvement efforts in the field of healthcare. This study concluded that the TQM movement has not yet made a sizable impact on the U.S. healthcare system. The second study, “Obstacles to the Application of Total Quality Management in Health Care Organizations” (Zabada, Rivers, & Munchus, 1998), is a scientific review of the obstacles that faced healthcare organizations that undertook TQM. The researcher compared TQM in a manufacturing environment to TQM in a healthcare environment. This study also concluded that TQM has failed to change the healthcare industry.

Printezis et al. cited the main reasons for the lack of results include: a) processes that are too difficult for healthcare professionals to interpret, b) the tools are costly and time-consuming to implement, and c) frontline staff and employees have to turn to senior management and qualified employees to solve problems (Printezis & Gopalakrishnan, 2007).

**Six Sigma in healthcare.** Motorola originally developed the Six Sigma process, but GE Medical Systems is credited with introducing the philosophy to the healthcare industry (Lloyd & Holsendack, 2006). Six Sigma is a process-focused, data-driven methodology aimed at eliminating defects in any process (Antony, Downey-Ennis, & Seow, 2007). This statistical concept represents the variability of a data set about its mean. Therefore, the Six Sigma philosophy represents a 99.7% error-free process. Six Sigma is a management philosophy designed to help organizations systematically reduce errors and defects to a rate of 3.4 per one million opportunities (Lloyd & Holsendack,
The Six Sigma methodology works within a five stage process—DMAIC. DMAIC is an acronym for: Define (D) a problem within a process, Measure (M) the defects, Analyze (A) the cause of defects, Improve (I) the process, and Control (C) the process so defects do not recur.

Six Sigma has been in healthcare for over 15 years, much longer than the critics expected. According to Black and Revers (2006), it became involved in healthcare around the year 2000; for a couple of years, its growth was slow but steady. However, by the year 2002, a number of healthcare institutions had adopted Six Sigma as their major quality program (Black & Revers, 2006, p. 260). Examples of Six Sigma projects for healthcare include operational processes such as billing, registration, or workflow, though it can also include clinical processes such as medication administration. Examples of success stories include: a) reduction in surgical inventory costs, b) reduction in length of stay in emergency rooms, and c) improvement in patient satisfaction (Antony, Downey-Ennis, & Seow, 2007).

While Six Sigma has tremendous potential in healthcare, some challenges include the following: a) the initial investment in the program is very high, b) the tools are very data driven and the infrastructure to collect useful data is not easily accessible, c) the absence of a standard operating procedure makes the task of measuring improvements difficult, and d) it is difficult for front line employees to understand the tools and concepts without a statistical background, once again leaving it up to senior management and specialized individuals to perform the analysis (Printezis & Gopalakrishnan, 2007).

What is the next step? It appears that lean thinking, or *The Toyota Production System* (TPS), might help address many of the shortcomings associated with TQM and
Six Sigma. The current thought is that the integration of Six Sigma with lean thinking will be the next big step for healthcare organizations (Antony, Downey-Ennis, & Seow, 2007). Not too long ago, lean and Six Sigma were believed to be opposing methodologies. Recently, the marriage of these two has given rise to a new concept, *Lean-Sigma*. Six Sigma is more about quality improvement, while lean is more about process improvement. The two methodologies are complementary and can be implemented sequentially. The logical order of implementation is to apply lean principles first, thereby eliminating the non-value-added process steps and creating flow. Six Sigma may then be employed to help improve quality (Zidel, 2006).

**Toyota Production System in Healthcare**

The Toyota Production System (TPS) is Toyota’s unique approach to manufacturing. It is the basis for much of the *lean production* movement that has dominated manufacturing trends (along with Six Sigma) since the late 1980s (Liker, 2004). TPS is a relentless pursuit of the reduction of waste and wait time, eliminating excess inventory and extra steps from a process. TPS is a commitment to continuous process improvement (Black & Miller, 2008).

It was after World War II that Taichi Ohno of Toyota in Japan began to develop true lean manufacturing principles. Like many organizations that evolved into lean enterprises, it was done out of sheer necessity. Toyota had neither the space nor the resources to hold inventory. Faced with a lack of money and space, small market demand, and a need for product diversification, Toyota could not survive using the Ford style of mass production. This quandary marked the beginning of the Toyota Production
System (Womack, Jones, & Roos, 1990). When Ohno was asked to define a lean enterprise, he very succinctly stated that:

All we are doing is looking at the time line from the moment the customer gives us an order to the point when we collect the cash. And we are reducing that time line by removing the non-value-added wastes (Liker, 2004, p. 7).

In his book, *Going Lean*, Ruffa (2008) explained how lean is challenging the way companies think about the way they do business. Lean changes the notion that efficient operations and innovation are only possible when business is steady and demand is growing, and that disruption and loss are the price that must be paid each time change is introduced. Instead, lean shows how a new breed of companies has demonstrated a powerful yet unexpected weapon in the battle against uncertainty. “Their lessons strike to the core of what is perhaps today’s greatest mystery of success: how one firm’s adversity can become another’s competitive advantage” (Ruffa, 2008, p. 3).

Kotelnikov (2009) listed and explained the seven principles of the Toyota Production System as:

1) Reduced Setup Times—Setup procedures are wasteful because they add no value while tying up labor and equipment. By organizing procedures, and training workers to do their own setups, Toyota has slashed setup times from months to hours and sometimes even minutes.

2) Small Lot Production—The production of large batches can result in huge setup costs, high capital cost of high-speed equipment, larger inventories, extended lead times, and larger defect costs. Since Toyota has found the way
to make setups short and inexpensive, it is now possible for them to economically produce a variety of things in small quantities.

3) Employee Involvement and Empowerment—Toyota has organized their workforce into teams and has given them the responsibility and training to do many specialized tasks. Teams are also given responsibility for housekeeping and minor equipment repair. Each team has a leader working as a member on the line.

4) Quality at the Source—Product defects must be discovered and corrected as soon as possible. Since workers are in the best position to discover a defect and to immediately fix it, they are assigned this responsibility. If a defect cannot be readily fixed, any worker can halt the entire line by pulling a cord (called *Jidoka*).

5) Equipment Maintenance—Toyota assigns their operators primary responsibility for basic maintenance since they are in the best position to determine malfunctions. This leaves the maintenance specialists to diagnose and fix only complex problems, improving the performance of equipment.

6) Pull Production—Toyota developed the “pull method” to reduce holding costs and lead times. Thus, demand for materials from the immediate next stage arrives only when needed. This is where the term *Just-in-Time* (JIT) originated.

7) Supplier Involvement—Toyota treats its suppliers as partners, as integral elements of Toyota Production System (TPS). Suppliers are trained in the ways of Toyota.
Since all organizations, including healthcare, should be concerned with cash flow, customer satisfaction, and quality, other industries are now applying lean principles to their core processes (Graban, 2009). Unfortunately, many individuals in healthcare misunderstand the term lean (Fillingham, 2007). All too often lean is assumed to denote cutting things back to the bone, asking staff to work harder, and doing more with less. Lean is not about cutting back. In fact, by removing many of the frustrations and timewasters that staff members encounter on a daily basis, lean can make work a more fulfilling experience. But typically, the first reaction of staff is that a manufacturing approach simply cannot work in a healthcare organization. "We are not making cars" is the initial response of many (Fillingham, 2007, p. 232). But as Ruffa (2008) pointed out in his book, *Going Lean*, TPS is not just for manufacturing; it works with other organizations as well. Two good examples of lean in a non-manufacturing environment are Wal-Mart and Southwest Airlines. As once unquestioned-industry-leaders continue to find themselves in a terrible struggle, one by one driven into financial turmoil and bankruptcy, Toyota, Wal-Mart and Southwest Airlines remain strong (Ruffa, 2008).

The Institute for Healthcare Improvement (IHI) released a paper titled, *Going Lean in Health Care* (2005). In it, IHI stated that principles of lean work in healthcare much the same way they do for industry. The report’s authors further indicate that TPS principles hold the promise of reducing or eliminating wasted time, energy, and money in healthcare (Miller, 2005). The report provided examples of two healthcare organizations that have successfully implemented lean thinking: Virginia Mason Medical Center (VMMC) and ThedaCare, Inc.
Virginia Mason Medical Center (VMMC) in Seattle, Washington has been using TPS principles since 2002, after sending leaders within the organization to Toyota in Japan to study the TPS system (Kenney, 2008; Miller, 2005). It has since been able to create more capacity in existing programs and practices, allowing them to scrap planned expansions. It has calculated the capital expenditure savings to be $8 – $11 million (Miller, 2005). Not only has it saved money, but a number of quality measures and indicators are telling. In 2004, 2005, and 2006, VMMC received the Distinguished Hospital Award for Clinical Excellence from Health Grades, a company that measures quality. No other hospital in Washington came close to this distinction. In 2005, Virginia Mason ranked first in Washington in The Leapfrog Group’s quality and safety survey. VMMC again led the region in implementing Leapfrog’s safety standards and was one of only 59 hospitals in the United States to be named on the Leapfrog Group’s Top Hospitals 2006 list (Kenney, 2008).

ThedaCare, Inc. is a healthcare system based in northeast Wisconsin. When ThedaCare became interested in the TPS process, the management group turned to an organization that was successfully implementing it in the United States. This consultation allowed the management group to avoid the costly visits to Japan. ThedaCare worked with a Wisconsin-based business, Ariens Outdoor Power Equipment Company, for its initial introduction to the TPS process. Since implementing the TPS techniques, ThedaCare has experienced tremendous results, which include $3.3 million savings in 2004. It reduced expenses by $154,000 in the catheterization lab supply procurement process. It redeployed staff in several areas saving the equivalent of 33 Full
Time Equivalent (FTE) employees and reduced by 50% the time it takes to complete clinical paperwork for admissions (Miller, 2005).

In the late 1990s, business leaders and a local philanthropic organization in Pittsburgh, Pennsylvania began looking at ways to create new jobs, increase capital investment, and build a better quality of life for residents in the region. This group of respected business and community leaders began to look at the business of healthcare, which is the largest economic sector in the region. At the time, healthcare was employing one in eight workers and was responsible for more than $7.2 billion in business. The many pressures on the healthcare system started to reflect in operating losses, bankruptcies, consolidation, and a high rate of employee turnover. From these discussions emerged the Pittsburgh Regional Health Initiative (PRHI), a nonprofit community consortium designed to respond to these challenges (Grunden, 2008).

PRHI was led by Karen Wolk Feinstein, Ph.D., president of the Jewish Healthcare Foundation. Feinstein recruited former Alcoa Chairman and U.S. Treasury Secretary Paul O’Neill to lead the initiative. Feinstein and O’Neill convened an array of the region’s healthcare stakeholders and posed this question: Can we work together as a region to create a better healthcare system? From this, PRHI moved forward to study the TPS system and created a program titled, “Perfecting Patient Care”. It is this initiative on which the book, *The Pittsburgh Way*, written by Grunden (2008), is based. The book provides many case studies and examples which show how PRHI successfully implemented the Perfecting Patient Care system in Southwest Pennsylvania; however, the book does not point to any standard methodology for calculating benefits, nor does it refer to ROI in any of the studies.
The reVIEW Program

In their 1999 paper, *Decoding the DNA of the Toyota Production System*, Spear and Bowen determined that the information underlying the Toyota Production System can be captured in four basic rules. These rules guide the design, operation, and improvement of every activity, connection, and pathway for every product and service at Toyota. The rules are as follows:

Rule 1—All work shall be highly specified as to content, sequence, timing, and outcome.

Rule 2—Every customer-supplier connection must be direct, and there must be an unambiguous yes-or-no way to send requests and receive responses.

Rule 3—The pathway for every product and service must be simple and direct.

Rule 4—Any improvement must be made in accordance with the scientific method, under the guidance of a teacher, at the lowest possible level in the organization.

Spear and Bowen (1999) went on to add that all the rules require activities, connections, and flow paths to include built-in tests to signal problems automatically. It is the continual response to problems that makes this seemingly rigid system so flexible and adaptable to changing circumstances (p. 98).

The other finding on which Spear and Bowen (1999) elaborate is Toyota’s notion of ideal. When Toyota employees speak of the ideal, they have a tangible definition in mind; it is one that is consistent throughout the organization. Specifically, for Toyota’s employees, the output of an ideal person, group of people, or machine:

1) is defect free (it has the features and performance the customer expects),
2) can be delivered one request at a time (a batch size of one),
3) can be supplied on demand in the version requested,
4) can be delivered immediately,
5) can be produced without wasting any materials, labor, energy, or other resources (such as costs associated with inventory), and
6) can be produced in a work environment that is safe physically, emotionally, and professionally for every employee (Spear & Bowen, 1999, p. 105).

Inspired by the work of Spear and Bowen, Jimmerson and Sobek conducted research under a grant from National Science Foundation (NSF) (2001 – 2004, NSF grant # 0115352). From 2001 – 2004, Jimmerson and Sobek researched the applicability of the TPS program in a healthcare environment. The study was conducted at the Community Medical Center (CMC) in Missoula, Montana.

In 2001 – 2002, Jimmerson and Sobek developed a seven-week, introductory training course and offered it to CMC employees. The purpose of the course was to train employees in the principles of the Toyota Production System so they could return to their departments to begin implementing the concepts. Students met once a week to review what they learned the previous week, discussed how they applied the learning goals within their departments, and introduced a new TPS subject (Jimmerson & Sobek, 2002). The program continued to be taught to CMC employees through 2004 with impressive results. Two examples of successful outcomes associated with the study conducted at Community Medical Center include:

1) The Rehabilitation Nursing Unit was experiencing low productivity, inconsistent treatment levels, and processes which were not clearly defined.
After applying some of the principles from the TPS program, they achieved an 80% improvement in billable time which improved revenue. They also improved patient care and increased patient care time by reducing set-up time (Printezis & Gopalakrishnan, 2007).

2) The pharmacy was experiencing high medication error rates, and was perceived by other departments as providing low levels of service – the average order delivery time was 38 minutes. After applying some of the principles from the TPS program, the pharmacy decreased the average number of orders-in-system by 32%, with a corresponding decrease of order to delivery time. The pharmacists reported less stress on the job and they achieved a 40% decrease in missing medication notifications (Spear & Schmidhofer, 2005).

The NSF grant also funded a dissertation study by Ghosh (2006), who studied the applicability of the TPS principles in a healthcare setting. Ghosh conducted a quantitative analysis of 18 cases at CMS where the principles were applied. He found a strong correlation between the degree to which problem-solvers invoked the principles, as defined by Spear and Bowen (1999), and the magnitude of improvement. He concluded that healthcare operations will improve by: a) increasing the specification of work activities according to outcome, content, sequence, and timing; b) making connections between the supplier and customer for a good or service more explicit, clear, and direct; and c) simplifying the pathways along which goods and services travel. He also found that clarifying connections and simplifying pathways are highly correlated, suggesting
that pathways often become complex because connections within them are not clear (Ghosh, 2006).

Based on the success of the NSF study conducted at the Community Medical Center, Jimmerson developed the reVIEW (realizing exceptional VALUE IN EVERYDAY WORK) program (Jimmerson, 2007b).

**What makes this program different?** The reVIEW program is research-based; it was developed after the extensive research conducted by Bowen and Spear and written about in their landmark paper, “Decoding the DNA of the Toyota Production System”. The program was refined during a four-year NSF-funded study (2001 – 2004, NSF grant # 0115352) conducted at the Community Medical Center in Missoula, Montana. The research included the dissertation study by Ghosh, who looked at the applicability of the reVIEW principles in a healthcare setting and concluded that the principles do apply.

Over the past several years, reVIEW has been practiced in more than 50 healthcare organizations across the nation. The program is taught using the most recent adult learning techniques, including: lecture, reading, audio, visual, demonstration, group discussion, learning by doing, and one-to-one teaching. The program is designed to be self-sustaining by training internal instructors for each organization that implements the basic reVIEW program (Sheehy, personal communication, June 9, 2009).

**What are the key components of the course?** Participants in the reVIEW course are taught:

1) The definition of ideal—The notion of ideal as adapted for healthcare is: a) exactly what the patient needs, defect free, b) one-by-one, customized to each individual patient, c) on-demand exactly as requested, d) immediate response
to problems or changes, e) no waste, and f) safe for patients, staff and 
clinicians - physically, emotionally and professionally (Jimmerson, Weber, & 
Sobek, 2005).

2) The four rules in use—The rules in use for the reVIEW program are those 
previously defined by Spear and Bowen (1999) in their paper, *Decoding the 
DNA of the Toyota Production System*, (Jimmerson, 2008).

3) The Seven Mudas in healthcare—*Muda* is a Japanese word meaning waste. 
The seven mudas in healthcare are: a) confusion, b) motion/travel, c) waiting, 
d) processing, e) inventory, f) defects, and g) over-production (Jimmerson, 
2008).

4) Conducting an observation—The course teaches that reality emerges from the 
process of observation. It is unrealistic to expect a plan to be real unless it is 
observed. Likewise it is not realistic to expect employees to embrace change 
without interacting with the process being changed. Observation is the first 
assignment in the reVIEW course (Jimmerson, 2008).

5) Value Stream Map (VSM)—A value stream map is a visual representation of 
how the work is really happening now. It is a tool that allows a person to 
visualize the workings of a process from a different perspective (Jimmerson, 
2007a).

6) A3 Problem Solving methodology—The A3 report is a powerful, structured, 
problem solving technique used by Toyota. The tool is called the A3 report, 
after the size of paper that has traditionally been used to do an A3 report. The 
primary headings on the A3 include: The Issue, Background, Current
What are the anticipated program benefits? According to Sheehy (personal communication, June 9, 2009), who is the Director of Education, Innovation, and Implementation at Lean Healthcare West, the reVIEW principles and methods, adapted to healthcare with a comprehensive implementation plan, can result in:

1) reduced errors and improved delivery of care,
2) reduced waste and increased capacity for care,
3) reduced cost and improved access to care,
4) increased patient satisfaction,
5) involved frontline workers,
6) improved workplace appreciation (to retain/recruit quality talent), and
7) improved leadership skills at all levels.

How is the program structured? The basic program is offered over a fourteen-week period of time. At the completion of fourteen weeks, 64 frontline workers have been trained in lean healthcare principles and implementation; up to 64 peer coaches and four reVIEW instructors also have been trained, who can then continue to teach the course within the organization.

The course format is as follows:

1) a four-hour introduction to lean healthcare for the Senior Leadership Team,
2) a reVIEW Course, presented for two different groups of 16 participants, three hours per week (plus homework assignments) for seven weeks,
3) time each week for scheduled one-on-one coaching of participants,
4) a report-out, by course participants, of their projects to the Senior Leadership Team on week seven,

5) a three-hour “Coaching” Course on week seven for any participant of the reVIEW course who wishes to become a peer coach,

6) a six-hour Instructor Training Course for four internal instructor-candidates,

7) a second set of reVIEW Courses (the same format as the first reVIEW Course) co-taught/co-coached by a Lean Healthcare West Senior Instructor and the instructor-candidates,

8) a second three-hour “Coaching” Course for any participant of the reVIEW Course who wishes to become a peer coach, and

9) a report-out, by course participants, of their projects to the Senior Leadership Team.

