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December 2006

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Kibily Samake
Louisiana State University

Sonja Wiley
Louisiana State University

Stephanie Mills
Our Lady of the Lake Regional Medical Center

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Health care IT Training Life Cycle:
A Methodical Approach To Train Health care Professionals

Kibily D Samake
Louisiana State University
Information Systems and Decision Science,
E.J. Ourso College of Business
ksamak1@lsu.edu

Sonja Wiley-Patton
Louisiana State University
Information Systems and Decision Science
E.J. Ourso College of Business
swpatton@lsu.edu

Stephanie Mills MD,MHCM
Our Lady of the Lake Regional Medical Center
SMills@ololrmc.com

ABSTRACT

Health care organizations have invested considerable funds to acquire new information systems, and replace or upgrade existing ones within the last decade. The implementation and adoption of these systems have raised interesting questions that fuel both academic researches and practical solutions. The aim of this conceptual paper is to provide some answers to a set of questions related to the training of Health care professionals in doing so we suggest a conceptual framework to visualize and better understand issues related to the training processes. Both individual and organizational level factors are to be considered to build adequate and valuable training programs that make the best uses of the Health care organizations resources. A training lifecycle framework consisting of three major stages (Training Preparedness, Training Delivery, and Training Evaluation) is proposed.

Keywords

Health care Information Systems, User Training, Education, Learning, IT Implementation.

INTRODUCTION

The implementation of an information systems innovation has proved to be a difficult task for most organizations. The topic has stumilated IS academic community interests as frameworks and theories were proposed to improve both the academic community and the practitioner community understandings of this phenomenon (Lapointe and Rivard, 2005; Gattiker and Goodhue, 2005; Keil et al, 2000; Alavi and Joachimathaler, 1992; Ginzberg, 1981). In general, information systems investments are subject to a plethora of critics (e.g. budget overruns, delays). That is, CIOs and the IT (Information Technology) departments are under pressure to justify their IT budgets and investments. Thus, they often promise more than they can deliver on time and within the budgets, which ultimately lead to a high failure rate that characterizes IT projects in general as expectations are set higher. IT investments in the Health care industry unlike those of other industries have grown in the last five years as Health care organizations are aggressively seeking processes efficiency (cost savings), improved patient care (quality of care delivered), and compliance (Ragbupathi and Tan, 2002; Raghupathi, 1997). While Health care organizations have committed huge resources to the implementation of various information systems (e.g. CPOE "Computerized Physicians Order Entry"), the IT departments in the Health care industry face multiple challenges (integrate emerging technologies, train Health care professionals, insure HIPAA[1] compliance, etc) to successfully implement various IT

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[1] HIPAA (Health Insurance Portability and Accountability Act 1996) regulations and standards, a set of rules that Health care organizations must comply to, have stimulate processes changes in many Health care organizations; thus, the need for these organizations to train members (Health care professionals are among those members).

innovations. One of the most obvious challenges is the training and education of the Health care professionals. Much of the IS discourse on training have primarily focused on training strategies (Gallivan et, 2005; Olfman and Bostrom, 1991; Davis and Bostrom, 1983; Davis and Davis, 1990), the effects of training on user acceptance of an innovation (Lee et al, 1995; Nelson and Cheney, 1987; Simon et al 1996), and the impacts of the training on the actual usage of a technology innovation (Lucas, 1975). While many studies supported the hypothesis of training influence on technology acceptance, they did not establish a direct connection between training quality and IT acceptance, nor did they investigate individual level and organizational level factors that dictate the choice of a particular training approach (individual vs. group training) and affect the quality and effectiveness of a given training program. Users' training programs require the use of organization resources (capital, human capital, learning infrastructure, etc), thus the need for organization to evaluate the quality and effectiveness of these programs. This study intends to propose a framework to guide practitioners design, delivery, and evaluation of effective training programs that meet both Health care organizations' objectives and Health care professionals' goals, and stimulate Health care training research discourse in the IS community. The subsequent sections of this paper are organized as follow. Firstly, we reveal the motivation of this study. Secondly, we discuss individual and Organizational factors that affect training effectiveness. Thirdly, a training lifecycle framework is proposed. Finally, we discuss the implications for future studies.

