A Season of Resolutions, Continuous Improvement and Systems Thinking

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Abstract

As New Year rolls in, many of us take on challenge of personal change. Many set goals to lose weight; do more exercises; watch less television; do more studying; do less partying; or to shed a habit such as smoking. Over last fifteen years in our Quality Management course students were asked to work on a term-long personal continuous improvement projects. The students were briefly introduced to basic concepts of causal loop diagrams and were encouraged to use them to clarify their theories regarding their own progress or lack of it. The basic premise is that the result students obtain and the dynamics they experience are built into the structure of their worldview and they learn if they can communicate and influence their worldview. This paper uses systems thinking lens to discuss the improvement framework and the experience reported by students.

Keywords: Resolution. Personal change. Continuous improvement. Systems thinking.

Introduction

The concept of personal quality as promoted by Roberts and Sergesketter [1993] may be thought of as a tool for personal empowerment. In order to learn the process of continuous improvement, students enrolled in our traditional quality management course[1] are required to undertake a personal continuous improvement project. The course is normally offered in the spring term that begins in the month of January and hence, many choose their theme based on their own New Year's resolution. After reviewing almost couple of hundred plus reports, it became quite clear that the learning experience can be preserved by using causal loop diagrams [Jambekar, 1995].

As our world is becoming interconnected, many believe systems thinking is an essential tool in helping to mange effectively. In business, it can help employees and managers to understand the complexity of a process so they can reengineer or improve it. In academic world, it can assist students reflect and construct meanings out of interconnectedness of elements that make up their personal systems. According to O'Conner and Mc Dermott [1997], systems thinking help to discern some structural rules, some sense of pattern of behavior and events every day, so individuals can prepare for the future to gain some influence over it. Systems are all around us and if we view what is happening around us through systems thinking lens, we could generate some sense of control, be more effective dealing with problems following better thinking strategies, and form a basis for clear thought and communication. Systems thinking and continuous improvement

concepts and tools are essential tools in helping individuals to manage themselves and others. Kim [1992] observed that by integrating systems thinking with quality concepts organizations can connect conceptual understanding with operations.

A key concept advanced by systems thinking is that leverage for organizational transformation comes from the ability to view interdependency among various elements of the system and locating leverage points to influence current actions [Senge, 1990]. However, today's fast paced world, our experiential and operational domain is made up of events and reactive or responsive actions. To act on a system, one needs to separate oneself from the operational domain to see interdependencies and move out in time to understand underlying time-varying behavior.

There is growing recognition that much learning is embedded in the day-to-day activities. Direct instructions can be one of the many stimuli for learning. Personal quality improvement involvement [Roberts and Sergesketter, 1993 ; Sergesketter, 2004] facilitates learning from the construction of meaning in the flux of using tools and pattern of events. If the framework can be augmented by enabling students to articulate their world-view using the systems thinking tool of causal loop diagramming, it is possible for them to reflect on their experience in a detached way. It then becomes likely for the participants to move into solution space and break the undesirable pattern of behavior. At least in theory viewing the progress or lack of progress toward desired goal through systems thinking lens can help students to recognize normally hidden dynamically subtle structures and their influence on the recorded patterns of behavior.

The purpose of this paper is to describe the entire pedagogical experience using systems thinking perspective. Next section briefly describes the limits to growth archetype as applied to resolution induced efforts. Then following sections summarize the pedagogical process, recurring structures as inferred from student reports, and observations about the course objectives, student experience of meeting their own goals and ability to use the causal loop diagramming to describe their world-views.

Resolution Induced Efforts and Limits to Success

It is generally known that many fail in meeting their resolutions. The limits to growth [Senge, 1990] archetype is useful for understanding the ineffective system dynamics operating when efforts are normally motivated by resolutions alone. There is a reinforcing process that operates on its own for a period of time. Then it runs against a balancing or stabilizing process. Figure 1 shows the underlying causal loop [Sterman, 2000]. The reinforcing loops R1 and B2 work synergistically in early periods during which the focused performance measure influences the motivational level and adjusts intensity and appropriateness of efforts. Assumption is that the individuals can determine required efforts and intensity of efforts associated with their own targeted performance goal.

