Higher Education - Not the End of Learning, But a Beginning
(Mathematics Education 30 Minutes/day – Mother of Invention)

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ABSTRACT*: Mathematics is generally regarded as the driest subject at school, made up of routine, difficult, boring, arcane and irrelevant calculations which have nothing to do with discovery and imagination. Whether we realize it or not, mathematics is around us, in our everyday life, and we are using the subject. Mathematics exists in nature. Mathematics is used in the kitchen; when we do our shopping, build a house, travel on the highway, and in whatever things that we do. Even then, whenever we talk about mathematics, many fear the subject. The fact is that, mathematics is a part of our life. We have to make the public aware of this. This is the duty of mathematicians or mathematical scientists. Popularization of mathematics could be done at various levels in the society, young and old, and wherever we are; at home, nurseries, schools, universities, offices, supermarkets, and on the highways. In this paper, we will discuss how this could be achieved. Mathematical activity has changed a lot in the last 50 years. Some of these changes, like the use of computers, are very visible and are being implemented in mathematical education quite extensively. There are other, more subtle trends that may not be so obvious. We will discuss some of these trends and how they could, or should, influence the future of mathematical education.*

The truly outstanding work of this research paper is a collection of review papers / articles investigating the open problems. Our paper will discuss recent advances, problems and their current status as well as historical background of the subjects such as:

1. *The influence of technology on school mathematics education*
2. *The turning point of mathematics / engineering mathematics in the 21st Century*
3. *Mathematics education towards vocationalisation*
4. *Industrial mathematics – A key technology for the future*
5. *Learning through distance education*
6. *Mathematics and the digital economy*
7. *Curriculum, methodologies and role of a mathematics teacher*
8. *Some question about mathematics of the 21st Century*

It will help the students in pursuing higher education in their respective fields.

Key words*: Mathematics Education, Distance Education, Vocationalisation, Digital Economy, Engineering Mathematics, Industrial Mathematics*

INTRODUCTION

The rising demand for higher education is represented by an increase from 100.8 million tertiary students worldwide in 2000 to 152.5 million in 2007. The higher education sector has undergone major changes throughout the world which led to increased competition for institutions in this sector. According to UNESCO, "higher education is no longer a luxury; it is essential to national, social and economic development". The quest to achieve Education for All (EFA) is fundamentally about assuring that children, youth and adults gain the knowledge and skills they need to better their lives and to play a role in building more peaceful and equitable societies. This is why focusing on quality is an imperative for achieving EFA. As many societies strive to universalize basic education, they face the momentous challenge of providing conditions where genuine learning can take place for each and every learner. Quality must be seen in light of how societies define the purpose of education (EFA Global Monitoring Report, 2005). Quality improves the value of education. So there is a lot of importance nowadays to increase the value of education. Pupil/teacher ratios remain

higher than is desirable in many countries of sub-Saharan Africa (regional median: 44:1) and South and West Asia (40:1). In many low-income countries, teachers do not meet even the minimum standards for entry into teaching and many have not fully mastered the curriculum. The HIV/AIDS pandemic is severely undermining the provision of good education and contributing significantly to teacher absenteeism. This results in improvement of the value of education. The central planks of most education systems are expected to ensure that all pupils acquire the knowledge, skills and values necessary for the exercise of responsible citizenship.

The broad objective of education is to create a sizeable population of such educated men and women who could understand the world well enough and are able to bring about a change leading to adequate health and education services, a better environment, and elimination of ignorance and deprivation (limitations), which continue to strangulate the developing societies. The policy, therefore adhering to the principles of equity, quality and efficiency place added emphasis on the education of the people, who are under-privileged and live in misery.