PURPOSE OF THE STUDY

Health care professionals [2] are subject to waves of learning curves and challenges throughout their formal[3] and informal[4] medical education; thus, perhaps one could argue that these highly skilled professionals should not find challenging the learning process of a newly introduced IT innovation. Moreover, these professionals use on the daily basis a plethora of electronic devices such as pagers, cell phones, medical devices, and others; thus, they should have developed favorable attitudes toward technology in general. Yet devising an effective training program has proven to be a difficult task . Health care organizations need answers to the following questions:

- Who needs training?

    o   Doctors, Nurses, Physicians Assistants, or else

- Who should provide the training?

    o   Vendors, Internal IT Department, or else

- What are the training needs of the medical staff?

    o   Healthcare professionals are highly specialized and perform a wide variety of tasks; thus, they have different training needs

    o   Healthcare professionals are different in terms of their respective formal education, experience in the practice of medicine, and expertise in a particular domain; thus, they manifest different needs to acquire new skills.

- What is the optimal training method?

    o   Web-based, one-on-one, or collaborative approach.

- What is the optimal training environment?

    o   In classrooms or on the job

- How do you get physicians to come to training?

    o   Healthcare professional are high performing individuals with often no spare time.

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[2] The term "Health care professionals" refers to physicians, nurses, pharmacists, and other medical staff that use the particular technology.

[3] Formal refers to the in class courses that inspiring physicians or nurses have to take in the early stages of their education

[4] Informal refers to the residency and practice phases of the education.

      o   In my cases, training programs are not mandated.

- What resources should be allocated to support training programs?

      o   Resource availability induces limitations in terms of the choice of a training method (web-based, one-on-one, or group) and a trainer (in house or consultants) to a great extent as effective training programs require substantial organizational resources.

- How does the organization evaluate the effectiveness of a training program?

      o   To justify current investments, support future ones, and improve overall training programs, healthcare organizations must evaluate the effectiveness their training programs.

      o   Kirkpatrick's typology (Kirkpatrick, 1967) and Return On Investment (ROI) analysis have proved to be useful even though they require time and additional resources (Time and money).

      o   Training evaluation usually implies the investment of additional resources and the initiation of political battles.

To address these questions we propose a three iterative stages framework: 1) Training Preparedness 2) Training Delivery 3) Training Evaluation. Before any further discussion of the framework and its constituents, we shall first discuss the individual and organizational factors affecting training effectiveness.

INDIVIDUAL FACTORS

Self-efficacy, cognitive ability, motivation, and goal orientation are characteristics that trainees bring to the training programs. It is important to consider these individual level variables that have significant impacts on the effectiveness of a training program as shown on figure 1 below. Health care professionals have different backgrounds in terms of their formal education, their experience in the practice of medicine, and their previous exposure to various IT innovations. They also perform different tasks and have different interests in terms of the set of skills that they would like to learn, and how quickly they would like to learn them to improve their job performance and accomplish their career goals. Perhaps, a complete knowledge and understanding of these factors can be time intensive and impossible; nevertheless, some level of understanding is necessary to make the right set of decisions regarding the choice of the adequate training method (e.g. group session or individual session), the choice of the trainer (e.g. consultant or In house expert), and the choice of the training materials. The appropriateness of these decisions drive the overall effectiveness of the training program. We will discuss each factor in the subsequent sections.
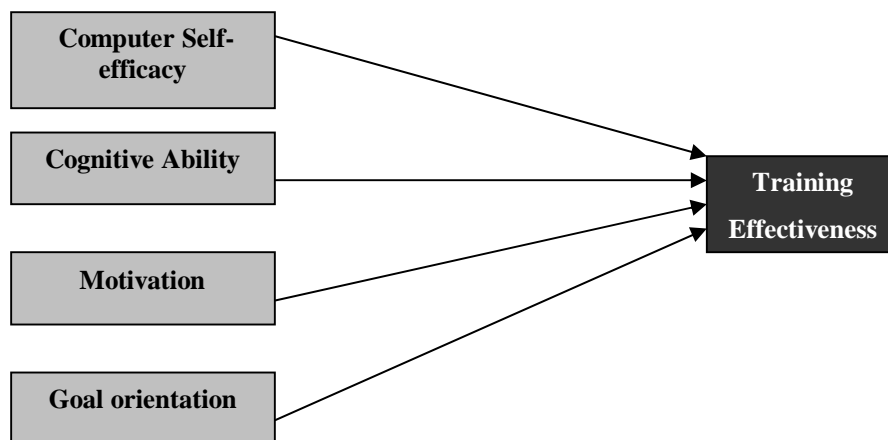

