Abstract

The quality, necessitated as the renewed interest in teacher education, has been spurred by the free spirit and the new world enterprise, which seeks to create human talent pool that can adapt to new ideas, cultures and environment (Hariharan and Mohanasundaram 2013). Further, Looking to the 2030 horizon, a highly competitive and sustainable social market economy will be needed in order to maintain social cohesion according to the European council. The teacher education and training are the key factors to achieve this aim (HariHaran, Zascerinska & Swamydhas, 2013).

I. INTRODUCTION

But for now, the 2030 horizon requires teacher training reform in order to facilitate teacher’s creation of new products, new patents, new entrepreneurial activities and new jobs as prospective teachers succeed harder to find a job in the light of enormous socio-economic and unprecedented demographic challenges. Therefore, innovative teacher training should teach how to turn challenges into advantages, thereby producing innovative products and services of the highest quality and improving their competitiveness (HariHaran, Zascerinska & Swamydhas, 2013).
For attaining the quality, Six Sigma methodology can be applied and this has seen broad acceptance in industry, no study has been published about its use in the learning
process of secondary teacher trainees. Although some indicate that the methodology would be applicable to higher education (Raifsnider & Kurt, 2004) but its approach is limited only to specific administrative setting. It has five stages with each letter in the acronym stands for one as in figure 1 in which the various performance indicators and its analytical tools are illustrated.

The DMAIC method emphasizes data analysis and fact-based decision making. The method guides a structured exploration of reasons leading to the problem. The essence of the DMAIC method is to reduce variation in a process to achieve high conformance quality in customers’ terms and its application in the class room learning framed by HariHaran, Zascerinska & Swamydhas (2013), is shown in the table 1.

**Table – 1: DMAIC Principles Applied to the class room learning System**

<table>
<thead>
<tr>
<th><strong>D</strong></th>
<th>Define the instructional process with learning objectives and outcomes</th>
</tr>
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<tbody>
<tr>
<td><strong>M</strong></td>
<td>Measure student learning in the classrooms of prospective teachers</td>
</tr>
<tr>
<td><strong>A</strong></td>
<td>Analyse student learning in the classroom by statistical process</td>
</tr>
<tr>
<td><strong>I</strong></td>
<td>Improve student learning based on the data analysis in the analyse phase</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Control plans that institutionalize the improvements for the future to ensure that student learning stay at a desired level</td>
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</table>

The whole concept of Six Sigma DMAIC is discussed in detail as under:

II. CONCEPT OF SIX SIGMA DMAIC

2.1. Define Phase

This phase defines the academic process, identifies critical learning requirements and links them with the academic needs. It also defines the strategy charter and class room processes to be undertaken for Six Sigma and present case study focuses on the project through which the passing rate of the prospective teachers in a teacher education college is to be improved.

In the define phase, the goals of the improvement activity are clearly defined. The parameters which greatly influence the goals of the academic practice in respect to quality are called critical to quality (CTQ) parameters. In the process of defining, the goals of CTQ are identified through Voice of Customer (VOC). VOC is collected by conducting brain storming sessions among the customers. Project Charter, CTQ flow down and Process mapping are the important tools used in this phase.

2.2. Academic Project charter

Academic project charter revealed in table 2 is a document stating the purposes of the project. It contains the elements such as academic activities, problem statement and goal statement. Academic charter indicates the purpose of the project in which the goals and objectives are established. The next element is the problem statement which clearly expresses the problem to execute. After establishing the problem statement the six sigma team has to decide the target values by thoroughly observing the past data. These values are mentioned in a statement called Goal statement.
### Table 2 - Academic project charter

**Project title:** Enhancement of learning ICT concepts of prospective teachers  

**Project description:** The psycho - somatic variations occur during the learning of ICT concepts in the classroom and these variations may be disruptive factors of learning outcome which is reflective through depleted level in writing, reading, self – expression, cognitive, note taking etc. While this study analyses to bring these effects down, The potential effect of various learning modes on the positive development of learning have also been additionally analyzed.

**Scope:** The classroom analysis on learning by suitable statistical tools

<table>
<thead>
<tr>
<th>Project objectives:</th>
<th>Mode of learning</th>
<th>process variations</th>
<th>process outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>To the minimize learning deficiencies</td>
<td>2. Traditional teaching</td>
<td></td>
<td>To increase achievement level.</td>
</tr>
<tr>
<td></td>
<td>3. ICT based learning</td>
<td></td>
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</tr>
</tbody>
</table>

**The need for the analysis**

**Customer Impact:** The students are ‘customer’ and learning efficiency is ‘product’ and making the more productive learning in the class rooms is an indispensable impact

**Process impact:** To minimize the influence of the psycho – somatic factors

**Social impact:** quality in learning of prospective teachers is the supreme essence for the best societal transformation at all levels in this modern global scenario which is based on neo economical world order. Moreover, This will yield the best impact in the entire functioning of the school system.