It should be noted that if the intensity and appropriateness of efforts are inadequate, individuals may not see any improvements and thus the process may come to halt on its

own. Students' initial plans are carefully checked as a part of the project requirements to determine what is considered to be acceptable level of intensity and appropriateness of the efforts. They are asked to consult appropriate people or do some research into their chosen theme.

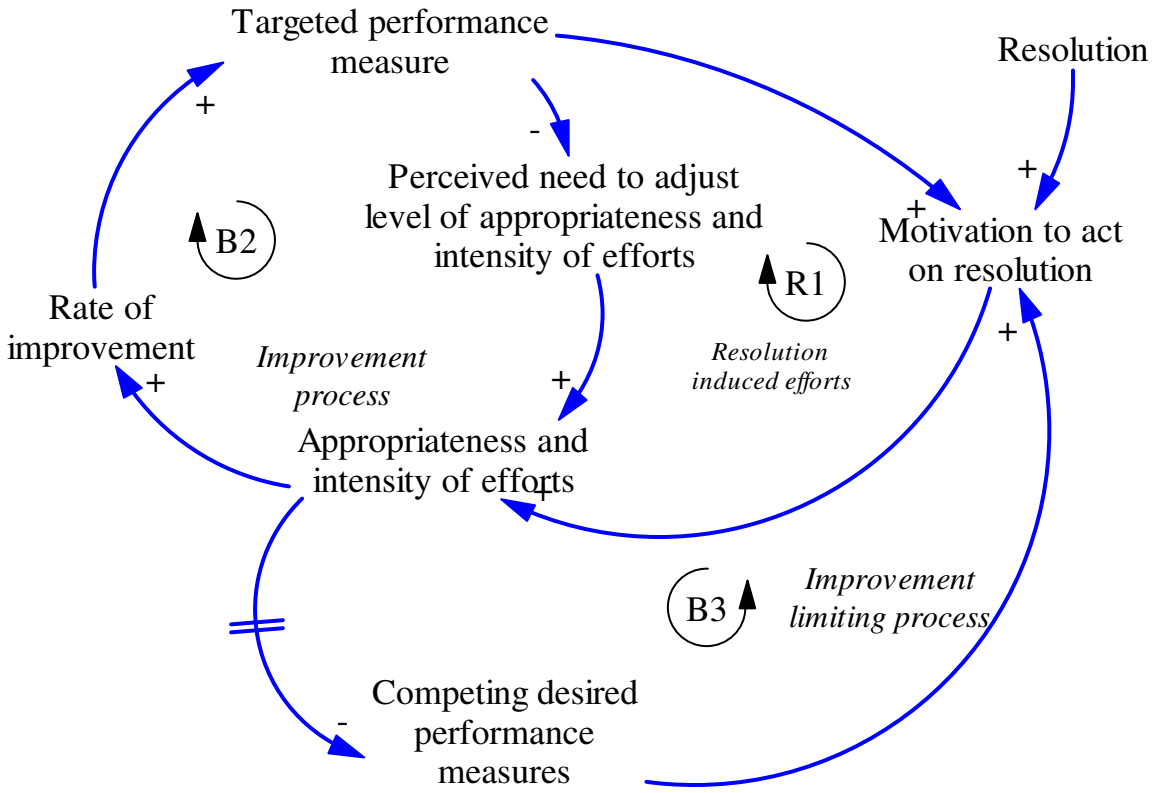

Figure 1. Limits to resolution induced improvements

Of course, in everyday life with so many stimuli flooding one's senses, it is very difficult to pay attention to any one thing at any one time. There are always overlapping priorities at any given time. As the competing performance measures in other areas of interests begin to drop the motivation to continue the efforts to improve resolution induced performance also drops. As time passes, the continuous improvement efforts are diminished and eventually discontinued.

