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From continuous improvement to organisational learning: developmental theory

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Abstract

As a learning theory, the continuous improvement (CI) discourse has benefited countless manufacturing enterprises to improve and adapt their methods of production. As one of the pillars of total quality management, it has generally included a range of dynamic concepts from high involvement teamwork and production enablers, to other social and technical capabilities such as innovation techniques. Such methodologies have been promoted in the literature as potential manifestos that can transform existing capabilities from simple representations of capability, to dynamically integrated ones (often labelled "full CI capacity"). The latter term in particular deserves more attention in the literature. Since CI techniques cannot be separated from organisational learning methodologies, it follows that CI methods should underpin holistic learning. This paper explores whether CI methodologies have advanced far enough to be considered as integrated and holistic in their own right. If not, it follows that new theories, challenges and discourses should be considered for exploration in the CI literature.

Purpose of the paper

While acknowledging the contributions of total quality management (TQM) techniques, this conceptual paper suggests that the holistic paradigm reflected in the TQM philosophy is limited by the boundaries placed on decision makers, particularly in the way learning is enacted. The purpose of the paper is to highlight the contextual and environmental constraints that impose restrictions on the quality of learning taking place, and to prompt further investigations of the links between continuous improvement and organisational learning. The paper also presents a new holistic cycle of learning.

From quality control to total quality management

The reform process in Australian manufacturing and that of other OECD countries owes much to the adaptation of overseas manufacturing techniques such as Japanese management. During the 1970s and 1980s, the difference between Japanese and Western manufacturing was quite pronounced. Japanese management made better use of quality systems and quality control in production (Pascale and Athos, 1981), and benefited from the early work of Deming (1982) who espoused many of the principles behind quality control techniques.

Quality however has evolved from a narrow manufacturing-based discipline to one with broader implications for management including quantifying the costs of quality, total quality control, reliability engineering, and zero defects (Garvin, 1988). Juran (1951) made significant advances in the quality assurance area. Juran's idea that quality could be broken up into avoidable cost (defects, product failures), and unavoidable costs (prevention,

inspection, sampling), helped managers decide how to invest in quality improvement. From Juran's work, early concepts of continuous improvement are observable. The knowledge that decisions made early in the production chain had implications for the level of quality costs later on in the chain was a major breakthrough. Similarly, the "plan, do, check, act" cycle has been the cornerstone of Deming's (1982) contribution. Crosby's (1980) findings that quality is free when underpinned by prevention costs (e.g. prototype inspections and tests), and failure costs (e.g. reworks, scrap), were also major advances in quality management.

Taken together, the views of Deming, Juran, and Crosby have been institutionalised in manufacturing folklore. In the 1980s, a number of Japanese experts made similar contributions including Ishikawa (1985), Taguchi (1986), and Imai (1986). Ishikawa was noted for his "seven tools" for workers engaged in TQC including pareto charts, cause-effect diagrams, histograms, check sheets, scatter diagrams, and flow charts. Taguchi on the other hand developed sophisticated statistical methods highlighting the value of design experiments prior to full production. Whereas both Taguchi and Ishikawa focused on quality control models, Imai elaborated on the Japanese management strategy of *Kaizen*, a process which stressed that incremental improvements were equally important as radical (breakthrough) innovations in securing and maintaining competitive success. He described *Kaizen* as:

… a humanistic approach because it expects everybody – indeed, everybody – to participate in it. It is based on the belief that every human being can contribute to improving his workplace where he spends one-third of his life (Imai, 1986, p. 227).

Since the 1980s, specific advances in quality practices and processes (such as the continuous improvement concept developed by Imai), have led some to reflect on the value of quality practices to a specific organisation (Pascale and Athos, 1981). Deming's top-down approach and Crosby's focus on product defects, for example, require great responsibility at the individual operator level, but appear to stop short of providing a broader quality management methodology suited for the whole organisation. Scholars generally concur that total quality is not a system but rather a state of mind, and that quality control is consistent with a holistic system such as total quality management. Total quality management (TQM) has been defined as a structured system for creating organisation-wide participation in planning, and the implementing of a continuous improvement process to meet and exceed customer needs (Brower, 1994). The TQM concept is unique because it focuses not only on broad-based and long-term quality perspectives, but also rapid value gains as part of an integrated corporate strategy. TQM not only uses the formal tools of quality management (e.g. sampling, statistical process control, zero defects, benchmarking, run charts), but also draws on the use of organisation-wide processes (e.g. leadership, quality function deployment, strategic planning, and customer satisfaction). By linking both the formal quality control processes and the broader organisation-wide processes to the strategic issues each company faces, TQM creates an interface between the corporate and business level, and the operational and functional level. While continuous improvement (CI) is often viewed as a key component of TQM, the process of implementing TQM in an organisation often creates a linkage between the more mechanistic and technical activities of quality control, and effective continuous quality improvement as shown in Figure 1.

Taken together, quality control and total quality management underpin the first phase of a learning organisation (Senge, 1990) that is fundamentally about adaptive and incremental learning. Total quality management is not only relevant to the physical production of goods and services, it also blends production techniques with social organisation. The total quality

management concept has helped firms change from essentially an economic paradigm to a socio-technical paradigm. The latter term embraces the blending of production techniques and quality processes, with the human capital necessary to improve productivity. The TQM concept appears most successful when improvements are embodied in adaptive behavioural routines as a continuous learning journey.

Contextual barriers to TQM implementation

Five strategic principles underpin total quality management:

1. (1) customer focus;
2. (2) process focus;
3. (3) teamwork;
4. (4) employee participation; and
5. (5) continuous improvement (Chong, 1999).