In the next few decades, India will probably have the world's largest set of young people. Even as other countries begin to age, India will remain a country of young people. If the proportion of working population to total population increases, that should be reflected in a sharp increase in the country's savings rate. And if India can find productive job opportunities for working population, that would give India a big opportunity to leapfrog in the race for social and economic development and as a result growth rates would go up. China and other countries of South East Asia face the phenomenon of ageing population and India is an exception to this rule. Therefore, it might be India's opportunity to leapfrog in the race for social and economic development. India's youth can be an asset only if there is an investment in their capabilities. A knowledge-driven generation will be an asset. If denied this investment, it will become a social and economic liability must be able to attract global investment into R&D activity at home and should put in place the required legal and physical infrastructure that can attract more foreign investment in R&D activity.

The National Knowledge Commission's (NKC) recommendations have been crafted to achieve the objective of tapping into India's enormous reservoir of knowledge, to mobilise national talent and create an empowered generation with access to tremendous possibilities. With 550 million below the age of 25, India's demographic dividend is a greatest asset. By recommending reforms in the education and associated sectors, NKC aim has been to provide a platform to harness this human capital, which has the ability to change the course of development in the country. Recommendations have also been suggested in other key areas, because to adequately tap this potential, the right development paradigm has to be created by investing in intellectual capital, developing the skill set of the population, strengthening research, encouraging innovation and entrepreneurship and creating effective systems of e-governance.

Objectives of the Study

- To analyse the Higher Education Scenario in India
- To know the need for popularization of Mathematics
- To find out the ways for popularization of Mathematics
- To understand the influence of technology on school mathematics education
- To analyse Industrial mathematics as a key technology for the future

Research Methodology

The study is explorative cum descriptive in nature. It is an empirical research based upon secondary data. The theory is basically developed from secondary sources of information and a thorough study of various academic works in the relevant field has been attempted.

Indian Higher Education Scenario

In the socio-economic development of a nation, human capital has a very crucial role. So, there is a need of investment in education In India, education, particularly higher education, is mostly owned by the public sector. Hence, the role of the State is very important in making literacy levels high. Private sector role is also increasingly becoming important because of wrong kind of state intervention or too little state intervention. About 0.37% of GDP is spent on higher education in India and this is also falling in recent years. Therefore, education in developed countries, have been able to have "market complementary arrangements" rather than "market excluding arrangements" which will result into widespread literacy levels (Government of India, 2007).The government of India has pursued a five-fold strategy following the recommendations of the NPE consisting of the following:

1. Improvement of infrastructural provision and human resources for education.
2. Provision of improved curriculum and teaching-learning material.
3. Improve the quality of teaching – learning process through the introduction of child-centered pedagogy.
4. Attention to teacher capacity building.
5. Increased focus on specification and measurement of learner achievement levels.

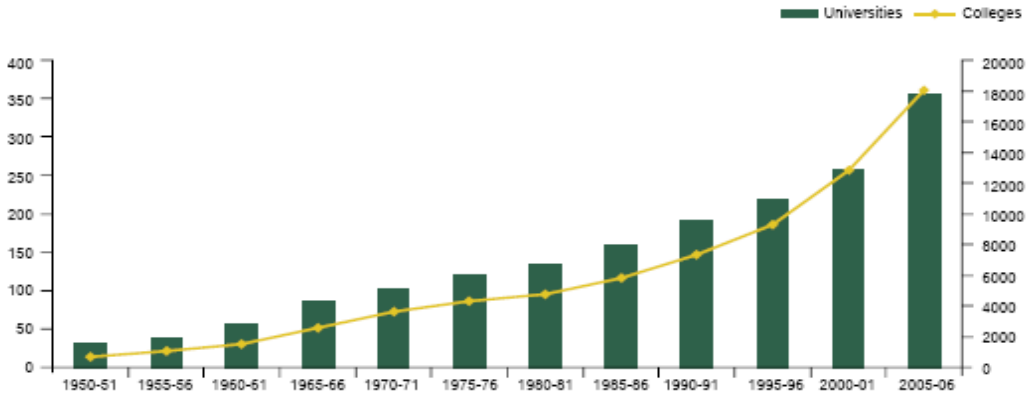


Figure 1. Growth of higher education system. Source: University Grant Commission.