Figure 2 augments the figure 1 by addition of variables that reflect the project efforts. The loop R4 shows the process that connects students' continuous improvement efforts to their progress toward completing the course sanctioned requirements to obtain the grade. It is assumed that the semester is long enough in duration to let the resolution induced motivation to maintain sustained efforts. Needless to say that some students who are

only interested in the grade could embellish the documentation that may not completely and/ or correctly reflect their true efforts.

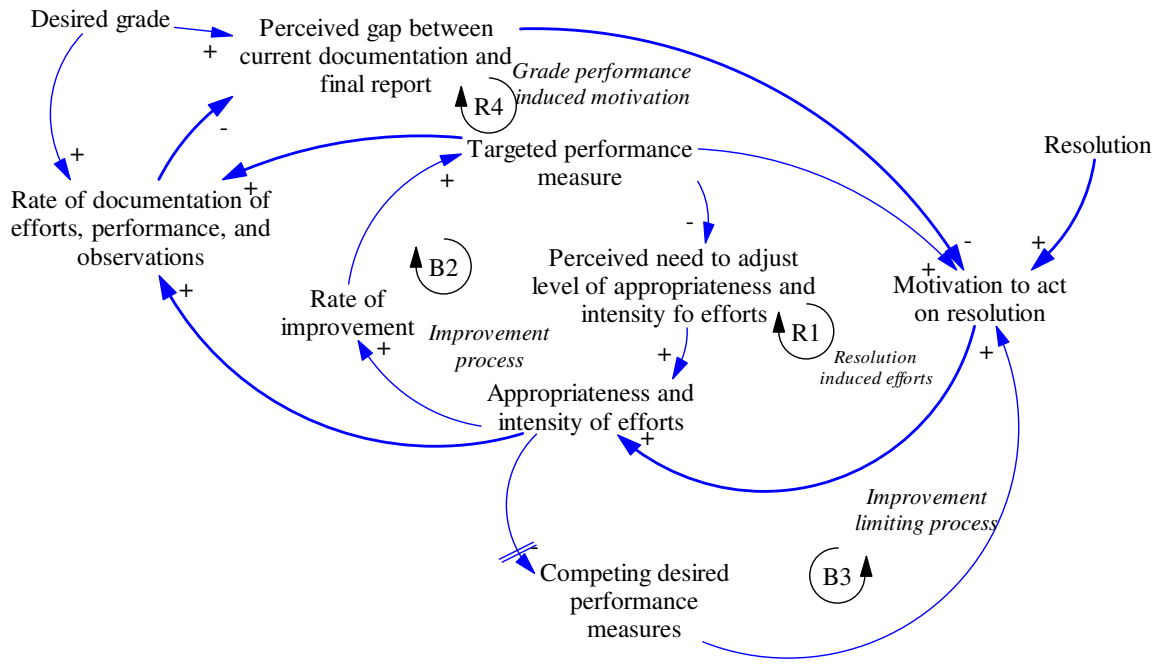

Figure 2. Course project intervention

Ideally, the project can be considered successful if extrinsic motivation provided by the course project requirements and intrinsic motivation induced by the resolution (the tentative commitment to change or improve) together overcome the countervailing competing performance limiting processes. Hope is that the students would form better habits and behaviors. Next section briefly summarizes the pedagogical process.

Pedagogical Process

There are three basic requirements for individuals to succeed in the change efforts: 1) they have to be ready, 2) they have to be aware, and 3) they must practice new habits. Because the course is offered during spring semester that begins in January and it is assumed that many of the students are ready to undertake some change that is beneficial to them. In the past many adopted habits and behaviors that take on life of their own and have become self-defeating. The course requirements bring these habits into full awareness. Quality management framework and tools offer a means to organize and communicate their experience and enable students to drill deeply into their own system to identify root causes and take responsibility for their own actions. Practice means awareness to consciously choose and practice new habits in the present. It is assumed that the project requirements keep awareness in the forefront for the length of the semester. Because the feedback from their own actions is rapid while working within the framework of personal continuous improvement, it becomes possible to learn about the important systemic issues in a relatively short duration.