Figure 1: Individual factors

Computer Self-efficacy

Self-efficacy is defined as the "belief that one can perform particular tasks and behaviors, it is a great predictor of performance" (Salas and Cannon-Bowers, 2001) . Trainees may have it before or acquire it during training, it ultimately leads to better learning and performance. Self-efficacy also mediates a number of personal variables including job satisfaction and organizational commitment (Judge et al, 2003). Computer self-efficacy refers to "the individuals' beliefs in their abilities to competently use computers" (Compeau and Higgins, 1995). Computer skills are likely to vary from trainee to trainee and affect the ability of a trainee to learn an information system innovation (Picolli et al, 2001; Thatcher and Perrewe, 2002).

Proposition 1: Higher Degrees of Computer Self-Efficacy will positively affect the effectiveness of a given training program.

Cognitive Ability

Cognitive ability refers to the different cognitive aptitudes that trainees possess. A cognitive ability assessment is helpful especially when one opts for a one-to-one training program (Carter, 2002). The higher a trainee's cognitive ability the faster he or she can learn a set of new skills. The ability to match a training program with the cognitive ability of the participants is crucial to the effectiveness of the program (Gully et al, 2002).

Proposition 2: Higher Degrees of Cognitive Ability will positively affect the effectiveness of a given training program.

Goal Orientation

Goal orientation refers to the individual goals of the trainees as they attend training sessions. Two major perspectives exist (1) mastery (or learning) goal orientation, which refers to trainees' search for competence development through new skills acquisition and mastering of new circumstances, and (2) performance goal orientation, whereby individuals pursue assurances of their own competence by seeking positive performance evaluations and avoiding negative ones (Chiaburu and Marinova, 2005, Towler and Diphoye, Schmidt and Ford, 2003). The higher the goal orientation of a trainee the faster he or she learns during the training programs given that the trainer has knowledge of the goal orientation. Trainees come to training sessions with a specific goal orientation or none. We argue that the trainer's ability to elicit the mindset of the trainees is positively related to the effectiveness of the training program.

Proposition 3: Higher Degrees of Goal Orientation will positively affect the effectiveness of a given training program.

Motivation

Training motivation refers to the effort, the passion, and the resolution that trainees apply to activities before, during, and after the training session (Tannenbaum and Yukl 1992). Studies have supported the fact that trainees' motivation to learn and attend training has an end result on skills retention, acquisition, and eagerness to apply the newly acquired skills to tasks on the job (Colquitt et al, 2000, Tannenbaum et al, 1991). The important question is how does one motivate Health care professionals to attend and learn during training sessions?

Proposition 4: Higher Degrees of Motivation will positively affect the effectiveness of a given training program.