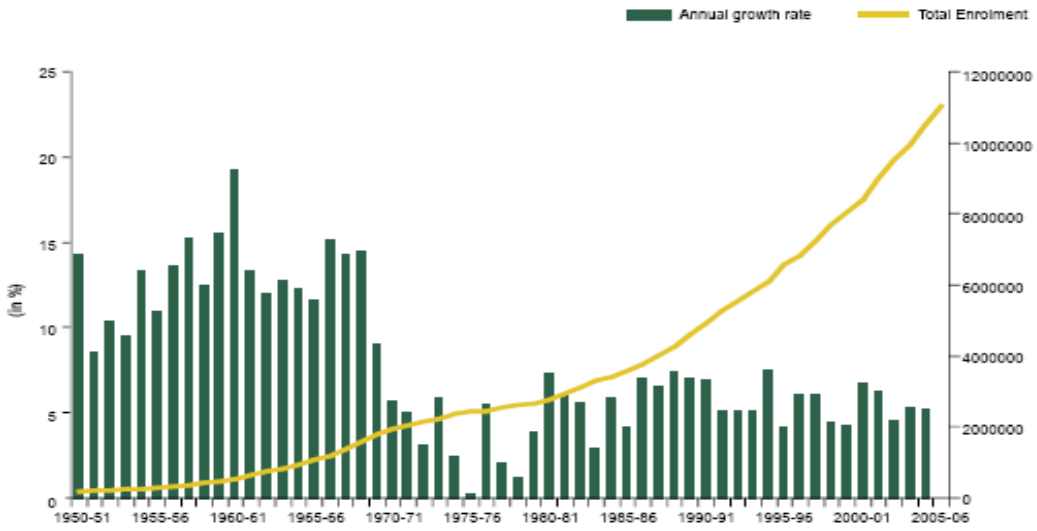


Figure 2. Growth of student enrolment in higher education in India (1950-51 to 2005-06).
Source: University Grant Commission.

Table 1 Gross enrolment ratio (GER) for 18-24 years (in percentage).

Year	Higher Education
	8.07
2002-03	8.97
2003-04	9.21
2004-05	9.97

Source: Government of India

The present scenario in India has recommended an increase in the GER to at least 20%. If India has to achieve the target soon, it would imply more than doubling the scale and size of the higher education system within the next 5 to 7 years.

Mathematics is generally regarded as the most dry subject at school, made up of routine, boring, arcane and irrelevant calculation which have nothing to do with discovery and imagination. You may have noticed how terms in mathematics have an unnerving effect on most students as well as the public. "Dull" and "Urgh" are the most common epithets often used to describe the subject. Whether we realise it or not, mathematics is around us, in our everyday life, and we are using the subject. Mathematics exists in nature. Mathematics is used in the kitchen; when we prepare our food, we must put in enough amounts of salt and spices in the curry, otherwise it will be too hot, tasteless, or very salty. To build a house we need mathematics for its shapes and to estimate the cost needed. We need mathematics when we go shopping, and when we are on the highway. Even then, whenever we talk about mathematics, many fear the subject; they have the mathematicophobia, and try to avoid it. The fact is that, mathematics forms part of our life. We have to make the public aware of this. This is the duty of mathematicians or mathematical scientists. Popularisation of mathematics could be done at various levels in the society, at home, nurseries, schools, universities, offices, supermarkets, highways and elsewhere. In this paper we will discuss how this could be achieved.

The role of mathematics in society is subtle and not generally recognised in the needs of people in everyday life and most often it remains totally hidden in scientific and technological advancements. The old saying: "The one who lives hidden lives best" is not true in present day society. If a subject becomes invisible, it may soon be forgotten and eventually it may even disappear. Mathematics has such a prominent place in school curricula all over the world that probably nobody can imagine such a fate for this subject. But if we do not constantly care about the image of mathematics, we will see continuing pressure to lower the amount of mathematics at primary schools, secondary schools and at the university level. Mathematics is exciting to many people but at the same time is considered difficult and somewhat inaccessible by many more. Since mathematics is the fundamental cornerstone in many diverse areas of society, it is important for civilisation as a whole that mathematicians do their utmost to help explaining and clarifying the role of mathematics."