A consideration of each of these principles suggests that it is possible to expropriate types of learning strategies from the total quality management framework. The first of these, customer focus, suggests that organisational goals and priorities should be driven by internal customers within the organisation who are "next in line" in the work process, as well as external customers outside the organisation that purchase products and services (Chong, 1999, p. 7). A customer service orientation means learning to value customers, learning from customers, and including customers in quality programmes. Taken together, this means improved service. By comparison, process focus involves managing and improving technical aspects of processes by using statistical tools to monitor and analyse work processes (Juran, 1995). When an organisation can manage input and output, while simultaneously balancing process design, product design, and service design, the increasingly stringent expectations of customers will be met (Dean and Bowen, 1994; Chong, 1999).

Managing the human aspects of processes is also important. Decisions related to job design, how much decision making to share or give away (Hackman and Wageman, 1995), underpins teamwork, where learning is internalised. Teamwork includes the collaboration between managers and non-managers, between functions, and between organisations and their suppliers (Dean and Bowen, 1994). Employee involvement goes beyond merely asking for employee ideas to the delegation of power and authority so that employees can pursue their ideas, work with others to solve problems, and improve work systems (Blackburn and Rosen, 1993; Chong, 1999). Thus, various learning practices are fundamental in the TQM process. The concept of teamwork in particular is a behavioural routine highly favoured in learning organisations. High participation is a higher-level routine of organisational learning, and team strategies form the basis by which work structures are challenged (Argyris and Schon, 1978). The process of TQM is a point of conflict however between the formulation of the theory surrounding TQM and its application in practice. While TQM philosophies espouse team processes, it is unclear how teams are mobilised, how learning styles are assessed and matched to various types of teams, and how the learning agenda unfolds. While the continuous improvement concept promotes constant refinement and improvement (e.g. Deming's plan, do, check, act cycle), this is more at a basic level of organisational learning – behavioural routines and learning actions are more consistent with an incremental step-by-step approach (Argyris and Schon, 1978; Senge, 1990).

In comparison to total quality management, the learning organisation is a knowledge-based company that continually challenges the way it learns by constantly scanning both the internal and external environment (Nonaka, 1991; Argyris and Schon, 1978; Stacey, 1996). At a procedural level, organisational learning exposes the patterned structures of routines as one-dimensional. Whereas TQM appears to represent a "complete" change process through the five principles, it underlies modes of reasoning based on scientific rationalism. This means that one can be entirely objective about content and process, the phenomenon under examination can be conceived in advance of the improvement process, and the role of the change agent or manager is fairly clear-cut.

Several scholars have criticised TQM on the basis that it can be "installed" like a new machine (Ingle and Jacobson, 1999), that techniques and processes can be "picked" from a list (Morley, 1995), and that organisations adopt some tools while ignoring others. Some scholars have called this a "sipping and tasting" approach (Jacobson, 1996). Others suggest it should not be based on change for change's sake (New, 1992), and that programmes of implementation will vary depending on differences in technical and organisation priorities (Chong, 1999; Ingle and Jacobson, 1999, p. 37). Although total quality management has evolved into an entire discipline of knowledge internalised as practical strategies, a reasonable question relates to how an organisation can promote internal adaptability and behavioural change on the one hand, and transfer the improvements to the environment. Both adaptability and behavioural change are key processes in organisational learning (Weick, 1979; Hedberg, 1981), but are at best only partially answered through TQM philosophies. One can argue that there is little point improving internal efficiencies unless these can be implemented in the firm's environment. Other contextual barriers such as strategy, decentralisation, culture, and environmental adaptability also blur the TQM process. It is not clear how such barriers influence the learning journey, nor is the link between individual learning and total quality management transparent.

Organisational learning is not simply the sum of individual learning (Fiol and Lyles, 1985). It has been defined as a renewal process of changing behaviours to enable a firm to achieve both change and growth simultaneously (Murray, 2002), and a process that allows for the testing and challenging of the decision assumptions that drive decision models (Dodgson, 1993; Garvin, 1993; Argyris and Schon, 1978). For instance, organisations develop rich cultures over time that are deeply embedded in learning systems (Schein, 1985). Organisational cultures (the first contextual barrier) continually influence their immediate members through histories and norms, and through cognitive systems and memories. As Hedberg (1981) suggests, organisations develop worldviews and ideologies over time by preserving certain behaviours, mental maps, and norms. Individuals may become prisoners of the systems and rules that pacify and oppress learning. Indeed, a firm's orientation to goal setting, reward systems, and internal work processes will be influenced by culture (Schein, 1985), and it is possible for competing cultures to exist within the same firm (Hinings and Greenwood, 1988; Murray, 2001). Thus, the ability of the organisation to learn and adapt to its environment (adaptability), as well as its capacity to change and grow simultaneously, will often depend on cultural forces that undermine its capacity to learn.

While culture in particular has the ability to manifest itself in the overriding ideologies and established patterns of the day, an organisation's learning capacity will determine its strategic direction (the second contextual barrier). Learning influences strategy by providing a boundary to decision making and a context for the perception and interpretation of the environment (Daft and Weick, 1984). Often a firm's strategic direction creates a momentum

that is pervasive and highly resistant to small adjustments. There appears to be a preference for a linear approach to TQM initiatives where small adjustments are the norm. Strategies often appear in a step-by-step manual or flow chart, where strategies and actions can be conceived in advance of them occurring. While a "design" approach to strategy is useful, research contends that strategic drift is common with this method (Johnson, 1988), strategies are made on the basis of cultural assumptions that may be flawed (Mintzberg, 1990; Quinn, 1980), and strategies may be formulated in the absence of strategic intent (Hamel and Prahalad, 1989; Barney, 1991). A focus on capabilities that lead to competencies that form the roots of competitive advantage is not the driving force of TQM.

