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Introduction

In 2001, Hendricks & Singhal ended the myth that Total Quality Management (TQM) was just another management trend. Their research showed a positive link between financial performance and quality over time. Companies that won quality awards had more hires, stronger stock performance, and increased sales and total assets. Since that time, interest in quality training has gained new attention. Expenditures on International Standards Organization (ISO) certification remain constant as the economic impact of the European Union has solidified. In addition, a new wave of interest in quality training has begun as training requirements for late adopters grows. The recent addition of not-for-profits to the Baldrige Award have increased the demand for quality training as well. Under these circumstances industry trainers and technology educators would be wise to dust off copies of TQM publications (i.e. Brown, 1994) in order to gain new insight into ways to increase worker skills, knowledge and abilities in the new TQM high performance workplace.

This emphasis on the use of training to facilitate change within quality-oriented organizations is not new. The relationship between effective educational practices and workforce development has long been considered important by curriculum developers, instructional designers, trainers and human resource development professionals. They are, however, not always applied to practice especially when business processes alone drive the design of training programs. This article makes the case that TQM organizational structures and processes are pre-disposed to certain learning strategies.

There is an important relationship between organizational characteristics and learning (Shipton, Dawson, West, & Patterson, 2002). As companies move from a traditional performance-based model to a TQM model their structure, processes and policies change (Henderson, 2002; Swift, Ross, & Omachonu, 1998; Love, Irani, & Edwards, 2003). These organizational factors impact the nature of work and have important implications for training (Burke & Church, 1992; Clardy, 2000; French & Bell, 1999; Henderson, 2002).

Understanding more about the synergy between quality organizations and the application of teaching/learning theories requires trainers, teachers and quality practitioners to frame new questions about training appropriateness and effectiveness in the context of organizational structures. To what degree is learning influenced by organizational change? How are traditional learning theories applicable to TQM organizations? How do instructional designers exploit the pre-disposition of the quality organization to design effective training offerings?

The purpose of this article is to examine the relationships between the characteristics of a TQM organization and the application of traditional learning theories in providing employees with new skills, knowledge and abilities. This is especially important to companies who move from a performance-based model to a TQM model. For this study, specific characteristics of an organization structured for quality are matched with specific characteristics of traditional learning theory in order to identify matches offering the greatest potential for effective TQM training. By exploiting these matches, quality deployment experts, educators and HRD professionals will be able to design effective training programs for both informal and formal training within organizations structured around a quality improvement model.

In this manuscript, we review the TQM literature in order to identify the characteristics of organizations oriented to it. In addition, the literature on learning theory is reviewed to identify important aspects of various theories. Specifically, we examine the following paradigms: Behaviorist Theory, Cognitive Theory, Constructivist Theory, Engagement Theory, and Adult Learning Theory. An emerging theme that crossed the two primary areas of investigation was the role of computer information systems. Therefore, additional literature on computer-based training is reviewed to explore how selected learning theories apply to computer delivery of training. In summary, primary themes of quality organizations and traditional learning theories are matched. Finally, implications are inferred.

TQM Culture

Organizations that successfully implement total quality management (TQM) exhibit characteristics that are critical to understand when selecting training programs (Shipton, et al., 2002). TQM is a management technique that uses various tools and data to help employees keep business processes within an acceptable level of quality in order to produce products or services that meet the expectations of customers. The organizational structure of a TQM business is the interconnected physical infrastructure, human relationships, values, traits, culture, and patterns of interaction associated with performing work. The results of an organization based on TQM are increased revenue, reduced costs and improved profitability by satisfying customers.

TQM organizations differ from traditional organizations in a number of ways. A customer orientation is paramount for TQM organizations. This means that feedback from customers on quality, price, value and convenience must be collected and integrated into the product or service design and production processes. TQM organizations strive for continuous improvement. Traditional organizations tend to produce products and services based on their own beliefs as well as make decisions based on their own convenience. They guess at what their customers want and establish the methods of producing the product or service based on short term outcomes. Employees tend to work in fortressed units under a top-down management hierarchy in traditional organizations. Traditional organizations focus on events as isolated factors unrelated to other things. This is in contrast to TQM organizations that are oriented to systems thinking.

A central focus of a TQM organization is its employees. The total quality organization aims to imbue employees at all levels with discipline of thought and action. This discipline is manifested in employees' positive attitude toward training, engagement in iterative processes, and a willingness to monitor progress and adjust input variables to achieve control over processes. These work-culture values exist at all levels of an organization if it truly is devoted to connecting customer values to the production of goods and services (Brown, 1994). In addition to these characteristics, employees in TQM organizations are encouraged and trained to be self-managed. They must be good communicators who make use of tools to seek and subsequently share information. They seek and use feedback and ideally they are growth-oriented with a tolerance for change. Workers in TQM organizations have the ability to work in-the-present while possessing a future orientation. More importantly, they are self-motivated to work and learn both independently and interdependently (Swift, Ross, & Omachonu, 1998; Yang, 2003).

