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Review Article

Overview On Status of Mathematics in Engineering Education

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Abstract:
Numerous studies have emphasised the value of a rigorous mathematics education for engineers. While there is disagreement over the quantity and nature of the mathematics required for the many engineering disciplines, all engineering disciplines agree that basic mathematics is necessary. The best engineering mathematics courses should be a part of an engineering programme that offers students the ability to observe significant advancements in related subject concepts and understanding. Although the inclusion of mathematics in the curricula of various engineering training institutions varies, there are several fundamental prerequisites that must be meet.
Keywords: engineering, circumstances, mathematical models, design

Status Of Mathematics in Engineering Education

Many engineering specialties make use of math in different ways. Cost-benefit-risk analysis and the usage of mathematical models are two of the most important components of math in this sector. Whether the steps are arithmetic, logical, or geometric, "mathematical models may comprise a collection of rules and instructions that specifies precisely a series to be taken. Even relatively simple rules and instructions may have effects that are challenging to foresee without actually doing the procedures. Often, it is simple to develop a mathematical explanation for a phenomenon under a narrow range of circumstances, but it may not work as well under a wider range. It is simple to understand why using mathematical models is a vital component of the engineering design process and how these models would be applied to different steps within this process given the importance of having an end result that not only functions but is also safe and trustworthy. Almost every mathematical concept can be and is used in some way during the engineering design process. Algebra, calculus, geometry, measurements, tables and graphs of findings, mathematical formulas, and time lines are just a few of the mathematics concepts that all engineering disciplines demand a thorough understanding of in order to function properly.

Numerous studies have emphasised the value of a rigorous mathematics education for engineers. While there is disagreement regarding the quantity and nature of the mathematics required for the many engineering disciplines, all engineering disciplines agree that basic mathematics is necessary. The best engineering mathematics courses need to be a part of an engineering programme that must provide the opportunity to view the major conceptual and theoretical advancements comprehension of connected topics.

In India the teaching of mathematics to engineering students is usually associated with large class

sizes. Innovative ways proposed for the teaching of mathematics to engineering students include problem-based learning (PBL), multidisciplinary approach, computer-based methods and active learning. While there is little consensus on how reform of mathematics education in undergraduate engineering should take place, key issues of concern include: the "one-size-fits-all" approach to engineering mathematics which leads to teaching more mathematics than is required by specific disciplines; applied mathematics is of greater interest to engineers compared to theoretical mathematics; and teaching computational methods given the availability of powerful computing and design tools.

The debate about mathematics in engineering education, while driven by the need to improve student retention and success is also considering the mathematics skills required by future practising engineers. They are of the view that engineering schools are often influenced by academic traditions that do not always support the professions' needs. They say that in engineering the first professional degree is the undergraduate degree and that "the tradition of putting theory before practice and the effort to cover technical knowledge comprehensively, allow little opportunity for students to have the kind of deep learning experiences that mirror professional practice and problem solving. There is a general support in the research literature for problem solving based learning strategies where students are required to engage in learning tasks that are relevant to engineering practice.

The need for professional engineers and students "becoming engineers" to think mathematically and utilise mathematics to explain and analyse many elements of the real environment they want to be an engineer, is widely acknowledged. The development of engineers depends heavily on mathematical modelling and over the past 20 years, there has been extensive research into the best ways to teach engineers the fundamentals of mathematics. Students of engineering should be taught mathematics by mathematicians under the supervision of engineers. Mathematics should be taught in the context of engineering, and problem-based and problem-solving or modelling courses should be necessary.

Mathematics is important outside of the classroom, it is changing from being "objective knowledge" to being mathematically ready for a world that is becoming more technological. The teaching and learning of mathematics are changing. In the framework of India's new curriculum, the National Council for Curriculum and Assessment (NCCA) stresses that mathematics is a wide subject with many facets "The Project Math mathematics programme" ,is about pattern, whose mathematics can be applied to explain and control natural occurrences and situations. On the other hand, it is about logical analysis, and it offers the fundamental language and techniques for dealing with many aspects of daily life and scientific endeavours. Mathematics deals with abstractions, logical justifications, deduction, calculations, and fundamental notions of truth and beauty, it is both a discipline of the mind and a source of aesthetic pleasure " (National Council for Curriculum and Assessment 2010a). The OECD Programme for International Student Assessment (PISA) measures students' mathematical literacy rather than their mathematical knowledge. Content, competences, and circumstance are all taken into consideration when evaluating a student's mathematics literacy.

However there is no consistent research-informed view of "how, what, when and by whom mathematics should be taught to engineering students, there is a strong view that the engineering curriculum is overcrowded and that engineers should no longer be taught mathematics as if they were mathematician. There are also beliefs that mathematics is of limited use in graduate engineers' professional life.

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