The expectation at the end of the fourteen-week format is that the healthcare organization will have 64 frontline workers who will continue to work on their lean projects, up to 64 peer coaches, and four instructors who will be able to continue to offer the reVIEW course for staff and physicians within the organization (Sheehy, personal communication, June 9, 2009).

As Lean Healthcare West becomes more engaged with healthcare organizations across the nation, it is being asked to provide Return on Investment (ROI) data to support its claim of program success. LHW is seeing tremendous results with its program, but much of the cost benefit data to date is anecdotal, since it is collected without a standardized methodology.
The Need for Research

In corporations, Return on Investment is one of the most essential aspects of executive investment decision-making. Managing a business through tough times does not mean organizations should stop spending money. But, it does mean they need to spend money in a way that creates maximum impact on productivity and financial results. In short, organizations need to realize the “biggest bang for the buck” (SBL, 2007). Of course the same holds true for healthcare, where the primary objective is increased value for patients. Increased value for patients is essentially the quality of patient outcomes with respect to the money spent. But, as Porter and Teisberg (2006) stated in their book, *Redefining Healthcare*, minimizing cost is simply the wrong goal and will lead to counterproductive results. Eliminating waste and unnecessary services is beneficial, but cost-savings must arise from true efficiencies, not from cost shifting, redirecting care (rationing), or reducing quality (Porter & Teisberg, 2006, p. 98).

A large part of the quality problem in healthcare can be traced to the surprising and counterintuitive fact that performance is rarely measured. Although nearly everything else of significance in the world is measured, healthcare is the surprising exception (Kenney, 2008). As Ovretveit and Gustafson (2003) saw it, health resources that could be used for clinical care are increasingly being used for quality improvement programs such as national quality initiatives, internal hospital programs, and quality accreditation. Ovretveit et al. went on to point out that surprisingly little research has been conducted into the effectiveness of quality initiatives in healthcare. Some Total Quality Management studies have been made that have produced useful information for
decision makers. Few other quality initiatives in healthcare have been systematically studied or evaluated (Ovretveit & Gustafson, 2003).

In recent years, ROI has become a “buzzword” across the healthcare system, with policymakers and consumers demanding greater value for dollars spent on healthcare. Medicaid, state officials, legislators, health plans and other stakeholders are increasingly challenged to identify programs with the potential to both improve quality of care and control healthcare costs (Chen, Au, & Hamblin, 2007).

The primary research challenge associated with quality improvement initiatives in healthcare is that they tend to be evolving programs which include a number of activities that start and finish at different times, making it difficult to collect data. In their journal article, “Evaluation of Quality Improvement Programs”, Ovretveit and Gustafson (2002) pointed out that future evaluation of quality initiatives in healthcare would be improved by focusing attention on the economics of the program, along with other initiatives such as longitudinal studies and common definitions and measures. They went on to say that:

No studies have assessed the resources consumed by a quality improvement program or the resource consequences of the outcomes. The suspected high initial costs of implementation would look different if more was known about the costs of sustaining the program and about the possible savings and economic benefits (Ovretveit & Gustafson, 2002, p. 275).

Of course, this was written in 2002; since then, the healthcare industry has become more interested in ROI. The researcher of this study was able to locate journal articles associated with ROI in healthcare improvement programs since 2002, but none specific to the TPS program. Also, the articles published since 2002 do not appear to use
a standardized and documented ROI methodology. This is not to say that they were not important studies; in fact, several articles such as, “The Impact of the Highmark Employee Wellness Program on 4-Year Healthcare Costs” (2008) and “Return on Investment in Pay for Performance: A Diabetes Case Study” (2006), have made significant contributions to understanding the impact of healthcare improvement programs.

**Methodologies for Evaluating Training Programs**

Evaluation is a systematic process by which data are collected and converted into information for measuring the effects of the program, helping in decision making, documenting results to be used in program improvement, and providing a method for determining the quality of the program (Basarab & Root, 1992). “Evaluation is an absolutely essential ingredient when you are attempting to close performance gaps or improve performance. It is the only way to determine the connection between performance gaps, improvement programs, and cost-effectiveness” (Clark & Estes, 2002, p. 125). In their book, The Value of Learning, the Phillips stated that measuring and evaluating learning has earned a place among the critical issues in the learning, development, and performance improvement fields. For decades, the topic of measuring and evaluating training has been on conference agendas and discussed at professional meetings (Basarab & Root, 1992; Bozarth, 2008; Chapman, 2009; Gray & Herr, 1998; Hodges, 2002; Kirkpatrick & Kirkpatrick, 2006; Kirkpatrick & Kirkpatrick, 2005; Phillips & Phillips, 2005a; Phillips & Phillips, 2005b; Phillips & Phillips, 2007a; Swanson & Holton III, 1997). Journals and newsletters regularly embrace the concept, dedicating increased print space to it. Professional organizations have been created to
exchange information on measurement and evaluation, and more than twenty-five books provide significant coverage of the topic. Even top executives have an increased appetite for evaluation data (Phillips & Phillips, 2007b, p. 1).

Measuring the impact of training is about showing tangible results that more than pay for the cost of the training (Kirkpatrick & Kirkpatrick, 2006). Research has demonstrated that training impact is only realized for 15% of all participants (Phillips & Phillips, 2007a). Determining the training impact or results on an organization is one of the greatest challenges for workplace learning professionals (Kirkpatrick & Kirkpatrick, 2006).

It is important for human resource development (HRD) professionals to understand the relationship between what they do and the financial benefits produced for their company. According to Phillips and Phillips (2007a), measurement and evaluation can display several distinct and important payoffs such as:

1) Responding to requests and requirements—Today’s HRD professionals need information showing impact on key business measures. In some cases, they are looking for ROI analysis. Developing a comprehensive measurement and evaluation system is the best strategy to meet these requests and requirements.

2) Justifying budgets—Evaluation data can show where programs add value and where they do not.

3) Improving program design—An effective evaluation system should provide information to improve the design of a program, program content, delivery method, duration, timing, focus, and expectations.
4) Enhancing the transfer of knowledge—Knowledge transfer is perhaps one of the biggest challenges of any intervention. Research shows that 60 to 90 percent of job-related skills and knowledge acquired in a program are not being implemented on the job.

5) Eliminating unnecessary or ineffective projects or programs—An effective evaluation process can provide credible data to help support the decision to either implement a program or discontinue it.

6) Expanding or implementing successful programs—Positive results may be duplicated in another area if a similar need exists.

7) Increasing support from managers—Data that shows managers how learning and education can help achieve their objectives will influence their support.

8) Setting priorities for learning and education—An effective measurement system can help determine which programs and projects represent the highest priority.

9) Reporting an economic payoff—In some situations, an actual monetary value can be calculated for investing in measurement and evaluation.

These key benefits, inherent in almost any type of impact evaluation process, make additional measurement and evaluation an attractive challenge for learning and education processes.

When Workplace Learning and Performance (WLP) professionals are asked to produce evidence that supports the value of training, they are often frustrated by the lack of simple and effective methods for assessment. Therefore, they resort to simple questionnaires to obtain feedback on the results of their efforts. All too often, they
assume that if the training was based on a needs assessment or if it focused on what the company wanted, it was probably effective. Unfortunately, this type of thinking does not tie training activities to the dollar values that are considered important by most organizations. This puts WLP professionals at a disadvantage when dealing with their financially literate colleagues. Administrators will likely know how much the training cost, but they may have little idea of its real value. The WLP professional must be able to supply that information (Brauchle & Schmidt, 2004; Rowden, 2005).

The review of the recent training evaluation literature uncovered the key trends in accountability and results. In order to better understand the training evaluation practices taking place, the literature was reviewed to identify various training evaluation frameworks and processes. Twenty-five models were identified: some looked at the consequences of not training employees, some involved analyzing performance records under training conditions, and others looked at predicting the ROI of an intervention. The most often cited in both the academic and practitioner literature was the four-level framework developed by Kirkpatrick and the five-level framework developed by Phillips.

A dissertation study conducted by Hill (1999) found that little is known about how training is evaluated in the U.S. healthcare industry (Jones, 2006; Ovretveit & Gustafson, 2003). With shrinking profit margins, rising regulations, and competitive and consumer pressure, healthcare organizations are struggling to fund training and development initiatives. Today, unverified or limited approaches to training evaluation are no longer sufficient. Hill adds that determining training's Return on Investment can contribute to accountability. The study explored how formal, employer-sponsored training is evaluated in the United States healthcare industry. The researcher selected
participants from the American Society for Training and Development's Healthcare Forum membership. The methodology employed was survey research. The study gathered data on the use of training evaluation tools, techniques, policies and procedures. The study found that evaluation of training occurs primarily at Level 1 (reaction) and Level 2 (learning) using Kirkpatrick's levels of evaluation (Hill, 1999).

A dissertation study conducted by Jones (2006) explored the practices used by hospital human resource departments to evaluate outcomes of training programs. This mixed-method study collected data from a sample of 27 HRD practitioners representing 25 of the 37 largest hospitals in Illinois. The results showed that training programs are routinely evaluated at all 25 participating hospitals, since they are mandated to do so by their accrediting agencies. But Jones also concluded that no specific evaluation method was used by the hospitals; however, many were familiar with the Kirkpatrick and Phillips methodologies.

Since 2005, the vast majority of the literature on measurement and evaluation (M&E) in training has centered on what Wang and Spitzer (2005) referred to as the third stage in evaluation research. They labeled the three stages as: 1) practice-oriented atheoretical stage (1950 – 1987), referring to the four-level framework, 2) process-driven operational stage (1987 – 2000), referring to the addition of the ROI component, and 3) research-oriented, practice-based comprehensive stage (2000 – present), referring to a theory building systems approach.

Wang and Spitzer (2005) believed that the third stage in the evolution of M&E in HRD is currently under way. The emergence of this stage is marked by efforts to seek out research-oriented, practice-based comprehensive methodologies as a continuation of
the theoretical inquiry began during the second stage. “Such efforts are rooted in existing theory, including the four-level model and rational analyses of it, and are motivated by a desire to enhance existing models and approaches to increase their comprehensiveness and aim to develop more robust evaluation methodologies” (Wang & Spitzer, 2005, p. 7). Wang and Spitzer (2005) discussed six models when addressing the third stage in evaluation research.

Holton’s evaluation model. Holton has been highly critical of the Kirkpatrick model as a simple, four-level taxonomy. He instead proposed the Holton Evaluation and Research Model, which he referred to as a comprehensive framework for understanding the causal influences of training intervention outcomes. The three outcome levels proposed in this model included: learning, individual performance, and organizational performance. He then added a macro structure to the model which includes: ability, motivation, and environmental influences. Unfortunately, the model is still theoretical and has not been tested. “The obvious challenge that remains is to validate the model” (Holton, 2005, p. 50).

Learning Effectiveness Measurement (LEM). LEM was developed for IBM and its customers. The process is based on addressing business needs and on research and best practices. It has been tested and utilized in numerous applications within IBM and with its customers. LEM was developed to guide the design and track the effectiveness of interventions. The methodology was developed to align learning with business results. The five phases of LEM include:

1) predictive measurement—done before an intervention—can be viewed as part of the up-front analysis of a proposed intervention,
2) baseline measurement—done before implementation—used to identify pre-
implementation measurements and target values,
3) formative measurement—done during intervention design—ensures that
predictive measurement data are included in the design and implementation plan
for maximum program effectiveness,
4) in-process measurement—done during implementation—tracks program
effectiveness during deployment, and
5) retrospective measurement—done after the program is implemented—collects
post-program data to provide input for final evaluative decision making.

According to Spitzer (2005), “LEM methodology has been presented as a practical,
results-oriented approach to HRD measurement and evaluation. Additional use and
refinement of the methodology is certainly called for” (p. 69).

**The Success Case Method (SCM).** The SCM evaluates the effect of training by
looking for the best that is being produced by training. When found, the cases are
analyzed for evidence to document the application and result of the training. The SCM
process also searches for evidence that it was the training that led to a positive outcome
(Brinkerhoff, 2005). SCM uses purposive sampling to focus on the most successful as
well as least successful program participants. There are two key steps in the process.
The first step includes a brief survey to all the program participants. Based on the results,
a group of the most successful and least successful participants are identified. The second
step includes in-depth interviews with the small group. The results of the interviews
include stories of the business results from applying the learning along with enablers and
barriers. The results can be used to improve the program, recruit new participants, and assist management (Phillips P. P., 2003).

**Critical Outcome Technique (COT).** As described by Mattson (2005), the Critical Outcomes Technique consists of five steps in evaluating an HRD program:

1. determine—post-hoc—the intended outcomes of the program,
2. collect data from each participant concerning their attainment of the intended outcomes,
3. validate the data collected through a source other than the participant (e.g., the participants' supervisors or managers),
4. identify a performance value for each outcome, and
5. create a summary report for key stakeholders.

The primary purpose of the COT method is to capture post-hoc results that can be used by leaders to help make decisions about organizational programs and systems.

**The Stakeholder Approach.** As described by Nickols (2005), the Stakeholder Approach requires trainers to include stakeholder requirements in the design, development, and delivery of programs. This eleven-step process is designed to increase stakeholder interest in the outcomes and ultimately in evaluating those outcomes in a way that offer relevance, value, and meaning to all of the stakeholders.

**Added Value Evaluation.** Kearns (2005) called for a complete reappraisal of Kirkpatrick’s framework because the ultimate evaluation level should be that of added value, in monetary terms. He suggested a five-level model with the first step being critical and the others as optional:
1. baseline—pre-training—determine how the training will add value and determine performance values for the participants before training begins,
2. reaction,
3. learning,
4. transfer/application, and
5. ROI.

Wang and Spitzer (2005) added that, “So far in the beginning of stage three, we have seen very few theoretical contributions, and we are convinced that further breakthroughs in M&E will depend on successful theory building and theory-building research” (p. 9). They went on to say that any advances in theory and practice will come from a joint effort between both researchers and practitioners. Regardless of operational differences, all the methods and approaches proposed in the third stage of evaluation contain the elements of planning, data collection, analysis, and reporting. In addition, almost all of the methods feature evaluations that would be at the fourth level of Kirkpatrick’s four-level model (Wang & Spitzer, 2005).

**Meta-Analysis studies.** This literature search identified two meta-analysis studies conducted on the effectiveness of training and the relationship among training criteria. The first study was titled, *A Meta-Analysis of the Relations Among Training Criteria* (Alliger, Tannenbaum, Bennett, Traver, & Shotland, 1997); the second study was titled, *Effectiveness of Training in Organizations: A Meta-Analysis of Design and Evaluation Features* (Winfred, Bennett, Edens, & Bell, 2003). Since the first study was incorporated into and validated by the findings of the more recent study, this review only addresses the 2003 meta-analysis.
Winfred, Bennett, Edens and Bell used meta-analytic procedures to evaluate training design and evaluation features and the effectiveness of the training. A primary decision that must be made when doing an analysis to evaluate the effects of training is to choose evaluation criteria. The researchers concluded that though newer models of training evaluation have been proposed, Kirkpatrick’s four-level model continues to be the most popular. Therefore, they chose to use Kirkpatrick’s framework since it was conceptually the most appropriate for their study. As depicted in the chart in Figure 2.2, the researchers identified 397 independent data sets. The study found that depending on the criterion (reaction, learning, behavior, or results), the sample-weighted effect size for organizational training was 0.60 to 0.63—a medium to large effect. According to the study’s results: a) the training method used, b) the skill or task characteristic trained, and c) the choice of training evaluation criteria are all related to the effectiveness of training programs (Winfred, Bennett, Edens, & Bell, 2003).
Kirkpatrick’s four-level framework. In 1959, Donald Kirkpatrick wrote a series of articles titled, “Techniques for Evaluating Training Programs”, published in *Training and Development*, the journal of the American Society for Training and Development (ASTD). This marks the timeframe in which Kirkpatrick initially described the four levels of evaluation: Level I (Reaction), Level II (Learning), Level III (Behavior), and Level IV (Results) (Blasdell, 2004).

In the book, *Transferring Learning to Behavior*, Kirkpatrick (2005) wrote that since 1959 the model has essentially remained the same: “The concepts, principles, and techniques are as applicable today as they were when the model was first introduced” (p. 4). Though there are many models of evaluation, most have been developed to enhance,
modify, or improve what was initially developed over 50 years ago by Kirkpatrick. His basic premise of considering evaluation as steps in measuring reaction, learning, behavior, and results offered a novel and useful twist in this area to practitioners. Although a few of the models take different approaches, the most used, essential framework is Kirkpatrick’s steps, now labeled levels. Kirkpatrick-based evaluation probably accounts for 80—90% of the models in use today, including the Phillips methodology (Phillips, Phillips, Stone, & Burkett, 2007).

The Phillips ROI Methodology

In the 1970s, Jack Phillips built upon the Kirkpatrick framework. He wanted to build not just a framework but a process to use in gathering data that included some form of an economic indicator of success. Therefore, Phillips began with Kirkpatrick’s model, built in the cost-benefit comparison (Level 5), and developed a step-by-step process and standards that allowed for consistent data collection and analysis (Kirkpatrick & Kirkpatrick, 2006; Phillips, 2003; Phillips, Phillips, Stone, & Burkett, 2007). The first ROI study was conducted by Phillips in the 1970s on a co-operative education program. Since that time the Phillips ROI Methodology has been replicated hundreds of times with more than thirty books published to support the methodology. The Phillips ROI methodology is used by more than two thousand organizations in 44 different countries. The process has been the basis for many published studies and is one of the most validated and reported ROI processes in existence (Phillips & Phillips, 2007a).

The five levels of evaluation as seen in Table 2.1 provide a framework for categorizing the different types of data. As shown in Figure 2.3, the Phillips ROI
Methodology addresses the planning, collection, analysis, and reporting of each level of data with the stakeholder requirements in mind.

The Phillips ROI process utilizes a systematic approach to developing ROI calculations. Following the four-stage, ten-step process outlined in the model generates six types of data and creates a chain of impact that demonstrates the value of a project.

<table>
<thead>
<tr>
<th>Level</th>
<th>Brief Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1—Reaction and Planned Action</td>
<td>Measures participant’s reaction to the program and outlines specific plans for implementation. Participant reaction questionnaires are typically completed at the end of the program.</td>
</tr>
<tr>
<td>2—Learning</td>
<td>Measures skills, knowledge, or attitude changes. Learning is typically assessed through observations, exercises, role-plays, and subjective assessments from the program faculty and mentors.</td>
</tr>
<tr>
<td>3—Application and Implementation</td>
<td>Measures changes in behavior on the job and specific application and implementation. Follow-up evaluation data are usually obtained from questionnaires, observations, and focus groups.</td>
</tr>
<tr>
<td>4—Business Impact</td>
<td>Measures business impact of the program, linking key performance measures directly to the program. Business impact is often obtained from participants as they apply what they learn.</td>
</tr>
<tr>
<td>5—Return on Investment</td>
<td>Compares the monetary value of the results with the costs for the program, usually expressed as a percentage.</td>
</tr>
</tbody>
</table>
Since impact studies can be expensive and time-consuming, it is necessary to understand when an evaluation should move to this level. Level 4 and 5 evaluation should only be conducted on programs designed to make a significant difference, or those important to the organization. The Phillips state that impact studies should only involve 5% – 10% of an organization’s training programs. They offer the following criteria for consideration when selecting programs for impact and ROI evaluation:

1. the lifecycle of the program,
2. the linkage of the program to operational goals and issues,
3. the importance of the program to strategic objectives,
4. the cost of the program,
5. the visibility of the program,
6. the size of the target audience,
7. the investment of time,
8. the quality of data collection systems, and
9. stakeholder interest in the evaluation.
Table 2.2 is a sample of published ROI studies, taken from a paper written by Jack Phillips in 2007. All the listed studies used the Phillips process.