TQM Culture and Learning

The importance of learning in a TQM organization is readily apparent. The culture of the organization, moreover, supports learning that is directed through formal curricula as well as self-directed curricula (Maurer, 2002). Self-directed learning can take the form of an individual identifying and framing a topic of interest, seeking information or learning opportunities about the topic and engaging in study or practice to gain new knowledge or skills (transformative and transformational learning) as described by Henderson (2002).

Clardy (2000) describes a self-directed employee. This employee had lost a job because his previous employer went out of business but volunteered to study work processes to improve quality at his new job. The researcher classified this as an example of synergistic self-directed learning. The worker was able to merge the earlier job experience and the new workplace's initiative to improve quality. By gaining new knowledge and skills, the worker has taken action to produce more positive results in his new job. It is important to note that this may occur in a TQM organization, despite the lack of an actual discrepancy between the workers' skills and their specific job.

The relationship between training and TQM is necessarily different than it is in more traditional organizations. The theoretical framework of Yang (2003) is useful here. Yang describes people input and structural input, which result in the "gain of organizational knowledge" and the "increase of organizational financial performance" (p. 156). At the people level, the author describes both individual and collaborative learning traits. These traits can be facilitated by an organization's structural elements. This may occur via a computer system that captures and distributes process control data and provides computer-based training. This results in both serendipitous and structured dimensions of training through the same computer systems.

Similarly, Applebaum and Reichart (1997) describe learning orientations within an organization. These include the accumulation of knowledge about products and how they are developed and made. How an organization shares knowledge and learning via formal and informal methods, the atmosphere of learning and the application of knowledge by individuals working as a group are equally critical. These descriptions suggest a broad view of training that references both individual and organizational learning.

From these examples, it appears that organizations undergoing change would be wise to facilitate access to self-study and formal training programs whether they are directly or indirectly connected with specific job requirements. In addition, access to learning resources should be available at any time, through various delivery modes and at various levels of difficulty. Inherently, training must occur at the individual level, be applied at the group level and be grounded in theory. Training also should be continuous, contextual and aligned to the structure and culture of the organization. An important question, then, is focused on the identification of learning theories and frameworks and how the characteristics of each relate to the nature of TQM organizations.

Teaching/Learning Theories

When applied to learning, behaviorist theory is based on the recognizable change on an individual's behavior and is based on the work of B.F. Skinner and others. The key to this theory is the observable change in behavior, because what occurs on the inside of the learner, such as thoughts or attitudes, are not observable actions. The theory posits that positive reinforcement of appropriate behavior accelerates learning, and once information has been learned, it will be retained as long as it is occasionally reinforced (Brookfield, 1996; French & Bell, 1999). From this perspective, Semple (2000) describes four conditions necessary to enable learning: 1. The learning process must be short and developed from previously learned behavior; 2. In the early stages of the learning process, behaviors should be rewarded often; 3. Feedback to the individual should be immediate; and 4. Complex behaviors can be learned by reinforcing gradual approximations of it or by teaching smaller units of the behavior over time.

Many computer based programs are based on behaviorist principles. Computer tutorials offer immediate feedback as the training individual progresses through the information. In this learning environment, correct answers are rewarded along the way.

Semple (2000) states that the input-processing-output technology reflects a cognitive approach to learning. Cognitive theory describes a more active role for the learner. As a result of technology, when using the cognitive theory, the learners' ability to think is increased because they are in control of manipulating the variables directly, especially if the information is organized in a hierarchical manner. This can enable learners to take slightly different pathways through related content and process information about the attributes of abstract concepts.

Constructivists view the learner as building new knowledge gained from experiences and information that has already been obtained. As knowledge is built and mistakes are made, learning opportunities lead to new concepts or ideas. As a result, learners take an active role in the learning experience. Collaboration with other learners is encouraged as it can provide alternate perspectives to consider. In addition, learners bring experiences to help fill in gaps in new knowledge and facilitate higher order thinking (Merriam & Caffarella, 1999).

Fox (2001) criticizes constructivist theory as vague, but advises that the theory is a "metaphor for learning," (p.23). In addition, Fox indicates that the learning constructed by the individual can be achieved in many ways and that the paths to learning are not always compatible. However, it appears that constructivist theory is appropriate in many workplace learning environments because using previous knowledge to build new knowledge is a major attribute of adult learning strategies. Even though, as Fox indicates, all paths to learning are not compatible, the learner may realize the path they decide to take is incorrect and learn from this mistake. Thus, the experience of the mistake has assisted in the learning process.

