



PRESENT STATUS OF APPLIED SCIENCE IN INDIAN TECHNICAL INSTITUTIONS

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ABSTRACT

It is indeed true that science provides the fundamentals for the development of new technology. It should also be admitted that no technology can prosper unless scientific methods are understood and adopted in professional manner. On the contrary, science plays only a small part in technical curriculum which might hinder the development of any country. The science faculty is only a humble unit in the science & Engineering curriculum that is engaged on the formal fulfillment of the technical courses. This paper shed a light on present scenario of applied sciences in top technical institutions of India. An attempt has been made to analyse the applied science curricula of autonomous, affiliated and deemed institutions based on the comparison of quality, quantity, its adaptability. Also, proposes an alternative curriculum model to facilitate the budding engineer and technologists to meet the global standards.

KEYWORDS: Applied Sciences, Technology and Curriculum.

Introduction:

Education is the most important lever for social, economic and political transformation. A well educated population, equipped with the relevant knowledge, attitudes and skills is essential for economic and social development in the twenty-first century. As India moves progressively towards becoming a 'Knowledge hub', it becomes increasingly important that the Five Year twelfth Plan, (2012-2017) has focused on Interlink expansion, equity and excellence, and focus on those programmes that serve as the locus at which more than one objective is met and to bring down the walls that separate higher education from technical education with a focus on interdisciplinary action points [1].

The Technical Education in India expanded multifold substantial growth from pre-independence period to post-independence period. Number of engineering colleges rose from mere 38 in 1947 with an annual intake of about 2940 students and the output of graduates being 1270 students. Number of technical institutes at the UG level was 49 in 1950-51 and on March 2004 is 1300+ imparting technical education to 3,60,0002 [2] and 3289 in the year 2016-17 churning out 15,53,809 with a greater number of colleges in the South and Southwest regions, compared with the other regions [3,4].

The scientists discover scientific principles, laws and hypothesis and invent devices to describe and explain them. The technician applies and magnifies these devices for human convenience and comfort. There is no branch in engineering or technology in which one or other basic laws of Science and Mathematical principles are not applied on a scale never contemplated by the discoverer. It is not generally realized, even by promoters of Industries that science and Industry are no more closely related to each other than philosophy and religion. It is indeed true that science provides the fundamentals for the developments of technology. It should also be admitted that no technology can prosper unless scientific methods are adopted. The initial investigations on radio activity by the H. Becquerel and Curie couple were never with a view to develop atomic energy. It took 40 years for this immense energy, conserved in matter, to be practically liberated after the original postulate of Einstein of the equivalence of the matter and energy. Instances without number can be given of applications of simple physical principles, demonstrated and developed in the beginning on a laboratory scale, to large scale engineering in a variety of branches of modern civilization. Though specialization in one branch technology has become the order of the day, in view of the vast developments in each branch by itself, a knowledge on the part of the technician of the fundamentals of science and its varied applications is essential for a proper understanding of the specialized role he is playing in the complicated scientific and industrial advances of the modern age. This comprehensive knowledge is imparted through applied sciences.

The "technology is applied science" paradigm in the philosophy of technology is reflected in education. Apart from traditional subjects like industrial arts or craft, we find elements of technology in science education. Science education for many years used to be a rather abstract subject where it was difficult for pupils to recognize the relationship between the knowledge that was taught in science lessons with their daily life. This relationship is found mainly through the technological products they find all around them and therefore a trend emerged in science education to show how scientific knowledge was applied in technological products [5]. When one considers the course material that resulted, one can easily recognize the "technology is applied science" paradigm.

The "technology is applied science" paradigm is challenged now. Does that mean that we also can move away from "science for all" and replace it by "Technology for all, science for some" or "Technology for all" [6] Can we reduce the role of science education to that of "gate keeper" [7], which it already seems to fulfill in many cases? To answer that question wisely we have to consider the relationship between science and technology somewhat more carefully with mention of applied science curriculum in imparting technical education in India.

Significance of Applied Sciences in Engineering and Technology:

Mathematics is both a creative enterprise that has captivated the human imagination since ancient times and an indispensable tool for much of science and engineering. It provides the basic language for understanding the world and lends precision to scientific thought. Modern scientific research reveals a great deal of interconnectedness between formerly separate disciplines. This trend has been accompanied by the need for future engineers and scientists to acquire a deeper foundation in mathematics.