Table 2.2 Sample of Published ROI Studies

<table>
<thead>
<tr>
<th>Case Study Name</th>
<th>Measuring the ROI</th>
<th>Key Impact Measures:</th>
<th>ROI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cracker Box</td>
<td>Performance Management (Restaurant Chain)</td>
<td>A variety of measures, such as productivity, quality, time, costs, turnover, and absenteeism</td>
<td>298%</td>
</tr>
<tr>
<td>Federal Information Agency</td>
<td>Internal Graduate Degree Program (Federal Agency)</td>
<td>Retention, individual graduate projects</td>
<td>153%</td>
</tr>
<tr>
<td>Healthcare, Inc.</td>
<td>Sexual Harassment Prevention (Health Care Chain)</td>
<td>Complaints, turnover, absenteeism, job satisfaction</td>
<td>1052%</td>
</tr>
<tr>
<td>Imperial National Bank</td>
<td>Executive Leadership Development (Financial)</td>
<td>Team projects, individual projects, retention</td>
<td>62%</td>
</tr>
<tr>
<td>International Car Rental</td>
<td>First Level Leadership Development (Auto Rental Company)</td>
<td>Various measures—at least two per manager</td>
<td>105%</td>
</tr>
<tr>
<td>Metro Transit</td>
<td>Absenteeism Control/Reduction Program (Major City)</td>
<td>Absenteeism, customer satisfaction</td>
<td>882%</td>
</tr>
<tr>
<td>Midwest Electric</td>
<td>Stress Management Program (Electric Utility)</td>
<td>Medical costs, turnover, absenteeism</td>
<td>320%</td>
</tr>
<tr>
<td>National Crushed Stone</td>
<td>Skill-Based Pay (Construction Materials Firm)</td>
<td>Labor costs, turnover, absenteeism</td>
<td>805%</td>
</tr>
<tr>
<td>National Steel</td>
<td>Safety Incentive Plan (Steel Company)</td>
<td>Accident frequency rate, accident severity rates</td>
<td>379%</td>
</tr>
<tr>
<td>Nations Hotel</td>
<td>Executive Coaching (Hotel Chain)</td>
<td>Cost reduction, sales growth, operating efficiency, retention, and customer satisfaction</td>
<td>221%</td>
</tr>
<tr>
<td>Nextel Communications</td>
<td>Diversity (Communications Company)</td>
<td>Retention, employee satisfaction</td>
<td>163%</td>
</tr>
<tr>
<td>Southeast Corridor Bank</td>
<td>Retention Improvement (Financial Services)</td>
<td>Turnover, staffing levels, employee satisfaction</td>
<td>258%</td>
</tr>
<tr>
<td>United Petroleum</td>
<td>E-Learning (Petroleum)</td>
<td>Sales</td>
<td>206%</td>
</tr>
<tr>
<td>VA Sunshine Healthcare Network</td>
<td>Competency Development (Veteran’s Health Administration)</td>
<td>Time savings, work quality, faster response</td>
<td>159%</td>
</tr>
</tbody>
</table>

References for Published Studies

In his book, *Return on Investment in Training and Performance Improvement Programs* (2003, p. 18), Phillips listed eleven essential criteria for an effective ROI process. They are:

1. the process must be simple,
2. the process must be economical,
3. the assumptions, methodology, and techniques must be credible,
4. the process must be theoretically sound,
5. the process must account for other factors that influence output variables,
6. the process must be appropriate for a variety of HRD programs,
7. the process must have the flexibility to be applied on both a pre-program and post-program basis,
8. the process must be applicable with all types of data,
9. the process must include the cost of the program,
10. the process must include an acceptable ROI formula, and
11. the process must have a successful track record, in a variety of applications.

Based on an extensive review of the current measurement and evaluation literature, the researcher of this study concluded that the Phillips methodology would provide the most accurate ROI analysis of the impact of the reVIEW program in a healthcare setting. The Phillips methodology is a comprehensive process that:

1. Meets all the criteria of the third stage in evaluation research as specified by Holton (2005), Wang and Spitzer (2005). The Phillips model (backed
by more than 30 books) contains all the elements of the six proposed processes mentioned by Wang and Spitzer.

2. The Phillips model includes real world case studies of its use along with all the tools and instruments to conduct a thorough study.

3. The vast majority of the studies identified through research are familiar with and utilize either the Kirkpatrick or the Phillips models (Alliger, Tannenbaum, Bennett, Traver, & Shotland, 1997; Hill, 1999; Jones, 2006; Phillips P. P., 2003; Winfred, Bennett, Edens, & Bell, 2003).

**Chapter Summary**

This chapter provided an overview of the related literature that supports the conceptual framework and foundation for this research. The review process revealed three primary avenues of research related to the key areas under investigation. The primary focus areas serving as the basis for this study are human capital theory, the quality movement in healthcare, focusing on TPS in healthcare, and training evaluation, concluding that the Phillips ROI Model provides the best impact data for this study. Chapter three details the methodology used for this study.
Chapter 3

Methodology

The purpose of this study was to examine the impact (Kirkpatrick & Kirkpatrick, 2005) of improvement techniques from the Toyota Production System (TPS) in a north central Pennsylvania healthcare facility. For this purpose, the study’s design involved an embedded case study (Yin, 2009), utilizing the Phillips ROI Methodology to evaluate the effectiveness of the reVIEW program.

This chapter describes the methodological framework and provides details on research procedures. It includes an explanation of the six parts of the research process: 1) the problem, 2) research questions, 3) research design, 4) data collection, 5) data analysis, and 6) strategies to enhance the quality of the study.

Problem

In recent years, Return on Investment (ROI) has become a “buzzword” across the healthcare system, with policymakers and consumers demanding greater value for dollars spent on healthcare. Medicaid, state officials, legislators, health plans and other stakeholders are increasingly being challenged to identify programs with the potential to both improve quality of care and control health care costs (Chen, Au, & Hamblin, 2007).

A large part of the quality problem in healthcare may be traced to the surprising and counterintuitive fact that performance is rarely measured. Although nearly everything else of significance in the world is measured, healthcare is the surprising exception (Kenney, 2008). Ovretveit and Gustafson (2003) concluded that scant research has been conducted into the effectiveness of quality initiatives in healthcare. Some Total Quality Management studies have been completed which have produced useful
information for decision makers. However, few other quality initiatives in healthcare have been systematically studied or evaluated.

This has become the challenge for Lean Healthcare West (LHW) and the reVIEW program. As LHW becomes more engaged with healthcare organizations across the nation, it is being asked to provide ROI data to support its claim of a successful program. LHW is experiencing impressive results with its program, but much of the cost benefit data is anecdotal since it is collected without a standardized methodology.

The use of evaluation processes and models, including the Phillips framework, continues to grow (Phillips P. P., 2003). The Phillips ROI Methodology has been replicated hundreds of times (see Table 2.2 in chapter two for examples of studies conducted) with more than thirty books published to support the methodology. The Phillips ROI process is used by more than two thousand organizations in 44 different countries. The methodology has been the basis for other dissertation studies (see three examples in Table 3.1), providing a step-by-step guide from initial planning through data collection and evaluation. The four-phase, ten-step process generates six types of data and is one of the only documented ROI methodologies to include a step for isolating the impact of the program. The Phillips methodology is a time-tested, consistent, and credible approach for ROI studies and one with a track record of success in both profit and non-profit organizations (Phillips, Phillips, Stone, & Burkett, 2007). The Phillips ROI Methodology utilizes five levels of evaluation to provide a framework to categorize the different types of data, as shown in Table 3.2.
Table 3.1. Dissertation Studies Using the Phillips Process

<table>
<thead>
<tr>
<th>Year</th>
<th>Title</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>Measuring Return on Investment of a Retention Management Training Program</td>
<td>Judith F. Cardenas</td>
</tr>
<tr>
<td>2005</td>
<td>Oklahoma Department of Career and Technology Education Existing Industry Training Program: Economic Impact, Return on Investment, and Customer Satisfaction</td>
<td>Erick J. Reynolds</td>
</tr>
<tr>
<td>2003</td>
<td>Training Evaluation in the Public Sector</td>
<td>Patricia P. Phillips</td>
</tr>
</tbody>
</table>

Table 3.2. Five Levels of Evaluation (Phillips, Phillips, Stone, & Burkett, 2007)

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</tr>
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</table>
Research Questions

The research questions (RQ) are aligned with the Phillips’ Five Levels of Evaluation and the program objectives at each level:

**RQ1.** (Level 1) To what extent did the program participants have a favorable experience with the reVIEW program?

**RQ2.** (Level 2) To what extent did the participants learn the skills taught in the reVIEW program?

**RQ3.** (Level 3) To what extent are the participants applying the skills learned in the reVIEW program on the job?

**RQ4.** (Level 4) What is the business impact as a result of utilizing the skills learned in the reVIEW program?

**RQ5.** (Level 5) What is the Return on Investment associated with implementing the skills learned in the reVIEW program?

Research Design

This study was a single point embedded case, utilizing the Phillips ROI Methodology. Embedded case studies involve more than one unit or object of analysis and usually are not limited to qualitative analysis alone. An embedded case study allows for a variety of methods that may be applied within the subunits. Thus, hypotheses may be formulated, quantitative data sampled, or statistical analysis applied (Scholz, 2002; Yin, 2009).

A case is an empirical unit with theoretical constructs. Cases are subject to evaluation because scientific and practical interests are tied to them. They are used for purposes of demonstration and learning, both in education and in research (Scholz, 2002).
Case studies are designed to capture the complexity of a single case, and may involve multiple perspectives. They seek out the detail of interaction within its context, to study the distinctiveness and complexity of the unit of analysis (Stake, 1995; Yin, 2003a). One way in which case study research stands apart from other types of research is by the unit of analysis. A clearly defined unit of analysis helps define what the case is and helps determine if a study is a case study (Merriam, 2009).

Yin (2009) restated the definition of case study research into a two-fold, technical definition:

1) “A case study is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context. Especially when the boundaries between phenomenon and context are not clearly evident” (p. 18).

2) “The case study inquiry copes with the technically distinctive situation in which there will be many more variables of interest than data points. Where one result relies on multiple sources of evidence. With data needing to converge in a triangulating fashion. And as another result, benefits from the prior development of theoretical propositions to guide data collection and analysis” (p. 18).

In other words, the case study as a research strategy is an all-encompassing method. It converts the logic of design, data collection techniques and specific approaches to data analysis. In this sense, case study methodology is a comprehensive research strategy (Yin, 2003b).
Case study research includes both single and multiple case studies. Certain disciplines such as political science and public administration have tried to distinguish between these two approaches, but in reality they are variants of case study designs (Yin, 2003b). Case studies can include and even be limited to quantitative evidence. In fact, any contrast between quantitative and qualitative evidence does not distinguish the various research methods. As a result, the case study method is not just a form of qualitative research (Farmer & Rojewski, 2001; Yin, 2009).

Most case studies require an integration of data and knowledge from various sources. Many case studies are conducted to improve action and make better decisions. Thus, integrative evaluation is an important component of case studies. Because of the complexity of many cases, they are conducted frequently by teams. This is especially true with embedded case studies which apply multiple methods or strategies for data generation (Scholz, 2002).

The more complex and contextualized the objects of research, the more valuable the case study approach is found to be. Thus, the use of case studies is becoming an increasingly respected research strategy in the following areas: a) policy and public administration research, b) community sociology, c) management studies, d) branches of psychology and medicine, e) educational science, f) planning science, g) civil engineering, and h) environmental sciences (Merriam, 2009).

Unlike experimental, survey, or historical research, case study research does not claim any particular methods for data collection or data analysis (Merriam, 2009). This study utilizes the Phillips ROI process to guide the researcher through proper case study protocol. The Phillips methodology was designed with case study protocol in mind, and
dovetails nicely with Yin’s case study research process. Figure 3.1 illustrates the case study process as noted by Yin (Yin, 2009, p. 1).

During the plan stage Yin (2009) recommended:

- identifying research questions,
- deciding to use the case study method, compared to other methods, and
- understanding case study strengths and limitations (p. 2).

During the design stage Yin (2009) recommended:

- defining the unit of analysis and the case to be studied,
- developing theory, propositions, and issues underlying the likely study,
- identifying the case studies design, and
- defining procedures to maintain case study quality (p. 24).

During the prepare stage Yin (2009) recommended:
- honing skills as a case study investigator,
- training for specific case study research,
- developing case study protocol,
- conducting a pilot case study, and
- gaining approval from human subjects protection (p. 66).

During the collect stage Yin (2009) recommended:
- following a case study protocol,
- using multiple sources of evidence,
- creating a case study database, and
- maintaining a chain of evidence (p. 98).

During the analyze stage Yin (2009) recommended:
- relying on theoretical propositions and other strategies,
- considering any of the five analytic techniques, using quantitative or qualitative data or both,
- exploring rival explanations, and
- displaying data apart from interpretations (p. 126).

During the share stage Yin (2009) recommended:
- defining the audience,
- composing textual and visual materials,
- displaying enough evidence for reader to reach their own conclusions, and
- reviewing and re-write until the report is done well (p. 164).

The Phillips ROI process, as shown in Figure 3.2, addresses the planning, collection, analysis, and reporting of each level of data with the stakeholder requirements.
in mind. The design and prepare phases of a case study are also addressed in this chapter.

The Phillips ROI process utilizes a systematic approach to developing ROI calculations. Following the four-stage ten-step process in the model creates a chain of impact that will demonstrate the value of a project.

![ROI Process Model](image)

Figure 3.2 ROI Process Model (Phillips & Phillips, 2007c) Used with permission

**Needs Assessment**

To determine if a need existed for the reVIEW program at healthcare facilities in north central Pennsylvania, a half-day executive overview was offered to the senior leadership, HR and Training Managers from ten healthcare facilities in north central PA.

The overview offered details on the program content, format, and expectations of the participants. A presentation of case studies of other healthcare organizations utilizing the reVIEW program was also provided. Upon completion of the overview, the DuBois Continuing Education Department conducted an on-line assessment to determine the need for and interest in the reVIEW program.

Seven of the ten facilities that participated in the executive overview responded to the survey. The survey results were as follows:
• Four of the respondents rated the quality and effectiveness of the executive overview (4) Very Good, and three rated the quality and effectiveness (5) Excellent on a five-point Likert-type scale.

• When asked if they had an interest in proceeding with training and implementation of the TPS in healthcare program, five responded (4) Most Likely and two responded (5) Definitely on a five-point Likert-type scale.

• When asked if they would be interested in taking part in an ROI study to determine program benefits from a monetary standpoint, three responded (3) Likely and four responded (4) Most Likely on a five-point Likert-type scale.

Based on the survey results, a decision was made to offer the reVIEW program through the North Central Pennsylvania Healthcare Industry Partnership.

Early in this type of process, it is critical to ensure that the project is aligned with one or more business measures. Research suggests that the number one reason for project failure is lack of alignment with the goals of an organization (Phillips & Phillips, 2007). Therefore, once an organization decided to participate in the reVIEW program, an executive overview was first provided to all the senior executives, managers and training coordinators. During the overview it was made clear that prior to attending the program, each participant should meet with his or her manager and identify projects that, if improved, would enhance patient care and or organizational performance. This process is the first step in determining the units of measure that are discussed in greater detail later in this chapter.
Evaluation Planning

Planning the impact study is the first step toward a successful outcome. This phase of the process is critical to improving the quality and quantity of data collected (Phillips & Phillips, 2007). Planning the evaluation answers the questions: a) why evaluate the program, b) what is evaluated, c) how to go about doing it, d) whom to get data from, and e) when to collect the data (Phillips, Phillips, Stone, & Burkett, 2007). During the evaluation and planning phase, the researcher performed the following tasks:

Develop Objectives. “Although the need for program objectives might seem obvious, their value and role are much broader than most people think” (Phillips & Phillips, 2008, p. 1). One of the most important steps in any higher level evaluation project is to create objectives for each of the five levels of evaluation. The program objectives for the reVIEW program are:

**Level 1 – Reaction and Planned Action.** Upon completion of the program, participants will:

- rate the facilitators as effective,
- perceive the reVIEW program as relevant to the job,
- recommend this program to other healthcare providers, and
- indicate an intent to use the reVIEW skills on the job.

**Level 2 – Learning and Confidence.** During the program, participants will demonstrate that they can:

- define IDEAL, and recognize when their organization’s outcome is not IDEAL,
- explain the importance of studying work as it is actually done,
see patient care and supporting systems as processes,

explain what “specify an activity” means, and identify when a given activity is not sufficiently specified,

explain the term “connection”, and identify when a given connection is not simple or direct, and

explain the term “pathway”, and identify when a care pathway is complex.

Level 3 – Application and Implementation. During program implementation, the participants will:

• observe an organization’s activities and create an understandable, pictorial, description of the Current Condition,

• create a “map” of a process, collect data to quantify processing times and interval times between process steps, and use the data to determine process performance measures,

• create a future-state map of flow of processes that is a visualized improvement over the current-state map,

• diagnose a workplace “problem” by seeking out root causes in terms of activity specification, connections, and pathways, and

• envision a Target Condition that moves the organization closer to IDEAL by improving activities, connections, and/or pathways.

Level 4 – Impact and Consequences. During program implementation, with the intent to impact one or several of the following (output, quality, cost, time, customer or employee satisfaction), the participants will:
• redesign work activities by specifying the content, sequence, and timing of individual steps, and desired outcomes; and document the new design,
• redesign workplace connections to establish simple yes/no communications along patient care pathway,
• redesign pathways such that delivery of the good or service is simple, direct, and consistent, and
• design improvement activities as experiments, with explicit hypotheses about expected outcomes and specific outcome measures.

Level 5 – ROI. At a pre-determined time (3 – 6 months) after implementation, the project will attempt to:
• demonstrate a positive ROI of at least 18%.

Plan the Evaluation. At this stage a detailed data collection plan and an ROI analysis plan are assembled. The data collection plan lays the initial groundwork for the ROI study. This plan answers the questions: a) what do you ask, b) how do you ask, c) whom do you ask, d) when do you ask, and e) who does the asking. An example of a data collection plan is shown in Figure 3.3. The data collection plan for this study is located in Appendix A.

