

10. RESEARCH ACTIVITY IN UN-AIDED ENGINEERING COLLEGES A REVIEW, NEED & HURDLES

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Abstract:

The Technological growth index will decide the progress of the country. There is a phenomenal growth in the infrastructure for providing science & technical education. The growth & development of technology is decided by extent of research activity undertaken not only at industries levels but also at institutional level. Research activities are conducted at institutional- graduate & postgraduate level- but lack in direction and goal. The research activities carried out at post-graduate level & doctoral level are not need oriented but executed to satisfy requirement for getting degree as a part of qualification enhancement. The research work done at postgraduate & doctoral level is many times not application oriented and is never used after completion of degree.

Freedom and autonomy are keywords, in the promotion of research, especially in foreign universities, is encouraging the local talent with lucrative offers, causing brain drain? Scientific & technological achievements could be crucial for our survival as a self-reliant country.

Author has made an attempt to emphasis the need & growth of research activity in comparison to the growth of technical education. An effort is made towards identifying the reasons for lack of cult, apathy for research and its application. Hurdles in growth of research activity at institutional level are identified. A sincere exercise is done to enlist the remedies and provide motivation for encouraging the core and applied research, at science & technical institute level. A SWOT Analysis approach is also suggested.

Introduction

India, today is among the top developing countries that attained technical capabilities & self-reliance in the area of technology research and development activities with annual growth rate of 8%. These outcomes are the key factors for technological development. Research & Development activities are mainly the contribution of R & D Departments in industries, partly by research institution & organisations and a very little by technical educational institutions. The era of liberalization,

privatization & globalization have put more stress on R & D activities at all levels to face global competition. The research activities are broadly divided into two, applied research & basic / core research. Big Industries / organization have their full-fledged. R & D departments to cater to their technical requirements. These big organizations are also financially sound to import the technology. But about 80% of the small scale industries are sick. The basic reasons, for this, are lack of skilled labour, technological awareness, knowledge &

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inability to have research & development activity in the area of need based technology. Sick industries are badly affecting the industrial development of the country by presenting poor scenario in front of upcoming entrepreneurs.

The research activity in the technical education is done at post graduate, doctoral, research & consultancy level. There is rapid growth of technical education in the country with about 3241 undergraduate colleges^[1]. The undergraduate engineering colleges are producing lacs of engineering graduates every year. More than one lac fifty thousand post graduate and doctorate engineers are available in the country. The research activities are done rarely at undergraduate level. At post graduate level, research is done mainly as a part of curriculum for completing the postgraduate degree. At doctoral level, research activities are done seriously, mainly in core/theoretical area, but many a times the finding are not applied in field, after completion of Ph.D. As such, there is a very little recognition and reward to research & development activity executed in the technical institutions. The environment in technical education is responsible for developing apathy for research at student & staff level. But is to be emphasized here that the quantum of research & development is going to decide the growth of indigenous technology and growth of India.

There are large numbers of factors that are influencing research activities in technical education. The nature of students admitted in the technical educations, recent technological advances, growth of knowledge economy, flexible approaches to teaching and learning, work intensification, government, industry and employer expectations and local committees are some of the key factors. Unless India brakes the existing barriers between education, research and technology, the three essentials for progress of any country, the country would be left far behind in next 5-10 years [7].

Need for Encouraging Research at Institutional Level

Although research may not yield immediate results, but it pays handsome dividends in long run. Indian brains have a better gray matter but their contribution in technological development is not that promising. The technological imports are more as compared to indigenous technology. The technology adopted in many cases is not cost efficient or productive. The R & D activities at big industries level are developed for their exclusive use. The development of technology & research at government institutions or R & D centers are not mission and time oriented. A small number of engineers or professional working in industry are involved in research activities. The question is how the R & D activity can be boosted? The country presently has a force of about one lack engineering professionals & teachers, who are producing the technical manpower and there is a need to encourage and motivate engineering teachers for the active involvement in research and development. Some of the reasons as to why the institution needs research activities are as below.

1. Regulatory Agencies

Looking to the need of development of research activities at institutional level, the regulatory agencies like UGC, AICTE have proposed new performance based system which gives more weightage to research activity at the time of appointment or promotion through CAS for the post of Associate Professor & Professor.

2. Self appraisal by NBA

NBA has proposed more weightage and compulsory minimum score for research & development activity covered under criterion No. III in the self appraisal format to be filled in by the institution during the process of accreditation.

3. Developing cult for R & D in Engineering Graduate.

The engineering institutes are the producers of technical human resources. The numbers of patents contributed and research activity undertaken at institutional level is also one of the parameters to grade the Institute. Unless the engineering teacher is reoriented, the cult and interest for research is not developed in them and they will not be able to develop the same in the students. The engineering graduates are responsible for the technical advancement of the nation. The technical manpower with research orientation will put our country ahead in technological race. The graduate engineers must be encouraged to develop problem-solving skills and approach to solve real life industrial problems.

