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Application of Total Quality Management in the Engineering Mathematics Classroom to Improve Students' Performance

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Abstract: *Quality has become the defining element of education in the 21st century. Total Quality Management (TQM) is a management philosophy, defined as a customer-oriented process and aims for continuous improvement of business operations. It ensures that allied works are toward the common goals of improving service quality and enhancing the process of rendering services. As all education institutions are service oriented organizations, there is a greater need of TQM in educational institutions. In this paper, we study the application of TQM in the teaching learning process of Engineering Mathematics by applying Deming's model to improve the students' performance*

Keywords: Total Quality Management, Quality control, Teaching and Learning Process, Continuous Improvement

I. INTRODUCTION

TQM is both a philosophy and methodology. TQM as a management model with its emphasis on leadership, team work, rigorous analysis and self assessment, has a universal message. And it has always been a philosophy for the long haul rather than a short term fix. It is now required more than ever in the world of continuous change.

Quality assurance and total quality were originally developed in the 1930s and 1940s in the United States, by W.Edwards Deming. Deming began formulating his ideas in the 1930s while working on methods of removing variability and waste from the industrial processes. The Japanese put into practice the ideas of Deming, Joseph Juran and other US quality experts who visited Japan on their post war census of World War II. The Japanese developed the ideas of Juran and Deming into what they call "Total Quality Control" and used it in automobiles, electronics and consumer durable industries in the 1970s and 80's. The most famous Japanese national writer on quality, Kauro Ishikawa, described the Japanese approach to TQC as 'a thought revolution in management'.

II. TOTAL QUALITY MANAGEMENT IN EDUCATION

The phase of industrial revolution took a major leap after the implementation of TQM as to improve the quality of the product or the service offered. The components of TQM which are Quality planning, Quality assurance, Quality control and Quality improvement has helped the companies to come up with better products and services.

The same concept of TQM can be applied to Education service sector which gives out fresh graduates every year. Quality in education has become an inevitable part of everyone's career growth. The need of the hour is to understand the factors that are to be considered to improve the quality of teaching, learning which in turn is evident on the quality of students.

Present education system which works on the marks or grade system forces and restricts the students to think out of the box and they end up in learning just to gain marks. There has to be a change in the present system and give more importance to practical learning, aptitude based understanding and logical thinking. Let the students come up with creative and innovative ideas and solutions.

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Educational organizations are also recognizing the need to pursue quality and to deliver it to students. The sources of quality in education are

- Outstanding and highly qualified stable teachers
- High moral and ethical values
- Best examination results
- The support of parents, guardians and the local community
- The application of latest technology in teaching and learning process
- Strong leadership with long term vision and mission
- The care and concern for students
- A well balanced and latest curriculum

The application of TQM in Education:

The educators who attempt to apply the Deming model believe that examinations are not an end, but a means to an end. They are motivated to introduce innovative pedagogy of teaching and learning process. In this way student centric learning process takes place which improves student learning and efficient curriculum results can be obtained.

Improving the Students performance in Engineering Mathematics classroom with Deming Model:

Before applying the Deming model (1986), the main reasons for the poor performance must be identified. The reasons are as follows:

- Most students develop feelings of fear of mathematics resulting in inferiority, hesitation and boring
- Lack of attention and low level of interest
- Lack of motivation and teaching methods by the teacher
- Lack of practice and solving problems
- Lack of students learning environment

Deming's 14 point management principles offer a guide to how to lead for quality improvement in teaching and learning process. They focus on prevention rather than cure. Applying the Deming 14 point's management principles in the teaching and learning process of Engineering Mathematics, some measures to be taken to improve the performance is as follows:

- **Create constancy of purpose:** The teachers and students should create a constancy of purpose, should think of long term benefit of learning mathematics and teachers should strive continuously of making mathematics leaning as an active learning.
- **End the practice of admissions based on Donation fees:** Admission to the college should be purely based on the merit but not on the amount of donation fees.
- **Adopt the new philosophy**: Students no more want the old traditional way of learning. Teachers should adopt and new methodologies which makes the learning process more creative.
- **Establishing the Quality**: Teachers must ensure that it is not how much syllabus has been completed but it is how much the students understood the subject. Teaching and learning process should be student centric rather than teacher centric.
- **Leadership**: The goal of leadership should seek to assist students and counsel them to do better in the future exams.
- **Drive out Fear:** Teachers should build a friendly environment where students shouldn't fear to ask doubts and encourage them to be active learners.
- **Break down barriers**: Refers to build a good relationship between student and teacher.
- **Institute Training on the Job**: Curriculum must give importance to practicals what the students learn in the class.
- **Eliminate work standards and "zero defects":** These only serve to frighten and deter the students who cannot achieve without acknowledging perseverance and enthusiasm.
- **Permit pride of Workmanship:** Pay attention to quality teaching rather than the examination results or performance.

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- **Stop relying on Results**: Results of students should not be treated as a criterion for quality. Tests and other internal exams should be considered as diagnostic and prescriptive tools in the overall learning process as samples of student work.
- **Institute a vigorous program of education**: Continuous faculty development programs must be conducted so as to enhance the latest technologies used in the current industry.
- **Eliminate Targets:** Pass percentage should not be made as teachers' target.
- **Top management commitment:** Top management should be committed to provide all the resources such as LCD projectors, OHP etc to develop quality of teaching learning process.

III. CONCLUSION

The notion of Total quality Management (TQM) developed by Deming is now attracting among educational practitioners and theorists. The Deming model can take the students to a context where they are actively engaged with problem solving exercises, application of knowledge to the real world problems, develop think-pair-share learning environment and as a result students become more creative and critical thinkers and become industry ready.

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