

# Faculty Enrichment through Research Practices: Challenge for the Self-Financed Technical Institutions in India

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## I INTRODUCTION

Owing to financial constraints, lack of job security and limitation in facilities, teaching job in private or self-financed institutions is not being a preferred option by the job seekers willing to enter into academic profession. Even then, most of the people engaged in teaching profession are attached with the private institutions producing 90% of graduates in engineering and management. Therefore, there is a great concern about the quality of teaching in the huge mass of teachers many of whom lack the passion which is the fundamental requirement in teaching profession. Teachers are required to enhance knowledge base through continuous process by enriching themselves with new teaching learning pedagogy, state of the art technology and their evolution, match and marry theory with application leading to research. This is only possible when the teachers get proper environment, facilities and infrastructure apart from self-motivation and passion for mastering the art of teaching.

## II RESEARCH CHALLENGES IN PRIVATE INSTITUTIONS

There are specific challenges for the teaching faculty in most of the private or self-financed institutions. Lack of fund for experimental research is one main concern. It is in general, difficult to get research grant in the private institutions. For any research, software tools required are in general are costly and the management may not agree to invest that amount for single or handful of researchers unless it is useful for general purpose keeping in mind the poor faculty retention rate. This is true for hardware equipment also. Hence, non availability of advance equipment/testbed (which is supposed to be costly) is another concern. Decline in the number of student's admission is a serious concern to the financial affordability of the private institutions to support costly research facilities. Another important concern is the lack of dedicated, motivated and sincere faculty in most of the private institutions.

Apart from the physical resources, there are other important and practical issues which pose challenge to the research faculties. For example, *difficulty in getting eligible supervisor* is a common issue. Even if available, getting registered in the university is very difficult unless the faculty has

any personal source. Moreover, in many institutions, there is lack of incentive from the management to motivate a teacher to carry out research in particular, when there is discriminating attitude by the government institutions, funding agencies and regulatory authorities towards the private institutions for grant of research fund. Finally, there is a lack of awareness on proper research practices among the fresher's joining in the teaching profession.

## III RESEARCH METHODOLOGIES

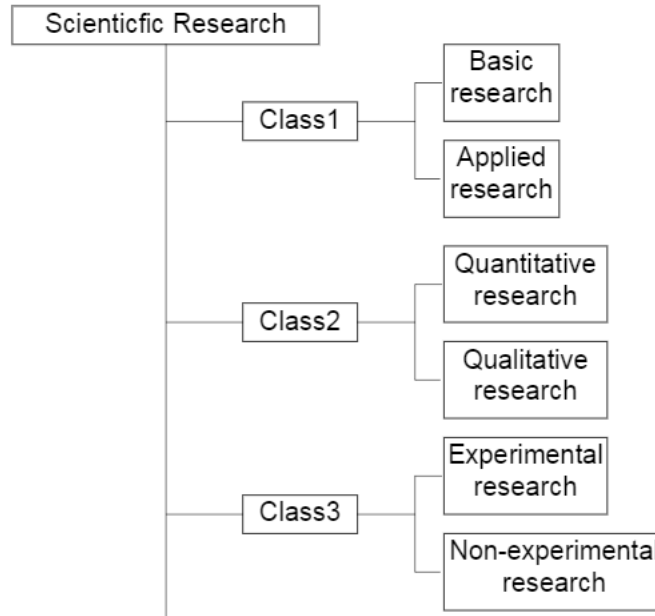
Research is the systematic approach of collecting information (data) and logical analysis of them applying scientific tools and methods to obtain new findings that leads to a meaningful contribution to the society. It is a combination of investigation of past work and outcome of work in the present that will help others in the future and generate a better solution to the problem. Research shows its best with the combination of imagination, initiative, intuition, critical thinking, common sense and curiosity.

- (a) The primary objectives of research [1] are to
  - (b) Discover new facts
  - (c) Verify and test important facts
  - (d) Analyze an event or process or phenomenon to identify the cause and effect relationship
  - (e) Develop new scientific tools, concepts and theories
  - (f) Find solutions to scientific, nonscientific and social problems and
  - (g) Overcome or solve the problems occurring in our everyday life.
- Three research paradigms are
  - Scientific
  - Interpretive
  - Critical

Scientific Methods in Research involve scientific investigation through collecting information (data) in a systematic process and logically analyzing those.