Specific objectives of this project are to learn:

- the difficulty of managing change firsthand,
- the difference between commitment and compliance,
- to collect and organize data and to understand critical role of self-discipline in collecting data,
- to use process improvement and problem solving road map or storyboard,
- to apply qualitative and quantitative data management tools, and
- to communicate their thinking that supports their actions with the aid of various tools.

The students are provided with the following steps of instructions to begin organizing their project:

Step 1: Identify an area of personal quality that after its improvement will lead to enhancement of one's productivity, reduction in waste, improved health, etc. Select an area, which has been relatively bothersome. The area of improvement selected should have the following characteristics:

1. The problem issue is important for productivity, self-esteem, or growth.
2. The problem is chronic, rather than a one-time event.
3. The problem has a known history, which one can describe.
4. There have been attempts to solve the problem before, with little or no success.

- *Sketch a time-dependent behavior (approximate) of this variable over time and also include in the sketch at what relative position this variable ought to be after the improvement, if any? The problem is the gap between where individual wants to be and where he/she will end up with the continuation of the past behavior.*

Step 2: Assume that the improvement theme related performance measure is a function of habits. Make a list of at least five habits that influence the area of the personal quality selected. For an example, for the theme "Reduction in Weight" one may choose eating between meals, eating deserts, not excising, not drinking eight glasses of water, etc. as potential habits, defects, or opportunities missed.

Step 3: For each of the habit selected, provide an operational definition. For an example, eating between meals means putting edibles in the mouth each time between meals will be called a defect. An operational definition must be related to the root cause.

Step 4: Prepare a check-sheet (worksheet) to record the defects, deviations from standards of behavior, or opportunities missed related to the theme.

Optionally, the students are then asked to use first week or two to record their worksheet without making any changes in their behavior. They are then given an opportunity to modify their list of items on the worksheet after couple of weeks.

Then they are asked to continue to make entries into their check sheet and encouraged to write down any time and space specific observations that can relate to their entries using "5-whys" quality tool of managing quality at the source. Every couple of weeks the students are advised to use as many quality tools as possible to document their work to demonstrate their progress or lack of progress. Objective here is to have students also learn the mechanics of applying tools. Over the length of the semester students generate their own theories why some things work or do not work.

One lecture is devoted to introduce basics of causal loop diagrams that include the concepts of balancing and reinforcing loops, behavior over time and some examples [2]. Some suggestions for further learning are offered. Students are then asked to provide their insights in their own words and wherever possible to use causal loop diagrams to make their theories explicit. During the course of the semester they are encouraged to discuss their theories concerning their progress or lack of progress with their instructor.

Student experiences and recurring structures

The completed student reports offer many personal stories. The typical types of projects selected over and over again by students are listed in Table 1.

Table 1: A Typical List of Personal Quality Projects Themes

Improving grade or study habits
Losing weight through diet
Keeping living space clean
Managing time
Improve standing with a friend or family
Reduce coffee intake
Reduce alcohol intake
Improve writing skills
Improve English communication (International students)
Improve health through exercise
Improve communication skills
Investing in future capability (music)

After reviewing their narratives and diagrams attempting to explain their theories, "Limits to success," "drifting goals," "success to successful" and "shifting burden" archetypes were consistently noted and are described below.