Physics can be thought of as the science of motion. From the smallest subatomic particles to the largest, most distant galaxies, motion in nature occurs over an incredible range of length and time scales. Physics encompasses this entire domain. As such, it is regarded by many as the most basic and fundamental of the sciences, crucial for understanding the world around us, the world inside us, and the world beyond us. Physics underlies many great inventions of modern technology, like computers, cell phones, lasers, the internet, etc., that have changed our lives, and is indispensable for many of the future technological challenges facing us.

Chemistry is the study of structural transformations of matter and their implications in wide ranging contexts - from materials science to living biological systems. Viewed from this over-reaching perspective, it is clear that the understanding of the fundamentals of this subject is essential to finding solutions for many of the immense challenges facing mankind today - starting from water purification, environmental remediation, development of environmentally benign chemical process and novel materials for sequestering solar energy and storage. Study of chemistry will provide the requisite fundamental knowledge base to begin researching in many of these interdisciplinary areas that straddle conventional disciplines.

Applied Science in Technological Institutions:

The present status of the applied sciences in technological course has been surveyed in South Indian technical institutes. In Karnataka state, nearly 215+ institutes are affiliated to Visveswarayya Technological University Belgaum and having common Under Graduate (UG) curriculum (Table 1). The applied science contribution in this curriculum is around 14%, where as in few autonomous private institutions this contribution varies between 10 to 30%. The position of the applied sciences in technological institutes of Tamil Nadu State, Andhra Pradesh and Kerala are given in Table 2 & 3 respectively.

Table 1:
Quanta of applied science syllabus in Institution of Karnataka

SN	College / University	Course	Affiliation	Credit points	% of Syllabus
1	Bheemanna Khandre Institute of Technology, Bhalki	B.E	VTU (215+)	16	14
2	MSRIT Bangalore*	B.E	VTU	21	30
3	RVCET Bangalore*	BE	VTU	28	28
4	SDM Dharwad*	BE	VTU	21	10.5
5	SIT Tumkur*	BE	VTU	16	14
6	BCE Bagalkot*	BE	VTU	16	14
7	PESIT Bangalore*	BE	VTU	26	20
8	NITK Surathkal*	BE / B.Tech	NITK	20	11

*Autonomous Institute

Table 2:
Quanta of applied science syllabus in Institutions of Tamilnadu

SN	College / University	Course	Affiliation	Credit points	% of Syllabus
1	Anna University	BE	Anna Univ. Chennai	18	14.4
2	NIT Tiruchirapalli*	B.Tech	NIT-T	26	11.11
3	Kongu Engg. College, Erode	B.E/B.Tech	Kongu University**	24	13
4	Anna University	B.E/B.Tech	Coimbatore	26	9.3
5	SRM University	B.Tech	Kanchipuram	23	11.5
6	VIT Vellore	B.Tech	Vellore	38	17.4

*Autonomous Institute, **Deemed University

Table 3:
Quanta of applied science syllabus in Institutions of Andhra Pradesh & Kerala

SN	College / University	Course	Affiliation	Credit points	% of Syllabus
1	JNTU Kakinada	BE	Andhra Univ.	26	11
2	GITAM University	BE	GITAM	27	16.8
3	IIT Hyderabad	B.Tech	IIT Hyderabad	20	13.7
4	Andhra University Vishakhapatnam	BE	Andhra University	20	7.2
5	K L University, Vijaywada	BTech	KLU	16	9.3
Kerala					
6	NIT Calicut	BTech	Calicut	20	14.5

Few top ranked institutes have been surveyed and found that under graduate curriculum poses applied science contribution between 9 to 18%. In comparison the Karnataka state institutes are allocated less contribution of applied science.

Conclusions:

Survey of top 20 institutions in south India reveals that the contribution of applied science in UG curriculum is varied from institute to institute both in terms of quality and quantity. However, every technical institute provides the best technical education and insists their students on par with IIT and IISc students in terms of knowledge and technical skills. Also the society demands, a new, better and reliable technology for leading comfort life. To meet the expectations of the society, it is important to have the appropriate knowledge of applied science. As per Accreditation Board for Engineering and Technology (ABET), regulation a minimum of 38% of applied science portion must be included in engineering courses. It is opined that the quality of technical education can be improved by incorporating relevant, adequate and uniform curriculum throughout the country and has to be revised time to time. It is also important to incorporate innovative teaching-learning methodology in the curriculum.

Acknowledgments:

The author expresses the gratitude to Dr. Vijay kulkarni and Dr. Prasanna Kulkarni of AITM Belgaum and Prof. S S kulkarni and Prof. Harish Bendigeri of Gogte Institute of technology, Belgaum for their valuable suggestion and helping in analysis of curricula.

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