A third contextual barrier is decentralisation. Decentralisation throughout the organisation is often achieved through groups and teams. These mechanisms help to coordinate the diverse range of activities that each company faces, helping to harness the link between structure and learning. It is not so much "what" type of teams is important, but rather, how well they can express their ideas. Hackman and Oldman (1980) found that mistakes are common in team building and team management. Such mistakes are often associated with rewarding and recognising individuals instead of the team, not maintaining stability of membership over time, not providing teams with autonomy, and not fostering interdependence among team members. It is widely noted that teams are one of the main mechanisms used by organisations to achieve high levels of sustained involvement (Nelson and Winter, 1982; Hackman and Oldman, 1980; Imai, 1986).

Establishing teamwork becomes institutionalised in routines and behaviours of social activity the organisation uses to continually improve work practices and processes. Although team cultures take time to evolve, they help to institutionalise different routines and behaviours associated with more efficient management action. Although several of these characteristics are found in the five key TQM principles listed previously, they are not always obvious to the practitioner. While some team concepts such as the type, agenda, and quality of teams are important in the TQM literature (Pascale and Athos, 1981), the literature is less clear as to why some teams learn faster than others, achieve better results, and negotiate change more effectively than others. The latter part of the paper will illustrate how individuals and teams have several learning styles that most likely account for sporadic successes in the implementation of TQM programmes. Despite management's best efforts, a lack of understanding of learning styles, as well as cognitive learning differences in individuals, most possibly accounts for variations in team-based learning.

Adaptive learning is also understood in terms of a firm's ability to align its activities with the environment (the fourth contextual barrier). This implies that alignment ability will depend on the organisation's potential to learn, unlearn, and relearn (Miller and Friesen, 1980; Hedberg, 1981). The process of adapting means to continually scan the environment. Making the right internal and external strategic choices will ultimately influence performance. Poor adaptive ability for instance will expose learning methodologies within the organisation not entirely contributable to individuals and the rate by which they learn. It may also relate to the poor integration ability of teams to interpret the environment because of inadequate belief systems (Neisser, 1967; Crossan *et al.*, 1993), and inadequate knowledge and information management (Nonaka, 1991). If adaptive learning is one of the key activities for dealing with changes in the environment (Chakravarthy, 1982), it follows that in circumstances where the environment is too complex and dynamic, learning may be severely restricted or may not take place at all (Lawrence and Dyer, 1983). But this also implies that the TQM process may be inadequate as a methodology that is unable to account for complex and multiple differences

in various types of environment, and for dynamic differences in learning styles within the firm. Poor learning integration for example will be a reflection of individual cognitive structures, learning styles, power relationships, and competency building techniques.

In summary, the contextual barriers appear to surface in the TQM literature as a one-dimensional analysis between the object of the study (such as quality) and the person or persons undertaking the improvement initiative (such as managers and staff). For instance, Deming's 14 obligations of management, and Imai's notion of incremental improvement or *Kaizen*, are examples of one-dimensional improvement programmes. Similarly, Crosby's suggestion that quality is free when underpinned by prevention costs, Juran's concentration on quality planning, quality control, and quality improvement, and Taguchi and Ishikawa's emphasis on quality control models suggest one-dimensional frameworks. Apart from the call for high levels of participation expressed in teamwork that is legitimised by Japanese management techniques (Imai, 1986; Bessant and Caffyn, 1996), there is little understanding how these four contextual barriers influence the TQM process. It is not clear from TQM models how a firm adapts to the environment and learns from it. Nor is it clear where the "creativity" paradigm takes over from the "improvement" paradigm – how learning styles and cognitive learning frameworks influence total quality management programmes.

From continuous improvement to organisational learning

In more recent times, several scholars such as Bessant and Caffyn (1996) have conducted empirical research designed to match improved organisation performance to superior behavioural routines. The research has broadened the concept of total quality management by describing the CI process as one of sustained incremental innovation (Bessant and Caffyn, 1996). Most of this research has been conducted in UK firms, where sets of behavioural capabilities have been assigned to developmental levels of continuous improvement. The research contends that higher levels of continuous improvement translate into superior behavioural routines (or vice versa), with standard and structured routines, by comparison, consistent with lower-level improvement initiatives (Bessant and Caffyn, 1996, p. 5). Essentially, the focus of this approach is underpinned by the five principles of TQM including customer focus, process focus, teamwork, employee participation, and continuous improvement, but the difference appears to be embodied in the way continuous improvement is enacted. The mobilisation of high levels of participation for achieving innovative problem solving underlies the approach (Leonard-Barton, 1992; Imai, 1986; Bessant and Caffyn, 1996, p. 3).

According to these scholars, high levels of participation account for significant improvements in productivity, in the implementation of advanced technologies, and in the improvement of manufacturing efficiencies between productivity, quality, and time (Bessant and Caffyn, 1996). Bessant and Caffyn (1996, p. 4) extend the more linear frameworks of TQM by drawing attention to the need for high levels of participation where such routines need to be built into the fabric of organisational life. High performance organisations have accredited much of their success to high-involvement routines, but the establishment of these will vary from company to company based on their capacity to learn. For example, the Toyota production system took over 40 years to become embedded in the culture of the firm (Monden (1983), in Bessant and Caffyn (1996, p. 8)). Many programmes of continuous improvement in UK companies have been similarly described:

At the outset there is enthusiasm, but little skill, and the early days of CI development are taken up with learning the basics of systematic problem solving, and practising the use of simple tools and techniques. Putting a workable program together that integrates the generation of ideas with their implementation, with recognising and rewarding the effort put in, with measuring and recording the improvements and identifying the next targets, is a long-term undertaking (Bessant and Caffyn, 1996, p. 10).