Limits to success

A reinforcing loop among the variables 'proactive defect identification and reflection,' 'defects elimination through well thought out actions' and 'enthusiasm' operated

unimpeded for a while. However, many participants found that the process created conflict in other parts of their life that ultimately reduced then initial enthusiasm. The limiting factor appeared to be ability to balance needs. The diagram is shown in Figure 3

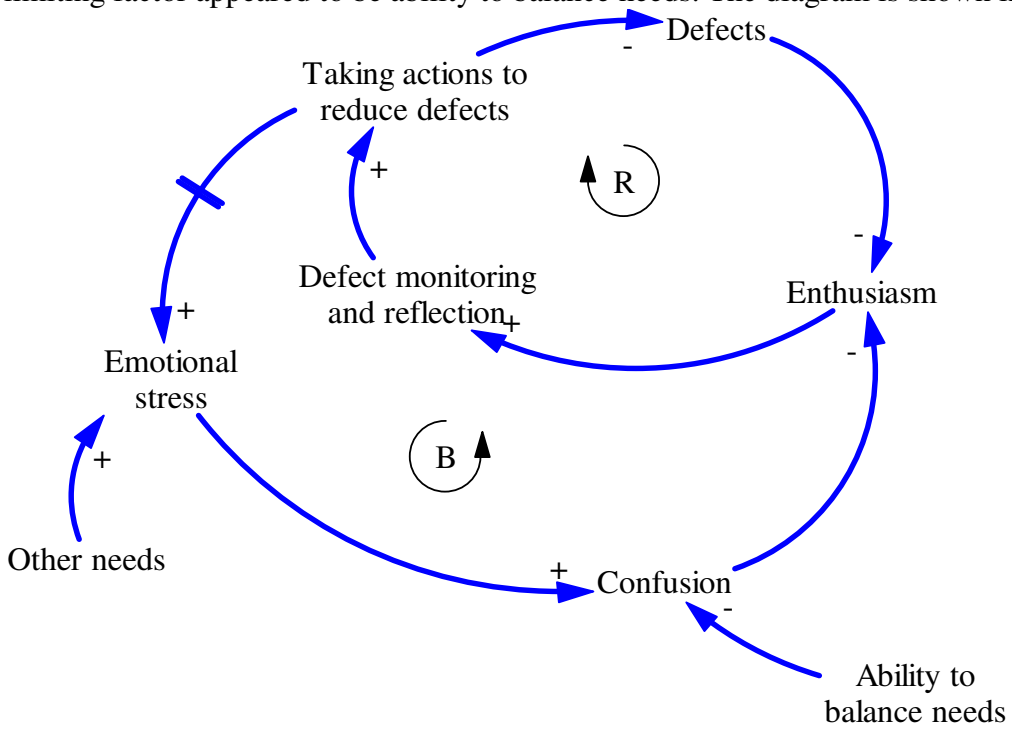

Figure 3. Limits to success

Drifting Goals

Several students after few weeks into their project modified the operational definitions of some of the defects. The result is improved demonstrated performance. This clearly appeared to be an example of drifting goals archetype as shown in Figure 4. Participants were allowed to modify defect definitions to reflect better understanding. Originally many defined some defects very tightly to demonstrate their sincerity toward this project. However, in most cases redefinition of defects by relaxing their interpretations has been equivalent to modification of a goal to meet the target.

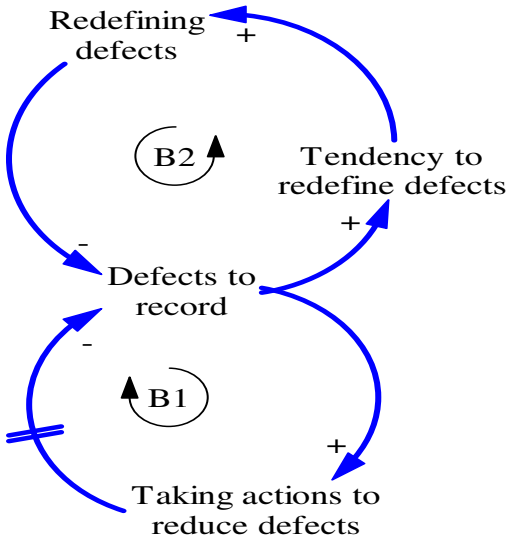

Figure 4. Drifting goals

Success to successful

Many participants related how the actions needed to support their projects competed with other endeavors. Figure 5 shows this archetype. In the beginning increased attention to defect reduction did not yield immediate results and hence, when opportunities for activities presented to participants, some of the effort diverted toward these competing activities that yielded much quicker payoffs in other areas.