ORGANIZATIONAL FACTORS

These factors characterize the particular organization that intends to provide or sponsor the training program. It is important to consider organizational level variables that have significant impacts on the choice of a particular training method (one-on-one training, e-learning, etc) as depicted in the figure below 2. Organizational resources (capital, human, and infrastructures) are invested in training programs, and the question that emerges is how much resources should be allocated to sustain the effectiveness of the training programs? Health care organizations face many constraints in terms of the delivery of their training programs. Human capital, infrastructures, and trainees are not always available when needed; thus, a savvy scheduling process is a necessity. The allocation of resources to train Health care professionals is usually a trial and error process as there is a need for a sound methodology. The organization resources, constraints, and training environment and climate (social norms, organization culture, and infrastructures), circumscribe the choice of a training method, the choice of a trainer, and the choice of training materials. We will discuss each factor in the subsequent sections.
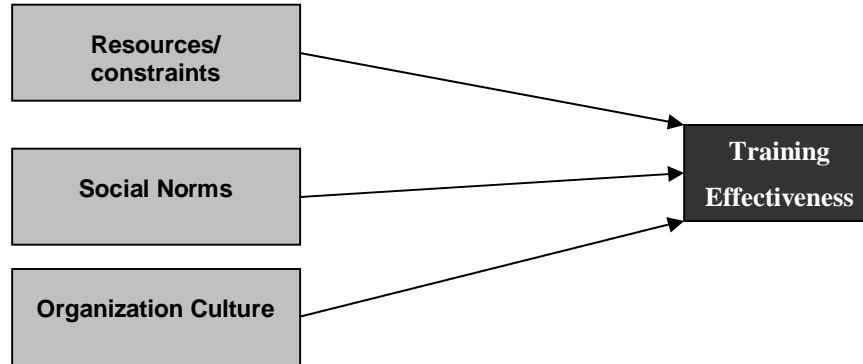
Figure 2: Organizational factors

Resources and constraints

In general, an organization makes use of its resources to gain or sustain competitive advantage (Barney, 1991; Barney, 1986). The resource-based view of the firm has received a great deal of interests in the IS community as a theoretical lens to study phenomena surrounding information systems projects (Bharadwaj, 2000; Jarvenpaa and Leidner, 1998; Wade and Hulland, 2004). Resources refer to the human capital (trainers and other training staff members), the capital (e.g. wages paid to trainers and trainees), the infrastructures (training facilities), and the training tools (e.g. a computers). An IT Trainer function is inexistent in most Health care organizations. Thus, who should provide the training? Multiple options exist to address this issue. One option is to delegate training duties to the internal IT department; even though, the internal IT professionals have received limited to no formal training education, they do possess some level of understanding of the system functionalities and internal processes[5]. The second option is to hire training consultants to conduct the training programs; even though, these consultants possess training experience and expertise, they lack a good understanding of the organization culture and social norms. Training resources are not always available for usage; thus, the concurrence of the availabilities of these resources is the major challenge faced. This fact also stresses the notion of constraints. Training programs must operate within IT departments or organization budgets constraints.

Proposition 5: Higher Degrees of Resources availability will positively affect the effectiveness of a given training program.

Proposition 6: Higher Degrees of constraints will negatively affect the effectiveness of a given training program.

Social Norms and Organization Culture

A training program operates in a given social context; thus, one needs to be cognizant of the training climate and context (Tracey et al, 1995). Moreover, social norms which refer to the shared values, beliefs, attitudes and behaviors in a given group (Thompson and Higgins, 1991; Malhotra and Galletta, 2005) and organization culture define acceptable behaviors and approaches during the sessions, and a good knowledge of these norms will assure conflicts[6] avoidance. We argue that the organization social norms and culture should be taken in account when Health care organizations make decisions regarding the choice of a training method, the choice of a trainer, and the choice of training materials, and the appropriateness of such decisions ultimately affects the effectiveness of the training program.

Proposition 7: Higher Degrees of social norms will affect the effectiveness of a given training program.

