The Use of the Continuous Improvement Process in an IET Program

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Abstract

Section V.A.2 of the ABET criteria indicates that programs must have plans for continuous improvement. The Industrial Engineering Technology (IET) faculty members at USM were consequently required to develop a continuous improvement plan.

Scherkenbach's [3] description of the PDSA cycle is the one used as a starting point for the continuous improvement plan for the industrial engineering technology program at the University of Southern Mississippi. The IET faculty at USM has written a continuous improvement plan. This plan is the first plan and hence as it gets implemented on a small scale at first, the results will be studied and the plan will be improved upon.

This paper describes how the continuous improvement process was used to improve the IET program. One group of customers is the potential employers of IET graduates. Thus, this paper describes an example where the Industrial Advisory Board was used via the continuous improvement process method to update the content of a specific course.

Introduction

Section V.A.2 of the ABET criteria indicates that programs must have plans for continuous improvement. The IET faculty members at USM were consequently required to develop a continuous improvement plan.

To begin the development of a continuous improvement plan, a search for examples of continuous improvement in the IET program began and found several examples, but none were documented. One example involved the use of the Industrial Advisory Committee to continually update the curriculum and the contents of specific courses.

This paper describes the continuous improvement model and documents an example of its use in the Industrial Engineering Technology program at the University of Southern Mississippi.

Continuous Improvement Process

The Memory Jogger Plus+ [1] describes a process-improvement model with four major stages of Plan, Do, Check, and Act. This is similar to many continuous improvement methods also called Plan-Do-Study-Act. Figure 1 illustrates how the four stages in the PDSA cycle are repeated continuously so that improvements will never end.

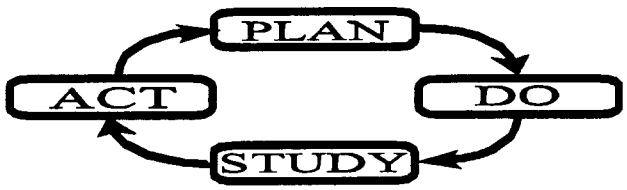

Figure 1: The PDSA Cycle

Deming [2] described the Plan-Do-Study-Act model for continuous improvement to the Japanese in 1950, and the Japanese called the model the Deming cycle. However, Deming credits the idea to Shewhart [4] who described a Plan-Do-Study cycle as a method for investigations and improvement of production processes. Scherkenbach [3] expands the description of the PDSA cycle into eight steps. Scherkenbach's eight steps were the basis for the generic continuous improvement plan for the industrial engineering technology program at the University of Southern Mississippi.

The PLAN Stage

In Scherkenbach's description of the PDSA cycle, the PLAN stage has four steps: identify the opportunity for improvement, document the present process, create a vision of the improved process and then define the scope of the improvement effort.

Scherkenbach breaks down the step for identifying the opportunity for improvement into further tasks. To identify the opportunity for improvement requires an understanding of the process customers is required. To understand the process' customer, Scherkenbach recommends three activities. First, determine who the customers are. Second, determine the needs or wants of the customer. Third, determine what the customer is getting from the current process. The opportunity for improvement can then be determined by comparing what the customer

wants and what the customer is currently getting from the process.

The next two steps of the PLAN stage deal with the process that is to be improved. The second step is to document the current process in order to understand the current process. The third step of the PLAN stage is to create a vision of the improved process. More than likely, the process descriptions for the current process (from the second step) and the envisioned process (from the third step) will not match, which will indicate where process changes can be made.

The final step of the PLAN stage is to define the scope of the improvement effort. It is probable that from the previous steps in the PLAN stage, there are several areas for possible improvement. This step involves deciding which of the possible improvements needed will be undertaken.

The DO Stage

The second stage of the PDSA cycle is to DO. Scherkenbach's only step in the DO stage is to implement the process improvement "on a small scale, with customers, and over time." Doing the planned improvement on a small scale allows the people implementing the plan to easily modify the plan as unforeseen difficulties arise. The customer should provide feedback often to guide the minor adjustments made. Doing the plan on a small scale also limits the risks of losses if the plan is a failure.

The STUDY Stage

The third stage of the PDSA cycle is STUDY, which also has one step. In this step, the results of doing the plan are studied to determine the improvements that were actually derived from the small scale improvement made in the previous stage.

The ACT Stage

The fourth phase of the PDSA cycle is to ACT which Scherkenbach recommends two steps. The first step is to use the knowledge obtained from the study stage to implement the process improvement on a larger scale. The second step is to return to the beginning of the PDSA cycle and make further improvements. This last step is crucial for continuous improvement.

Example Implementation of the Process

The first step in the continuous improvement process is to identify the opportunity by identifying the customer, determining the wants or needs of the customer, determine what the process is providing the customer, and then use the differences to indicate the opportunity for improvement.

Determining the customer for the higher education process is very difficult. For this example, the decision was made to use the employers of IET graduates as the customer. The Industrial Advisory Council was then used as a representative of this customer.

During the annual meeting with the Industrial Advisory Board, the operations research course for engineering technology students, "Resources in Engineering Technology" was discussed. The board wanted the course to give more emphasis to logistics topics such as transportation issues and network modeling.

The next task in this step is to compare the current process with the ideal process to determine improvements. The current process for each course in the IET program is documented in the detailed syllabi. The syllabus for the improved course was written that included logistics topics in addition to standard topics in operations research such as linear programming, forecasting, and queuing. The added logistic topics dealt with the solution of delivery service problems via linear programming techniques such as transportation and transshipment, network graph methods, and integer programming methods. The new course syllabus was sent to the members of the Industrial Advisory Board for their comments and positive feedback was obtained from them.

The next stage in continuous improvement is the DO stage. This stage involved conducting the course in the spring semester of 1997. The course was conducted with new homework assignments to accommodate the new material. The students used a student version of LINDO software for Windows to solve many of their assignments.

The new syllabus required the students to do a project that involved solving a real problem of their choice with the techniques learned in the class. The problems ranged from a regional manager who needed to minimize his route path to various stores to a computer network installer who needed to minimize the amount of wiring to connect all the computers in a multi-storied building.

The study stage indicates that the course was successful. The enthusiasm displayed by the students was evident during both the project phase and during the presentations. A presentation of the benefits from the course changes will be made at the next Industrial Advisory Board in the coming months.

The act stage has two steps. One is to implement the improvements on a larger scale and then begin the cycle again. The Industrial Advisory Board will again be asked to recommend adjustments to the content of this course and other courses in the IET curriculum. The last step is to repeat the PDSA cycle again.

Conclusions

The success of using the continuous improvement process provided experience that was valuable in developing more detailed continuous improvement plans. One

continuous improvement plan written was for improving the topics in IET courses. Another plan was written for improving the course selection in the curriculum. Two continuous improvement plans written cover the acquisition of equipment and software used in the courses. Two other continuous improvement plans were written for improving student recruitment and student retention. Each of these plans will be continuously improved as more experience provides improvement ideas.

Acknowledgments

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