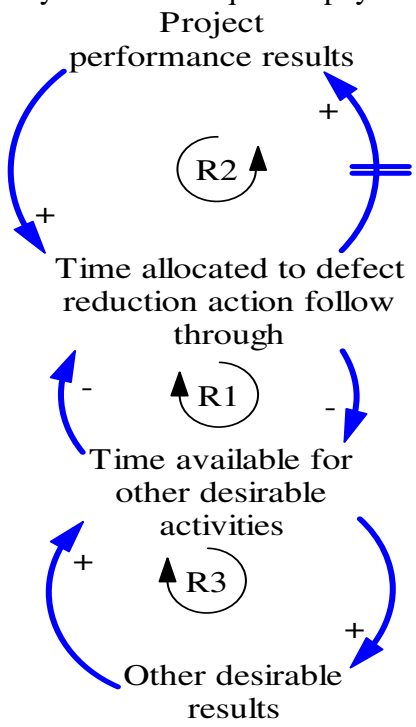

Figure 5: Success to suceesful

Shifting burden- addiction

Some stories had litany of excuses why participants could not carry out their planned activities to reduce defect levels. Usually they couched in terms of some specific circumstances that prevented them from focusing on their planned activates. This is clearly resembles shifting burden archetype as shown in Figure 6.

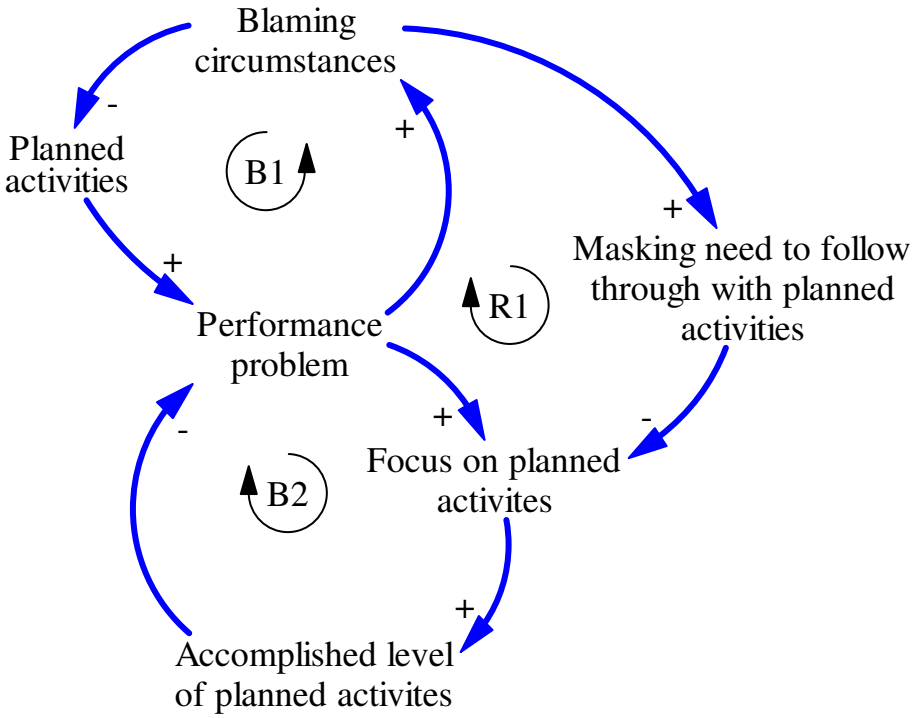

Figure 6. Shifting burden

Next section summarizes general interpretations and observations about the entire experience.