4. Consultancy for Small Scale Industries

About 80% of small industries are sick, which is a great hurdle in the industrial development of the country. Basic problems of a sick industries are labor and technical know how. The industries are not financially strong to invest in R & D. The best solution lies in interaction and involvement of engineering teachers in solving their technical problems. This will develop the industry institute interaction and will provide economical solution to small-scale industries for their technical problems. Thus institution can develop their base in industries.

5. Development of need based technology

At present technology for our needs is imported, which may not be economical or need based. There is a need of developing the technology for our environment, economy and requirements of agriculture & industries. The involvement of institution & professionals is the best economical solution. So also the institutions get a chance to work on industry based problems.

6. Student Development

R & D environment helps the students for upgrading and updating their concepts, practical skills and provides more involvement in laboratory and fieldwork. The R & D environment also stimulates the learning and innovative cult of students exposing them to personal & professional development. This helps to keep pace with rapid development in technology and demand of industries. Encouraging research will grow the educational institutes as center of excellence & expertise with generation of resource.

Hurdles in encouraging Research

When role of engineering teachers toward contribution to research & development is discussed and emphasized for years, then why it is not brought into practice? What are the hurdles in encouraging research? Probably the greatest hurdle is lack of genuine will in the educational environment, universities and government departments for promoting research. Some of the hurdles are discussed below

1. Most university programmes give emphasis to theoretical concepts and have a little weight for research in curriculum. This ultimately produces an engineer with theoretical base but little orientation for application of it. But now a days efforts are being taken to orient students for applying the theoretical knowledge to practical problems. Still much more is required.
2. Activities like seminar, field visits, and mini-projects etc. though may be a part of curriculum, do not have marks weightage for getting grade. These activities, which can put research orientation to upcoming engineers, are not seriously undertaken in the colleges.
3. Though there is specific mention of weightage to research activity in workload of a teacher, usually due to deficiency of teaching staff in the departments and as the

teachers have sufficient academic and administrative work, the research activity gets last or no priority.

4. The research is carried out by faculty while enhancing their educational qualification (i.e. M.Tech, Ph.D. etc). There is specific recognition in the form of advance increment to faculty for completing M.E./M.Tech. and Ph.D., but it is not followed in many of the institutions.
5. Research work is dedicated and time-consuming activity. In educational institutions, due to hectic academic and administrative load, research work is given little recognition. No incentive, encouragement, benefits or facilities are given to the faculty interested in research work. Research activity has been treated as individual's own work/interest. Some faculty members take research and consultancy projects, but due to the environment in the institution, the concerned faculty gets little recognition and financial benefits. This further curbs the effort & initiatives of the individuals.
6. The process of completion of post graduate & doctoral research work, apart from actual time taken for basic work, is very time consuming. Some times, the dissertation sent to examiner takes months for its review. The hard working student with bubbling enthusiasm, keeps on waiting & waiting for exam, which kills his spirit and initiative. This is a common picture of various departments and universities
7. There are no special grants available in budget of institution that can help the faculties involved in research activities toward the expenses involved in research activity. Usually, the individual faculty has to pay from his own pocket for the research. This again develops the apathy for involvement in research. There are many more reasons and factors, generated out of personal reasons, environment in

department and institution, and lack of seriousness on the part of authorities, government & university etc

Remedies:

If Indian scientists can be noble laureates by working in USA, UK & Europe, why can't they work in their own country? This is high time when we should seriously look to the remedies for neglected research at institution level. A few of remedies are listed below.

1. There is a need of generating awareness and cult in the Heads of institution, Authorities, Management and government Authorities for encouraging the individual for research. With out the government / University / AICTE involvement in encouraging research, the technical undergraduate institutes will not get seriously involved in research activity.
2. The University / AICTE should frame rules which give special encouragement in monetary form to the faculties involved in research or those who have acclaimed some achievement through research. Some of the institutions already have financial incentive schemes.
3. The time allotted for research activity in the work load should be clearly mentioned and strictly adhered. The faculties should be made accountable for their involvement in research work. Though research may not bear immediate fruits, but the sincerity of efforts can always be checked.
4. The faculties who help in resource generation by way of consultancy, research and development, should be properly encouraged, not only by appreciation but also by handsome remuneration. Friends, it is fact that financial motivation is one of the best motivation. This will not only motivate individuals and others for their active participation but will also help for building institutional image by way of industry institute interaction, public opinion, better development of students & faculties and

ultimately the Nation.