**Academic officials**

<table>
<thead>
<tr>
<th></th>
<th>Members of management council</th>
<th>Entire process responsibility</th>
</tr>
</thead>
</table>

**Project champion**

| Dr.K.Mohanasundaram, The principal-grade-1, Government Arts college, The chief of research work on academic six sigma for process performance. | | Advocates the team efforts to manifest the perfect leaning by remarkable modifications of the class room instructional process. |

**The master Black Belt**

| R. Hariharan , The investigator of the six sigma research work | | Deals to implement Six Sigma & gathers and analyses data about team activities as per the direction of the project champion. |

**The Black Belts** (Team of professors)

| Dr.P. SwamyDas Dr.R. Arumuga Rajan Dr.D.Sivakumar Dr. K. Thiyagu & Shri.K.Natarajan | | Reviews/revises/clarifies the project, Works with team members, Selects project team members and Identifies resources for the team, Documents final project results. |

**Process owners**

| All staff members become responsible “owners” | | They are responsible for continuous improvement |
2.3. Measure Phase
This phase is inclusive of identifying the critical to quality (CTQs) characteristics of the process which is decisive to determine the factors that contribute to student attrition. Once the CTQs are identified, surveys and interviews can be used to measure their effects on passing rate and data collection is the main emphasis of this phase.

<table>
<thead>
<tr>
<th>Define</th>
<th>Measure</th>
<th>Analyse</th>
<th>Improve</th>
<th>control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project definition (31-10-2010)</td>
<td>Process variation</td>
<td>Value stream analysis (muda analysis)</td>
<td>Implementation of new process</td>
<td>Standardising academic plans</td>
</tr>
<tr>
<td>Top level process (13-11-2010)</td>
<td>Estimation of variation</td>
<td>Statistical inference</td>
<td>Access the benefits</td>
<td>Control plan</td>
</tr>
<tr>
<td>Team formation (13-11-2010)</td>
<td>Estimation of Baseline</td>
<td></td>
<td>Evaluation of failure mode</td>
<td>Learning the process more</td>
</tr>
</tbody>
</table>

The baseline statistics such as sample mean ($\mu$), standard deviation ($\sigma$) and process capability indices $C_p$ and the $C_{pk}$ for each CTQ are calculated. The process capability index is an easily understood aggregate measure of the goodness of process performance. The Failure mode and effect analysis (FMEA) can also be performed to measure the failure factor.

2.4 Analyse phase
In this phase, process capability analysis is analysed to find out the actual state of the process. The existing DPMO (Defects per million opportunities) or PPM (Parts per million)
level which is the way to calculate the sigma level or yield of a process is determined using process capability analysis. Minitab software may be used for analysing the data and it generates a process capability report. In the present case, a survey is conducted among the prospective teachers on the basis of collection opinion method through check lists. This is the most appropriate way of finding the Key Critical Factors (KCF) of a teacher training college which directly or indirectly affects the passing rate of the students. The procedure followed is enumerated:

- As the academic process has found the key critical factors of the institute so we are opting for the student system. Being students this would be most appropriate to collect the data.
- The student performance will be adjudged in the most important fields like class room learning.
- A survey will be conducted among the students to categorize the degree of importance of various factors of learning.
- The learning deficiencies and some key performance areas will be located in sub-systems like home environment and assigned weightage according to the importance.

2.5 Improve phase

Improve the process to remove cause of defects. The optimal solution for reducing mean and variation is determined and confirmed in improve phase. The gains from the improve phase are immediate and are corrective in nature. Specific problem identified during analysis are attended in improve phase. This phase involves improving process performance characteristics for achieving desired results and goals.

2.6 Control phase

This phase requires the process conditions to be properly documented and monitored through statistical process control methods. After achieving the desired level of Sigma in the learning stage of DMAIC cycle, there is a continuous control of the process. The control phase aims to institutionalize the improvement results from six sigma methods through documentation and standardization of the new procedures. It includes the setting up of monitoring and process control systems. Control charts are used to monitor the system performance. In the control phase control charts are prepared in respect of CTQs to sustain the quality improvement.

III. CONCLUSION

The academic six sigma as a comprehensive and flexible system of achieving, sustaining and maximizing the process outcome through adopting the societal needs, efficient use of facts, statistical quality control principles and attaining the objectives through effortful consideration to manage, improve and reinventing the educational process (Hari Haran & Mohanasundaram, 2013).

IV. REFERENCES


To Cite This Paper