This suggests that the culture for continuous improvement (CI) develops over time, is established through cultural routines, and through behavioural change. Bessant and Caffyn's research suggests that these changes can be tracked by categorising them at different levels of continuous improvement. They identified five levels of CI as organisations progressively develop:

1. (1) natural/background CI;
2. (2) structured CI;
3. (3) goal oriented CI;
4. (4) proactive/empowered CI; and
5. (5) "full" CI.

Each of these levels is associated with a matching capability so that the capability or behaviour would improve as each higher level is reached. Most of the capabilities used to categorise these levels are clearly linked to specific learning behaviours, and it is not difficult to view the levels as specific levels of learning. At the highest level (full CI), this underlies the characteristics of a learning organisation (Figure 2). This paper contends that it is useful to think of the levels as cycles, since one cycle of learning depends on the other, and evidences of learning can be found at each stage of the cycle. For instance, the CI literature argues that firms can only advance to a new stage after an earlier one has been achieved (Bessant and Caffyn, 1996, p. 14). Murray's research contends that there are elements of every stage in most firms (Murray, 1999, 2001). Generally, such routines are found in various competencies. The point is that the evidence of routines at each stage in a cycle of learning increases as firms learn new behaviours that challenge and improve the old routines. From their research of UK firms, Bessant and Caffyn (1996, p. 12) suggest that six behaviours (or routines) are needed to activate the cycle:

1. (1) getting the CI habit;
2. (2) focusing CI;
3. (3) spreading the word;
4. (4) CI on the CI system;
5. (5) walking the talk; and
6. (6) building the learning organisation.

In expanding the contextual barriers discussed previously, the problem with the five cycles in Figure 2 is the emphasis on a process that draws on some fundamental ingredients of change while ignoring others. Steps 1 to 3 in Figure 2 draw on adaptive learning. Adaptive learning is based on a firm's coping ability, that is, its capacity to select, interpret, and respond to environmental stimuli both inside and outside the firm (Murray, 2001; Hedberg, 1981). Underlying a firm's coping ability will be its capacity to learn and change simultaneously. Adaptive learning is similar to continuous improvement in that a firm is concerned with gradual learning where companies improve past decisions and make them better through small-scale adjustment (see Stacey, 1996; Quinn, 1980). Steps 4 to 5 in Figure 2 closely

resemble Senge's concept of generative learning. Generative or higher-level learning requires new ways of looking at the world, whether in understanding customers or in understanding how to better manage a business (Senge, 1990, pp. 7-8), and encourages learners to challenge, question, and repudiate decision-making assumptions (Fiol and Lyles, 1985; Kim, 1993; Argyris and Schon, 1978).

Generative learning will also be influenced by individual and organisational worldviews to the extent that organisations see what they want to see and filter out information that fails to match their decision-making coping ability (Cyert and March, 1963). Much recent research shows that learning styles, cognitive learning abilities, as well as generative learning abilities influence learners (Crossan *et al*., 1993; Allinson and Hayes, 1996; Honey and Mumford, 1986), not always in the way managers prefer (Argyris, 1993). Similarly, culture is often portrayed in the CI literature as "shared values", "cultural fit", and "cultural adaptation", yet recent research suggests that two or more different archetypes (competing structures and systems) exist in most firms (Hinings and Greenwood, 1988). Competing archetypes reflect cultural values and ideologies that prevent new learning taking place, and deep-seated paradigms that inhibit change on an ongoing basis (Johnson, 1988). Firms develop and maintain learning systems that not only influence their immediate members, but are then transmitted to others by way of organisation histories and norms (Fiol and Lyles, 1985).

Figure 2 is incomplete in the sense that firms depend on learners who can exhibit many different learning styles (Table I). Indeed, if the goal of learning cycles is to improve behavioural routines and achieve shared values, then it follows that an individual's belief system (individual schema) will need to be highly advanced and continually challenged. Highly advanced individual belief schemas will have more ability to interpret environmental stimuli (interpretive skills) than those individuals with less advanced cognitive schemas. The potential level of interpretation is a function of the complexity of individual schemas and the divergence among them (Crossan *et al.*, 1993; Neisser, 1967). Similarly, when groups work to create shared meaning from their experiences, whether good or bad, the collective experiences translate into an integrative ability, leading to greater capability that transcends individual experiences. Managers need to understand that individuals have varying style dispositions when exposed to various problem-solving stimuli and only a small number of individuals have sufficient breadth (learning versatility) to perform well in multiple roles (Allinson and Hayes, 1996, p. 14).

To optimise the behavioural routines illustrated in the continuous improvement cycle, managers will need to choose from a range of possible learning behaviours that best suits the environment, or requirements of a given situation or task. Indeed, organisations need to have available to them a range of learning behaviours, some which are habitual (i.e. derived from individual schemas), but others which are consciously applied to overcome the weaknesses of one's habitual approach (Sadler-Smith and Badger, 1998, p. 252). To achieve change, managers must go further than simply creating the illusion of change such that managers appear to be in control (Starbuck, 1983).

Capabilities have been interlinked with the stages of learning in much of the continuous improvement literature. The literature suggests that capabilities are underpinned by behaviours that must be advanced before the capability can be reached. Bessant and Caffyn's approach is a fairly objective one; picking from a list of behaviours and implementing them suggests that a firm will move closer to a predefined capability. Such an approach does not take account of learning styles, organisation and individual worldviews, and cultural systems

that mirror the actions of a regulator that push-pull any new learning initiatives back to a state of equilibrium. In most firms, the concept of equilibrium is represented by norms and values, and any change in the technical or operational system is greeted with resistance by the existing social system. It is not easy to simply advance a group of behaviours, conceived in advance, and expect them to emerge into a set of capabilities.