Proposition 8: Higher Degrees of Organization culture will affect the effectiveness of a given training program.

Individual as well as organizational level factors drive the effectiveness and quality of training programs. That is, we argue health care organizations' awareness of these factors and their importance will affect their ability to provide successful training programs and improve existing programs. While the awareness of how the individual and organizational level factors

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[5] Internal processes refer to those processes unique to the organization

[6] Conflicts refer to misunderstandings, implicit and explicit reactions to inappropriate behaviors

affect the effectiveness of a training program is crucial, how should one commence and administer the program? We propose the training lifecycle framework as an approach to .conduct training programs.

TRAINING LIFECYCLE FRAMEWORK

A new training program is initiated as organization members manifest the desire or needs to learn a new set of skills or the needs to meet processes compliance is apparent. The training process consists of three major stages 1) Training preparedness, 2) Training Delivery, and 3) Training Evaluation (Salas and Cannon-Bowers, 2001). These stages are interdependent, and the training process is an iterative process of continuous improvement as depicted in figure 3 below. We will discuss each stage in the subsequent sections.
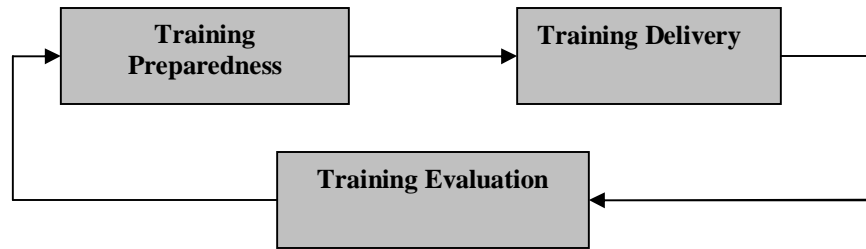
Figure 3: Training Lifecycle Framework

Training Preparedness

This stage consists of a set of activities such as training need analysis, organization analysis, task analysis, and cognitive task analysis (Goldstein, 1993) that take place before a training session. Training need analysis is conducted to determine who needs training, where training is need, what skills need to be taught? (Nelson et al, 1995) The question that emerges thereafter is Does the organization have the resources needed to meet these needs? An organization analysis is performed to answer this question; it focuses on the alignment of training needs and goals with organization goals, resources and constraints. Health care professionals are highly specialized and perform different tasks; thus, the need to conduct a job/task analysis which provides a detailed description of the trainees' job and performed tasks on the job. Cognitive task analysis refers to a set of procedures for understanding the mental processing and requirements that foster job performance. A training program should also stimulate the cues and cognitions that enable trainees to know when to apply the newly acquired skills.

Training Delivery

Various methods are available to conduct training. The effectiveness of training methods resides on four basic principles: 1) The relevance of information or concepts to be learned must be presented, 2) the demonstration of skills to be learned, 3) the opportunities for trainees to practice the learned skills must exist, and 4) the opportunities for feedbacks mechanisms during or after the training session must be present (Salas and Cannon-Bowers, 2001).

Collaborative Learning:This approach is cost-effective as many users are trained at the same time, and it also offers the opportunities to foster feedbacks mechanisms as many trainees can provide valuable insights that are instantaneously shared (Gemino et al, 2005; Alavi 1994); however, this approach has a limitation in Health care organizations as the trainees (e.g. Physicians) are not usually available for training at the same, which makes it almost impossible to find adequate training times for group sessions.

One on one Training: It is a costly and time-consuming approach, and it is adequate to train fewer trainees. This strategy requires a resident expert that will provide training on a need-basis.

*E- Training:*While we still rely on classroom training, Health care organizations have begun to investigate technologies such as video conferencing, and on-line Internet and Intranet courses. Certainly, web-based training technology makes classroom training obsolete (Piccoli et al, 2001; Boisvert, 2002). This approach is the most cost-effective strategy, and it allows trainees a greater flexible, but it also add an extra layer of complexity as the trainees need to learn and understand the system that enables the training. Limited opportunities for feedbacks mechanisms also exist.