Mathematics in Nature:

Mathematics exists in nature. The mathematical element, symmetry, exists in natural objects such as snowflakes, honeycombs, insects, leaves, flowers, butterflies, fish, sea shells, crabs, and starfish (Figure 1), and also in man-made objects such as carvings on wood or ceramics, woven straw for food cover (Figure 2) and motifs in songket weaving (Figure 3).

a. Butterfly

b. Sea shell

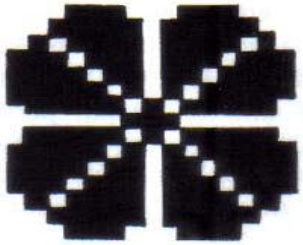
c. Leaves

d. Sea coconut

Figure 1: Natural symmetry

Figure 2: Woven straw for food cover

a. Pucuk Rebung
(Mangosteen Stalk)



b. Tampuk Manggisnbn (bamboo Shoot)

Figure 3: Motifs in songket weaving

Multiplication Table and Mathematical Songs

A multiplication table is easily memorised if it is sung. During our time, primary school children read or memorised multiplication tables (in the Malay language) by singing them. For example,

dua kali satu, dua	2 × 1 = 2 two times one is two
dua kali dua, empat	2 × 2 = 4 two times two is four
dua kali tiga, enam	2 × 3 = 6 two times three is six
…	…
dua kali dua belas, dua puluh empat	2 × 12 = 24 two times twelve is twenty four

If the children forgot the verse (the multiplication table), they went on by humming its melody. It could also be sung in the English language. For instance, for the multiplication table, they use the melody for the "Happy Birthday" song, and for "*Subtraction up to* 1000," they use the melody for "*A thousand legged worm*". It is really interesting when all the children sing together.

Mathematical game or song such as "*Pukul berapa Datuk Harimau*?" (What is the time Mr. Tiger?) attracts the children's interest. Other mathematical songs are "10 *Budak Hitam*" (10 Black Boys) and "*Anak Ayam Turun* 10" (10 little chicken) which are suitable to be sung or played when the children are on a long excursion trip, just to keep them occupied, rather than letting the time goes by without doing anything. For a longer journey, for instance from Kuala Lumpur to Kuantan, the song "10 Black Boys" could be lengthened or extended to "20 Black Boys". This will then needs the creativity of the children to arrange the verses; in order to match with the words nineteen until eleven. For the Malay version, they have got to match *sembilan belas* until *sebelas* with words ending with "*-as*" such as *batas, cantas, deras, kapas, kertas, lemas, malas, palas, pantas, paras, pentas,* and *tetas*. For a simpler song, which does not need variation of words, they could try the following rhyme:

N bananas on a box
N bananas
Take a banana, give it to your friend at the back
N – 1 bananas.

They could begin the song with *N* = 10, 20 or up to 100 (see Renteln & Dundes 2005).

The song "*Anak Ayam Turun* 10" is more difficult and challenging, since the children have to be more creative, especially if they sing "*Anak Ayam Turun* 20".

Mathematics can be both enjoyable and interesting. Rather like completing a word puzzle, there is a great deal of satisfaction in working your way through a mathematical problem and coming up with the correct solution. There are no grey areas to worry about – you are either right or wrong. Of course, a lot of the popularity of mathematics depends on how it is taught, since a lack of enthusiasm and inspiration often reflects in how effectively the subject is received by the students.

Teaching in Schools

The teaching of mathematics in school should not only consist of the "must know". That is teachers do not only teach the topics in the syllabus. It should also consist of the "should know" and the "good or nice to know". These three things could make mathematics not a boring subject, interesting to learn and the students want to learn more about the subject. For instance, if in school students are taught about even and odd numbers, tell them also about the existence of other numbers such as perfect numbers, amicable numbers, square numbers and cubic numbers. In school students are taught:

The "*must know*":

If $x + 3 = 8$ (1)

then $x = 8 – 3 = 5$. (2)

Students are not taught how they really get the second step. This is the "*should know*":

Actually to get the second step, that is to make x the subject of the equation, we have to eliminate 3 from equation (1) by adding –3 (negative 3) to the equation.