Instead of a one-dimensional approach to developing capabilities, capabilities may best be understood in terms of teams of resources that perform some task or activity (Grant, 1991), as collective learning that integrates multiple streams of technology (Hamel and Prahalad, 1989), and the ability of an organisation to develop a competence to continuously use learning to achieve its purpose (Dunphy *et al.*, 1996). If learning is embedded in competencies that enable firms to achieve something better or different, then the development of capabilities will already be predisposed to learning styles, cognitive learning, and cultural routines. Multiple approaches will be needed. Scholars underplay most if not all of these approaches in the CI literature.

A multiple approach to learning will add a new dimension to the CI framework discussed earlier. Murray (2002) suggests that a multiple approach to learning can be thought of in terms of unbounded learning (Figure 3). Unbounded learning means the capacity of a firm to grow and change simultaneously without being limited by organisational systems and culture (Murray, 2002, p. 239). In Figure 3, while each learning approach depends on the other, learning has a reciprocal effect in that improvements and advances in one area will affect the other. Unbounded learning approaches help to foster the development of new individual and organisational routines and these will be reflected in the firm's cultural values. Improvements in learning behaviour will enable better response time to the environment as well since more sophisticated learning responses challenge the various forces that impede change (e.g. deeply held values, old management practice). Recent empirical research has found that higher-level learning routines assist learners to interpret and respond better to environmental stimuli (Murray and Donegan, 2003).

While the continuous improvement and total quality management literature has played a key part in improving and developing work processes, particularly in the manufacturing area, its essential contribution lies in adaptive learning. The capacity to improve past decisions and make them better is a useful insight in improving and adapting past discoveries and decisions, and is particularly useful when high involvement routines are enacted. However, significant change will come from a more holistic approach; multiple learning methods are infinitely more valuable as old routines are challenged and new ones created. Significantly, this discussion suggests that new behavioural routines reflect the new learning and that a firm's capacity to respond to change internally and adapt to change externally will be greatly improved.

Conclusions

In summary, there are a number of contextual barriers to implementing TQM in practice, and CI methodologies appear to be imbued with a one-dimensional approach. Organisational learning frameworks provide useful ways of thinking about TQM and CI – a more holistic process towards learning suggests that efforts to improve and develop behavioural routines will be more beneficial. A different cycle of learning is demanded when the barriers to current learning impede firm performance. We suggest an unbounded learning approach that represents the four broad areas discussed in this paper. Unbounded learning underlies a

holistic approach represented by adaptive learning (continuous improvement), styles of learning, generative learning, and developing capabilities. Such areas can be recognised from the previous discussions. It is our hope that this paper will stimulate discussion with other scholars to explore the links between improved firm performance and an unbounded learning philosophy. The unbounded approach includes the best that continuous improvement methodologies can offer, and adds a number of new dimensions that will assist the firm to achieve change and growth simultaneously.

Table I Differences in learning styles

| Honey and Mumford's learning styles	Kolb's learning styles
Activists: people who learn best when they can use trial and error to discover something	The ability to be involved fully, openly, and without bias in new experiences (concrete experience)
Reflectors: people who learn best when they are given adequate time to digest, consider, and prepare	The ability to reflect on and observe experiences from different perspectives (reflective observation)
Theorists: people who learn best when there is a sound structure and a pattern or purpose – they respond well to complex ideas or concepts that stretch or question current thinking	The ability to create concepts that integrate reflection and observation into logical theories (abstract conceptualisation)
Pragmatists: people who learn best when they can be given real life practical issues to discuss and are supplied with practical tips and suggestions (Honey and Mumford, in Rylatt, 1994, p. 67)	The ability to use theories to make plans and implement action (active experimentation) (Kolb, 1984)