Interpretive methods of research start from the position that our knowledge of reality, including the domain of human action, is a social construction by human actors and that this applies equally to researchers. Thus there is no objective reality which can be discovered by researchers and replicated by others, in contrast to the assumptions of positivist science.

'Critical research' is not a tidy, clearly defined category of research but represents many different types of research. We used to identify approaches that challenge orthodox approach through out of the box thinking.



**Fig 1 Research classification**

Basic research is driven by a scientist's curiosity or interest on nature problem. The main motivation is to expand man's knowledge, not to create or invent something. There is no obvious commercial value to the discoveries

Applied research is designed to solve practical problems of the modern world, rather than to acquire knowledge just for knowledge's sake. Quantitative Research options have been predetermined and a large number of respondents are involved. By definition, measurement must be objective, quantitative and statistically valid. Qualitative Research is collecting, analyzing, and interpreting data by observing what people do and say. Whereas, quantitative research refers to counts and measures of things, qualitative research refers to the meanings, concepts, definitions, characteristics, metaphors, symbols, and descriptions of things. Qualitative research is much more subjective than quantitative research.

Experimental research requires infrastructure to carry out the experiment. Quantitative and qualitative research depends on the experimental research as the qualitative and quantitative measurements based on the designed prototype in experimentation. Self financing institutes in India lacks research infrastructure and they motivate the

faculty to do in house research to complete PhD. On the other hand, basic research requires indefinite time to get the outcome. These constraints force the researchers to do applied research or non experimental simulation based research. Simulation is an important component to of research in science and engineering. Its results must be supported and validated by mathematical analysis. Simulation is necessary only to complement mathematical analysis where closed loop solutions are intractable. Simulation parameters must be decided and chosen properly. The output graphs and results must be realistic and within the expected range. All assumptions taken in the simulation must be spelt out properly with their effects in the results.

#### IV RESEARCH OUTCOME

Outcome of the research is new theory (for basic research), new model (for experimental, quantitative and qualitative research). This outcome can be protected through publication in scientific journal or through intellectual property right (patent). The paper cannot be published before the patent is granted. Patent process in India takes longer time (2-5 years) then the patent process in USA but the patent processing fee in US

is higher than in India. Publishing a paper in SCI indexed journal takes 2-3 years. So the faculty prefers to publish the research outcome rather than filing patent.

IPR protection of research outcome:

Government is changing its policy by emphasizing more on filing patents rather than publishing paper. There are several government agencies and programs are there to support financial and technical assistance to Indian researchers in protecting innovation, commercialization and patent filing like

- (a) India Innovation Growth Program
- (b) Millennium Alliance
- (c) TIME IS
- (d) GITA(Global Innovation and Technology Alliance)
- (e) NSTEDB(National Science & Technology Entrepreneurship Development Board)
- (f) Business Incubator Association ISBA (provide technical support only)

Moreover, several industries like CSIR TECH, Venture capital are there to finance an innovative project on a partnership basis.

## V RESEARCH PUBLICATIONS

Research paper indicates academic as well as research excellence of an academician. Ideal research paper contains 90% results and 10% presentation whereas common research paper contains 10% results and 90% presentation. Researchers should stay aloof from plagiarism and fake journals. Even self-plagiarism is also injurious for citation count. Now-a-days, good conferences and SCI indexed journal check the papers initially through software for plagiarism before reviewing. There are mushrooming of so-called "open" journals with no pedigree attracts budding researcher to publish their valuable research work. Researchers should avoid such journals. Thomson Reuter maintains a rank based on the merit of the journals. Researchers can refer the list to publish their paper.

But when a faculty joins a self financing institute; pressure comes to them to do research, and publish paper. Level of their research is analyzed through number of publications in national/international journals or in national/international conferences. Due to this objective, the research becomes just to

(a) Publish more number of papers

(b) Get a research degree (Ph.D.) along with its benefits like better employment, promotion, increment in salary, etc.

