Introduction

Total Quality Management (TQM) is not the panacea it might have promised to be. However, the tools of quality used in TQM are of considerable value. Used correctly they can be used to resolve many business concerns. Correct use comes from teaching not only the tools’ processes, but also their benefits, and limitations. The tools must also be taught in reference to the policies, procedures and beliefs of the organization. Specifically, the tools should be taught using a carefully focused demonstration followed by a structured exercise. This proved most effective in promoting the successful use of quality tools at Honda of America Manufacturing (HAM).

Methods Used

How to teach these tools has always been a concern. Quality tools are generally taught as a series of discrete nonintegrated units. Each tool’s use is taught separately from the other. Learning to use these tools in this way is similar to someone trying to learn to speak a foreign language by memorizing a dictionary. It represents an impossible task. The ineffectiveness of this method was seen when associates were required to show on-the-job use of at least one tool after taking classes to learn about each tool. The examples presented generally did not show tools helping solve a problem, but rather showed a tool injected into a previously solved problem. This diluted the worth of these classes. A better method had to be developed.

Theory

A second method of teaching uses two concepts as guides:

1. The characteristics of adult learners
2. The theory of knowledge

Teaching adult learners is different from teaching other students in four ways:

1. The learners, not the instructor, determine what is important.
2. The content should be immediately useful.
3. Experiences contribute more to the opinions of adult learners, at times they have a fixed point of view prior to the class.
4. They do not accept information at face value.
These characteristics often make the teaching much more difficult. The class must not simply present the information, it must also demonstrate the importance and relevance of the information.

This suggests differences between training and education.

Learning is the difference between education and training. Education is the “why” and training is the “how”. Learning, by contrast, requires a desire on the part of the learner. The theory of learning can be shown as a circle with four parts; questions, theories, testing, and reflection.\footnote{1}

\begin{center}
\begin{tikzpicture}
  \node[align=center, circle, draw] (q) {Questions};
  \node[align=center, circle, draw, below right of=q] (t) {Theory};
  \node[align=center, circle, draw, below left of=q] (r) {Reflection};
  \node[align=center, circle, draw, below left of=t] (s) {Testing};
  \path[->] (q) edge (r)
                        edge (t)
                        edge (s)
                        edge [loop left] (q)
                        edge [loop below] (q)
                        edge [loop right] (q)
                        edge [loop above] (q);
\end{tikzpicture}
\end{center}

Normally the circle starts with Questions. This could be in the form of a problem that needs to be solved or a dilemma facing the learner. Learning needs intrinsic motivation. The learner, must have the question and desire to know the answer.

The proposed answer to this question can be thought of as a theory. Dr. W. Edwards Deming spoke of it as a ‘prediction.’ Problem solving calls this “the most probable cause.”

The theory then goes through testing, to see if the prediction comes true. After the testing is complete, evaluation of the results is called reflection. The reflection often results in more questions, completing the circle. This is similar to the Plan, Do, Check, Action of the Shewart Cycle.\footnote{2}

**The New Method**

After recognizing the shortcomings of the current method of teaching the tools of quality, HAM developed a class to integrate the teaching of these tools. The emphasis in the new method is on the application of the tools and when to appropriately use them.

The format for the class is a warranty problem which is familiar to the students. Although the problem was known to the attendees, thus whetting their curiosity, the method used to solve the problem was unknown to them. In an auto company, problems such as this are serious, and therefore the importance of solving this problem is obvious to all. The problem was complex and the solution was not trivial.

The new method presents a flow for solving the problem. Each step in solving the problem is demonstrated using many of the quality tools. The first step utilizes a Situation Appraisal to catalog and prioritize concerns. This technique is taught by Kepner-Tregoe of Princeton, New Jersey.\footnote{3} It focuses on what should be done and when it should be done. The exercise then resolves special cause and common cause variation into alternatives to be investigated further.
In the new method, actually learning the mechanics and internal processes for each tool is accomplished by self study. In other words the “how” of the tool is left mostly to the associate. This is fairly easily accomplished since the tools are simple. Lee Iococca once noted the difference between Japanese and American workers in saying that the Japanese could just hand out a book on SPC and the workers would learn it, where as “we need classes on company time.” The problem is American workers want to see the relevance of what they are being asked to learn. Once they are shown a real problem, American workers can and will learn from the same books.8

After seeing the demonstration exercise, the associates are given a structured exercise to work on which is relevant to them. For example, at Honda if it is not about cars it better be about motorcycles. The exercise uses a number of tools and the instructors act as a coach.

**Testing**

Trials utilizing the new class format quickly exposed some flaws, but none were major and only one concerned the format. The difference between special and common cause variation had to be more clearly explained. The other flaws concerned details of the content, and actual data that was used.

Accurate measures of training are difficult to assess. The benefits are often unknown and unknowable. Surveys of the attendees were very favorable. This is not a good measure of the class, however, because as Dr. Deming has stated, students are not a good judge of a course.9 They can only comment on the style of the presentation, they don’t know what content has been left out or the verity of what was included. If they did they would not need to attend the class.

Significant input came, however, from those knowledgeable in the use of the quality tools. In general this input was very favorable, but more important was the follow-up with attendees months after the class. The attendees were more confident as they found themselves more clearly understanding what tools were appropriate to use and when to use them in solving quality problems.

**Conclusions**

As a result of this class, associates now read the books on quality tools that were previously ignored. The Nelson Funnel Test10 is now used in the class to help associates more clearly understand the theory of variation.

The new method of teaching requires much more effort in crafting both the demonstration case and the structured exercise. The examples used will soon be obsolete as the previous attendees tell future students of the class and as the memory of the warranty claim fades. New exercises should be developed by a team with both hands-on experience in problem solving and class development. Overall, the class has been a success.
References

'Quality Control Leadership, internal Honda of America Manufacturing text 1986.


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