Table I *Differences in learning styles*
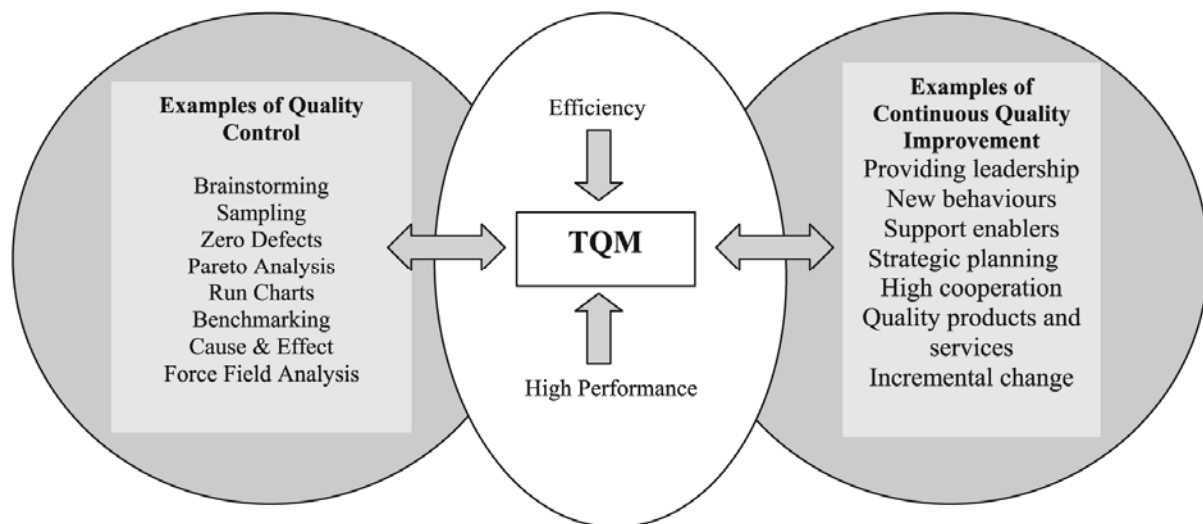
Figure 1 *The implied interface between quality control and continuous quality improvement*
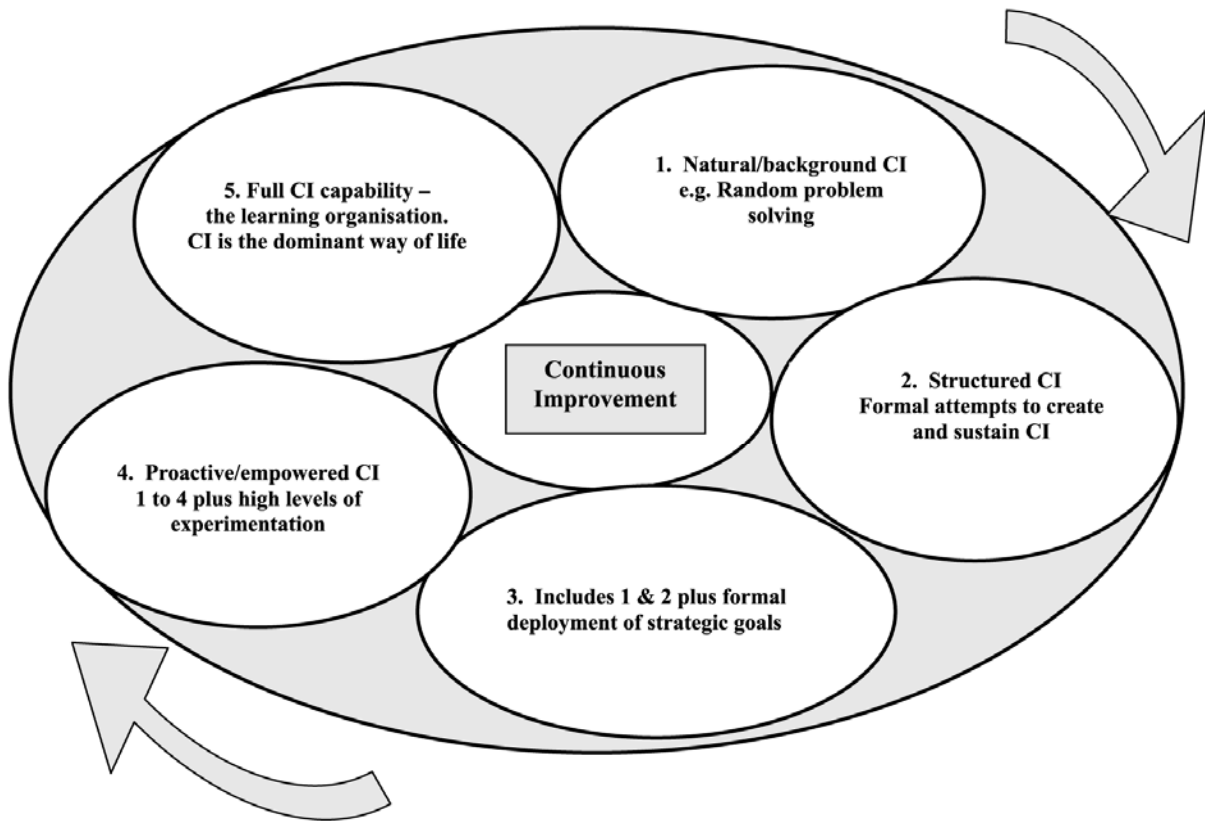
Figure 2 *Adaptive learning, cycles of continuous improvement*
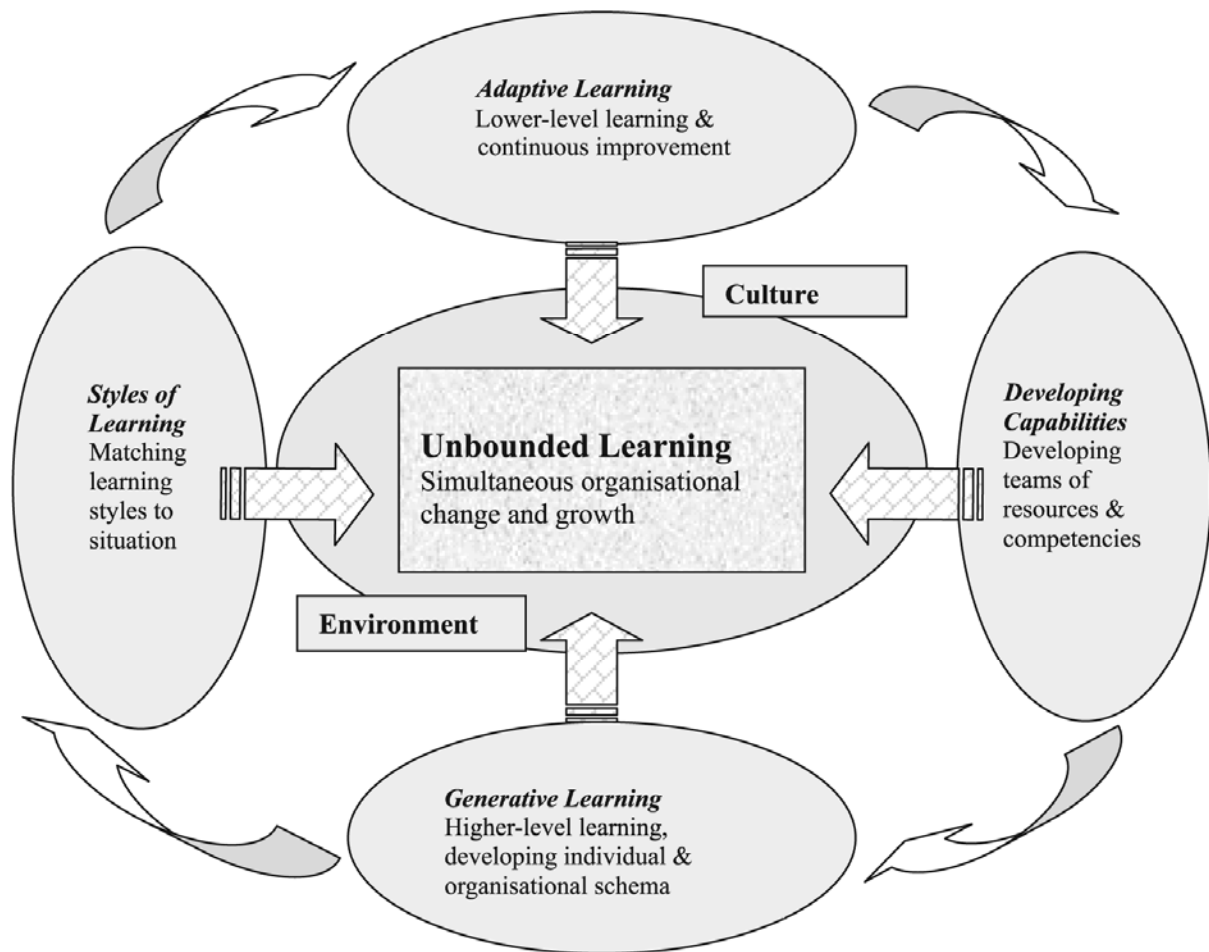
Source: Murray (2002, pp. 239-247)

