

Research at Higher Education Level: Problems and Actions Required

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ABSTRACT

India has many advantages in terms of the institutions of higher learning with capability to support doctoral programmes and having excellent research facilities, yet the contribution of the country to R&D is not significant. Technical education has shown massive growth during the last two decades and about 90% of the institutions are private. Majority of the faculty work in these institutions under varying conditions and face problems in pursuing research. Problems exist at the individual, organizational, university and government levels. The paper is an attempt to identify the problems faced by the faculty in pursuing research and the actions that are required at various levels to promote research culture in technical institutions. Faculty members (N=118) working in various private technical institutions stated that major problems include lack of policy at institution level to sponsor faculty for pursuing research, lack of infrastructure facilities in emerging areas, no dedicated laboratories in high-tech areas, non-availability of journals (print or online), non-availability of software and lack of financial support from the institution. At the university level, faculty opined that there are no uniform guidelines for research and there is no common entrance examination for the various universities. At the Govt. level and procedure to obtain sponsored projects is rigorous and time consuming. The ten top most actions required at the institution level include: assignment of research based projects and constitution of multi-disciplinary teams of students for undertaking research based projects, subscription to online journals, strengthening and modernization of facilities in laboratories and workshops, financial support to faculty and students for attending seminars, strengthening of collaboration with technical institutions in vicinity for setting up high-tech laboratories, organization of seminars and conferences in emerging areas and setting up of incubation centres in collaboration with industry.

Keywords: Research Problems, Technical Education.

INTRODUCTION

The importance of research and development cannot be undermined, as it is one of the drivers that determine the economic growth and development of any country. India has many advantages in terms of the institutions of higher learning such as Indian Institutes of Technology, Indian Institute of Science Education & Research, National Institutes of Technology, Tata Institute of Fundamental Research etc. with capability to support doctoral programmes and excellent research facilities and capacity yet the contribution of the country to R&D is not significant. Since 2000, India has quadrupled its scholarly output, but that rate is surpassed by Brazil's and

China's. However, the scholarly impact remains 30% below the world's average [1]. India is one of the leading filers of patent applications but the number of patents granted remains quite low. India filed around 52000 patent applications and less than 10000 patents were granted in 2014 [2].

Govt. of India has laid focus on increasing expenditure on research from existing 0.9% to 2.0% of Gross Domestic Product (GDP), increasing the number of scientists and researchers from 0.15 million to 0.17 million, ensure corporate expenditure to the tune of 1.0% of GDP, earmark 10–15% of the R&D expenditure for public private partnership and ensure policy reforms in twelfth five year plan [3] and also taken other initiatives such as announcing Science, Technology & Innovation Policy 2013 [4], instituting fellowship schemes, encouraging Indians abroad to take up collaborative research etc. but much remains to be achieved. Technical education, being an integral part of higher education, needs to create research culture in the technical institutions to give boost to research and development in the country. Various stakeholders namely policy makers, administrators and faculty and students especially those who are pursuing or intend to pursue research or guiding research need to pay attention to these issues and improve the country's contribution to global R&D.

Technical education has shown massive growth during the last two decades and about ninety percent of the institutions in the country are private and thus one can say the majority of the faculty in technical education system, particularly at degree level, works in these institutions under varying conditions. The paper is an attempt to identify the problems faced by the faculty of private institutions in pursuing research or creating a research culture in their colleges and the suggested actions required at various levels to promote research culture in technical institutions. The problems and actions to be taken detailed below are based upon the perceptions of the 118 faculty members working in the private technical institutions who attended the programme on Research Methodology for two weeks organized through video conferencing (google hangout) by the institution. The faculty members included faculty at various levels namely assistant professors, associate professors and professors working in various branches of engineering and technology, pharmacy and management.

MAJOR PROBLEMS FACED

The problems faced by the faculty can be classified into four i.e. individual level, institution level, university level and Govt. level. The identified problems are enlisted below:

Individual Level

Faculty were of the opinion that:

- Majority of the faculty members lack the needed motivation to pursue research work
- There is lack of systematic training in the area of research
- Cost of accessing high quality journals (IEEE, SCOPUS, Springer, ACM etc.) is very high
- The process of publishing takes between one to two years and sometimes it demotivates the individual

- They are unable to procure costly software
- There is lack of time for research due to loss of time in commuting from home to institution and back
- There is lack of support from the family.