Training Evaluation

Upon the delivery of a training session, a training evaluation must be initiated. This is crucial to the continuous improvement philosophy of training .Training evaluation process is intensive[7], costly, political, and many times is the carrier of unwelcome reports (Salas and Cannon-Bowers 2001). Kirkpatrick's typology (Kirkpatrick, 1976) is the most widely used framework for conducting training evaluations (table 1). Most organizations conduct level 1 and 2 evaluations.

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[7] Training evaluation is labor intensive and requires additional human capital and other organization resources

As an alternative evaluation method, some organizations have used the Return on Investment (ROI[8]) analysis. This method is widely use to evaluate investments decisions in general (Branch, 1978). A ROI analysis is performed as the training results or benefits are converted to monetary values and compared with the total cost of the program. Thus, it shows the contribution of the program in terms of financial value and ignores intangibles benefits. It is an inaccurate value to some degree as training results are predominantly soft and unconvertible into monetary values. Huge investments in training require a ROI analysis, which can be a complex and long process. Training evaluation is a difficult task, both the ROI analysis and the Kirkpatrick's typology are helpful, but, both methods are inefficient. There is a need for an effective approach; perhaps future studies should contribute to this discourse. Training evaluation is critical to the notion of continuous improvement and the view of the training design as an iterative process.

Levels	Definition	Questions	Measures Guidelines
Level 1: Reaction	Assess trainees reactions (satisfaction, perception of training effectiveness)	• Were the trainees pleased? • What do they plan to do with what they have leaned?	• Determine what you want to find out • Encourage honest comments and suggestions. • Develop standards • Measures reactions against those standards and take appropriate actions. • Communicate trainees reactions
Level 2: Learning	• Assess the amount of information understood and absorbed by the trainees • May use a criterion-referenced test	What skills, knowledge, or attitudes have changed? By how much?	• Use a control group, if feasible • Evaluate knowledge, skills, or attitudes before and after training • Use the results of the evaluation to take appropriate action
Level 3 : Behavior	• Assess the on-the-job behavior based on the objectives of the training program • May use survey and interviews	Did the participants change their behavior based on what was learned in the program?	• Use a control group, if feasible • Allow enough time for a change in behavior to take place • Repeat evaluation • Consider the cost of evaluation versus the potential benefits.
Level 4: Results (organization impacts)	• Assess the impacts of the behavioral changes on the organization, e.g. better patient care, efficiency. • May use survey and interviews	Did the change in the behavior positively affect the organization?	• Use a control, if feasible. • Allow time for results to be achieved. The amount of time depends on the context. • Measure both before and after training. Repeat the measurement. • Consider the cost of the evaluation versus the potential benefits

Table 1. Kirkpatrick's Typology (Kirkpatrick, 1976)

FUTURE STUDIES AND CONCLUSION

Training design is an important aspect of Health care information systems implementation. It is a long and complex process that requires time, resources, and organization support and commitment. While the short term and long term benefits of training have proved hard to evaluate, studies have shown that training does affect the acceptance and use of an information system innovation (Lee et al, 1995; Nelson and Cheney, 1987; Simon et al 1996). Hopefully, this paper will stimulate Health care training design discourse in the IS community. Future studies should investigate different aspects or phases of the

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[8] ROI refers to the dollar value of the benefits obtained by an organization over a specified time period in return of a given investment

training design to uncover new insights that will guide practitioners in their training design. Future empirical studies, especially longitudinal field studies of Health care organizations using the training lifecycle framework will yield interesting findings.

This paper outlined the training design challenges of Health care organizations, and proposed the training lifecycle framework has a methodological approach to make effective training design decisions and conduct training in Health care organizations.

ACKNOWLEDGEMENT

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