The second planning document is the ROI analysis plan, which requires the researcher to identify: a) methods for isolating the effects of the program, b) methods for converting data to money, c) cost categories, d) intangible benefits, e) communication targets for the final report, f) other influences and issues during application, and g) researcher comments (Phillips & Phillips, 2005). Figure 3.4 provides an example of an ROI analysis plan. The ROI analysis plan for this study is located in Appendix A.
**DATA COLLECTION PLAN:**

<table>
<thead>
<tr>
<th>Level</th>
<th>Broad Program Objective(s)</th>
<th>Measures</th>
<th>Data Collection Method/Instruments</th>
<th>Data Sources</th>
<th>Timing</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SATISFACTION/PLANNED ACTION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>LEARNING</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>APPLICATION/IMPLEMENTATION</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>BUSINESS IMPACT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>ROI</td>
<td>COMMENTS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 3.3 Data Collection Plan (Phillips, Phillips, Stone, & Burkett, 2007)*

**ROI ANALYSIS PLAN:**

<table>
<thead>
<tr>
<th>Data Items (Usually Level 4)</th>
<th>Methods for Isolating the Effects of the Program/Process</th>
<th>Methods of Converting Data to Monetary Values</th>
<th>Cost Categories</th>
<th>Intangible Benefits</th>
<th>Communication Targets for Final Report</th>
<th>Other Influences/Issues During Application</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 3.4 ROI Analysis Plan (Phillips, Phillips, Stone, & Burkett, 2007)*

Used with permission
Data Collection

This study followed Yin’s principles of data collection by: a) using case study protocol, b) using multiple sources of evidence to ensure triangulation, c) creating a case study database, and d) maintaining a chain of evidence (Yin, 2009).

Any process or research study should clearly define the standards and principles by which they collect and analyze data. Without such a protocol, one cannot ensure consistency from study to study or within the same study. The Phillips ROI Methodology guiding principles that form the basis for the ROI operating standards are:

1) When a high-level evaluation is conducted, data must be collected at lower levels.

2) When an evaluation is planned for a higher level, the previous level of evaluation does not have to be comprehensive.

3) When collecting and analyzing data, use only the most credible source.

4) When analyzing data, choose the most conservative among the alternatives.

5) At least one method must be used to isolate the effects of the solution.

6) If no improvement data are available for a population or from a specific source, it is assumed that little or no improvement has occurred.

7) Estimates of improvements should be adjusted (discounted) for the potential error of the estimate.

8) Extreme data items and unsupported claims should not be used in ROI calculations.
9) Only the first year of benefits (annual) should be used in the ROI analysis of short-term solutions.

10) Costs of the solution should be fully loaded for ROI analysis.

11) Intangible measures are defined as measures that are purposely not converted to monetary values.

12) The results from the ROI methodology must be communicated to all key stakeholders (Phillips & Phillips, 2005, p. 30).

Data collection is central to the Phillips ROI Methodology. Both hard data (e.g., output, quality, cost, and time) and soft data (e.g., job satisfaction and customer satisfaction) are collected. An important issue is the timing of data collection. In some cases, pre-program data are collected for comparison with post-program data, and in some cases, multiple measures are taken. In other situations, pre-program data are not available and specific follow-ups are still taken after the program. The important issue is to determine the timing of the follow-up evaluation (Phillips & Phillips, 2007b). Data may be collected using a variety of methods, including:

- Surveys: Surveys can be administered to determine participant satisfaction, learning, and if they intend to utilize various aspects of the program.

- Questionnaires: Questionnaires are typically more detailed than surveys and can be used to uncover a variety of data.

- Tests: Tests are conducted to measure changes in knowledge and skills (Level 2). Tests come in a variety of formal and informal methods.
- On-the-job Observation: On-the-job observation is utilized to capture actual skill application and use. Observations are more effective when the observer is transparent.

- Interviews: Interviews are conducted with participants to determine the extent to which learning has been utilized on the job.

- Focus Groups: Focus groups are conducted to determine the degree to which a group of participants has applied the training to job situations.

- Action Plans and Program Assignments: Action plans and program assignments are developed by participants during the program and are implemented on the job after the program is completed. Follow-ups provide evidence of program success.

- Performance Contracts: Performance contracts are developed by the participant, the participant’s supervisor, and the facilitator who all agree on job performance outcomes.

- Business Performance Monitoring: Business Performance monitoring is useful where various performance records and operational data are examined for improvement.

An important challenge in the data collection phase is to select the method or methods appropriate for the setting and the specific program, within the constraints of the organization and the researcher.

This study followed Yin’s second principle of data collection by using a combination of action planning, assignments, questionnaires, interviews (individual coaching sessions), observation, and on-site follow-up visits to obtain relevant data. The
third principle, creating a case study database, was met by collecting and maintaining a copy of all the forms and instruments used for each project associated with this study. The fourth principle, maintaining a chain of evidence, was demonstrated by collecting and maintaining a chain of impact data at each of the five levels of the Phillips framework.

**Sampling Strategies**

The sampling method utilized in this study was purposeful sampling. Merriam (2009) pointed out that, “purposeful sampling is based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned” (p. 77). A purposeful sampling strategy provides rich information and the most information that is directly relevant to this study (Patton, 2002).

**Participant Selection**

Since this study explored the impact of the reVIEW program within a north central Pennsylvania long-term care facility, the embedded units of analysis were projects conducted by participants from that specific facility. The projects were chosen by the participants and management of the long-term care organization. Selected participants in the study were all informed by management of the ROI analysis before volunteering to participate in the program. All program participants from the above-mentioned long-term care facility participated in this study.

**Participant Description**

The eight participants in this study were employed by a long-term care facility located in north central Pennsylvania. They had all completed the reVIEW training and
implementation program, and were between the ages of 25 – 60. Individuals as well as teams of two to three participants worked on a project. The demographic information for the participants is shown in Table 3.3. The eight participants included the director of nursing, finance manager, quality manager, two nursing unit managers, two nurses and an office manager. The eight participants had a combined total 92 years in their current occupations and 75 years with their current employer.

*Table 3.3. Demographics of Participants (N=8)*

<table>
<thead>
<tr>
<th>Gender</th>
<th>Occupational Area</th>
<th>Years in Occupation</th>
<th>Years With Current Employer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female (6)</td>
<td>Management (4)</td>
<td>0 – 5 (2)</td>
<td>0 – 5 (2)</td>
</tr>
<tr>
<td>Male (2)</td>
<td>Finance (1)</td>
<td>6 – 12 (2)</td>
<td>6 – 12 (3)</td>
</tr>
<tr>
<td></td>
<td>Nursing (2)</td>
<td>13 – 20 (3)</td>
<td>13 – 20 (3)</td>
</tr>
<tr>
<td></td>
<td>Director (1)</td>
<td>21+ (1)</td>
<td>21+ (0)</td>
</tr>
</tbody>
</table>

**Instrumentation**

This study used several instruments as the basis for data collection, such as questionnaires, action plans and observation templates. The instruments were developed with the assistance of a Subject Matter Expert (SME), Patti Phillips, and are patterned after similar published case studies utilizing the Phillips Methodology. Central to the study is the action planning form depicted in Figure 3.5. The action planning process can be traced to the 1930s when the federal government used it as the participant action planning approach (PAPA) (Phillips & Phillips, 2003).
The action planning process has several inherent advantages for data collection. First, “for business impact data, the action plan is more focused and credible than a questionnaire” (Phillips & Phillips, 2007, p. 221). Also, since much of the data are collected by the participants, it will have the credibility needed for the analysis. And, with data collection responsibility shifted to the participant, an embedded case study such as this can be conducted with limited resources (Phillips & Phillips, 2007b).

This study followed the action planning sequence of activities as described by Jack and Patti Phillips (Phillips & Phillips, 2007b):

1) **Before the reVIEW program, the researcher:**

- Communicated the action plan requirement at the executive overview.
• Discussed the importance of identifying operating measures for improvement.

2) **During the reVIEW program, the researcher:**

• Described the action planning process at the beginning of the program.

• Taught the action planning process as part of the reVIEW program.

• Allowed time to develop the plan.

• Had the facilitator approve the action plan.

• Required participants to assign a monetary value to the plan.

• Reviewed each plan during a coaching session.

• Explained the follow-up mechanism.

3) **After the reVIEW program, the researcher:**

• Required participants to provide improvement data.

• Asked participants to isolate the effects of the program.

• Asked participants to provide a level of confidence for estimates.

• Collected action plans at the pre-determined follow-up time.

• Summarized the data and calculate the ROI.

Prior to the first review class an executive overview was offered. During the overview, the researcher briefly introduced the action planning process with senior leaders, managers and training coordinators. Also, the importance of identifying operating measures for improvement was discussed. On the first day of the program, the researcher described the action planning process during a ten-minute overview of the ROI research project, setting the stage for program expectations. Also, on day one, each participant received a handout on which to capture cost data throughout the program (see Figure 3.6).
The action planning process was discussed in greater detail during a one-hour session on week five of the program. This discussion included: an overview of the Phillips ROI Methodology, action plan forms, guidelines for developing action plans, a worksheet to help convert data to money, and examples to illustrate what a complete action plan should look like. A complete packet of this information was provided to each participant. The researcher discussed each item on the action plan to ensure that the participants understood how to answer all questions. A form was also included with the handouts which offered information on each item.

Participants were asked to complete the action plan, through item C (see Figure 3.5) prior to the start of class on week six. This step allowed the researcher to meet with participants on week six to ensure that they understood how to fill out the form.
After a pre-determined amount of time (three months for this study), participants completed the remainder of the form – parts D, E, F and G (see Figure 3.5), as well as intangible benefits and comments. This process was monitored by the researcher through on-site follow-ups.

**Reaction and Learning**

Reaction data were collected using a standard questionnaire (see Appendix B) during week six of the program. The questionnaire focused on issues such as relevance of the material to their job, if the participant felt that they had learned new skills, and their intention to use the skills in the workplace. The course content, delivery, and facilitation were also evaluated.

Learning improvement was measured throughout the program by participants conducting report-outs on the previous week’s assignment. This allowed the facilitator to assess the amount of learning by each participant and document the results on the form displayed in Figure 3.7. Learning data were also captured in questions 16 and 17 on the end of course questionnaire (see Appendix B).

**Application and Implementation**

The end of program questionnaire captured application and implementation data with questions 15 and 18 – 22. Another method used to determine the extent to which the skills were being used and to check progress on the action plan was, on-site visits by the researcher. During the visits, the participants were also asked about the following topics:

- skill usage and frequencies,
- additional linkage to organizational business measures,
- barriers and enablers to implementation,
- progress with the action plan, and
- additional intangible benefits.

Workshop Name: reVIEW Program

COMPETENCY: Learning

Workshop Participant’s Name: ____________________________________

<table>
<thead>
<tr>
<th>Skills to be Demonstrated</th>
<th>Unsatisfactory</th>
<th>Needs Improvement</th>
<th>Satisfactory</th>
<th>Role Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Define IDEAL, and recognize when their organization’s outcome is not IDEAL</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Explain the importance of studying work as it is actually done</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>See patient care and supporting systems as processes</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Explain what “specify an activity” means, and identify when a given activity is not sufficiently specified</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Explain the term “connection”, and identify when a given connection is not simple or direct</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Explain the term “pathway”, and identify when a care pathway is complex</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>

Figure 3.7 Observation Template (Phillips & Phillips, 2007) Used with permission

Ethical Issues

Each participant involved in this study signed an informed consent form, giving his or her permission and acceptance to participate in the study. The informed consent form for this study is in Appendix C. The informed consent was designed to protect the participants’ identities and privacy. Before beginning this study, the researcher obtained
a signed informed consent form from each participant. The informed consent form was approved by the Office for Research Protections (ORP) at The Pennsylvania State University. Before filling out the action planning forms, the researcher once again discussed the informed consent form with each participant to clarify any confusion or questions. The researcher also reminded each participant before administering the questionnaire and before each coaching session of the measures to be followed in ensuring the confidentiality of their responses and identities.

Data Analysis

Yin (2009) maintained that every case study analysis should follow a general analytic strategy to help define priorities for what to analyze and why. The strategies that Yin recommended are: a) rely on theoretical propositions, b) consider any of five analytic techniques (Pattern Matching, Explanation Building, Time-Series Analysis, Logic Models, or Cross-Case Synthesis) using quantitative or qualitative data or both, c) explore rival explanations, and d) display data apart from interpretations (Yin, 2009).

This study was based in human capital theory, which is built on the idea that individuals and society derive economic benefits from investments in people (Sweetland, 1996). The study utilized the Phillips ROI Process to determine if healthcare organizations implementing the reVIEW program experienced a positive business impact.

The analytic technique used in this study was logic modeling. As such, the researcher collected both qualitative and quantitative data. This technique has become increasingly useful in recent years for conducting case study evaluation.

The logic model deliberately stipulates a complex chain of events over an extended period of time. The events are staged in repeated cause-effect-cause-
effect patterns, whereby a dependent variable (event) at an earlier stage becomes the independent variable (causal event) for the next stage (Yin, 2009, p. 149).

Wholey was one of the first to develop logic models as an analytic technique. He formulated the idea of a “program” logic model by tracking the impact of a public program intervention that was intended to produce a sequence of outcomes. The intervention initially produced activities with immediate outcomes; these immediate outcomes in turn produced some intermediate outcomes; and in turn, the intermediate outcomes produced final or ultimate outcomes (Yin, 2009).

The logic model utilized for this study is illustrated in Figure 3.8. This Chain of Impact Model illustrates the six types of data generated by the Phillips process.

![Figure 3.8 Chain of Impact Logic Model (Phillips & Phillips, 2005)](image-url)
Isolating the impact of the intervention. The Phillips ROI model adds an isolation step, which addresses rival explanations as described by Yin. In this step of the ROI process, specific strategies are explored to determine the amount of business performance directly related to the program. This step is essential since usually several factors influence performance data after training programs have been conducted. The specific strategies used in this step pinpoint the degree of improvement directly related to the program. The payoff is in increased accuracy and credibility of the ROI calculation (Phillips & Phillips, 2007). Some of the more common techniques used to isolate the effects of a program include:

- Control Groups: A control group is formed when one group participates in the intervention, while a similar group does not. The difference in the performance between the two groups can then be attributed to the intervention. If appropriately conducted, control groups are the most effective way to isolate the effects of a program.

- Trend Lines: A trend line analysis can be used to project the values of an output variable as if the intervention had not been conducted. The projection is compared to the actual data after the intervention is implemented, and the difference represents the impact of the intervention.

- Forecasting Model: A forecasting model can also be used when the output variable is predicted with the assumption that no intervention is conducted. The actual performance of the variable after the intervention is then compared with the forecasted value, which results in an estimate of the impact of the intervention.

- Participants Estimate: A participant estimate is when the participants are provided with pre and post-program data, and are then asked to indicate the percent of the
improvement that is actually related to the intervention. All estimates are adjusted for the error of the estimates.

- **Supervisors or Managers Estimate:** The supervisor or manager estimate is when the manager or supervisor is provided with pre and post-program data, and is then asked to indicate the percent of the improvement that is actually related to the intervention. All estimates are adjusted for the error of the estimates.

- **Experts:** Experts can also provide estimates based on previous experience, but the expert must be familiar with the type of program and the specific situation. All estimates are adjusted for the error of the estimates.

The Phillips process requires use of at least one technique to isolate the impact of the program. This study isolated the impact of each project by utilizing participant estimates to answer questions E and F on the Action Plan form (see Figure 3.5). To help further isolate the effects of the reVIEW program, each project utilizes at least one other technique in conjunction with the action plan.

**Converting data to monetary value.** When calculating the actual Return on Investment, the business impact data must be converted to a monetary value. This requires placing a financial value on each unit of data connected to the program. The specific techniques used to convert data to money usually depend on the type of data and the situation. Some of the more common techniques used to convert data to money include: a) using output data as standard values, b) the cost of quality as a standard value, c) time savings converted to participants wage and benefits, d) analysis of historical costs, and e) participant and manager estimates.
This study used the action planning form identified in the instrumentation section of this chapter to assist with converting data to a monetary value. The action plan helped the participants to identify the units of measure and the cost of each unit, which took place between weeks five and seven of the reVIEW program. A four-page handout, *Converting Data to Monetary Value*, along with a conversion flowchart, was provided to each participant during the one-hour cost benefit training session (see Appendix D). All efforts were made to convert data to money, but if the conversion was at all questionable, participants were encouraged by the researcher to list the improvement as an intangible benefit.

**Identifying intangible benefits.** The ROI calculation is based on converting both hard and soft data to monetary values. In addition to tangible, monetary benefits, most training programs will have intangible, non-monetary benefits. These intangible data items, which are not converted to monetary values, include items such as: a) increased job satisfaction, b) increased organizational commitment, c) improved teamwork, and d) reduced conflicts.

During data analysis, every attempt is made to convert all data to monetary values. All hard data such as output, quality, and time are converted to monetary values. The conversion of soft data is attempted. However, if the process used for conversion is too subjective or inaccurate and the resulting values lose credibility in the process, then the data are listed as an intangible benefit with an appropriate explanation. For most programs, intangible, non-monetary benefits are extremely valuable, often carrying as much influence as the hard data items.
Calculating program costs. Calculating the program cost involves monitoring or developing all of the associated costs of the program. Many of the cost components that should be included are: a) the cost to design and develop the program, b) cost of all the program materials, c) instructor/facilitators fees, d) the cost of the facilities, e) travel, lodging, and meal costs for the participants, f) salaries and benefits of the participants for the time involved in the program, g) administrative and overhead costs associated with the training function, and h) the cost of others’ time involved in the program. In addition, specific costs related to the needs assessment and evaluation should be included, if appropriate. The conservative approach is to include all of these costs so that the total is fully loaded. Table 3.4 illustrates an example of the worksheet utilized to capture the costs associated with the reVIEW program.

<table>
<thead>
<tr>
<th>Category</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant costs</td>
<td>$_____</td>
</tr>
<tr>
<td>Tuition</td>
<td>$_____</td>
</tr>
<tr>
<td>(including Lodging, Meals and</td>
<td></td>
</tr>
<tr>
<td>travel for instructor, room</td>
<td></td>
</tr>
<tr>
<td>costs, supplies and program</td>
<td></td>
</tr>
<tr>
<td>delivery)</td>
<td></td>
</tr>
<tr>
<td>Lost Wages</td>
<td>$_____</td>
</tr>
<tr>
<td>(including salary and benefits</td>
<td></td>
</tr>
<tr>
<td>while in training and while</td>
<td></td>
</tr>
<tr>
<td>working on project)</td>
<td></td>
</tr>
<tr>
<td>Project Cost</td>
<td>$_____</td>
</tr>
<tr>
<td>Lost wages of project</td>
<td>$_____</td>
</tr>
<tr>
<td>participants</td>
<td></td>
</tr>
<tr>
<td>(including salary and benefits</td>
<td></td>
</tr>
<tr>
<td>while working on project)</td>
<td></td>
</tr>
<tr>
<td>Material and equipment purchase</td>
<td>$_____</td>
</tr>
<tr>
<td>Evaluation Cost</td>
<td>$_____</td>
</tr>
<tr>
<td>Researcher Salary</td>
<td></td>
</tr>
<tr>
<td>(including salary and benefits</td>
<td></td>
</tr>
<tr>
<td>while working on evaluation)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>$_______</td>
</tr>
</tbody>
</table>
Calculating the ROI. The Return on Investment is calculated using the program benefits and costs. The benefit/cost ratio is the program benefits divided by cost. The formula is:

\[
BRC = \frac{\text{Program Benefits}}{\text{Program Costs}}
\]

The Return on Investment uses the net monetary benefits divided by program costs. The net benefits are the program monetary benefits minus the costs. The formula is:

\[
\text{ROI} (%) = \frac{\text{Net Program Benefits}}{\text{Program Costs}} \times 100
\]

This formula is the same basic one used in evaluating other investments in which the ROI is traditionally reported as earnings divided by investment. The ROI from some programs can be very high. For example, in sales and supervisory training, the ROI can be quite large, frequently over 100%, while the ROI value for technical and operator training may be lower.