Figure 3 *Unbounded cycles of learning*

References

Allinson, C.W., Hayes, J. (1996), "The cognitive style index: a measure of intuition – analysis for organisatonal research", *Journal of Management Studies*, Vol. 5 No.3, pp.119-35.

Argyris, C. (1993), "Education for leading – learning", *Organisational Dynamics*, Vol. 21 No.3, pp.5-17.

Argyris, C., Schon, D.A. (1978), *Organizational Learning*, Addison-Wesley, Reading, MA., .

Barney, J.B. (1991), "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17 No.1, pp.90-120.

Bessant, J., Caffyn, S. (1996), "High involvement innovation through continuous improvement", *International Journal of Technology Management*, Vol. 14 No.1, .

Blackburn, R., Rosen, B. (1993), "Total quality and human resource management: lessons learned from Baldrige Award winning companies", *Academy of Management Executive*, Vol. 7 No.3, pp.49-66.

Brower, M.J. (1994), "Implementing TQM with self-directed teams", in Costin, H. (Eds),*Readings in Total Quality Management*, Dryden, New York, NY, .

Chakravarthy, B.S. (1982), "Adaptation: a promising metaphor for strategic management", *Academy of Management Review*, Vol. 7 No.1, pp.35-44..

Chong, C. (1999), "Where does TQM begin? A case study of two Singapore companies", in Ho, S.K.M. (Eds),*TQM and Innovation, Proceedings of the 4th International Conference on ISO 9000 and TQM*, Hong Kong Baptist University, Hong Kong, .

Crosby, P. (1980), *Quality is Free*, Mentor Books, New York, NY., .

Crossan, M., Lane, H.W., Hildebrand, T. (1993), "Organization learning: theory to practice", in Hendry, J., Johnson, G., Newton (Eds),*Leadership and the Management of Change*, John Wiley & Sons., .

Cyert, R.M., March, J.G. (1963), *A Behavioural Theory of the Firm*, Prentice-Hall, Englewood Cliffs, NJ., .

Daft, R.L., Weick, K.E. (1984), "Toward a model of organizations as interpretation systems", *Academy of Management Review*, Vol. 9 pp.284-95.

Dean, J.W., Bowen, D.E. (1994), "Management theory and total quality", *Academy of Management Review*, Vol. 19 No.3, pp.392-418..

Deming, W.E. (1982), *Out of the Crisis*, MIT Press, Cambridge, MA., .

Dodgson, M. (1993), "Organizational learning: a review of some literatures", *Organization Studies*, Vol. 4 No.3, pp.375-94.

Dunphy, D., Turner, D., Crawford, M. (1996), *Organisational Learning as the Creation of Corporate Competencies*, Centre for Corporate Change, Australian Graduate School of Management, Sydney, No.paper No. 060, .

Fiol, C.M., Lyles, M.A. (1985), "Organizational learning", *Academy of Management Review*, Vol. 10 No.4, pp.803-13.

Garvin, D.A. (1988), *Managing Quality, the Strategic and Competitive Edge*, The Free Press, New York, NY., .

Garvin, D.A. (1993), "Building a learning organization", *Harvard Business Review*, Vol. 71 No.4, pp.78-91.

Grant, R.M. (1991), "The resource-based theory of competitive advantage: implications for strategy formulation", *California Management Review*, Vol. 33 No.3, pp.114-35..

Hackman, J.R., Oldman, G.R. (1980), *Work Redesign*, Addison-Wesley, Reading, MA., .

Hackman, J.R., Wageman, R. (1995), "Total quality management", *Administrative Science Quarterly*, Vol. 40 pp.309-42.

