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Research Article

SIX SIGMA - CONTROL CHARTS FOR ANALYSING THE SPECIFICATION LIMITS OF LEARNING THE ICT CONCEPTS BY SECONDARY TEACHER TRAINEES

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ABSTRACT

The quality does not just happen. It must be planned for. Quality needs to be a major plank in an institution's strategy and needs to be approached systematically using a rigorous strategic planning process. Some of the crucial issues that necessitate the quality are:

- The quality is sacrificed by the quantity in an undesirable way due to proliferation of teacher education institutions. Generally private institutions, particularly the teacher education institutions in in India are viewed with skepticism and contempt (Hariharan and Mohanasundaram, 2013).
- The skill acquisition is paramount but the skillful training provided to the prospective teachers are not optimum and inadequate, as result, the incompetent teachers are produced which, in turn, it affects the quality teaching in their respective schools.

INTRODUCTION

The Six Sigma Assessment Method of Quality Learning

The emergence of influential factors during the classroom learning and its impact in the achievement test performance can be analysed by the six sigma quality method. While Six Sigma is increasingly implemented in industry, little academic research has been done on Six Sigma and its influence on quality management theory and application (Xing xing Zu *et al*., 2008).

Six Sigma Defined

Brue (2003) claim that six sigma developed towards a technology-based statistical process approach rather than a broad business improvement approach. Six Sigma is an organized, parallel-meso structure to reduce variation in organizational processes by using improvement specialists, a structured method, and performance metrics with the aim of achieving strategic objectives.

Statement of The Problem

This study is inclusive of the academic process improvement, quality management of classroom learning by reducing the various psycho-somatic deficiencies which are hindering the quality outcome and to examine the possibility of applying the six sigma methods within the sphere of teacher education which is mother of all education (Hariharan and Mohanasundaram, 2013). In view of these perspectives, the problem of the study is stated as ''Six Sigma - Control Charts for Analysing the Specification Limits of Learning the ICT Concepts by Secondary Teacher Trainees''

Need and Significance of the Study

This study has been aimed at examining the relevancy of the six sigma method in academia and its beneficial aspects while implementing in the academic process of the teacher education. This six sigma based experimentation analyses of various psycho – somatic factors, which may tend to change abruptly in particular situation and governs the process improvement in learning of the prospective teachers (HariHaran, Zascerinska & Swamydhas, 2013).

Control Charts – A Six Sigma Tool

In 1924, Walter A. Shewhart from Bell Telephone Laboratories, proposed the concept of using statistical charts to control the variables of products manufactured at Western Electric. This was the beginning of statistical quality control (Small, 1956). The role of the quality inspector changed with the statistically based control charts form one of identifying and sorting defective product to one of monitoring the stability of the process and identifying when it had changed. Improved product quality was resulted by early detection of the change and appropriate corrective action.

Shewhart kept on with his efforts and applied the fundamentals of statistical quality control to industry. This lead to the modern attention to the use of statistical tools for the manufacture of

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products and process originated prior to and during World War II, when the United States of America geared up to a massive build-up of machinery and arms to successfully conclude the war.

The need to manage the myriad of complex weapon systems and their varied and distributed defence contractors led to the evolution of the system of Statistical Quality Control (SQC), a set of tools that culminated in the military standards for subcontracting, such as MIL-Std 105 (Shina, 2002). The basis of the SQC process was the use of 3 sigma limits, which yields a rate of 2700 defective parts per million (PPM).

Control chart for the achievement test

In statistical process control (SPC), the mean, range and standard deviation are the statistics most often used for analyzing the data measured. Control charts are used to monitor these statistics. An out of control point for any of these statistics is an indication that a special cause of variation is present and that an immediate investigation should be made to identify the special cause. Eugene L.Grant and Richard Leavenworth (2011) have cited the main features of the control chart as mentioned below:

- The quality characteristics can be measured and expressed in numbers. Many quality characteristics can be observed as attributes, by classifying each item inspected into two classes, conforming or non – conforming to the specifications.
- Thus the Shewhart control chart for fraction rejected generally makes use of data that either are already available for purposes or can readily be made available. These charts show whether the assignable causes of variation appear to be present on day–day basis and are explainable. It provides a clear picture and exerts pressure for quality improvement.
- The most versatile and widely used attributes control chart is the *p* chart. This chart for the fraction rejected as non-conforming to specifications (so called fraction defective). It may be applied quality characteristics that can be observed only as attributes.
- As long as the result of an inspection is the classification of an individual article as accepted or rejected, a single *p* chart may be applied to one quality characteristics or dozen or hundred.
- Fraction rejected of the *p* chart may be defined as the ratio of the number of non– conforming articles found in any inspection or series of inspections to the total number of articles actually inspected. Fraction rejected is nearly always expressed as decimal function.
- As long as the non-conforming fraction in the universe remains unchanged, the relative frequencies of non-conforming fractions in the samples may be expected to follow the binomial law.

Control chart in the present investigation

Control chart in the present study is determined only for the terminal sigma values of the test score as it is the final stage of the learning of the experimentation, it may provide an ample confirmation of the defective proportion the test score at terminal level. The existing study consists of the three guidelines:

1. Centre line – average proportion defective
2. A lower control limit – computation of lower variation of the test score
3. An upper control limit – computation of upper variation of the test score

Case Study

Sampling design

30 prospective teachers of DR. Sivanthi Aditanar College of Education, Tircuhendur Thoothukudi district. The student teachers were selected by purposive cluster sampling.

Variables

Independent - teaching methodology
Dependent - The achievements of the students were assessed in terms of fraction defective.

Objectives

To check whether the achievement test score falls within the specification limit or not in the control chart of the Traditional teaching group at posttest.

Null hypothesis

The post –test (terminal sigma level) achievement test scoring of the traditional teaching group does not fall within the specification limits of p – control chart.

The specification limits of control chart

The variation in the achievement test of traditional teaching group at intermediate level of learning (interim sigma) was estimated and the values achievement test was within the specification limit which was tested through the control chart drawn by denoting the no of students in the X axis and fraction defective in the Y axis.

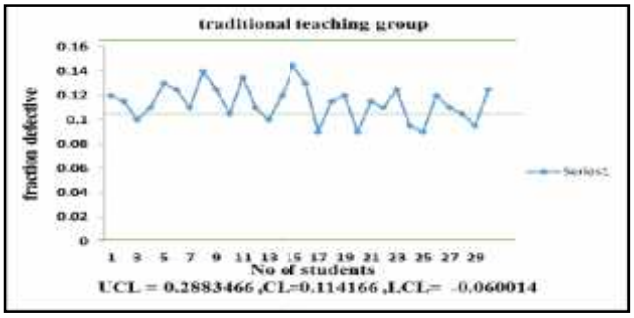

Figure 1 – Control chart shows the statistical limits of the Traditional teaching group

Interpretation

The control chart clearly infers that the individual achievement marks in ICT concepts of self-learning group at posttest level (terminal level) fall within the specification limit and the above mentioned null hypothesis is rejected. It is also noted that the uniform pattern in scoring in the achievement test and hence the individual marks of the 30 prospective teachers fall within the specification limit of the p- chart as in the figure 1.

This chart shows the common cause for variation in the achievement tests which is formed due to the lack of cognitive,

reading, note taking and writing strategies. Further, it is found that the control chart is a well-known and reliable method which can find the quality learning systems.

CONCLUSION

Thus the control chart can be considered as effective tool to identify the specification limits of learning by elimination the possible cause of deficiencies and the same can be adopted of the socio – economic factors that influence that greatly affect the learning process – a vital force of any individual learner.

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