Enhancing Research Quality

Validity and reliability. According to Phillips (2007), “when test design is considered, two important issues are validity and reliability. Validity is the extent to which an instrument measures what it is designed to measure. Reliability is the extent to which an instrument is stable or consistent over time” (p. 157).

According to Yin (2009), four tests are commonly used to establish the quality of any empirical social research:
• Construct Validity: determining the correct measures for the concepts being studied. Trochim (2006) would call this translation validity, where you operationalize the construct or concept being measured.

• Internal Validity: attempting to determine a causal relationship if possible, whereby one condition leads to another condition, as distinguished from spurious relationships.

• External Validity: defining the domain to which a study’s findings can be generalized.

• Reliability: demonstrating that a study can be repeated and produce similar results.

Yin maintains that because case studies are one form of empirical social research, the four tests are also relevant to case studies. In Table 3.5, Yin goes on to further identify tactics for dealing with these four tests when conducting case study research.

Table 3.5. Case Study Tactics for Four Design Tests (Yin, 2009, p. 41)

<table>
<thead>
<tr>
<th>Test</th>
<th>Case Study Tactic</th>
<th>Phase of research in which tactic occurs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construct Validity</td>
<td>• use multiple sources of evidence&lt;br&gt;• establish chain of evidence&lt;br&gt;• have key informants review draft case study report</td>
<td>data collection&lt;br&gt;data collection composition</td>
</tr>
<tr>
<td>Internal Validity</td>
<td>• do pattern matching&lt;br&gt;• do explanation building&lt;br&gt;• address rival explanations&lt;br&gt;• use logic models</td>
<td>data analysis&lt;br&gt;data analysis&lt;br&gt;data analysis&lt;br&gt;data analysis</td>
</tr>
<tr>
<td>External Validity</td>
<td>• use theory in single case studies&lt;br&gt;• use replication logic in multiple case studies</td>
<td>research design&lt;br&gt;research design</td>
</tr>
<tr>
<td>Reliability</td>
<td>• use case study protocol&lt;br&gt;• develop case study database</td>
<td>data collection&lt;br&gt;data collection</td>
</tr>
</tbody>
</table>
This study considers all four design tests in the following way:

1) **Construct Validity:**

- This study collected data by utilizing multiple sources of evidence as described in the data collection section of this chapter.
- A chain of evidence was created by following the logic model set forth in the Phillips process model.
- The instruments used in this study were suggested by P. Phillips during a meeting with the researcher on April 23, 2009.
- The questionnaire and the action planning process used in this study are described in great detail throughout many published ROI books and can be traced to the 1930s when the federal government used them as the participant action planning approach (PAPA).
- Content experts such as Dr. William J. Rothwell, Dr. Edgar P. Yoder and Dr. Patricia P. Phillips have reviewed drafts of this study.
- A pilot study was conducted to ensure that the tools and instruments used by the participants were clear and easy to use. Based on the pilot study, only minor modifications were made to the one-hour training program that introduces the action planning process. A slide was added to the presentation which walked through the action planning form step-by-step to further clarify where the information could be found. A detailed attachment was added to the information packet to help in identifying units of measure.
2) **Internal Validity:**

- Rival explanations were addressed in this study by utilizing the isolation techniques described in the analysis section of this chapter.

- This study utilized a logic model as illustrated in Figure 3.7.

3) **External Validity:**

- This study was grounded in human capital theory, although the major outcome was not to generalize.

4) **Reliability:**

- The end of course evaluation instrument for this study was examined for internal consistency using Cronbach’s alpha. The Cronbach’s alpha results appear in Table 3.6. Isaac and Michael (1997) indicated that a Cronbach’s alpha value of .7 or higher reflects acceptable internal consistency.

*Table 3.6 Summary of Cronbach’s Alpha Values*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Number of Items</th>
<th>Number of People</th>
<th>Cronbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaction</td>
<td>8</td>
<td>30</td>
<td>.873</td>
</tr>
<tr>
<td>Program Content</td>
<td>6</td>
<td>31</td>
<td>.892</td>
</tr>
<tr>
<td>Learning</td>
<td>2</td>
<td>32</td>
<td>.667</td>
</tr>
<tr>
<td>Application</td>
<td>4</td>
<td>30</td>
<td>.826</td>
</tr>
</tbody>
</table>

- This study was guided by the Phillips ROI protocol, which utilizes 12 guiding principles to navigate through the four-phase, ten-step process. Utilizing the Phillips methodology creates a chain of evidence which produces six types of data.
• A database consisting of all the data collected for each project was maintained in the researchers office located in office 206 DEF Building at Penn State DuBois.

**Researcher qualifications.** The researcher spent three years prior to this study educating himself both inside and outside the classroom on quantitative and qualitative research methods. Most important to meeting the requirements of the preparation phase as described by Yin, the researcher completed a 16-hour Phillips ROI overview and the 40-hour Phillips ROI certification program, which included completing an ROI case study as part of the certification. The researcher has also taught the Phillips methodology in seminars, at professional meetings, and as a guest lecturer in graduate classes. As the Director of Continuing Education at Penn State DuBois, the researcher has been conducting training evaluations for 10 years.

**Chapter Summary**

This chapter described the methodology used to conduct this study, including a detailed explanation of the Phillips ROI Process. The study’s design was an embedded case study (Yin, 2009), utilizing the Phillips ROI methodology to evaluate the effectiveness of the reVIEW program in a long-term care facility. The chapter included a detailed explanation regarding: a) the problem, b) research questions, c) methodological framework, d) data collection, e) data analysis, and f) strategies enhancing the quality. The primary data collection tools used to answer the research questions included an: a) end-of-course evaluation, b) action plan, c) observation template, and d) on-site follow-up interviews. Chapter four reports on the findings of this study.
Chapter 4

Study Results

This chapter presents the study results. A brief review of the research, including the purpose, research questions, study background, and research method, opens the chapter. The results of each research question follow with a description of the impact of each project. Finally, a summary of the results is presented.

Review of the Study

The purpose of this study was to examine the impact (Kirkpatrick & Kirkpatrick, 2005) of improvement techniques from the Toyota Production System (TPS) in a north central Pennsylvania long-term care facility. For this purpose, the study’s design involved an embedded case study (Yin, 2009), utilizing the Phillips ROI methodology to evaluate the effectiveness of the reVIEW program. More specifically, this study sought to answer the following research questions:

RQ1. (Level 1) To what extent did the program participants have a favorable experience with the reVIEW program?

RQ2. (Level 2) To what extent did the participants learn the skills taught in the reVIEW program?

RQ3. (Level 3) To what extent are the participants applying the skills learned in the reVIEW program on the job?

RQ4. (Level 4) What is the business impact as a result of utilizing the skills learned in the reVIEW program?

RQ5. (Level 5) What is the Return on Investment associated with implementing the skills learned in the reVIEW program?
The reVIEW Program

The reVIEW Program is seven weeks in length. Each course includes sixteen participants. The participants meet once a week for three hours of interactive classroom time, plus additional time for one-on-one coaching. Through the seven weeks of the course, participants are introduced to the following lean principles and tools:

- The Toyota Production System Model and Lean Healthcare,
- The Power of Observation,
- Value Stream Mapping (current state and future state), and
- A3 Problem-Solving.

During the program, participants identify a specific area or problem they wish to improve. They can choose to work individually or in teams. Participants have a homework assignment each week and each week’s assignment builds upon the previous week’s work. Each participant is expected to complete one observation exercise, one current-state and one future-state value stream map, and one A3 Problem-Solving activity.

The primary improvement tool utilized in the reVIEW program is the A3 Problem Solving Form. The A3 process teaches the participants to identify problems through the observation process. After participants report their observation during week two, they are taught to draw a value stream map, which helps identify through visualization the issues or projects to work on. Once a value stream map is completed, the participants are taught to identify the root cause of a problem by using the 5 why process.
The Phillips ROI Methodology

The use of evaluation processes and models, including the Phillips framework, continues to grow (Phillips, P. P., 2003). The Phillips ROI Methodology has been replicated hundreds of times, with more than thirty books published to support the methodology. The Phillips ROI process is used by more than two thousand organizations in 44 different countries. The methodology has been the basis for other dissertation studies, providing a step-by-step guide from initial planning through data collection and evaluation. The four-phase, ten-step process generates six types of data and is one of the only documented ROI methodologies to include a step for isolating the impact of the program. The Phillips methodology is a time-tested, consistent, and credible approach for ROI studies and one with a track record of success in both profit and non-profit organizations (Phillips, Phillips, Stone, & Burkett, 2007). The Phillips ROI Methodology utilizes five levels of evaluation to provide a framework to categorize the different types of data.

Healthcare Industry Partnership reVIEW Program

In April 2009, an executive overview of the reVIEW program was offered to all the participants of the north central Pennsylvania healthcare industry partnership. Following the overview, a needs assessment was conducted to determine if a need existed for such a program in north central Pennsylvania. Seven organizations expressed an interest, and of the seven, six participated.

The first program ran from June 2, 2009 – July 21, 2009 and the second program ran from July 28, 2009 – September 8, 2009, with 16 participants in each program. This
study focuses specifically on a long-term care unit associated with one of the six organizational participants.

**Target Organization Background**

This study focused on a senior services organization in north central Pennsylvania. The target organization was selected because of the management groups’ interest in ROI, and commitment to becoming a lean enterprise. The three embedded case studies targeted for this research paper were all from one long term-care facility associated with the above mentioned senior service organization. The long-term care facility was the skilled nursing and rehabilitative division associated with a continuum of care retirement community. The health center offers three levels of skilled nursing care – comprehensive, rehabilitative, and memory support. The facility has 90 beds and 168 employees.

This study was the beginning of an on-going relationship between this researcher and the senior service organization. This research focused on the first three projects completed after the reVIEW program. The data collected for the three projects took place during December 2009. The researcher will continue with quarterly follow-up meetings during this organization’s lean implementation, to better build a comprehensive cost benefit analysis of a healthcare organization’s lean transformation.

**Project Overview**

**Project 1 - dressing change delays.** This project concerned the delays that took place when a resident required a dressing change. The resident’s dressings are naturally changed in the privacy of their room. Typically, when a nurse would have a dressing change, delays would occur because the dressing supplies were stocked in three different
locations. Inconsistency in what was stocked in each location meant that the nurses would have to travel from location to location to obtain the required supplies. Often, when the needed supplies could not be located, the nurse would walk to the main stock room in a different part of the building to acquire the needed supplies. During the observation phase of this project, the two project leaders (the nurse manager and a unit nurse) discovered that this process meant that a simple five-minute dressing change took anywhere from ten minutes to one and one-half hours.

**Problem and Analysis.** During the problem analysis phase, project leaders determined that a typical dressing change process should take approximately five minutes. Due to supply issues the process was often delayed, taking time away from nurses who needed to conduct other critical and/or important quality-of-care activities.

During the root cause analysis, the project leaders found that the nurses were not always able to locate the needed supplies to perform a dressing change.

Why? The supplies were stocked in three different locations and not always available in any of the three locations.

Why? The nurses had their own preferences about where to keep certain supplies, and would remove supplies without the knowledge of the supply personnel.

Why? The dressing supply process was not specified.

**Target Condition, Countermeasures and Implementation Plan.** The target condition for this project was to have a process in place which allowed a nurse to perform a dressing change without supply delays. The project leaders discussed the process with the nurses on their wing. The countermeasure identified by the group was to implement a
dressing supply cart that was fully stocked with all the supplies needed to change a dressing.

The dressing supply cart was implemented. It is located in the supply room near the nurses’ station. When a dressing change is needed, a nurse wheels the cart into the patient’s room. When completed, the cart is immediately placed back in the supply room. To ensure that supplies remain fully stocked, the cart has an inventory checklist that is maintained on a daily basis by the head nurse.

**Project 2 – Short-term rehab discharge to home.** The second project focused on part one of a three-part project to address the delays experienced when a short-term care rehabilitation patient is discharged to home. This project leader will address the process with three successive A3 problem-solving forms. The project leader is following a logic model approach, in which the completion of one project triggers the beginning of the next.

The social workers always used a standardized form to collect information necessary for a short-term care discharge. The issue was that a standardized process for obtaining the information was never created. Therefore, gathering information for a short-term rehab discharge was sometimes a lengthy process, which causes delays in the discharge process. At times, a delay will force a patient to stay longer than required, which in turn creates missed opportunities to fill that bed with another short-term rehab patient.

**Problem and Analysis.** During the problem analysis phase, the project leader found that gathering information for a short-term rehab discharge is sometimes a lengthy process.
Why? The social services coordinator was often unable to obtain the required discharge information in a timely manner.

Why? Staff members were busy doing other tasks.

Why? A process was not specified concerning staff input needed for a short-term rehab discharge.

Target Condition, Countermeasures and Implementation Plan. The target condition for this three phase process was to discharge a short-term rehab patient with no rework on the part of the social workers, and no delay in the discharge date.

This first phase established a process for obtaining family input prior to the weekly rehab meeting. This phase also created a process in which nursing input is provided during the weekly meeting. Both steps were coordinated with social services and the rehab nurses and implementation was completed. Phase two of this project is now underway, and will be captured in a future document.

Project 3 – Chart-to-go. The third project addressed the documentation system used by the Certified Nurse Assistant (CNA) to capture the Activities of Daily Living (ADL) information for each resident in the long-term care unit. The documentation system that was in place had the CNAs hand-writing the ADLs for each resident in a chart at the end of the shift. The CNAs would have to remember what they did with each resident throughout the day. This process tended to create a copy cat approach, in which the CNAs would look at what was written on the prior day, and often they would re-write very similar information. This process was not only time-consuming but created a situation in which the ADL information might not have been accurate. Inaccurate ADL
information can create reimbursement inaccuracies, since the Case Mix Index (CMI) might not reflect the true amount of work required for each resident.

**Problem and Analysis.** During the problem analysis phase, the project leaders found that the existing ADL documentation system was inaccurate and time consuming.

Why? The CNAs documented ADL information in a book at the end of the shift from memory.

Why? That was the only time they had to do it.

Why? No other time or process was specified for ADL documentation.

**Target Condition, Countermeasures and Implementation Plan.** The target condition for this project was to have CNAs accurately document the ADL information for each resident while the activities were being conducted.

The countermeasure put in place was the purchase of Palm Pilots for each CNA. The new system allowed the CNA to document ADL information in the resident’s room while the activities were taking place.

The implementation plan included training for each CNA on the proper way to document on the Palm. Once that step was completed, week-by-week the Director of Nursing added different components of the ADL documentation process, until the implementation was complete.

**Research Question Results**

**RQ1.** (Level 1) To what extent did the program participants have a favorable experience with the reVIEW program?

Reaction data were collected at the end of the reVIEW program using an end of course questionnaire. The questions focused on the relevance of the material to the
participants’ workplace, the amount of new information learned, and the intention of the participant to use the skills learned while in the reVIEW program. The program content, delivery, and instructor facilitation were also evaluated. The overall average response for all questions was 4.5 out of 5 on a Likert-type scale, with 1 being strongly disagree and 5 strongly agree. A visual summary of the Level 1 (reaction) responses from the end of course questionnaire can be found in Figure 4.1. The following Level 1 responses related directly to the participants from the target organization:

- To what extent did the reVIEW program and materials meet participant expectations?
  a) (Q2) The reVIEW course met my expectations. The participants’ responses were 4.5 out of 5 on a Likert-type scale.
  b) (Q12) The material was organized logically. The participants’ responses were 4.4 out of 5 on a Likert-type scale.

- To what extent did the instructor meet participant expectations?
  a) (Q3) The instructor was prepared and organized for the class. The participants’ responses were 5 out of 5 on a Likert-type scale.
  b) (Q4) Participants were encouraged to take part in class discussions. The participants’ responses were 5 out of 5 on a Likert-type scale.
  c) (Q5) The instructor was responsive to participants’ needs and questions. The participants’ responses were 4.8 out of 5 on a Likert-type scale.
  d) (Q6) The instructor was knowledgeable about the subject. The participants’ responses were 4.6 out of 5 on a Likert-type scale.
e) (Q7) The instructor related the training to my work. The participants’ responses were 4.4 out of 5 on a Likert-type scale.

- To what extent was the program relevant to participants’ job?
  a) (Q10) The program content was relevant to my job. The participants’ responses were 4.8 out of 5 on a Likert-type scale.
  b) (Q19) What percent of your total work time requires the knowledge and skills presented in this program? The participants stated that on average 51% of their total work day required the knowledge and skills taught in the review program.

- To what extent was the program important to participants’ job?
  a) (Q11) The program content was important to my job. The participants’ responses were 4.8 out of 5 on a Likert-type scale.
  b) (Q20) On a scale of 0% (not at all) to 100% (extremely critical), how critical is applying the content of the reVIEW program to your job success? The participants stated that on average 65% of their job success came from applying the content taught in the reVIEW program.

- To what extent will participants recommend the reVIEW program to others?
  a) (Q8) I will recommend this program to others. The participants’ responses were 4.8 out of 5 on a Likert-type scale.

- To what extent is there room for improvement with facilitation, materials, and the learning environment?
a) (Q9) The learning environment was conducive to learning. The participants ranked the learning environment 4.5 out of 5 on a Likert-type scale.

b) This was an open ended question: Please provide us with suggestions for improving the program’s facilitation, content, and utility.

(a) Perhaps developing a way to ensure that weekly report-outs remain within the specified timeframe.

(b) Spend more time on instruction and less time on the report-outs.

(c) Spend less time on the report-outs.

![Figure 4.1. End of Course Questionnaire Responses for Level 1 (Reaction)](image)

**RQ2.** (Level 2) To what extent did the participants learn the skills taught in the reVIEW program?

Learning improvement was measured several ways: a) through the participant’s demonstration of knowledge learned during weekly project report-out sessions, b) at the end of the program using a self-assessment, and c) through a facilitator assessment. The instructor ranked all participants with an average of 3.35 out of 4 on a Likert-type scale.
with 1 being unsatisfactory and 4 being a role model. A visual summary of the Level 2 (learning) responses from the end of course questionnaire can be found in Figure 4.2. The following Level 2 responses relate directly to the participants from the target organization:

- To what extent did the program provide new information?
  