Hamel, G., Prahalad, C.K. (1989), "Strategic intent", *Harvard Business Review*, Vol. 89 No.3, pp.63-76.

Hedberg, B. (1981), "How organizations learn and unlearn", in Nystrom, P.C., Starbuck, W.H. (Eds),*Handbook of Organisational Design*, Oxford University Press, London, pp.8-27.

Hinings, C.R., Greenwood, R. (1988), *The Dynamics of Strategic Change*, Basil Blackwell, New York, NY., .

Honey, P., Mumford, A. (1986), *Learning Styles Questionnaire*, King of Prussia, PA., .

Imai, M. (1986), *Kaizen: The Key to Japan's Competitive Success*, McGraw-Hill, New York, NY., .

Ingle, S., Jacobson, D. (1999), "Approaches to TQM adoption in an Irish context", in Ho, S.K.M. (Eds),*TQM and Innovation, Proceedings of the 4th International Conference on ISO 9000 and TQM*, Hong Kong Baptist University, Hong Kong., .

Ishikawa, K. (1985), *What is Total Quality Management: The Japanese Way*, Prentice-Hall, Englewood Cliffs, NJ., .

Jacobson, D. (1996), *New Forms of Work Organisation in Ireland: An Annotated Bibliography*, Dublin City University Business School., Research Paper 9, .

Johnson, G. (1988), "Rethinking incrementalism", *Strategic Management Journal*, Vol. 9 No.1, pp.75-91.

Juran, J.M. (1951), *Quality Control Handbook*, McGraw-Hill, New York, NY., .

Juran, J.M. (1995), *A History of Managing for Quality*, ASQC Quality Press, New York, NY., .

Kim, D.H. (1993), "The link between individual and organizational learning", *Sloan Management Review*, Vol. 35 No.1, pp.37-50.

Kolb, D. (1984), *Experiential Learning*, Prentice-Hall, Englewood Cliffs, NJ., .

Lawrence, P.R., Dyer, D. (1983), *Renewing American Industry*, Free Press, New York, NY., .

Leonard-Barton, D. (1992), "The factory as a learning laboratory", *Sloan Management Review*, Vol. 34 No.1, pp.23-38.

Miller, D., Friesen, P.H. (1980), "Momentum and revolution in organization adapatation", *Academy of Management Journal*, Vol. 23 No.4, pp.591-614.

Mintzberg, H. (1990), "The design school: reconsidering the basic premises of strategic management", *Strategic Management Journal*, Vol. 11 No.3, pp.171-95.

Monden, Y. (1983), *The Toyota Production System*, Productivity Press, Cambridge, MA., .

Morley, M. (1995), "Current themes in organisational design and work structuring", in Gunnigle, P., Roche, W.K. (Eds),*New Challenges to Irish Industrial Relations*, Oak Tree Press, Dublin, .

Murray, P. (1999), *Rediscovering Productivity in the NSW Contruction Industry*, Department of Public Works and Services., NSW Government Discussion Paper, .

Murray, P. (2001), "Developing sustainable learning strategies in the construction industry", University of Western Sydney, Macarthur., unpublished PhD thesis, .

Murray, P. (2002), "Cycles of organisational learning: a conceptual approach", *Management Decision*, Vol. 40 No.3, pp.239-47.

Murray, P., Donegan, K. (2003), "Empirical linkages between firm competencies and organizational learning", *The Learning Organization*, Vol. 10 No.1, pp.51-62.

Neisser, U. (1967), *Cognitive Psychology*, Meredith Publishing, New York, NY., .

Nelson, R.A., Winter, S. (1982), *An Evolutionary Theory of Economic Change*, Belknap Press of Harvard University Press, Cambridge, MA., .

New, C. (1992), "World-class manufacturing versus strategic trade-offs", *International Journal of Operations and Production Management*, Vol. 12 No.6, pp.19-31.

Nonaka, I. (1991), "The knowledge creating company", *Harvard Business Review*, Vol. 69 pp.96-104.

Pascale, R.T., Athos, A.G. (1981), *The Art of Japanese Management*, Penguin Books, Harmondsworth, .

Quinn, J.B. (1980), *Strategies for Change: Logical Incrementalism*, Richard D. Irwin, Homewood, IL., .

Rylatt, A. (1994), *Learning Unlimited*, Business and Professional Publishing, Sydney., .

Sadler-Smith, E., Badger, B. (1998), "Cognitive style, learning and innovation", *Technology Analysis and Strategic Management*, Vol. 10 No.2, pp.247-65.

Schein, E. (1985), *Organizational Culture and Leadership*, Jossey-Bass, San Francisco, CA.,

Senge, P. (1990), "The leader's new work: building learning organizations", *Sloan Management Review*, Vol. 32 No.1, pp.7-23.

Stacey, R.D. (1996), *Strategic Management and Organisational Dynamics*, 2nd ed., Pitman, London, .

Starbuck, W.H. (1983), "Organizations as action generators", *American Sociological Review*, Vol. 48 pp.91-102.

Taguchi, G. (1986), *Introduction to Quality Engineering*, American Supplier Institute, Dearborn, MI., .

Weick, K.E. (1979), "Cognitive processes in organizations", *Research in Organizational Behaviour*, Vol. 1 No.1, pp.41-74.

Further reading

Hambrick, D.C. (1983), "Some tests of the effectiveness and functional attributes of Miles and Snow's strategic types", *Academy of Management Journal*, Vol. 26 No.1, pp.5-26.

March, J.G., Olsen, J.P. (1976), *Ambiguity and Choice in Organisations*, Universtetsforlaget, Bergen, .

Morgan, G. (1997), *Images of Organization*, Sage, London., .