Adding –3 to equation (1):$(x + 3) + (–3) = 8 + (– 3)$

Then we use the associative law for addition of numbers:

$x + (3 – 3) = 8 – 3$ giving $x + 0 = 5$.

Since 0 is the identity with respect to addition, thus we have $x = 5$.

The "*good or nice to know*": Students will be interested to know that actually we can use our fingers to do multiplication of numbers, to learn about magic square; that they can use mathematics to do magic: guess a car registration number, a birthday date, identity card number or the amount of money your friend has in his pocket.

When teaching algebraic equations (linear, quadratic and cubic equations), it might be an inspiration to the students if the teacher tells them that these equations lead to the discovery of group theory which they will be studying if they do mathematics in the university (see also section 5 below).

Lectures

Pure mathematics courses such as Linear Algebra, Abstract Algebra, Analysis and Topology are often treated by students as abstract, difficult to understand and boring. It is normal and standard that the structure of these courses consists of Definitions, Propositions, Lemmas, Theorems and Corollaries. Often, mathematics is presented as something whose development has been unrelated to the activities of human beings. The questions which motivated the whole theory in the first place are often simply omitted, and students are asked to appreciate the methods and the theory without context, without relevance to other mathematical or scientific activity, one might even say, without meaning. For example, how many books on group theory are there which mention the range of applications of group theory, from crystallography to modern physics, and which show how the exposition given fits into the wide mathematical and scientific context? The dehumanising of the presentation of mathematics has gone very far (Brown & Porter 2008).

Even though each concept that has been introduced is followed by a few examples, students still find difficulty in understanding the examples given because they do not really understand the concept just introduced. To grasp the theorems (and the proofs) that follow will be more difficult. To lessen the students' difficulty and boredom,

at least we try to include some historical background of the subject and its applications in our daily life or in culture. This might help to bring the students closer to the subject, and help them to a better understanding of the course. Normally, in a lecture, especially in Abstract Algebra or Analysis, the students get bored and sleepy. This is the time to crack some jokes or humour, if possible, mathematical jokes or mathematical humour. According to Renteln and Dundes (2005) most mathematical humour are based on words involving standard mathematical concepts. Most of the humour involves food, which indicates the existence of mathematical concepts that are difficult to digest or swallow. Consider the following humour.

Q: *What's purple and commutes*? A: An abelian grape.
Note: In abstract algebra, if the binary operation on a group commutes, then the group is called an abelian group. Grape sounds like group.
Q: *Why did the mathematician name his dog "Cauchy"*? A: Because he left a residue at every pole.
Note: In complex analysis there is a result called Cauchy Residue Theorem.
Q: *Why can't you grow wheat in* **Z**/6**Z**? A: It's not a field.
Note: Of course wheat can only be grown in a wheat field. In abstract algebra **Z**/6**Z** is not a field, it is only an integral domain.
Q: *What is grey and huge and has integer coefficients*? A: An elephantine equation.
Note: We have diophantine equation in number theory.
Q: *What do you get if you cross an elephant and a banana*? A: **elephant** ⊗⊗ **banana** = |**elephant**| |**banana**| sinθ
Note: In linear algebra we have cross product between vectors **a** and **b** defined by the following equation: **a** ⊗⊗ **b** = |**a**| |**b**| sinθ, where θ is the angle between the two vectors.
Q: *What does an analytic number theorist say when he is drowning*? A: Log-log, log-log, log-log, ...
Q: *What does a topologist call a virgin*? A: Simply connected.
Q: *What is sour, yellow, and equivalent to the Axiom of Choice*? A: Zorn's lemon.
Q: *What is yellow, linear, has a norm and complete*? A: A Bananach space.
Q: *Who is a topologist*?
A: Someone who could not differentiate between a doughnut and a teacup.