  (Q14) The program content provided me new information. The participants’ responses were 5 out of 5 on a Likert-type scale.

- To what extent did participants gain new knowledge and skills?
  
  (Q16) I learned new knowledge and skills from the reVIEW program. The participants’ responses were 4.8 out of 5 on a Likert-type scale.

- To what extent do participants know how to apply what they learned?
  
  (Q13) The exercises and examples helped me understand the material. The participants’ responses were 4.3 out of 5 on a Likert-type scale.

- To what extent are participants confident to apply what they learned?
  
  (Q17) I am confident that I can effectively apply the skills learned in the reVIEW program. The participants’ responses were 4.5 out of 5 on a Likert-type scale.
RQ3. (Level 3) To what extent are the participants applying the skills learned in the reVIEW program on the job?

Application data were captured on both the questionnaire and the action plan form. To determine the extent to which the skills were actually being utilized, and to check progress of the action plan, an on-site follow-up interview was also conducted three months following the program completion. The interview included all the program participants, the HR manager and the CEO of the organization. The follow-up questions included:

- skill usage and frequencies,
- additional linkage to organizational business measures,
- barriers and enablers to implementation,
- progress with the action plan, and
- additional intangible benefits.
The projects captured on the A3s and action plans could focus on any observation, as long as they were consistent with the skills required in the program and related to the business improvement measures established between management and the instructor. The most difficult part of developing the action plan was for the participants to convert the measure to a monetary value. Several approaches were offered to the participants and a converting data to money handout with examples was provided. For the majority of the items converted, standard values were available and used. If a standard value was not available, the participants were encouraged to use either expert input, or estimate using the conservative process defined by the Phillips Methodology. It was important to require this value to be developed during the program or at least have it developed soon after the program was completed, so that the follow-up could focus on the improvement.

A visual summary of the Level 3 (application) responses from the end of course questionnaire can be found in Figure 4.3. The following Level 3 responses relate directly to the participants from the target organization:

- How effectively are participants applying what they learned?
  
  (Q18) I will effectively apply what I have learned in this program. The participants’ responses were 4.6 out of 5 on a Likert-type scale.

- To what extent do participants intend to use what they learned?
  
  a) (Q15) I intend to use what I learned in this program immediately. The participants’ responses were 4.8 out of 5 on a Likert-type scale.
  
  b) (Q21) The participants estimate that they will apply 75% of the new knowledge and skills learned from the reVIEW program on their job.

- (Follow-Up) How frequently are they applying what they learned?
The participants were all actively working on projects using the reVIEW techniques. Three projects are completed, three are near completion and at least five other projects have been started.

- (Follow-Up) If they are applying what they learned, what is supporting them?
  a) Senior level management support is helping keep the program alive and working, not only at the long-term care facility, but across the organization.
  b) The project leaders are including all employees in the projects, which in turn has created buy-in.

- (Follow-Up) If they are not applying what they learned, why not?

The participants are applying the reVIEW tools as of the three month follow-up.

![Level 3](image.png)

*Figure 4.3. End of Course Questionnaire Responses for Level 3 (application)*

**RQ4.** (Level 4) What is the business impact as a result of utilizing the skills learned in the reVIEW program?

During the follow-up, the participants were asked to provide five items:
1. The actual monthly change in the measure as indicated in part D of the action plan (see Figure 4.4). This is the value used to develop an annual improvement.

2. An isolation technique used to determine the effects of the program included an estimate directly from the participants. As they monitor the business measures and observe their improvement, the participants likely know the actual influences driving a specific measure, or at least the percentage improvement related to their actions detailed on the action plan. Understanding that other factors could have influenced the improvement, the reVIEW participants were asked to estimate the percent of improvement resulting from the application of the skills required in the reVIEW training program (the action steps on the action plan). Each participant was asked to be conservative with the estimate and express it as a percentage (see parts E and F on the action plan).

3. Understanding that the above value is an estimate, the participants were asked to indicate the level of confidence in their allocation of the contribution to this program. This is included in part G on the action plan (100% for certainty and 0% for no confidence). This process reflects the degree of uncertainty in the value and frames an error range for the estimate.

4. The participants were asked to provide intangible measures observed or monitored during the three months that were directly linked to this program.

5. Participants were also asked to provide additional comments, including explanations.
Figure 4.4 shows a sample of the action plan instrument used for this study. The example focuses on project 2, which is phase one to reduce the delays created during a short-term rehab discharge. The A3 problem solving form from which this example is taken is located in Appendix E.

**ACTION PLAN**

<table>
<thead>
<tr>
<th>Name:</th>
<th>Instructor Signature:</th>
<th>Follow-Up Date: 12-3-09</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective: Reduce Delays in Short-Term Rehab Discharge</td>
<td>Evaluation Period: 9-1-09 to 12-3-09</td>
<td></td>
</tr>
<tr>
<td>Improvement Measure: Missed Short-Term Admissions</td>
<td>Current Performance: Once per month</td>
<td>Target Performance: No misses</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Action Steps</th>
<th>Analysis</th>
</tr>
</thead>
</table>
| Steps 1. Family input will be sought before rehab meeting. | A. What is the unit of measure? $ \text{missed short-term admit} \quad (90\% \text{ conf.}) \\
| | B. What is the value (cost) of one unit? $ \text{388.17 per day} \quad (7 \text{ days, 80\% conf.}) \\
| | C. How did you arrive at this value? Standard Value \\
| | D. How much did the measure change during the evaluation period? (monthly value) 20\% reduction \\
| | E. What factors influenced the change in performance? The reVIEW Program \\
| | F. What percent of this change was actually caused by this program? 85\% \\
| | G. What level of confidence do you place on the above information? (100\% = Certainty and 0\% - No Confidence) 90\% |

Intangible Benefits: Employee and Patient Satisfaction

Comments:

*Figure 4.4. Action Plan*

The following Level 4 responses relate directly to the three projects from the target organization:

- (Action Plan & Follow-Up) To what extent does participant application of what they learned improve the measures the program intended to improve?

To date, the completed projects have:

a) **Project 1 - dressing change delays.** Reduced the combined nursing time spent looking for dressing supplies by 3.75 hours per day (24-hour day).
This time is now spent providing resident care. This process has also reduced the amount of wasted medical supplies due to an inaccurate inventory.

b) **Project 2 – Short-term rehab discharge to home.** Reduced the amount of time the social services department spends coordinating short-term rehab discharges by 25%. Phase one has also reduced the number of missed short-term rehab patients due to a delay in another patients discharge by approximately 20%. If a short-term rehab patient is turned away for admission because they cannot guarantee the bed of someone being discharged, that bed will become unoccupied for an average of seven days once it is available. Missed short-term rehab admittance opportunities were costing the organization over $23,000 per year.

c) **Project 3 – Chart-to-go.** Reduced the average amount of time the CNAs were spending documenting ADLs by 46%. Documentation has become more accurate and the CMI has increased by 2.8%. The process is now entirely paperless, and environmentally friendly.

- **(Action Plan & Follow-Up)** How do we know it was the program that improved these measures? Each of the three projects in the target organization used two isolation techniques. The following techniques were used: a) participant estimates on all projects, b) control group on project one, c) expert estimates on project two, and d) trend-line analysis on project three. Project three is in the early stages of a trend-line analysis and will require
addtional date points. The additional data points will increase the project leaders’ confidence in the CMI change.

**RQ5. (Level 5)** What is the Return on Investment associated with implementing the skills learned in the reVIEW program? The following Level 5 responses related directly to the three projects from the target organization:

- (Action Plan & Follow-Up) Do the monetary benefits of the improvement in business impact measures outweigh the cost of the program?
  
a) **Project 1.** Yes. The benefit and cost information for this project is listed in Figure 4.5. The cost information is fully loaded to include all the expenses associated with the program. The benefit information is conservative and includes confidence adjustments for any potential error.

b) **Project 2.** Yes. The benefit and cost information for this project is listed in Figure 4.6. The cost information is fully loaded to include all the expenses associated with the program. The benefit information is conservative and includes confidence adjustments for any potential error.

c) **Project 3.** Yes. The benefit and cost information for this project is listed in Figure 4.7. The cost information is fully loaded to include all the expenses associated with the program. The benefit information is conservative and includes confidence adjustments for any potential error.
Project 1 - dressing change delays

Project Cost

Tuition = $2,390 per student
# of students = 2
$1,593.33
(Includes lodging, meals, instructor travel, room costs, supplies and program admin. costs)

Lost Wages (Provided by HR)
$974.60
(Includes salary and benefits while in training and while working on the project)

Project Implementation Cost
$494.66
(Includes Salaries & Benefits of project participants and any material and equipment purchases)

Evaluation Cost
$617.18
(Includes researcher time, travel, and benefits pro-rated for all the projects in the study)

Total Cost
$3,679.77

Project Benefit

<table>
<thead>
<tr>
<th>Project Benefit</th>
<th>Annual Benefit</th>
<th>Confidence</th>
<th>Actual Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing time saved</td>
<td>$33,833.80</td>
<td>75%</td>
<td>$25,375.35</td>
</tr>
</tbody>
</table>
(adjusted for confidence by each nurse and then averaged)

Total Benefit
$25,375.35

BCR = Project Benefits / Project Costs

BCR = 6.90

ROI = Net Project Benefits / Project Cost X 100

ROI = 590%

Note:
Numbers containing salary information are intentionally kept vague to retain anonymity and confidentiality.

* Tuition is pro-rated over the number of projects that each participant estimates that they will conduct in a one year period and adjusted for the confidence in their estimate.
### Project 2 – Short-term rehab discharge to home

#### Project Costs

<table>
<thead>
<tr>
<th></th>
<th>Actual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tuition = $2,390 per student</strong></td>
<td>$478.00</td>
</tr>
<tr>
<td>(Includes lodging, meals, instructor travel, room costs, supplies and program admin. costs)</td>
<td></td>
</tr>
<tr>
<td># of students</td>
<td>1</td>
</tr>
<tr>
<td>*Pro-rated over</td>
<td>5</td>
</tr>
<tr>
<td><strong>Lost Wages (Provided by HR)</strong></td>
<td>$590.00</td>
</tr>
<tr>
<td>(Includes salary and benefits while in training and while working on the project)</td>
<td></td>
</tr>
<tr>
<td><strong>Project Implementation Cost</strong></td>
<td>$210.18</td>
</tr>
<tr>
<td>(Includes Salaries &amp; Benefits of project participants and any material and equipment purchases)</td>
<td></td>
</tr>
<tr>
<td><strong>Evaluation Cost</strong></td>
<td>$617.18</td>
</tr>
<tr>
<td>(Includes researcher time, travel, and benefits pro-rated for all the projects in the study)</td>
<td></td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td>$1,895.36</td>
</tr>
</tbody>
</table>

#### Project Benefits

<table>
<thead>
<tr>
<th>Project Benefits</th>
<th>Annual Benefit</th>
<th>Proj. Leader Confidence</th>
<th>Actual Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social worker time saved (adjusted for confidence (75%) by the social worker)</td>
<td>$1,360.17</td>
<td>90%</td>
<td>$1,224.15</td>
</tr>
<tr>
<td>The annual missed opportunity due to delays</td>
<td>$23,476.52</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>(adjusted for confidence by the admissions coordinator)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>This project is preventing 20% of the missed opportunity (adjusted for conf. (85%) by the admissions coordinator)</td>
<td>$3,991.01</td>
<td>90%</td>
<td>$3,591.91</td>
</tr>
<tr>
<td><strong>Total Benefit</strong></td>
<td>$4,816.06</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BCR = Project Benefits / Project Costs  \[ BCR = \frac{2.54}{1} \]

ROI = Net Project Benefits / Project Cost X 100  \[ ROI = 154\% \]

Note:

Numbers containing salary information are intentionally kept vague to retain anonymity and confidentiality.

* Tuition is pro-rated over the number of projects that each participant estimates that they will conduct in a one year period and adjusted for the confidence in their estimate.

** Miss on average 1 referral per month - 90% conf. When a referral is missed the bed will be empty on average 7 days - 80% conf. Reimbursement rate per day for short term rehab = $388.17  
\[(1 \text{ miss } \times 90\% \text{ conf}) \times ((7 \text{ days } \times 80\% \text{ conf}) \times \text{ reimb. rate}) \times 12 \text{ to annualize} = \$23,476.52 \text{ per year.}\]

Figure 4.6. Cost Benefit Worksheet (Project 2)
## Project 3 – Chart-to-Go

### Project Costs

<table>
<thead>
<tr>
<th></th>
<th>Actual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuition = $2,390 per student</td>
<td>$1,195.00</td>
</tr>
<tr>
<td>(Includes lodging, meals, instructor travel, room costs, supplies and program admin costs)</td>
<td></td>
</tr>
<tr>
<td>Lost Wages (Provided by HR)</td>
<td>$3,961.30</td>
</tr>
<tr>
<td>(Includes salary and benefits while in training and while working on the project)</td>
<td></td>
</tr>
<tr>
<td>Project Implementation Cost</td>
<td>$31,486.85</td>
</tr>
<tr>
<td>(Includes Salaries &amp; Benefits of project participants and any materials and equipment purchases)</td>
<td></td>
</tr>
<tr>
<td>Evaluation Cost</td>
<td>$617.18</td>
</tr>
<tr>
<td>(Includes researcher time, travel, and benefits pro-rated for all the projects in the study)</td>
<td></td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$37,260.33</strong></td>
</tr>
</tbody>
</table>

### Project Benefits

<table>
<thead>
<tr>
<th><strong>Annual Benefit</strong></th>
<th><strong>Confidence</strong></th>
<th><strong>Actual Benefit</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CNA time saved (adjusted for confidence by each CNA)</strong></td>
<td>$22,219.28</td>
<td>95%</td>
</tr>
<tr>
<td><strong>Change in CMI (2.8% change)</strong></td>
<td>$45,990.00</td>
<td>60%</td>
</tr>
<tr>
<td><strong>Total Benefit</strong></td>
<td><strong>$48,702.32</strong></td>
<td></td>
</tr>
</tbody>
</table>

**BCR = Project Benefits / Project Costs**

**BCR = 1.31**

**ROI = Net Project Benefits / Project Cost X 100**

**ROI = 31%**

Note:

Numbers containing salary information are intentionally kept vague to retain anonymity and confidentiality.

* Tuition is pro-rated over the number of projects that each participant estimates they will conduct in a one year period and adjusted for the confidence in their estimate.

** CNA’s were asked if they were spending more, less, or the same amount of time using the new Chart-to-Go system. The time was then adjusted for each CNA’s confidence in the number, and then averaged.

*** CMI number is based on 2 months of data and will be re-visited at the three, six and nine month points. (CMI = $.70 per day for each .01 change, CMI increased by .04 for the 45 residents on medical assistance)

---

*Figure 4.7. Cost Benefit Worksheet (Project 3)*
Balanced Data

The three projects also included several intangible measures (resident satisfaction, employee satisfaction, teamwork, reduced waste, and environmentally friendly processes) that were considered important and helpful to the facility. Therefore, several types of data points were generated from this project:

1. Reaction, Satisfaction and Planned Action,
2. Learning,
3. Application and Implementation,
4. Business Impact
5. ROI, and

Collectively, the six types of data provide a balanced viewpoint of the success of the reVIEW program.

Summary

All five levels of the Phillips ROI Methodology were successfully applied to the three projects in this study. Each of the five levels of evaluation provided information to answer the research questions identified in this study.

RQ1. (Level 1) To what extent did the program participants have a favorable experience with the reVIEW program? The overall average response for all questions was 4.5 out of 5 on a Likert-type scale.

RQ2. (Level 2) To what extent did the participants learn the skills taught in the reVIEW program?
a) The instructor ranked the participants with an average of 3.35 out of 4 on a Likert-type scale,

b) Participants’ responses were 4.65 out of 5 on a Likert-type scale, on the self assessment learning portion of the questionnaire, and

c) The participants successfully demonstrated learning during the weekly report-out sessions.

**RQ3. (Level 3)** To what extent are the participants applying the skills learned in the reVIEW program on the job? To date, three projects were successfully completed, three projects were near completion, and as of this writing program participants have started five other projects. This organization plans to continue using the reVIEW techniques as their quality improvement process across all facilities.

**RQ 4. (Level 4)** What is the business impact as a result of utilizing the skills learned in the reVIEW program? To date, the three completed projects have:

a) reduced the combined nursing time spent looking for dressing supplies by 3.75 hours per day (24-hour day),

b) reduced the amount of wasted medical supplies due to an inaccurate inventory,

c) reduced the amount of time the social services department spends coordinating short-term rehab discharges by 25%,

d) reduced the number of missed short-term rehab patients due to a delay in another patients discharge by approximately 20%,

e) reduced the average amount of time the CNAs were spending documenting ADLs by 46%,
f) ADL documentation is more accurate, thus reducing the chances of a Department of Health violation,

g) the CMI has increased by 2.8%,

h) the ADL documentation process is entirely paperless, therefore more environmentally friendly, and

i) the organization is experiencing increased resident and employee satisfaction.

**RQ 5. (Level 5)** What is the Return on Investment associated with implementing the skills learned in the reVIEW program? The ROI for the three completed projects was:

a) Project 1 = 590%

\[
ROI\% = \frac{25,375.35 - 3,679.77}{3,679.77} \times 100
\]

b) Project 2 = 154%

\[
ROI\% = \frac{4,816.06 - 1,895.36}{1,895.36} \times 100
\]

c) Project 3 = 31%

\[
ROI\% = \frac{48,702.32 - 37,260.33}{37,260.33} \times 100
\]

The ROI for all three projects = 84%

\[
ROI\% = \frac{78,893.73 - 42,835.46}{42,835.46} \times 100
\]
Chapter 5

Summary, Conclusions and Recommendations

The preceding four chapters introduced the research questions, reviewed the related literature, discussed the Phillips methodology, and presented the research findings. The intent of this chapter is to discuss the research findings and conclusions, and to provide recommendations for future research.

The purpose of this single point embedded case study was to examine the impact of improvement techniques from the Toyota Production System (TPS) in a north central Pennsylvania long-term care facility. The Phillips Return on Investment (ROI) Methodology was therefore used to evaluate the effectiveness of the reVIEW (Realizing Exceptional Value In Everyday Work) program. More specifically, this study was intended to answer the following research questions, which align with the Phillips’ five levels of evaluation:

RQ1. (Level 1) To what extent did the program participants have a favorable experience with the reVIEW program?

RQ2. (Level 2) To what extent did the participants learn the skills taught in the reVIEW program?

RQ3. (Level 3) To what extent are the participants applying the skills learned in the reVIEW program on the job?

RQ4. (Level 4) What is the business impact as a result of utilizing the skills learned in the reVIEW program?

RQ5. (Level 5) What is the Return on Investment associated with implementing the skills learned in the reVIEW program?
Summary of Findings and Conclusions Related to Research Question 1

To what extent did the program participants have a favorable experience with the reVIEW program? The overall average response for all questions was 4.5 out of 5 on a Likert-type scale.