Merriam and Caffarella (1999) point out that in constructivist theory the learner's knowledge is obtained from their experiences, but it is a collaborative process. In addition to the learner

being more active in the learning process, it is clear that collaboration is important. This is especially important to understand for workplace learning. Collaboration can take place electronically for those who are participating at a distance. Furthermore, the utilization of multimedia tools can facilitate problem solving, critical thinking and other higher order thinking processes. For example, threaded discussions within asynchronous chat groups can accomplish a consensus of ideas much like a face-to-face meeting, and embedded hyperlinks can take users to process flow charts or real-time control charts.

A teaching and learning strategy that has evolved from electronically delivered training is engagement theory. This theory focuses on the active participation of the learner with the content. This engagement is intended to promote the development of higher order cognitive skills including evaluation, reasoning, and problem-solving. In addition, activities implemented using the principles of this theory often incorporate collaborative work among peers. Kearsley and Shneiderman (1998) advise that the fundamental idea of engagement theory is that learners must interact with others in worthwhile tasks that contribute to learning. In this paradigm, both individual and group learning are emphasized in that team efforts are encouraged and ways to understand information or engage in a purposeful activity are created. Learners are to contribute to others' learning or the knowledge-base. Thus, technology is used to facilitate the engagement of learners as a communication device rather than a medium to disseminate information.

Bloom, Englehart, Furst, Hill, and Krathwohl (1956) outline a taxonomy of hierarchical levels of learning ranging from the lowest level (knowledge) progressing upward to comprehension, application, analysis, synthesis and evaluation. Delpierre (1991) states that computer-based question episodes typically involve the lower level thinking skills, which may degrade the learning process for the individual. In addition,

Delpierre is concerned with questions that are posed to learners in the learning environment in that they may work together to form the correct answers, and thus further degrade the learning because they end up memorizing and regurgitating the information in the question episodes. As a result, Delpierre advises that if the higher level or evaluation thinking skills are to be incorporated into this mode of learning, more attention needs to be applied to the design of episodic questioning.

Bensusan (2001) offers yet another unique teaching and learning technique related to engagement theory. In distance learning courses, a teaching and learning theory called the learning stairway process or self-directed learning is described. The stairways are similar to Bloom's taxonomy in that as one continues up the stairway the complexity of learning increases. However, Bensusan indicates that the process developed is more of a self-directed approach to learning that includes col-

Table 1. Learning Framework and Relationship to Quality Organization

Learning Theory/ Framework	Characteristics of the Learning Theory/Framework	Relationship to Quality Organization	Opportunities for Computer Based Training
Behaviorist Theory Brookfield (1996) French & Bell (1999)	• Learning is short and develops from previously learned behavior • Early learning is to be rewarded often • Feedback should be immediate • A stimulus should be given to discriminate	• Monitoring processes and responding to changes is important • Conditioning to small variations in processes occurs	• Technology is invested in the instructional designer

Cognitive Theory
 	
Semple (2000)
Bloom, Englehart, Furst, Hill, & Krathwohl (1956)
	• Lower level thinking skills progress up to higher levels
	  • Evaluation
	  • Synthesis
	  • Application
	  • Analysis
	  • Comprehension
	  • Knowledge
		• The value chain of input/ output operations and subsystems arranged by hierarchy and matrix structures	• Can assess and provide multilayered access to content

Constructivist Theory Merriam & Caffarella (1999)	• Learning capabilities • Intellectual skills • Verbal information • Cognitive strategies • Motor skills • Attitudes	• Multifunctional workgroups requiring flexible thinking around new paradigms • Creating new knowledge	• Technology is invested in the learner
Engagement Theory Bensusan (2001) Kearsley & Shneiderman (1998)	• Learners relate to one another which emphasizes team efforts • Learning is creative and purposeful • Learners donate or contribute to others' learning	• Iterative processes • Feedforward thinking • Teamwork	• Peer to peer communication in synchronous and nonsynchronous modes
Adult Learning Theory Knowles (1970) Knowles, Holton, & Swanson (1998)	• Learning shifts from being dependent to self directed • Experience is a resource for learning • Learning is socially oriented • Learning orientations shift from subject to problem centered	• Existence of personal accountability • Team work and contextual thinking • Problem-solving and critical thinking	• Provides choices about scope and sequence of learning

laboration, similar to the nature of work in quality organizations. The process provides the learner with opportunities to share ideas about information, iterate one's understanding of this information and obtain a view of other students' perceptions of the information.