Mathematics Competition
Mathematics competition is one of the ways of popularizing mathematics. Its presence encourages students to widen their knowledge and sharpen their mathematical thinking.

Mathematics Master Classes
To inculcate mathematics awareness in society, the School of Computer Science at the University of Wales, Bangor, United Kingdom has been organizing the Royal Institution Mathematics Masterclasses for Young People in North West Wales, since 1985. The participants are taken from school year 9 aged 13 – 14 years old.

Mathematics Exhibition
Mathematics exhibition is one of the ways to present mathematics to as wide as possible an audience, and as a stimulus and focus to a range of activities. It could be put up in school, university, and an art gallery. An exhibition should convey some flavor of the real achievement of mathematics. If instead it simply presents an assortment of, for example, strange polyhedral, and states that these are the wonderful things mathematicians study, then it will be very easy for the public to be convinced that mathematics is hard or weird or both. Each exhibit should have a mathematical point and should explain its relations with other parts of mathematics and with other disciplines.

Surprising applications are also important. Many are not aware that mathematical elements such as symmetry, geometric figures, tessellations, commutative diagram, and topological spaces, can be presented in the form of drawing. Mathematicians look at them as mathematical objects, whereas artists look at them as abstract drawings (Hofmann 2002, Figure 6 and Figure 7).

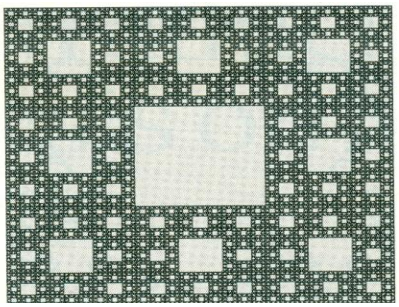


Figure 6: Sierpinski Carpet

Mathematical Theatre

In western countries such as England and the United States, the development of mathematics is more advanced that stories related to mathematics are also being staged and dramatized. For instance, Alice in Wonderland, Breaking the Code, Proof, and QED, and are also being filmed, such as A Beautiful Mind, and had won few awards (Jackson 2002; Butler 2002).

Open Access

The science plays a crucial role in the modern society, and the popularisation of science in its electronic form is closely related to the rise and development of the World Wide Web. Since 1990s, the introduction of the Web as a part of the Internet, the science popularisation has become more and more involved in the web-based society. Therefore, the Web has become an important technical support of the popularisation of science (Alireza 2008). The overall purpose of web site is to help make Mathematics seem more attractive and useful subject to the general public. Thus the popularisation of mathematics through open access is an attempt to reduce the distance standing between mathematicians and the public. New tools: computers and information technology Computers, of course, are not only sources of interesting and novel mathematical problems. They also provide new tools for doing and organizing our research. We use them for e-mail and word processing, for experimentation, and for getting information through the web, from the MathSciNet database, Wikipedia, the Arxives, electronic journals and from home pages of fellow mathematicians. Are these uses of computers just toys or at best matters of convenience? I think not, and that each of these is going to have a profound impact on our science.It is easiest to see this about experimentation with Maple, Mathematica, Matlab, or your own programs. These programs open for us a range of observations and experiments which had been inaccessible before the computer age, and which provide new data and reveal new phenomena. Electronic journals and databases, home pages of people, companies and institutions, Wikipedia, and e-mail provide new ways of dissemination of results and ideas. In a sense, they reinforce the increase in the volume of research: not only are there increasingly more people doing research, but an increasingly large fraction of this information is available at our fingertips (and often increasingly loudly and aggressively: the etiquette of e-mail is far from solid). But we can also use them as ways of coping with the information explosion. Electronic publication is gradually transforming the way we write papers. At the first sight, word processing looks like just a convenient way of writing;

but slowly many features electronic versions become available that is superior to the usual printed papers: hyperlinks, colored figures and illustrations, animations and the like. The use of computers is an area where often we learn from our students, not the other way around. The question here is: how to use the interest and knowledge in computing, present in most students today, for the purposes of mathematical education? Most suitable for this seem to be some nonstandard mathematical activities.