Early feedback is essential. It would be counterintuitive to conduct a program without collecting feedback from those involved in it. Participant feedback should be considered a very important data collection step in the process. Understanding how well the program is perceived by the participants can very well determine the future success of its ability to impact business measures.

The Phillips have recently begun looking at the predictive capability that reaction data can have on the future success of a program. They have found that “when positive, significant correlations are developed, reaction measures can have predictive capability” (Phillips & Phillips, 2007b, p. 104). Though other reaction questions have predictive capability, the Phillips have found the following six questions to consistently produce a strong, positive correlation:

1) The program is relevant to my job.
2) The program is necessary to my job.
3) The program is important to my success.
4) The program contains new information.
5) I intend to use the skills and knowledge.
6) I would recommend this program to others.

The six questions found by the Phillips to consistently produce strong, positive correlations were captured 11 times on the end of course questionnaire for this study (Q8,
Q10, Q11, Q14, Q15, Q16, Q17, Q18, Q19, Q20 & Q21). The overall average response for the 11 questions was 4.5 out of 5 on a Likert-type scale.

**Summary of Findings and Conclusions Related to Research Question 2**

To what extent did the participants learn the skills taught in the reVIEW program?

a) The instructor ranked the participants with an average of 3.35 out of 4 on a Likert-type scale,

b) participants’ responses were 4.65 out of 5 on a Likert-type scale, on the self assessment learning portion of the questionnaire, and

c) the participants successfully demonstrated learning during the weekly report-out sessions.

Over the last several decades, organizations have been experiencing the subtle effects of globalization. The changes are challenging the economic and strategic leadership that the U.S. has enjoyed since World War II. A large portion of America’s workforce is now in direct competition for jobs with lower-wage workers around the world (National Academy of Sciences, 2007). Today, work can be accomplished in many parts of the world using modern communications and other advances, and the healthcare field is not immune. Workers in almost every sector of our economy face competitors who live and work just a mouse-click away in New Zealand, Ireland, Finland, China, India, or any other nation with a growing economy (Florida, 2007; Friedman, 2005; Gray & Herr, 1998; National Academy of Sciences, 2007). Of the three resources needed to build national wealth (natural resources, technology, and human capital), the new knowledge economy is proving that human capital is becoming the most important of the three. Human capital theory is based on the idea that individuals,
employers, and society derive economic benefits from investments in people (Becker, 1993; Gray & Herr, 1998; Sweetland, 1996). Essentially, the skills of each individual within an organization must continue to increase as organizations become more technology-based. The big winners in the new global scramble will be those organizations that develop talent, techniques, and tools so advanced that there is no competition.

In order to meet these challenges, the concept of a learning organization has developed. This requires organizations to proactively use learning to support and improve growth for individuals, teams, and the entire organization. With the focus on learning and learning organizations, measurement becomes even more important. As programs and projects are initiated, learning is an essential factor, and the only way organizations will know if learning is taking place is to measure it (Phillips & Phillips, 2007b). Learning was measured three different ways for the participants in the reVIEW program: a) self assessment, b) instructor assessment, and c) demonstration.

**Summary of Findings and Conclusions Related to Research Question 3**

To what extent are the participants applying the skills learned in the reVIEW program on the job?

To date, three projects were successfully completed, three projects are near completion, and as of this writing, program participants have started five other projects. This organization plans to continue using the reVIEW techniques as their quality improvement process across all facilities.

Many programs and projects fail at this stage. Without application (knowledge transfer), the value chain is broken and business impact and benefits from the program
cannot be achieved. Measuring program or project implementation often provides important information about its success. Measurement at this stage can also help identify other factors that can contribute to greater success in future programs.

Another important reason for data collection at this level is to help understand the barriers and enablers to application. “Although both groups are important, barriers can kill an otherwise successful program. The barriers must be identified and action must be taken to minimize, remove or go around the barriers. This problem is serious because barriers exist in every program” (Phillips & Phillips, 2007b, p. 204). When barriers are removed or minimized, the program or project has a much better chance of success.

On the end of course questionnaire, and during the follow-up interviews, the following barriers and enablers were identified by the target organization:

Barriers – a) not enough work time designated to the process, b) staff not embracing or buying into the process, and c) ensuring that all the managers encourage and help with projects.

Enablers – a) senior management support, and b) a process that is simple but effective.

**Summary of Findings and Conclusions Related to Research Question 4**

What is the business impact as a result of utilizing the skills learned in the reVIEW program? To date, the three completed projects have:

a) reduced the combined nursing time spent looking for dressing supplies by 3.75 hours per day (24-hour day),

b) reduced the amount of wasted medical supplies due to an inaccurate inventory,
c) reduced the amount of time the social services department spends coordinating short-term rehab discharges by 25%,
d) reduced the number of missed short-term rehab patients due to a delay in another patients discharge by approximately 20%,
e) reduced the average amount of time the CNAs were spending documenting ADLs by 46%,
f) ADL documentation is more accurate, reducing the chances of a Department of Health violation,
g) the CMI has increased by 2.8%,
h) the ADL documentation process is entirely paperless, therefore more environmentally friendly, and
h) the organization is experiencing increased resident and employee satisfaction.

For many programs and projects, the impact on business metrics is the initial reason for implementing the program or project in the first place. Issues with poor performance or the opportunity to improve a business measure will usually lead to a new program or project. The chain of impact can be broken at this point, and this happens with many programs (Phillips & Phillips, 2007b). If the program does not impact a business metric, or at least not enough to create a positive ROI, then the final result may be less than satisfactory. In some instances attainment can occur at Levels 1 – 3, but fail at Level 4. There are several explanations for why this occurs. First, the proper business alignment steps were not completed. Therefore, the correct solution was not used. The second possibility is that other dynamics drove the business measure in the opposite direction (e.g. rather than increasing staff efficiency, it decreases it).
If a significant increase occurs in a business metric following a program, it is many times associated with the program. Though the increased performance may be due to the program, other factors may have contributed as well. If this issue is not addressed (the impact of the program isolated), the change in business metrics will not be credible (Phillips & Phillips, 2007a).

Each of the three projects in the target organization used two isolation techniques: a) participant estimates on all projects, b) control group on project one, c) expert estimates on project two, and d) trend-line analysis on project three.

**Summary of Findings and Conclusions Related to Research Question 5**

Calculating ROI requires two steps: 1) calculating monetary benefits by converting Level 4 data into a monetary value, and 2) determining the fully loaded cost of the program. When the ROI is calculated, the following standard formula should be used:

\[
\text{ROI} (\%) = \frac{\text{Net Program Benefits}}{\text{Program Costs}} \times 100
\]

Return on investment uses the net benefits divided by program costs. The net benefits are the program benefits minus the costs. This is the same basic formula used in evaluating other investments in which the ROI is traditionally reported as earnings divided by investment (Phillips, Phillips, Stone, & Burkett, 2007).

What is the return on investment associated with implementing the skills learned in the reVIEW program? The ROI for the three completed projects was:

a) Project 1 = 590%

\[
\text{ROI} (\%) = \frac{\$25,375.35 - \$3,679.77}{\$3,679.77} \times 100
\]
b) Project 2 = 154%

\[ \text{ROI (\%)} = \frac{4,816.06 - 1,895.36}{1,895.36} \times 100 \]

c) Project 3 = 31%

\[ \text{ROI (\%)} = \frac{48,702.32 - 37,260.33}{37,260.33} \times 100 \]

The ROI for all three projects = 84%

\[ \text{ROI (\%)} = \frac{78,893.73 - 42,835.46}{42,835.46} \times 100 \]

According to the Phillips, while results at the lower levels are important, converting the positive outcomes into monetary figures and weighing them against the cost of the program is more valuable from an executive viewpoint. This is the ultimate level in the five-level evaluation framework (Phillips & Phillips, 2007b, p. 257).

The project leaders at the target organization were taught how to convert Level 4 data into monetary values during a one-hour cost benefit training session. A four-page handout, *Converting Data to Monetary Value*, along with a conversion flowchart, was provided to each participant during the one-hour session (see Appendix D). The author of this research paper (certified to use the Phillips methodology) was available during every class, by phone, e-mail and during the follow-up sessions to assist with data conversion.

**General Discussion and Implications**

Healthcare organizations face many long-standing problems. Lean is not about fixing any one major problem— it is about solving the hundreds of thousands of little
problems plaguing healthcare every day (Graban, 2009). According to Jimmerson (2009), the practical and affordable methods that have made Toyota the unquestionable leader in auto manufacturing are available to every organization dedicated to similar performance and results.

The results of this study begin to validate what many already know through experience—that implementing the TPS principles in a healthcare setting can have a positive impact. This single case illustrates the potential for future studies. The reVIEW program is designed in such a way that it is a great example of how a training and implementation program should be structured in order to produce maximum results:

- the program objectives are specific and developed to align with the five levels of evaluation,
- learning is comprehensive, and touches on all the learning methods: lecture, reading, audio, visual, demonstration, group discussion, learning by doing, and one-to-one teaching,
- application is built into the program by requiring that each participant conduct a project, and therefore,
- when the reVIEW techniques are properly implement, organizations can potentially experience the following business impact result:
  a) reduced errors and improved delivery of care,
  b) reduced waste and increased capacity for care,
  c) reduced cost and improved access to care,
  d) increased patient satisfaction,
  e) involved frontline workers,
f) improved workplace appreciation (to retain/recruit quality talent), and

g) improved leadership skills at all levels.

These results are not guaranteed to all organizations. As we move along the chain of impact, from Level 1 through Level 5, one can quickly see that many organizational influences can disrupt the value chain. Training clearly cannot take place in a vacuum. Even with ideal design and motivated trainees, real change and transfer of learning requires organizational support. All too often, employees attend training to foster independent thinking, only to go back to a non-supportive environment. “Any form of needs assessment is rare, but organizational analysis is almost nonexistent” (Bunch, 2007, p. 146). Research has been conducted on the relationship between organizational culture and productivity, technology, retention, improvement initiatives, and other variables. Culture can be one of the most powerful and stable forces operating within an organization (Bunch, 2007), but only recently have scholars seriously considered the importance of organizational culture on the impact of a training intervention (Burke & Hutchins, 2007).

Burke and Hutchins (2007) conducted an integrative and analytical review of factors impacting transfer of learning. The review found a strong to moderate relationship with transfer and transfer climate, supervisory support, peer support and opportunity to perform. Another factor related to training interventions is the support for trainees at higher levels in the organization. Cromwell and Kolb (2004) found that in the case of training in supervisory skills, greater support enables training transfer and enhanced application of the knowledge gained in training.
One final thought—when Workplace Learning and Performance (WLP) professionals are asked to produce evidence that supports the value of training, they are often frustrated by the lack of simple and effective methods for assessment. Therefore, they resort to simple questionnaires to obtain feedback on the results of their efforts. All too often, they assume that if the training was based on a needs assessment or if it focused on what the company wanted, it was probably effective. Unfortunately, this type of thinking does not tie training activities to the dollar values that are considered important by most organizations. This puts WLP professionals at a disadvantage when dealing with their financially literate colleagues. Administrators will likely know how much the training cost, but they may have little idea of its real value. The WLP professional must be able to supply that information (Brauchle & Schmidt, 2004; Rowden, 2005).

**Recommendations for Practice**

Based on the findings of this study, and this researcher’s experiences, the following recommendations are offered to healthcare organizations interested in TPS in healthcare:

- TPS in healthcare is about creating incremental change, which over time can have an enormous impact for any organization willing to make the commitment to becoming Lean. The reVIEW program provides participants with information that can be used immediately and often. Initially, it is easier to identify the root cause of a problem (the low hanging fruit) and the ROI’s can be quite large from these easy-to-identify, quick projects. But eventually, the organization will become more efficient and the projects more complicated. As this progression occurs, other processes such as Six
Sigma should be introduced. Lean and Six Sigma can work hand-in-hand to help create the ultimate Lean Enterprise.

- As with any organization-wide initiative, TPS in healthcare implementation must be tied into the strategic goals of the organization. If this process does not occur first, the program will likely become just another failed initiative. It’s not enough for the senior leadership to just say that they support the initiative. That support must be turned into action. Projects should be tied into the business objectives of the organization and measured for impact, because ultimately what gets measured gets done. Project leaders can begin with the best of intentions, but if the project is not tracked for progress, there is a high probability that it will not realize its full potential.

- Finally, if an organization is truly interested in the long term sustainability of an initiative such as the reVIEW program, then measurement and evaluation must become a part of implementation. Anecdotal evidence of success (though it is likely accurate) will be viewed as suspicious or not credible. Organizations must ensure that someone is trained in an acceptable evaluation process. That individual should then be held accountable for tracking the costs and benefits of implementation. This coupled with best practice sessions and employee recognition for participation will likely go a long way toward program sustainability.

**Recommendations for Future Research**

This study was a single point embedded case study that looked at the impact of TPS techniques in a healthcare environment. Based on study findings, and this researcher’s experiences, the following recommendations are offered for future research:
• In order to enhance external validity, this study should be replicated in many other healthcare settings. This researcher intends to continue building a database of case studies for this organization, along with a variety of other healthcare organizations.

• A comparison study of the success or lack of success between projects within one organization can be studied. Links could possibly be drawn back to the participants’ responses at the previous levels of evaluation. A study such as this could help in building predictors to success based on previous levels of evaluation.

• A comparison study of the impact of TPS techniques across like-healthcare organizations should be conducted. This type of study could compare the different results to internal and external organizational influences.

• A comparison study of the impact of TPS techniques across different types of healthcare organizations should be conducted.
References


http://roicollaboration.roiinstitute.net/Resources/Tools/ROI%20Methodology%20-%20Glossary%20of%20Terms%20April%202008.pdf


### APPENDIX A

**DATA COLLECTION PLAN:**  
**reVIEW PROGRAM**  
**Date:** 7-17-09

<table>
<thead>
<tr>
<th>Program/Project:</th>
<th><strong>reVIEW ROI STUDY</strong></th>
<th>Responsibility:</th>
<th>John Piccolo</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Level</th>
<th>Program Objective(s)</th>
<th>Measures</th>
<th>Data Collection Method/inst.</th>
<th>Data Sources</th>
<th>Timing</th>
<th>Responsibility</th>
</tr>
</thead>
</table>
| 1     | **SATISFACTION/PLANNED ACTION**  
- Rate the facilitators as effective  
- Perceive the reVIEW program as relevant to the job  
- Recommend this program to other healthcare providers  
- Indicate an intent to use the reVIEW skills on the job  

| 2     | **LEARNING**  
- Define IDEAL, and recognize when their organization’s outcome is not IDEAL  
- Explain the importance of studying work as it is actually done rather than work as espouse  
- See patient care and supporting systems as processes  
- Explain what “specify an activity” means, and identify when a given activity is not sufficiently specified  
- Explain the term “connection”, and identify when a given connection is not simple or direct  
- Explain the term “pathway”, and identify when a care pathway is complex  

| Ability to explain and demonstrate the learning objectives through application and articulation during the program | Skill Practice  
Facilitator Assessment  
Participant Assessment on questionnaire  
Assignments  
Coaching Sessions | Participant  
Facilitator  
During the Pgm. | Facilitator |
### APPLICATION/IMPLEMENTATION

- Observe an organization’s activities and create an understandable, pictorial description of the Current Condition
- Create a “map” of a process, collect data to quantify processing times and interval times between process steps, and use the data to determine process performance measures
- Create a future state map of flow of processes that is a visualized improvement over the current state map
- Diagnose a workplace “problem” by seeking out root causes in terms of activity specification, connections, and pathways
- Envision a Target Condition that moves the organization closer to IDEAL by improving activities, connections, and/or pathways

<table>
<thead>
<tr>
<th>Completion of all steps on the Action Plan</th>
<th>Standard questionnaire</th>
<th>Action Plan</th>
<th>Assignments</th>
<th>Observation</th>
<th>Coaching Sessions</th>
<th>On Site Meetings With Researcher</th>
<th>Participant</th>
<th>During and after pgm.</th>
<th>Researcher</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level</td>
<td>Program Objective(s)</td>
<td>Measures</td>
<td>Data Collection Method/Inst.</td>
<td>Data Sources</td>
<td>Timing</td>
<td>Responsibility</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>BUSINESS IMPACT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Redesign work activities by specifying the content, sequence, and timing of individual steps, and desired outcomes; and document the new design</td>
<td></td>
<td>Action Plan</td>
<td>Participant</td>
<td>During and after Pgm.</td>
<td>Participant, Researcher</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Redesign workplace connections to establish simple, yes/no communications along patient care pathway</td>
<td></td>
<td>Coaching Sessions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Redesign pathways such that delivery of the good or service is simple, direct, and consistent</td>
<td></td>
<td>On Site Meetings With Researcher</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Design improvement activities as experiments, with explicit hypotheses about expected outcomes and specific outcome measures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level</th>
<th>Program Objective(s)</th>
<th>Measures</th>
<th>Data Collection Method/Inst.</th>
<th>Data Sources</th>
<th>Timing</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>ROI 18%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COMMENTS:

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**ROI ANALYSIS**

**PLAN:** REVIEW PROGRAM

<table>
<thead>
<tr>
<th>Data Items (Usually Level 4)</th>
<th>Methods for Isolating the Effects of the Program</th>
<th>Methods to Convert Data to Monetary Values</th>
<th>Cost Categories</th>
<th>Intangible Benefits</th>
<th>Comm. Targets for Final Report</th>
<th>Other Influences</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three Business Impact Measures Identified in conjunction with management and the reVIEW facilitator</td>
<td>Control Group</td>
<td>Standard Value</td>
<td>Program administration, implementation and overhead</td>
<td>Leadership development</td>
<td>Board of Directors</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Participant Estimate</td>
<td>Participant Estimate</td>
<td>Expert Input</td>
<td>Program Materials</td>
<td>Standardized process improvement method</td>
<td>Management Team</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Management Estimate</td>
<td>Management Estimate</td>
<td>Participan</td>
<td>Travel &amp; Lodging</td>
<td>Employee confidence and satisfaction</td>
<td>Workforce Investment Board</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customer Input</td>
<td>External Studies</td>
<td>Evaluation</td>
<td>Participant salaries and benefits</td>
<td></td>
<td>PSUC CE Units</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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APPENDIX B

End-of-Course Evaluation

Thank you for participating in this important evaluation project. Your input is necessary to ensure that the success of the reVIEW Program is captured in its entirety.

Your answers to the following questions will be held in strict confidence by John Piccolo at Penn State DuBois. It will take you approximately 10 minutes to complete this questionnaire.

Because your input represents much of the data collected for this ROI Project, it is very important that you provide this information. Please take a few minutes and provide us with this critical input.

Thank you for taking time to respond to the following questions.