Unlike the research work done in premier institutions like IIT's or IISc where fundamental results are brought out in the form of patents, commercialized products and very few number papers in the SCI indexed journals. Change in objectives of research changes the paradigm of research. Researchers try to find a problem which can be solvable in a heuristic approach with some result. Publish the result in a journal or conference without bothering whether the results can make an impact to the society or it can be used by the industry in a commercially viable way. Most of the post publication "research" papers, though archived, are hardly read by anybody, including the authors themselves. Even the authors sometimes don't remember the titles of their own papers once the purpose is solved. Most of the research works in India are out of academic compulsion rather than research penchant. It's either to supplement one's career or for better job opportunities.

## VI QUALITY MEASUREMENTS IN RESEARCH PUBLICATIONS

Research quality is more important than research quantity, i.e. just the number of publications. Quality is measured with parameters such as:

(a) **ISSN**-is a unique 8-digit number -electronic serial of a periodical or publication without any bibliographic description.—Print ISSN (p-ISSN) /electronic ISSN (e-ISSN) identifies just a title without any other significance.

(b) **Citation** - is the process of acknowledging or citing the author, year, title, and locus of publication (journal, book, or other) of a source used in a published work. For example, references in a paper add citation number. Such citations can be counted as measures of the usage and impact of the cited work to assess the value of a researcher's output. This is called citation analysis or *bibliometrics*. *ISI citation indexes* are published by Institute for Scientific Information (now part of Thomson Reuters) the in print and electronic form against subscription. Elsevier publishes *Scopus* indexing for citation. *Cite Seer* and *Google Scholar* citations are freely available online. *Indian Citation Index* published online for the peer reviewed journals published from India.

(c) **Indexing (h,g,I etc)**-

- (i) **h/g indexes** are the quantitative measures to assess the value of a researcher's output. It does not count the number of papers. It can be measured using the free software "Publish or Perish" (<http://www.harzing.com/pop.htm>).

- (ii) (***h-index*** measures both the productivity and impact of the published work of a scholar. It is based on the set of the scientist's most cited papers and the number of citations that they have received in other publications. A scholar with *h-index* equal to "*n*" has published at least "*n*" papers each of which has been cited in other papers at least "*n*" times.
- (iii) The ***g-index*** - suggested in 2006 by Leo Egghe for quantifying scientific productivity based on publication record and is calculated based on the distribution of citations received by a given researcher's publications:  
Given a set of articles ranked in decreasing order of the number of citations that they received, the *g-index* is the (unique) largest number such that the top *g* articles received (together) at least  $g^2$  citations
- (iv) **Impact factor** - was devised by Eugene Garfield- founder of the Institute for Scientific Information (ISI), now Thomson Reuters. It refers to the average number of citations counted in a year for articles published in a journal in the previous two years - how frequently peer-reviewed journals are cited by others in a particular year. It evaluates a journal's relative importance, compared with others in the same field. Publication in a journal with high impact factor increases citation count and hence higher *h/g-index*. Impact factors are calculated yearly for those journals that are indexed in Thomson Reuters *Journal Citation Reports*. It is based on a three-year period, average number of times published papers are cited up to two years after publication. For example, the impact factor for a journal in 2014 would be calculated as follows:

A = the number of times articles published in 2012-2013 were cited in indexed journals during 2014

B = the number of articles, reviews, proceedings or notes published in 2012-2013.

Impact factor in 2014 = A/B

The value of the impact factor cannot be compared among different scientific disciplines. Microbiology journals have much higher Impact Factors than Mathematics or Engineering journals. The citation patterns in these disciplines are entirely different, therefore the numerical values of their Impact Factors also differ significantly and comparisons would not yield appropriate results.

## REFERENCES

- [1] S. Rajasekar, P. Philominathan, V. Chinnathambi," Research Methodology".
- [2] Geoff Walsham , "What is Interpretive Research?", Lecture 1 of Course on Interpretive Research in IS - Oslo University
- [3] <http://planets.ucf.edu/resources/citation-counts>
- [4] <http://www.lib.utexas.edu/chem/info/cited.html>