Interpretations and Observations

The learning from participation in this type experience depends upon the commitment with which one participates. The following list represents a collection of lessons learned as reported.

- Understanding the Deming's first principle about "constancy of purpose" and commitment;
- Recognizing that individual habits are part of the system and that individuals act according our own view of how system works;
- Appreciating resistance to change first hand;
- Understanding the difference between treating symptoms and treating the root causes;

- Making connection between defects and own responsibility;
- Malleability of world-view one and thus making make difference with their efforts;
- Recognizing we are victims of our own systems.

The list reflects many salient features of many systems observed in private and public sectors. Total quality management practitioners can relate to the lessons participants learn by engaging in such an experiment. It can be concluded based on the reported lessons learned; the course objectives have been met.

Majority of the students reported that they did not succeed in achieving their goals, though they considered the project was interesting, worthwhile, and educational. Approximately twenty five percent of the students concluded their reports by expressing their intention of continuing the project in the future. For those who self reported some success moving toward their goals, one cannot necessarily claim that the involvement in the project was the only contributing factor. Their ulterior motive to influence the grade cannot be ruled out, even though they were informed that the grade did not depend on their success in meeting their goals.

From written reports submitted, it can be concluded that most students appreciated and even appeared to enjoy drawing causal loop diagrams. Those who reviewed archetypes prior to building their own diagrams did better job. However, majority of student generated diagrams were overly complicated and did not always reflect the theories they were trying to communicate in their narratives. One reason might be that this was their first experience and did not see the importance of ability to communicate their insights using causal loop diagrams. Second explanation is that the causal loop diagramming is considered to be just another quality tool that most felt that they need to use it as a part of the report. Majority did not realize that the development of a causal loop diagram is an iterative process and purpose is to communicate one's theory or assumptions using minimum number of well-chosen variables and concepts. This observation also reflects that students received a very brief exposure to systems thinking concepts. However, if the purpose of the drawing causal loop diagrams is to stimulate one's thinking, then the process can be considered to be partially successful.

Conclusions

Kim (1992) made observations indicating that quality management and system dynamics have complementary strengths that can greatly enhance ability to improve performance through more balanced learning perspectives. Quality management tools and concepts are particularly useful working in operational domain of process management and improvement, whereas systems thinking concepts and tools are useful to enhance conceptual learning. While operational learning focuses on what and how of doing a task, conceptual learning emphasizes the why of doing a task. Efforts in applying systems thinking tools help surface assumptions and norms that have been previously hidden. This paper verifies these observations to some extent.

The results from this type of pedagogical experiment are gratifying from perspective of the major focus of the course. The term long engagement offered students some experience in the area of quality improvement and also provided an opportunity to reflect on their own world-view of how things work. If the evidence that learning is an observable change (or no change) in behavior due to experience, then the framework generates that learning. Systemic thinking has little effect unless the tools and concepts change the way people perceive the situation.

One key lesson most participants took with them was that the implementation of any technology or a program requires skills, will and commitment. The leverage avails itself when the problems can be viewed from a systemic perspective. A systems perspective in an event driven operational domain requires us to make a connection between an event, pattern of events, and systemic structures. A personal quality management project supplies one hands-on means of experiencing this connection.

Notes

1. Quality Management course is a junior level course offered during spring semester. Many students make New Year resolutions and hence, the term paper on applying continuous improvement to self offers them an opportunity to see if they can stick to their resolutions and get some academic credit as well. The work reported here is a reflective piece based on several boxes of reports collected over time. Total number of usable reports was over one hundred and hence, the sample was large enough to develop some tentative observations.
2. The lecture covered very basics and asked students to further explore the topic by reviewing key chapters from *The fifth discipline* [Senge, 1990]. The lecture is also used to inform students that more rigorous perspective on the topic that included significant computer based modeling can be learned in an elective course on Systems Thinking and Dynamic Modeling.

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