1. How many classes were you able to attend? Coaching sessions?
   7 6 5 4 3 2 1 3 2 1 0

Participant Reaction

Please indicate the extent to which you agree with the following statements regarding facilitation of the reVIEW course.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. The reVIEW course met my expectations.</td>
<td>☐  ☐  ☐  ☐  ☐</td>
<td>☐</td>
</tr>
<tr>
<td>3. The instructor was prepared and organized for the class.</td>
<td>☐  ☐  ☐  ☐  ☐</td>
<td>☐</td>
</tr>
<tr>
<td>4. Participants were encouraged to take part in class discussions.</td>
<td>☐  ☐  ☐  ☐  ☐</td>
<td>☐</td>
</tr>
<tr>
<td>5. The instructor was responsive to participants’ needs and questions.</td>
<td>☐  ☐  ☐  ☐  ☐</td>
<td>☐</td>
</tr>
<tr>
<td>6. The instructor was knowledgeable about the subject.</td>
<td>☐  ☐  ☐  ☐  ☐</td>
<td>☐</td>
</tr>
<tr>
<td>7. The instructor related the training to my work.</td>
<td>☐  ☐  ☐  ☐  ☐</td>
<td>☐</td>
</tr>
<tr>
<td>8. I will recommend this program to others.</td>
<td>☐  ☐  ☐  ☐  ☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
Please provide us your feedback on the learning environment.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

9. The learning environment was conducive to learning.

If you disagree with this statement, please provide us details as to how we can improve the learning environment.
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Please indicate the extent to which you agree with the following statements regarding the program content.

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

10. The program content was relevant to my job.
11. The program content was important to my job.
12. The material was organized logically.
13. The exercises and examples helped me understand the material.
14. The program content provided me new information.
15. I intend to use what I learned in this program immediately.

Please provide us with suggestions for improving the program’s facilitation, content, and utility.
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
### Learning

Please indicate the extent to which you agree with the following statements regarding the level to which your knowledge increased as a result of the reVIEW program.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. I learned new knowledge and skills from the reVIEW program.</td>
<td>☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>17. I am confident that I can effectively apply the skills learned in the reVIEW program.</td>
<td>☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐</td>
</tr>
</tbody>
</table>

### Application

Please answer the following questions with regard to your applying the knowledge and skills learned in the reVIEW program.

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>18. I will effectively apply what I have learned in this program.</td>
<td>☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐</td>
</tr>
<tr>
<td>19. What percent of your total work time requires the knowledge and skills presented in this program? Check only one.</td>
<td>☐ 0% ☐ 10% ☐ 20% ☐ 30%</td>
<td>☐ 40% ☐ 50% ☐ 60% ☐ 70%</td>
</tr>
<tr>
<td>20. On a scale of 0% (not at all) to 100% (extremely critical), how critical is applying the content of the reVIEW program to your job success? Check only one.</td>
<td>☐ 0% ☐ 10% ☐ 20% ☐ 30%</td>
<td>☐ 40% ☐ 50% ☐ 60% ☐ 70%</td>
</tr>
<tr>
<td>21. What percent of the new knowledge and skills learned from this program do you estimate you will directly apply to your job? Check only one.</td>
<td>☐ 0% ☐ 10% ☐ 20% ☐ 30%</td>
<td>☐ 40% ☐ 50% ☐ 60% ☐ 70%</td>
</tr>
<tr>
<td>22. What potential barriers could prevent you from applying the knowledge and skills learned from this program?</td>
<td>☐ ☐ ☐ ☐ ☐</td>
<td>☐ ☐ ☐ ☐ ☐</td>
</tr>
</tbody>
</table>
Informed Consent Form for Social Science Research
The Pennsylvania State University

Title of Project: Return on Investment (ROI) Study on the reVIEW© (Realizing Exceptional Value in Everyday Work) curriculum utilizing the Phillips ROI Methodology™.

Principal Investigator: John Piccolo, DCE
DEF Education & Tech Center
Penn State DuBois
DuBois, PA 15801
(814) 375-4715; jdp155@psu.edu

Faculty Advisor: William J. Rothwell
The Pennsylvania State University
310 B Keller Building
University Park, PA 16802
(814) 863-2581; wjr9@psu.edu

1. Purpose of the Study: The purpose of this research study is to determine if a positive return on Investment (ROI) can be achieved with regard to the training and implementation of the reVIEW training program.

2. Procedures to be followed: You will be asked to fill out the attached Action Plan to help obtain ROI data as part of this study. I will show you all how to fill out an action plan. I will also be available to help answer questions about the action planning process as you continue through the program. It is standard practice to do an end of course questioner. This program will be no different, but I am asking for your permission to use the data from that questionnaire as part of the ROI study.

3. Benefits: You will have a better understanding of how an ROI study is conducted on any training and implementation program. You will have useful information to help obtain future workforce development training dollars through the state of Pennsylvania.

4. Duration: You will be taught the Action Planning Process on week four of the reVIEW program. I will ask that you have the action steps and letters A, B & C filled out for class on week five. The reminder of the Action Plan should be completed by the end of the reVIEW program.

5. Statement of Confidentiality: Your participation in this research is confidential. The data will be stored and secured at the Penn State DuBois Continuing Education Department in a locked file cabinet. In the event of a publication or presentation resulting from the research, no personally identifiable information will be shared. If the content of this Action Planning process is discussed in other venues outside the training program, individual responses will not be discussed.
6. **Right to Ask Questions:** Please contact the Continuing Education Office at (814) 375-4715 with questions, complaints or concerns about this research.

7. **Voluntary Participation:** Your decision to be in this research is voluntary. You can stop at any time. You do not have to answer any questions you do not want to answer.

You must be 18 years of age or older to take part in this research study. If you agree to take part in this research study and the information outlined above, please sign your name and indicate the date below.

You will be given a copy of this consent form for your records.

____________________________________   ______________________
Participant Signature                  Date

____________________________________   ______________________
Person Obtaining Consent               Date
APPENDIX D

Converting Data to Monetary Value

By Patti Phillips

For some evaluators, the act of converting data to monetary value inspires fear, misconception, and bewilderment. But remember, all data can be converted to monetary value. You just need to know what techniques are available to you.

Use Standard Values

Many organizations have standard values to measure turnover, productivity, and quality. If a measure has a monetary value developed and accepted by the organization, there’s no reason to reinvent it. Standard values are generally grouped into three categories: output to contribution, cost of quality, and employees’ time.

When considering output to contribution, look at the value of an additional output. For example, let’s say you work at a passport office and your entire role is to process passports. If you can process one more passport, given the resources and time you have available, the value of that one passport is equivalent to the cost of processing one passport. This one additional output—the passport—times the cost of processing the passport is the monetary contribution of increasing the output to the organization.

Now consider the cost of quality, another standard value in most organizations. Waste, reject rates, and defects often have assigned monetary values. Other measures, such as re-work, can be converted to monetary value by looking at the cost of the work. For example, when employees make mistakes and errors in reporting, the monetary value of those mistakes is the cost incurred in re-working the report.

Employees’ time is probably the simplest and most basic approach to data conversion. If time is saved due to a program, the first question to ask is, Whose time is it? Then to convert time to monetary value, take time saved multiplied by labor cost and add the percentage of additional value for employee benefits. (This benefits factor can easily be obtained from Human Resources.) A word of caution: When considering employee time as a gain, remember that the time savings is only realized when the amount of time saved is actually used for productive work.

Turn to Historical Costs

When no standard values exist, go to historical costs. The question to ask is, What has a similar incident cost in the past? An example of using historical costs is the case of a sexual harassment prevention program that was implemented in a large health care organization. The measure of the investigation was formal, internal complaints. The value of the complaint was determined by looking at its historical cost, including litigation, legal fees and expenses, settlement losses, as well as investigation and defense of the organization.

This article was previously published by ASTD, Alexandria, VA, Sept. 2007
Look to Internal or External Experts

When standard values are unavailable and developing the monetary values through historical costs is not feasible, the next option is to go to internal or external experts. It’s important for these experts to fully understand your intent and the business measure you are targeting.

Leverage External Databases

External databases can also provide a wealth of information, including the monetary value of an array of measures. An example of how to use external databases to convert a measure to monetary value is in the case of turnover.

Link with Other Measures

Another technique is to link the value of a measure with others that have already been converted to monetary values. This involves identifying existing relationships to show a correlation between the measure under investigation and another measure to which a standard value has been applied (as in the link between job satisfaction and turnover). Remember, the further you get from the actual monetary value, the lower the credibility of the information.

Use Estimations

Estimates of monetary value can come from participants, supervisors, managers, and even the WLP staff, and can be easily gathered through focus groups, interviews, or questionnaires. The key is to first clearly define the measure so that the people providing estimates have a clear understanding of what you’re looking for, and then to determine the most credible data sources.

Consider the case of absenteeism. The table, below, shows supervisors’ estimates of the per-day cost of one person not showing up for work, the confidence level in that estimate, and the adjusted per-day cost for one absence at $1,061.
<table>
<thead>
<tr>
<th>Supervisor</th>
<th>Est. Per Day Cost</th>
<th>Confidence</th>
<th>Adjusted Per Day Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$1,000</td>
<td>70%</td>
<td>$700</td>
</tr>
<tr>
<td>2</td>
<td>$1,500</td>
<td>65%</td>
<td>$975</td>
</tr>
<tr>
<td>3</td>
<td>$2,300</td>
<td>50%</td>
<td>$1,150</td>
</tr>
<tr>
<td>4</td>
<td>$2,000</td>
<td>60%</td>
<td>$1,200</td>
</tr>
<tr>
<td>5</td>
<td>$1,600</td>
<td>80%</td>
<td>$1,280</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$5,035</td>
</tr>
<tr>
<td></td>
<td>Average adjusted per day cost of one absence</td>
<td>$1,061</td>
<td></td>
</tr>
</tbody>
</table>

Since estimates are subjective, we reduce the error by adjusting them with confidence levels. For example, if Supervisor One tells you it costs $1,000 per day for an unexpected absence, then present them with the other supervisors' estimates and ask how confident they are that their estimate is indeed correct. After thinking it over, they may say, "Well, I know what happens when people don't show up for work and I can be pretty sure what it's costing us from a time perspective. Given that it is an estimate and I'm not totally sure, I'll say that I am 70 percent confident in my number." Repeat the process with each Supervisor.

This additional step in the estimation process reduces variability and provides a more conservative value. You have reduced the amount of error and improved the reliability of the value of one absence.

Data Conversion Four-Part Test

For those times when you cannot decide whether you can credibly convert a measure to monetary value, complete this four-part test:

- If the measure you want to convert has a standard value, then convert it to monetary value.
- If there is not a standard value, is there a method other than standard values to get there? If there is not a method, then report the measure as intangible.
- If there is a method to convert the measure, can you do so with minimum resources? If no, then report it as intangible.
- If you can convert the measure to monetary value using the selected method with minimum resources, can you convince your executive in two minutes or less that the value is credible? If no, then report the measure as intangible. If yes, then convert it.

Five Steps to Data Conversion

Once you’ve decided to convert a measure to monetary value and have chosen the technique that you’re going to use, there are five steps to complete the data conversion process:

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Focus on the unit of measure.
Determine the value of each unit.
Calculate the change in the performance of the measure.
Determine the annual improvement in the measure.
Calculate the total monetary value of the improvement.

Finally, remember intangible benefits are those that you choose not to convert to monetary value. Typical intangible benefits are job satisfaction, organizational commitment, teamwork, and customer satisfaction.

Considerations

While all measures can be converted to money, several factors should be considered. One factor is the cost to convert the measure. You don’t want to spend more on data conversion than the evaluation itself. Importance of the measure is another consideration. Some measures, such as customer satisfaction and employee satisfaction, stand alone quite well. In that case, you might think twice before attempting to convert the measure to money. Also consider credibility. While most business decisions are made on somewhat subjective data, the source of the data, the perceived bias behind the data, and the motive in presenting the results are all concerns when data is potentially questionable.

Patti Phillips is president and CEO of the ROI Institute and co-author of Show Me the Money, published by Barrett-Koehler. The ROI Institute is a research, benchmarking, and consulting organization that provides workshops, publications, and consulting services on the ROI Methodology.

Holly Burkett is principal of Evaluation Works and a certified ROI professional with over 20 years’ experience assisting public and private sector clients measure the business value of training efforts. Editor of ISPI’s PI Journal, she is a frequent conference presenter, workshop leader, and author. She recently co-authored The ROI Fieldbook with Jack and Patti Phillips and Ron Stone. Holly is also a field editor for ASTD Links and can be reached at hburkett@evalwork.net.

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# Data Conversion Worksheet

<table>
<thead>
<tr>
<th>Data Items</th>
<th>Is there a standard value?</th>
<th><strong>Then</strong></th>
<th>Is there a method to get there?</th>
<th><strong>Then</strong></th>
<th>Can we get there with minimum resources?</th>
<th><strong>Then</strong></th>
<th>Can we convince our executives in 2 minutes or less that the value is credible?</th>
<th><strong>Then</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>√ Yes</td>
<td>Convert</td>
<td>√ Yes</td>
<td>Move to intangibles</td>
<td>Yes</td>
<td>Yes</td>
<td>Convert</td>
<td>Move to intangibles</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
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<td>Convert</td>
<td>√ Yes</td>
<td>Move to intangibles</td>
<td>Yes</td>
<td>Yes</td>
<td>Convert</td>
<td>Move to intangibles</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Yes</td>
<td>Convert</td>
<td>√ Yes</td>
<td>Move to intangibles</td>
<td>Yes</td>
<td>Yes</td>
<td>Convert</td>
<td>Move to intangibles</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Yes</td>
<td>Convert</td>
<td>√ Yes</td>
<td>Move to intangibles</td>
<td>Yes</td>
<td>Yes</td>
<td>Convert</td>
<td>Move to intangibles</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Yes</td>
<td>Convert</td>
<td>√ Yes</td>
<td>Move to intangibles</td>
<td>Yes</td>
<td>Yes</td>
<td>Convert</td>
<td>Move to intangibles</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>6.</td>
<td>Yes</td>
<td>Convert</td>
<td>√ Yes</td>
<td>Move to intangibles</td>
<td>Yes</td>
<td>Yes</td>
<td>Convert</td>
<td>Move to intangibles</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Yes</td>
<td>Convert</td>
<td>√ Yes</td>
<td>Move to intangibles</td>
<td>Yes</td>
<td>Yes</td>
<td>Convert</td>
<td>Move to intangibles</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Yes</td>
<td>Convert</td>
<td>√ Yes</td>
<td>Move to intangibles</td>
<td>Yes</td>
<td>Yes</td>
<td>Convert</td>
<td>Move to intangibles</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Yes</td>
<td>Convert</td>
<td>√ Yes</td>
<td>Move to intangibles</td>
<td>Yes</td>
<td>Yes</td>
<td>Convert</td>
<td>Move to intangibles</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Yes</td>
<td>Convert</td>
<td>√ Yes</td>
<td>Move to intangibles</td>
<td>Yes</td>
<td>Yes</td>
<td>Convert</td>
<td>Move to intangibles</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td>No</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX E

ISSUE: Gathering information for discharge is sometimes a lengthy process.

BACKGROUND: There is a standardized form which contains information necessary for discharge, but no one is responsible for obtaining that information on the form.

CURRENT CONDITION

PROBLEM ANALYSIS

1. Gathering information for discharge is sometimes a lengthy process.
   - Social Services is sometimes unable to obtain info as needed.
   - Staff is inefficient in doing this task due to a lack of training.
   - Staff is unsure of what is needed to be done.

2. There is no specified process for obtaining the information.
   - The process has been changed several times.
   - There have been problems getting info in a timely manner.
   - They have never been a specified sequence for info gathering.

COUNTERMEASURES

- Founding input will be sought before rehab meeting.
- Nursing input will be sought during rehab meeting.

IMPLEMENTATION PLAN

<table>
<thead>
<tr>
<th>what</th>
<th>who</th>
<th>when</th>
<th>outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Input</td>
<td>Social Services</td>
<td>Sept 11</td>
<td>info delay</td>
</tr>
<tr>
<td>Nursing Input</td>
<td>Rehab Nurse</td>
<td>Sept 17</td>
<td>info delay / info needed</td>
</tr>
</tbody>
</table>

COST

COST BENEFIT/WASTE RECOGNITION

TEST: Revise the 5 shot time rehab discharge and compare the amount of time saved from beginning of discharge with the process.

FOLLOW UP

(Handwritten notes and diagrams)
Vita

John D. Piccolo
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The Pennsylvania State University, DuBois, PA

8/00 – Present, Director of Continuing Education: Responsible for the management of a 2 million dollar department consisting of 11 staff members, 109 part-time faculty members and a multi-million dollar training facility. Continuing Education is a workforce development function of the university. We offer countless outreach services, extending the many resources of a world class university beyond the traditional academic walls and into the communities that we serve. We focus on workforce development and the educational needs of adult learners. We conduct needs assessments, plan and manage the delivery of a wide variety of continuing education programs. We conduct all the marketing, advertising and financial transactions as an autonomous entity of the university.

GKN Sinter Metals, DuBois, PA

5/00 – 8/00, Sales Engineer: Responsible for the technical sales of the GKN DuBois facility, a manufacturer of bronze and iron powder metal parts. Responsible for helping design engineered applications for the lawn and garden, home appliance and automotive industry.

Windfall Products Inc., St. Marys, PA

8/97 – 5/00, Production Manager: Responsible for the production of over 100 components with sales of over $12 million a year to U.S. and International automobile manufacturers. Accountable for $10 million in machinery, a $2.5 million budget and more than 95 employees. Responsible for increasing efficiencies and decreasing scrap in order to maximize capacity and profit. Responsible for hiring, training and terminating employees. Work with engineering consulting firms to improve processes.

2/95 – 7/97, Account Manager: Project Manager for international and domestic accounts including GM, Torrington, Monroe, Toyota, Bosch, Tokico, KYB, Kirby and Showa. Coordinated programs with 8 outside sales representatives. Quoted and managed multi-million dollar programs from inception through production. Coordinated the efforts of personnel in Engineering, Manufacturing, and Purchasing to successfully implement programs.

Aviation and Military Intelligence, U.S. Army

Captain/Pilot with Top Secret Security Clearance

1/93 - 1/95, Battalion Training Officer; Kaleen, Texas: Planned, developed and ensured execution of all training and education for a 250-soldier Aerial Exploitation Battalion. Assisted in the development of and selected to command the Army's first Unmanned Aerial Vehicle (UAV) Program. Flew multi-million dollar Top Secret reconnaissance aircraft. Supervised 15 personnel. Planned and conducted air mission briefings.

12/91 - 12/92, Aviation Company Operations/Executive Officer; Berlin, Germany: Supervised the daily operations of a 35-member aviation company consisting of German and American personnel. Accountable for 9 fixed and rotary wing aircraft, 3 vehicles, 16 automation systems, and a multi-million dollar budget. Planned and conducted air mission briefings. Maintained currency as a fixed and rotary wing pilot.

10/88 - 11/91, Aviation Company Assistant Operations Officer; Berlin, Germany: Scheduled and coordinated all flights for 9 aircraft. Supervised 7 personnel. Maintained the company arms room consisting of 80 weapons and associated ammunition. Planned, briefed, and flew classified missions into East Berlin before unification. Worked with U.S. Special Forces, British, French, and German Forces.