The theories discussed here have several things in common with general adult learning, or to use Knowles (1970) term, andragogy. Basically, adult learner characteristics can be described as shifting from being a dependent learner to a more self-directed learner. Adult learning makes use of an individual's experience as a resource for learning. The paradigm that recognizes that learning is socially oriented, and a learning orientation that shifts from one of a subject to problem centeredness. Merriam and Caffarella (1999) advise there is a concern that andragogy is typically used in non-formal and self-directed learning situations more so than in formal learning situations. However, Knowles (1970), Knowles, Holton, and Swanson (1998), and Merriam and Caffarella (1999) clearly state that all adult learning is voluntary, and the learner has some level of control over what content is learned. Merriam and Caffarella further state that although there are similarities in instructional models, andragogy is different from these models in that "the learner is viewed as a mutual partner or, when learning in natural settings, as the primary designer of learning activities" (p. 37).

Brookfield (1996) cautions us that several critics of andragogy believe that it is not a true learning theory, but a descriptive phenomenon that simply describes the learner, without the empirical evidence of a true theory. Others advise that adult learning is a set of good practice principles and remains an ideology rather than a theory. However, Knowles, Holton, and Swanson (1998) argue that as a theory, it meets the requirement of being a "comprehensive, coherent, and internally consistent system of ideas about a set of phenomena" (p. 10).

Implications

Although there was no single best learning framework upon which one could base training programs for quality organizations, all have value and some characteristics have unique applications. Eleven (11) key matches of quality organizations and characteristics within the five (5) learning theories are described under the column "Relationship to Quality Organizations" in Table 1. Summary information in this column comes from Swift, Ross and Omachonu (1998), and Yang (2003). In addition, matches of learning theories and quality organization characteristics to five (5) computer-based training features are described under the column "Opportunities for Computer Based Training." This summary information comes from Kearsley and Shneiderman (1998) and Delpierre (1991).

Trainers and educators of TQM need a broad understanding of learning theory, and they need to be skilled in the development of instructional strategies within the framework of each. For example, behaviorist theory, consisting of learning activities in small increments with frequent rewards, should be employed when training employees about the impact of small variations in processes. Trainers must be able to use the cognitive levels of thinking as the theoretical base of instruction to train learners about the hierarchical nature of a process value chain in a manufacturing enterprise. Likewise, trainers must be able to recognize the advantages of preparing workgroups to think around problems by developing training on constructivist theory.

Perhaps the best point of entry in applying specific learning strategies to quality organizations is through the adult learner framework. Using adult learning framework as a basis for more sophisticated learning theories is a practice many quality training practitioners already employ. What this analysis shows, is that by considering the goals of a specific training program, such as developing flexible problem-solving skills, one could develop and deliver training in a manner that matches those

characteristics of the quality organization relevant to both learners and the organization. For example, developing team problem-solving skills could best be accomplished by basing the training on engagement theory.

The association of teaching and learning practices to TQM organizational structure requires quality training experts and HRD professionals to continue to expand an understanding of the relationships among these and other variables. For example, the ability to access real-time process control charts used on the shop floor within a computer-mediated training program satisfies many of the requirements of effective adult learning, and provides learner access to information about quality through the obvious link of a common computer system. This type of synergy provides opportunities to integrate real-world events to training (Maughan & Prince Ball, 1999).

Certain aspects of traditional learning theories provide a strong tie-in to quality organizations. Each theory provides a basis for interactive and repeated task accomplishment especially when facilitated by computer-mediated access and delivery. When offered as self-study as well as formal training, the quality of learning may be improved in spite of different learner motivation or entry level. One challenge to quality trainers will be the application of learning theory and instructional design techniques to transfer collaborative learning activities such as those found in face-to-face group-work when solving a problem. Computer-based group-work that requires participants to engage training content, real data, and reference material through software that provides seamless access would be an ideal learning environment.

Conclusion

As organizations adopt or re-emphasize total quality management practices, the structure of the workplace changes, as does the nature of work and the subsequent requirements for new knowledge and new skills. Of particular importance in these organizations is

providing learning opportunities about quality that:

- are based on sound learning theory or frameworks;
- can be controlled by the learner relative to topic, learning goals, and pathways;
- are engaging in an iterative manner in which the learner can frequently seek information on a need/want to know and apply and share that information;
- can be used in both formal and self-directed training modes;
- are accessible, in part, through computer-mediated systems; and
- are capable of showing the results of applying new knowledge and skills to simulated problems or processes in a measurable way.

The notion of situational learning recognizes that the learner is strongly influenced by the structure of the organization and other social constructs within the workplace (Smith, 2003). Industry trainers and technology educators involved in the development and delivery of training about TQM should reconsider the theoretical basis of their efforts within this context. By developing instructional strategies on specific characteristics from a number of learning theories, trainers and educators can take advantage of organization and employee pre-dispositions resulting in more effective training and more effective quality organizations.

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