5. The evaluation process for grading an institution by quality assurance agency like "National board of Accreditation" (NBA) TEQIP, UGC, ATCTE should give still more weight to research activity in the department, at undergraduate level.
6. Industries and institution should come forward for reaching some MOU or interaction by generating avenue for research to teachers and a economical solution to industrial problems. This would help financially to both, the industries and faculty/ institutions.
7. Career in teaching/educational institutions should be made very lucrative and appealing, so that good brains can be attracted in educational circles. This will not only help producing better human resource but also help in technological development and research.
8. Final Year UG and PG project should be designed so as to have defined involvement in research contribution.
9. We should try to translate knowledge into new research and new research into technology and products.
10. Technical staff should keep abreast of

development in their own field of teaching as well as changes in teaching methods and technologies. Understanding new technologies and practices will help in introducing innovative teaching and learning practices into the classroom. Research trends can be developed by providing industrial exposure to staff members to make significant value addition to technical education by arranging industrial tours of students, practical training/Internship, students doing projects in industry and teacher on deputation to industry. In addition, the industry need to depute persons for higher degrees to institute, depute working professionals for continuing education programs in institutes, assign consultancy jobs to institutes, sponsor R & D projects to institutes and arrange expert lectures from senior industries personnel in institutes.

SWOT ANALYSIS:

SWOT Analysis, a strong management analysis tool, can be used to strengthen the Research activities in Industries and institutes. It is a need of hour to identify our strengths and weaknesses as well as opportunities and threats at the institutional level and at the staff level. The management as well as the staff are both responsible to take initiative and work together to see that the research activities are

SWOT analysis can be carried out as below with research in focus

Strength	Weakness
<ul style="list-style-type: none"> ● Aspirations of Youth to pursue Technical education. ● Increasing interest of Industry Associations (such as CII, FICCI, and ASSOCHAM) and collaboration with academic institutions. ● Efforts like Accreditation by NBA, TEQIP by World Bank etc. ● Motivation to PG/Doctoral qualification through QIP ● Removal of absolonsance through MODROB/ TAP Tech scheme of AICTE. 	<ul style="list-style-type: none"> ● Technical Education perceived as a business opportunity by some. ● Severe shortage of qualified and competent faculty. ● Lack of interest for pursuing research in degree programs. ● Lack of availability of Ph.D's in engineering for faculty positions. ● Lack of adequate industry - institute interaction.

<ul style="list-style-type: none"> ● Good analytical, design capabilities decision making & problem solving capabilities ● Ability to handle open-ended, poorly defined problems ● Creativity and innovation, discipline & work ethics 	<ul style="list-style-type: none"> ● The widely prevalent affiliation system in our universities precludes timely curriculums updating and introduction of innovative reforms. ● Relatively less number of PG Institutes ● Little encouragement to faculty in pursuing research. ● Inability to work in a Team, Lack of inter-disciplinary knowledge, little practical orientation & low Inter personal skill of teachers.
Opportunity	Threats
<ul style="list-style-type: none"> ● Setting up quality Indian institutions – sponsored by offshore campuses. ● Networking of technical institutions, at different levels, for mutual benefit, sharing of resources, undertaking major projects. ● Many alumni are offering substantial supports to their Alma Maters for research & development. ● The role of Technology and Technology Education for national developments and prosperity is widely acknowledged. ● National policies recognize role of Science & Technology ● Industries growth recognize role of Research and Technology Education. ● Globalization offers opportunities for acquisition of state-of-the-art technologies. 	<ul style="list-style-type: none"> ● In the emerging GATS scenario, Quality concerns need to be addressed urgently. ● Forthcoming competition from international players & universities. ● The non-uniformity in the distribution of Technical Institutions in the country, causing regional imbalances, and inter-state migration of students. ● Poor admissions in Technical institutes hampering strength of Institute. ● The tendency of research scholars to prefer computers-based research to experimental research. ● Marginal role of Scientist, Economists, Financial experts, Administrators in high-level decision making bodies. ● Quantitative expansion in Technical education without simultaneous Quality assurance.

carried out in technical institutes.

Conclusion

It is the time when we must understand the need of building research attitude in faculties and institutions. The government authorities like Universities, Directorate of Technical Education, A.I.C.T.E., N.B.A., etc. should involve themselves in promotion and implementation of research activities. The

industries should also come forward with open arms to welcome the interaction, which will help them in technical expertise and training. A research cult, exposed to industrial & research environment should be encouraged. This will produce a better practical and research-oriented student as an engineering professional.

India needs to achieve and sustain an 8-10%

economic growth rate to meet its economic and development objectives. To deliver this level of sustained growth by 2020, India needs to grow its research and development activities. The Engineering institutes are the workplace for laying the foundation of these activities. This area cannot be neglected at any cost, as there is a two-way benefit to the institute. Firstly, the institutes will improve upon their image as world leaders in providing quality technical education and secondly, it will start generating resources for self development. In all the mantra for developing the research trends is initiative to be taken by Management, Principal & Government. Once started, the day is not far when the industries will come to industries to set up their R & D centers.

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