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## A Study on Teaching Mathematics to Engineering Students

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**ABSTRACT:**

Mathematics is a branch of science, which deals with numbers and their operations. It involves calculation, computation, solving of problems etc. Its dictionary meaning states that, 'Mathematics is the science of numbers and space' or 'Mathematics is the science of measurement, quantity and magnitude'. It is exact, precise, systematic and a logical subject.

Mathematics helps the man to give exact interpretation to his ideas and conclusions. It is the numerical and calculation part of man's life and knowledge. It plays a predominant role in our daily life and it has become an indispensable factor for the progress of our present day world.

In this paper we present the effective ways of teaching Mathematics to the Engineering Students and the impact of the subject on Engineering students.

**KEY WORDS:** Engineering students, Mathematics, Conceptual learning

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# 1. INTRODUCTION

The literal meaning of mathematics is "things which can be counted" now you can think that counting has vital role in our daily life; just imagine that there were no mathematics at all, how would it be possible for us to count members of the family, number of students in the class, rupees in the pocket, runs in a cricket match, days in a week or in a months or years? On a basic level you need to be able to count, add, subtract, multiply, and divide. Mathematics is around us. It is present in different forms; Right from getting up in early hours of the day to the ringing of an alarm, reading time on a watch, rounding a date on a calendar, picking up the phone, preparing a recipe in the kitchen, to wait for the counts of whistles of the cooker, manage the money, travel to some place, to exchange currency at a ticket outlet while availing a public conveyance or checking up the mileage of your car, halting at the filling station, attending to a roll call at school, getting scores in the class exams, even meet new friends the list is just endless if one goes on to note down the situations when our computational skill, or more specifically, simple mathematics comes to play a role, almost every next moment we do the simple calculations at the back of our mind. Of course these are all done pretty unconsciously without a thought being spared for the use of mathematics on all such occasions.

Even nature also embraces mathematics completely. We see so much of symmetry-around us and have a deep sense of awareness and appreciation of patterns. Observe any natural thing and find out symmetry or pattern in it. Change of day into night, summer into winter etc.

In plants there are innumerable examples of symmetry, shapes, patterns, etc. Such examples exist in animals, in objects, in pictures and other things. The sun rises and sets at specified moment. The stars appear at fixed time. Mathematics runs in the veins of natural sciences like Physics and Astronomy.

# 2. PRESENT SCENARIO

The main goal of mathematics learning for engineering students is the ability of applying a wide range of mathematical techniques and skills in their engineering classes and later in their professional work. The lack of understanding of concepts in engineering mathematics may hinder the understanding of other concepts or even subjects. However, for most undergraduate engineering students, mathematics is one of the most difficult courses in their field of study.

Most of the engineering students never understood mathematics or they never liked it because it was too abstract for them and they could never relate to it. Most of the undergraduate engineering students and faculties feels that no efforts and attempts are made to demonstrate the applicability of various topics of mathematics that are taught thus making mathematics unavoidable for some engineering faculty and their students.

Mostly grown up educated people believe that mathematics is not taught properly in schools. The school mathematics is often far removed from reality. The syllabus expects and compels students to mug up the methodology and solve selected problems, which are considered to be important in examination point of view, which kills the creativity and imagination power of students. Students are taught only the computational aspect. This also leads to students hating mathematics subject. This negative thought also affects the other courses when they go for higher studies.

## 3. CHANGING THE TRADITIONAL TEACHING METHODOLOGY

Before we think to change the traditional way of teaching engineering mathematics, two major questions arise: what to teach, and who should teach engineering mathematics? In most of the engineering colleges, bridge course in mathematics is conducted before the start of semester and taught by discipline specific faculty. By doing this, students can learn mathematics more comfortably and in a better way. Engineering students prefer the examples used to explain the various concepts of mathematics should be from their branch specific courses.

Usually mathematics in engineering colleges is taught by faculty from mathematics department, sometimes engineering faculty. The academic interaction between mathematics and engineering faculty is very poor. There is a need to bridge the gap that exists between them to improve the exchange of pedagogical and research ideas. Every engineering institute should have a platform or forum for discussion, disseminating and interchanging educational and pedagogical ideas between and among mathematics and engineering faculties. Guest lectures by engineering faculty should be arranged to reinforce the importance of mathematics in engineering and it will improve engineering student's appreciation of mathematics. Also, engineering faculty can elaborate to the students about what mathematics is required to understand and do the engineering. Imposing vast syllabus of mathematics on students will not transform them into mathematics wizards. The vast syllabus kills the student's interest for mathematics and makes him more confused. Often engineering student lacks an understanding of the basic concepts that are essential to follow a course. The only way to solve these problems is to design the syllabus more realistic and compact. While framing the curriculum of engineering mathematics, vital parameters like needs of engineering courses, industry needs, and lifelong learning should be given top priority. At the same time, include advanced topics and drop the topics which are no longer of practical use.

Engineering Mathematics should be taught by both problem based and project based methods. Problem based teaching results in acquisition of knowledge whereas project based teaching targets application of knowledge. Mostly in engineering subjects, it is difficult to differentiate between problems based or project based subjects as most of the subjects contain elements of both.

Project based learning allow students to put into action the knowledge acquired in the foundation courses to solve real world problems. Use of problem based or project based approach in mathematics will allow students to develop communication skills, team work, research skills and an appreciation of the inter-disciplinary nature of mathematics.

## 4. CONCLUSION

Engineering students should have a solid fundamental knowledge in mathematics. The close interaction between mathematics and engineering departments can play a significant role in this effort. To enable greater student understanding, let all mathematics in engineering be taught by mathematics department using branch specific engineering examples and problems, help in this effort can be sought from the various engineering departments. The objective is to teach the students examples that are relevant to their branch of engineering to help them in understanding the concepts and its utility. Students will start feeling attachment with mathematics if they see the relevance of what they are doing with mathematics, thus it will motivate them to take mathematics more seriously. Collaborative teaching should be encouraged. We should motivate and encourage engineering students in doing mathematics.

We should always remember that if a student with an average intelligence does not understand a concept of any subject after making good number of attempts, we should not doubt his ability, the other possibility that a faculty or a book or textbook has not given a good explanation and illustration of the concept could be true. Sometimes mathematics becomes difficult to understand because the concepts are explained in terms of some other concepts. Strong mathematical understanding is a prime requirement of today's engineering student. To gain such understanding first we need to identify what mathematical skills are required and where in the engineering curriculum these skills are applied. This exercise will only bridge the gap between mathematics and engineering. Formal lecturers should be supplemented by compulsory reading, handouts, elements of small group teaching and formative assessment. The analysis of self-assessment forms completed by students show that their progress in understanding physical concepts is much more visible than their progress in understanding mathematical concepts.

## 5. ACKNOWLEDGMENTS

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