Institution Level

The following are the problems faced by faculty at the institute level:

- Management's primary concern is admission and examination and not research.
- Funds are not earmarked for research.
- Lack of policy to sponsor faculty for pursuing research
- Lack of infrastructure facilities to pursue research in emerging areas.
- There are no dedicated laboratories in high tech areas.
- There is lack of financial support for research, seeking professional memberships, attending conferences & seminars.
- Journals (print or online) are not available in the institute library.
- Competent faculty, in most cases, get overburdened with administrative tasks leaving less time for teaching and research.
- Software required for research are not available in laboratories due to high cost.
- There is lack of technical supporting staff in laboratories needed to assist in setting up of experiments.
- Faculty are assigned different subjects for teaching restricting them to pursue their areas of specialization.
- There is lack of coordination between educational institutions and government.
- There is lack of networking with other educational institutions in vicinity
- There is no policy to provide incentives to faculty for research or publications or patents

University Level

The faculty members opined that they get demotivated to pursue research or face problems in pursuing research on account of the following issues concerning affiliating universities:

- Each university conducts its own eligibility test for candidates who want to pursue research.
- There is no uniformity of guidelines.
- The course work varies from university to university.
- Seats are limited for doctoral work.
- Universities offer courses, which sometimes are not relevant to the candidate and are not of interest to him.
- Universities have put a condition that one guide will be from the university itself and some universities have taken a decision to assign guides to the selected candidates. Sometimes, this leads to a situation where the areas of specialization of the guide and the candidate do not match. In the words of one participant, 'sometimes a situation may arise where a blind is leading a blind'.

- In case, candidate selects an external guide, he/she is not serious.
- There are limited guides available for doctoral work. Government Level

Problems stated included the following:

- The procedure to obtain sponsored projects is rigorous and time consuming.
- There are limited opportunities for scholarships/fellowships.

ACTIONS REQUIRED

A scale consisting of thirty different actions required at the institute level was given to the faculty members to seek their agreement or disagreement. Table 1 shows the percentage of faculty

Table 1: Actions Required at Institute Level to Create Research Culture

S. No.	Action	SA	A	I	DA	SD
1.	Offer ME/MTech programmes	59.3	29.7	5.9	4.2	0.8
2.	Offer collaborative programmes with foreign universities	47.5	49.2	1.7	1.7	0.0
3.	Plan faculty exchange programmes with foreign universities	53.4	41.5	3.4	1.7	0.0
4.	Plan student exchange programmes with foreign universities	41.5	44.9	11.9	1.7	0.0
5.	Assign research based projects to students	74.6	25.4	0.0	0.0	0.0
6.	Constitute multi-disciplinary teams of students for research based project work	58.5	33.1	8.5	0.0	0.0
7.	Keep the laboratories/ workshops open 24x7	43.2	46.6	8.5	1.7	0.0
8.	Provide incentives to faculty for undertaking research/ consultancy projects/ published work/ patents	74.6	24.6	0.8	0.0	0.0
9.	Provide scholarships to students for undertaking research projects	67.8	32.2	0.0	0.0	0.0
10.	Provide financial support to faculty for attending and/ or presenting papers in conferences and seminars with-in and outside India	72.9	26.3	0.8	0.0	0.0
11.	Provide financial support to students for attending and/ or presenting papers in conferences and seminars with-in and outside India	71.2	27.1	1.7	0.0	0.0
12.	Organize seminars & conferences in emerging areas	64.4	32.2	3.4	0.0	0.0
13.	Involve students in consultancy or sponsored research projects undertaken by faculty	46.6	46.6	6.8	0.0	0.0
14.	Create problem bank by gathering information from society	34.7	54.2	10.2	0.8	0.0
15.	Constitute teams of students to undertake surveys to identify research problems	44.9	46.6	7.6	0.8	0.0
16.	Organize industry-institute meets to gather information about the problems faced by industry	56.8	41.5	1.7	0.0	0.0
17.	Join hands with industry to set-up incubation centres at institute campus	61.9	37.3	0.8	0.0	0.0

S. No.	Action	SA	A	I	DA	SD
18.	Ensure that faculty integrates research articles in teaching	39.8	52.5	6.8	0.0	0.8
19.	Ensure that students by teachers are encouraged to write articles based on research	54.2	43.2	1.7	0.0	0.8
20.	Ensure that students are encouraged by teachers to put a critique on research articles	36.4	60.2	3.4	0.0	0.0
21.	Ensure that students are encouraged by teachers to review literature and identify gaps in research	60.2	37.3	2.5	0.0	0.0
22.	Ensure that curriculum includes contents based on research in the area	47.5	47.5	3.4	1.7	0.0
23.	Provide autonomy to technical institutions to design their own curricula for various courses	33.9	45.8	11.9	5.9	2.5
24.	Make it mandatory for the students of MTech/ME to publish at least two papers before submission of dissertation/thesis work	39.0	47.5	8.5	1.7	3.4
25.	Train faculty in the area of intellectual property rights	37.3	56.8	5.9	0.0	0.0
26.	Train students in the area of intellectual property rights	33.9	58.5	7.6	0.0	0.0
27.	Strengthen and modernize facilities in laboratories and workshops	74.6	23.7	1.7	0.0	0.0
28.	Collaborate with other technical institutes in vicinity to set-up high tech labs	72.0	25.4	2.5	0.0	0.0
29.	Provide access to online journals-national and international	87.3	12.7	0.0	0.0	0.0
30.	Earmark funds for encouraging research	66.9	32.2	0.8	0.0	0.0