Industrial Mathematics

Industrial mathematics is a mathematical modeling and scientific computing of industrial problems. Of course, modeling and asymptotic analysis appears in classical applied mathematics, but industrial mathematicians need a wide and broad knowledge of mathematical ideas, algorithms and computer. They need an understanding of the problems in industry, actually, they have to understand and speak the language spoken in the industries.

Main objectives of Industrial Mathematics:

1. To transform the technical, organizational and economic problems originally posed in a non-mathematical language into mathematical problems.

2. To solve these problems by applying mathematical techniques or by approximate methods of analytical or numerical nature.

3. To reinterpret the results in terms of original problems.

Industrial mathematicians are bridge builders. They build bridges from the field of mathematics in the practical world: for that they have to know problems from some companies and ideas and methods from mathematics. They have to be generalists, not specialist. If you enter the world of the Industry, you never know what kind of problems you will encounter and which kind of mathematical method you will apply. Here I suggest some problems in industry and mathematical methods to solve them, but the list is not exhaustive and final:

1. Problems where signals and images have to be processed or solved by applying Bayesian statistics, time series analysis, wavelets, energy functional etc.

2. For problems of optimizing the Transport or in storage of industrial good new methods of combinatorial optimization are used.

3. In problems of predicting the outcomes of complicated systems, which do not allow to understand the mechanism behind the methods of adaptive systems theory, of learning of neural networks etc. are used.

4. Problems where complicated multiphase flow happens in porous media, forming fronts and drops are solved by the methods of homogenization, level set methods, front tracking algorithms etc.

5. Problems of interaction of flexible structure (Fibres, papersheet) within a flow round require, multigrain methods etc.

6. Problems of optimizing the properties (elasticity, beat conductivity etc.) for compound materials are dealt with the methods of homogenization and regularization of inverse problem of optimal shape design.

Difference between Applied and Industrial Mathematics:

From the above discussion it is obvious that industrial mathematicians have to be generalists, they have in know a large variety of mathematical concepts and methods. They have to know modern mathematics. They should know more advanced method than scientists and engineers.

Industrial mathematics is not a new subject in itself like statistics, engineering mathematics etc. actually, it is another kind of activity of getting problems, looking at problems, solving problems, interpreting and using solutions. It is a new discipline different from pure and applied mathematics. In his article "Applied Mathematics is Bad mathematics and mathematics tomorrow". Halmos compares the picture of real world provided by applied mathematics with police photograph of a wanted criminal, and that of pure mathematics with a portrait by Picasso. Main differences are summarized as given below:

1. Applied mathematicians do not accept a difference between pure and applied, while pure mathematicians do. Industrial mathematics makes the use of both pure and applied mathematics whichever is suited to the problems in industry. This is the first difference between applied and industrial mathematics.
2. Most of applied mathematics is 'applicable' mathematics-mathematics, which hopes or expects to be applied, but still has not been applied whereas industrial mathematics has its industrial applications, it treats problems posed by industry and questions of technical, organization of economic nature which are posed by companies. This is the second main difference between applied and industrial mathematics.
3. Thus form the points of human creativity, industrial mathematic is one of the most exciting, adventurous and joyful activities mathematician can find.

In spite of being different from pure and applied mathematics, it needs both. Industrial mathematics stand on the shoulders of mathematics and industrial mathematicians use ideas of others, than they invent the new ones.
Mathematics is also profited from industrial mathematics, mainly by offering new challenging problems, better chances for young mathematicians, higher prestige in outside mathematical community.

