

A Review: Teaching Methodology in Mathematics

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Abstract

In Tamil Nadu Engineering education has become a fantasy and there are more than 560 engineering colleges and nearly 10 deemed universities offering engineering education. The students joining engineering course has underwent mathematics curriculum for about 12 years. The syllabus of engineering mathematics of 1st year is at par with higher secondary level syllabuses. In spite of this the recent result published in various universities reveals more than 60% failure in engineering mathematics. Astonishingly the creamy layer students joining Anna University also encountered failures in mathematics. This paper aims to look forward the reasons for failures by pareto analysis and also the remedial measures in teaching mathematics a better easy way. The main aim of teaching mathematics in engineering education is to make the engineering to think analytically and solve the problems for their requirements in various fields. Clarity of thought and pursuing assumptions to logical conclusion is central to mathematical enterprise. The main concept of learning mathematics is to approach for problem solving and handling obstruction in spite of many ways of thinking. Our vision in teaching mathematics is 1. Student feel enjoyable with mathematical learning. 2. To remove the fear of failure. 3. To make them to realize the importance of mathematical application in real time applications. 4. To use abstraction to perceive relationship and structure. To understand the basic structure henceforth the applications become easy. On the other hand in today scenario: 1. There is fear among students regarding failure in mathematics. 2. Lack of faculty explanation with real time problems. 3. Curriculum has ups and downs and not in linear trend. 4. Lack of preparation and supporting material in mathematics teaching. 5. Making students to work mechanically (computation) instead of making them to understand the concepts. 6. Systematic problems aggravate the students.

Keywords: Clarity, Concept, Curriculum, Mechanical, Structure

1. Introduction

Mathematics is a compulsory subject for any individual to acquire engineering degree as per the curriculum of our country. Repeated failure in the subject leads to dropouts. It is the right of any individual to access for quality mathematical education to pass the subject in order to acquire degree. The main goal of teaching mathematics according to the words of David Wheeler, it is "more useful to know how to mathematics than to know lot of mathematics"¹. The second aim is to make an individual employable so in turn they contribute to the social and economical development of any country.

The aim is to develop the inner resources to have clarity in thinking, making logical conclusions and to handle abstractions^{2,7}. Learning mathematics improves to have

right attitude of problem solving in a systematic manner. This can be achieved by a curriculum that is ambitious, coherent and teaches importance of mathematics. Teaching and learning mathematics should make the individual to feel the need of solving such problems in real time situation. It should be activity oriented and made easy even for slow learners. Only problem solving and analytical thinking developed will make the individual to achieve their aims^{3,4}.

The National policy on education 1986 went further mathematics should be visualized as the vehicle to train an individual to think, reason, analyze and articulate logically. Apart from being specific subject, it should be treated as a concomitant to any subject involving analysis and reasoning.

First year engineering mathematics syllabus is almost

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same as the higher secondary board syllabus of various boards in our country. The fundamentals of differential calculus, Integral calculus, Trigonometrical identities, and little applications are taught at higher secondary level. The first engineering syllabus deals with more application in these chapters. But astonishingly the results published in recent years by Anna university reveals that the failure rates are more in engineering mathematics^{5,8}. The minimum eligibility to enter engineering college is to clear mathematics at higher secondary level. This made us to look into the reasons for so many failures in this subject at first year when the curriculum is not so difficult⁶.

2. Objectives

The aim of the study is to find out the reason for failures in mathematics.

3. Materials and Methods

The secondary data was collected regarding the failures in mathematics from various universities result⁹.

The data was collected from 300 students of various colleges by structured questionnaires.

In the questionnaires, various points leading to failures like clarity of subjects, teaching method, leaning ability, curriculum part, practicing method, concept learning, handling abstractions question paper pattern. The data was analyzed using pareto analysis.

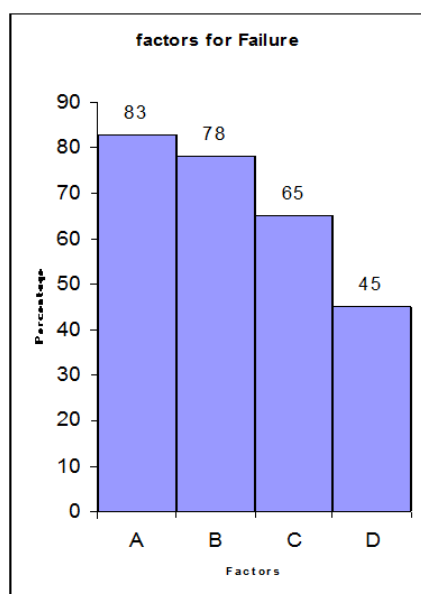


Figure 1. Pareto analysis – Factors of failure.

X axis represents factors like: A - Fear of Failure, B - Lack of Practice, C - Teaching Methodology and D - Curriculum.

- A - Fear of failure was the highest factor (83%) leading to failures. The fear in the subject arises due to following factors like Clarity of subject, teaching methodology, learning ability, practicing method, handling abstraction.
- B - Lack of practice was the second highest factor (78%) leading to failures. The lack of practice arises due to teaching methodology, learning ability, practicing method, handling abstraction.
- C - Teaching Methodology was third highest factor (65%) leading to failure. This compromise of teaching methodology learning ability, and curriculum¹⁰⁻¹⁴.
- D - Curriculum was last factor (45%) leading to failures. Clarity of subject, teaching methodology and question paper.

4. Results and Discussion

4.1 Fear and Failure

Pareto analysis from the engineering students reveals that fear in subject is the major reason for failures. Mathematics is a subject of cumulative nature. Number theory, decimals, percentages, algebra, geometry, trigonometry, differentiation, integration are all integrated. Symbols and notations repeated without understanding creates fear in mind. Studying without understanding the subjects makes the students feel boredom^{4,6}. There by learning is not there in the class room in spite of teaching lectures. Thus fear places the major role in failure.

4.2 Lack of Practice

Till school level mathematics with start with prescribed text book comprising exercise which are made to work regularly in a note book. But in college, the pattern is different student are mere lectures to solve the problem and they have to take interest to practice. Only before examination the take some text book and they are confused with solving procedures. This leads to failures in subjects.

4.3 Teaching Methodology

Students are not clear with fundamentals and the lectures are also not touching the fundamentals. Lectures are focused based on the curriculum. Most of the engineering colleges the experience staff are not handling first year.

Clear vision of the subject is not given to the students, there it lead to failures⁶. Crude methods of assessment and mechanical computation increase the difficulty of the subjects. Lack of teacher preparation with life time application make the feel to the students, the subject is of no use. Hence they neglect the subject and there by failures occurs.

5. Curriculum

Engineering curriculum has more on application oriented and also not in linear trend; hence students do not understand the subject in proper way leads to failure in subject. Also the subject thought mostly in formula oriented to solve the specific book problem, which is not helpful to solve the real application problems. This is the bridging gap in the curriculum⁷. Mathematics is a universal subject; the curriculum should be designed at par with universal curriculum in order to have smooth sail with the subject in their higher education.

6. Suggestions

- To teach mathematics enjoyable, understandable.
- To remove the fear of failure regarding the ambiguity in the subjects.
- To make them to realize the importance of real time application with examples.
- To make them to understand the basic structure hence forth application become easy Curriculum is to be modified in linear trend.
- To introduce mathematical lab and enable the student to solve the real time problems.
- To train the teachers to teach application oriented problem and not to aggravate the student with systematic problems.

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