SA: Strongly Agree A: Agree I: Indifferent DA: Disagree SD: Strongly Disagree

members in agreement or disagreement with the various actions required. Majority of the faculty members expressed their agreement with all actions included in the scale. Faculty ranging between 0.8 to 11.9% were, however, indifferent to the various actions and faculty ranging from 0.8% to 5.9% either showed disagreement or strong disagreement with eleven actions (indicated at serial numbers 1-4, 7, 14-15, 18-19 and 22-24). The percentage of faculty members who were in disagreement was, however, low.

In addition to the above stated actions required at the institute level, the faculty suggested that:

- Institutes should strengthen collaboration with industry to create a problem bank for research, strengthen infrastructure and promote collaborative research.
- Faculty can be given flexi-working hours so as to encourage them to devote more time to research. Faculty members pursuing research may be given less teaching load to allow time for their research work.
- The promotion criterion for faculty should give weightage to contribution in research
- Research methodology paper should be an integral part of curriculum and the curriculum should be more practical oriented

- Independent study paper can be introduced at graduation and post graduation levels to develop learning to learn skills among students and make them autonomous learners
- Training in the area of Intellectual Property Rights should be given to both faculty and students.
- Eminent scientists may be invited from time to time to interact with the faculty.

Weighted scores were calculated to find out the top ten actions required at the level of technical institutes to create a research culture. These include the following in order of ranking:

- There is a need to constitute multidisciplinary teams of students for undertaking research- based projects. Research paradigm is changing and it has been realized that real life problems cannot be solved without involving multidisciplinary teams. This will enable the students to look at the problems from multiplicity of viewpoints and use knowledge from various disciplines to find appropriate solutions.
- Institutions should subscribe to online journals of repute to facilitate the process of review of related literature and enable the faculty and students to remain current with developments in the areas of their specializations and research. MHRD has taken an initiative called e-Shodh Sindhu and has constituted a negotiation committee to ensure availability of e-resources at affordable prices. Govt. should consider extending the same facility to private institutions.
- Students need to be assigned research- based projects. At present, majority of the projects undertaken by students do not involve research component. If research based projects are assigned, they will certainly help in developing research skills among students and identifying problems which are real life, relevant and in turn would enhance the utilization of findings of research based projects.
- There should be provision for incentives to faculty for undertaking research/consultancy projects/published work or patents. Incentives may motivate faculty for further research work or publications.
- Institutions should strengthen and modernize facilities in the laboratories and workshops.
- Institutions should provide financial support to faculty for attending and/or presenting papers in conferences and seminars with-in and outside India. This will certainly broaden the mental horizon of the youngsters and provide needed exposure to bring transformation in technical education to compete globally.
- Institutions should provide financial support to students for attending and/or presenting papers in conferences and seminars with-in and outside India.
- Institutions should collaborate with other technical institutions in vicinity to set up high tech laboratories. High tech labs are expensive proposition and utilization by an institution may be limited. Thus, setting- up of joint labs will reduce the burden on any institution and increase utilization of labs.
- Institutions should organize seminars and conferences in emerging areas. This may help the faculty to know the current developments and research in the field. It may also lead to cross fertilization of ideas.
- Institutions should join hands with industry to set up incubation centres. Incubation centres will help those students who have innovative ideas to develop and implement ideas and it may result into certain start-ups.

Faculty members also suggested a few actions to be taken by the universities and government agencies/bodies to promote research culture in technical institutions. These include the following.

Actions to be taken by universities:

- There should be one common entrance examination for pursuing Ph.D.
- Universities should uniformly follow guidelines as specified by UGC.
- Universities should give freedom to the researchers/candidates to select guide as per their area of specialization.
- Courses included in the course work should be relevant to the area of research of the candidate.
- More number of fellowships should be available.
- Stipend/Research fellowship should increase.
- Unnecessary delays in evaluation of thesis should be avoided.

Actions to be taken by Government agencies/bodies:

- Number of fellowships and stipend should be increased.
- Allocation of sponsored projects should be done purely on the basis of merit of proposal and not type of institution.
- Autonomy can be granted to better performing institutions. Autonomy will help the institutions to design courses in emerging areas, offer collaborative programmes and undertake collaborative projects with industry or other institutions.

Multipronged approach needs to be used to create research culture in the technical institutions and motivate both faculty members and students to contribute to research. Government needs to formulate appropriate policies based on evidence, administrators need to ensure implementation of the policies and other stakeholders need to work with commitment to realize the goals of national development.

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