Engineering Mathematics

Engineering is one of the most important professions for the mathematics discipline. New developments in engineering have stimulated new areas of mathematical research. Control theory, signal processing and coding theory are all examples for this. When taking into account the close relationship between engineering and mathematics, we can easily say that mathematics have a vital role in the engineering education. In the last twenty years, both new demands of the engineering profession and inadequate mathematics ability of the engineering students have led in a big change in the scope of the mathematics education. The recent developments in technology and computers have caused variation in teaching mathematics of engineering students and have brought with them the use of modern techniques and methods. The ever more rapid pace of technological development has created a situation in which many engineers will require frequent updating in areas of their specialization. This may involve the mastery of new techniques and understanding of new theoretical concepts. Fluency with mathematics is an essential weapon in modern graduate engineer's armory

Distance Education

Distance Education is a process to create and provide access to learning when the source of information and the learners are separated by time and distance, or both. In other words, distance learning is the process of creating an educational experience of equal quality for the learner to best suit their needs outside the classroom. Here it is important to mention that distance education has played an important role in increasing the educational skills of the vast majority of Indian masses. Therefore, there is an urgent need of restructuring the entire structure of the distance education in the country. It is clear from the above analysis that national bodies have failed miserably to give right direction to the distance education of the country. Hence, there is an urgent need for redesigning the entire controlling framework of distance education in the country. The modalities developed by the IGNOU and DEC must be scrapped where step motherly treatment is given to most of the distance education institutions. This is possible only by bringing all distance education institutions at par and supremacy of IGNOU must come to an end. It is an old saying that accused can not be judge. Obviously, IGNOU being a distance education institution can never be a controlling agency for distance education. Duration of courses in conventional and distance education must be equal. There can not be any justification of taxing the distance education students without any fault. Serious efforts should be made to further widen the scope

of distance education and all retrogressive decisions to restrict its scope must be scrapped like banning of M.Phil, PhD. etc.

The utmost need of the hour is that unless and until these so called national bodies are not restructured, the growth and development of distance education is not possible. Although, Mr. Kapil Sibal, Hon'ble Minister for HRD has assured of dissolving of all these bodies those are controlling higher education in India and these will be replaced by the National Commission for Higher Education and Research perhaps which can be considered as the most revolutionary decision but still the question remains that whether the problems of the distance education will be solved or these will continue to remain in the same state of affairs even under National Commission for Higher Education and Research? Obviously, unless, a strong case is not prepared by the people engaged in distance education; there is remote possibility of any solution. Therefore, the immediate task is to float a national level organization of distance educators which can take up the matter with the concerned ministry so that an alternate policy for distance education may be framed where these grievances of distance education can be addressed thoroughly. The bodies like DEC and IGNOU have miserably failed to address the discriminatory treatment given to the distance education. Last but not least, background in distance education must be a pre qualification for any person to be appointed in the policy formulation for distance education so that distance education must get its due place.

Conclusions

The purpose of University Education is only to open the minds and enable one to perceive new problems and seek solutions. Education is only a ladder to gather fruits and not the fruits itself. It is up to the people to keep pace with advances in science and technology and adapt them to the constantly changing environment. Learning is a lifelong process. One has to evolve own individual programs to keep one well informed to be an efficient citizen of the country. University education is not the end of learning; it is only the end of the beginning. Learning is a perishable commodity that needs vigilant updating. Further learning is a mental activity, which keeps one young. Mathematics Club or Society, and School or Faculty of Mathematical Sciences, play an important role in the popularisation of mathematics to as wide as possible an audience, especially school students and the public. These bodies could organise various activities such as quiz, mathematics competition, mathematics essay competition, mathematics camp, excursion, exhibition, conferences/seminars, sessions on explaining "mathematics behind wonders", and popular lectures by distinguished or eminent local mathematicians or from abroad. The academics must write books, and popular articles in magazines or local newspapers. The young kids at home could be attracted to mathematics if this subject is "inserted" in popular television series such as "*Kampung Boy*" and "*Upin and Ipin*", and in the form of a cartoon series in a local weekend newspaper. At university level, joint seminars should be encouraged. Innovative methods for science and mathematics delivery to children and the public should be devised so as to inculcate scientific awareness and culture in society.

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