

“Research and Reformation in Rejuvenation of Undergraduate Education”

Mr. Barakatali Halakeri

Dept of Education, Anjuman Arts, Science and Commerce College, Dharwad

Abstract:

This brief examines the status of research in Indian higher education and offers an overview of the concept of undergraduate (UG) research as a means of reform. The article attempts a brief review of the government efforts to improve higher education research, and underlines the limitations of their scope as well as their implications. Through an expansive review of existing empirical and qualitative studies, this brief shows the benefits and impacts of UG research on development of scholarly traits in students as well its effect on institutions. Finally, it recommends ways of inducting this concept in the present system of undergraduate education in India, based on prescriptions by the Council on Undergraduate Research.

Key Words: Research, Reformation, Schemes, Implications, Suggestions

Introduction:

MHRD has made efforts to organize a nationwide debate on some of the key issues related to school education; higher education and their linkages with the society and the economy. The Union Government has also announced several new policies which have been perceived as a new perspective to deal with the current as well as future challenges in the Indian society and the economy. The state of research, in particular, has not only failed to improve, but has suffered tremendously—and the blame can be placed on both the government and the educators themselves. Owing to the segregation of teaching and research in the country, entire generations of students have graduated from the university system without producing even a single original research. Many of these graduates lack the skills required to be employable as well as knowledge of the industry they were to work in. Of India's 1.3-billion population, there were only 216 researchers per million population in 2015. India's investment in research is a measly 0.62 percent of GDP. These numbers are well below global best practices. France, for example, spends 2.25 percent of its GDP on research, and the United States, 2.74 percent; both countries have some 4,300 researchers per million population. China, for its part, invests

more than 2.11 percent of its GDP on research and has 1,200 researchers per million population. In higher education, in particular, India's research expenditure is only four percent of GDP. There are some 161,412 students enrolled in PhD programmes in 2018. This comprises less than 0.5 percent of the total student enrollment in higher education in the country – which constitutes students enrolled in universities, colleges and standalone institutes pursuing undergraduate and postgraduate programmes.

Schemes to Improve Undergraduate Education:

Time and again, questions have been raised on the quality and authenticity of the research output. The Government of India (GoI) has launched, beginning in 2013, a string of initiatives to boost the number of researchers in higher education. For starters, the Ministry of Human Resource Development (HRD) launched the Rashtriya Uchchatar Shiksha Abhiyan or the National Higher Education Mission to strategically fund higher education institutes in the country. In 2015, the National Institutional Ranking Framework (NIRF) was launched to rank universities and institutes in various parameters, including research. Subsequently, the GoI announced the 'Institutes of Eminence (IoE)' scheme, where it initially pledged to support 20 institutes to become world-class universities – of which six have already been announced and more than a dozen are awaiting the status upgrade. A "world-class" university, however, cannot be devoid of research; teaching and research go hand-in-hand. IoEs are chosen on the basis of, among others, their research performance in NIRF.

In March 2018, in the annual budget, Finance Minister Arun Jaitley announced the 'Prime Ministers Research Fellowship', with an initial budget allocation of INR 16.5 billion. Under the scheme, undergraduate and postgraduate students with a Cumulative Grade Point Average (CGPA) of at least 8.0 from elite Indian institutes such as the Indian Institute of Science (IISc), Indian Institutes of Technology (IITs), National Institutes of Technology (NITs), Indian Institutes of Science Education and Research (IISERs) and Indian Institutes of Information Technology (IIITs), will be eligible for direct admission in PhD programmes of IITs and IISc. They will also be fairly compensated under the scheme. While it may be too early to judge the implications of such measures, the question that must be asked is whether the research crisis in the country is only about scarcity of compensation or funds for scholars. Moreover, it needs to be examined why the schemes are restricted to a select few elite institutes that constitute only two percent of student enrollment in higher education.

Implications:

The various benefits of undergraduate research: enhanced student learning, effective mentorships, increased enrollment in graduate education, increased retention, higher critical thinking prowess, creativity, problem solving skills, intellectual independence, and understanding of research methodology. There have been several efforts to understand and link the benefits of undergraduate research to a student's aptitude for sciences and social sciences, as well as their inclination to pursue graduate studies and eventually research-intensive careers. While most of these reviews are based on self-report surveys, some of them have analyzed the end research product as well to show a direct correlation between UG research and higher education. Some of them even use the Grade Point Averages (GPA) secured at the end of the course to quantify the success and benefits of participation in UG research. For example, professor of Psychology, George Spilich's experience in his department at the Washington College reveals that the students' marks for major subjects dramatically improved since they introduced "research-based" programmes.

Students who pursue CUREs or research for prolonged periods of time during their undergraduate years tend to benefit more from such experiences. However, there seems to be little benefit, if at all, from short-term research experiences. Studies show that undergraduate research enables enhancement of knowledge, writing skills, research ability and also boosts confidence of the participants in their respective fields. It is essential for students to spend enough time on their agreed area of research, understand the depth of the problem, come up with research questions, and base their findings on credible data analyses. Basic qualities such as writing and research, if learnt at an earlier stage, can help students write authentic and original research papers at advanced levels.

In the US, a quantitative analysis using a sample size of 1,135 students representing 41 institutions showed the following results: students reported enhanced "technical and personal skills" and 87 percent of them either proceeded to pursue graduate science education or began planning for one. Furthermore, various qualitative analyses reveal an increase in participation of underrepresented students by way of participation in undergraduate research. Their experience in undergraduate research prepared them for graduate studies and helped them decide on a career in science. At a stage when students are academically vulnerable and have yet to decide the course of their career, it is imperative that they are guided voraciously by a well-meaning and competent mentor. A mentor helps students work intricately in a collaborative environment with researchers, scientists, technicians and colleagues to not only analyse their chosen research area, but to tackle the peripheral issues as well. Some even refer to UG research as "apprenticeship", where students learn by critically analysing problems and undertaking "intellectual ownership" of the performed task. Students can gain remarkably by learning from their mentor's

experiences, their expertise in their subject and nuances of research methodology, and eventually have the pleasure of forming their own research questions, question the unanswered, and develop a culture of science.

To gauge the impact of UG research on different institutions, there are a few success stories that provide valuable lessons for India. At the Washington College's Psychology department, a "research-based curriculum" was introduced after meticulous consultation with students, even in the absence of their department faculty. The faculty begin by discussing their research projects in the first and second year classes and inviting students to join them if they find the topic of interest. Another effective way that the faculty has incorporated in middle and upper level classes is inducting their research projects in laboratory sessions. The results are multifarious – students either take these projects as "starting points for their own ideas", or branch out more ideas based on their interest area from these projects. This helps build a sustainable student-mentor relationship. The paper concludes that the results have been more than satisfactory and the exercise has also improved the faculty's approach to teaching undergraduates.

Reforms in the Undergraduate Education

Reforming and rejuvenating the Indian Higher Education has been a matter of intense debate and deliberations among all stakeholders viz. policy makers, recruiters, faculty, academic leaders and private sector educational services providers. Following Committees appointed by MHRD during the UPA (I & II) and current NDA Governments have given various recommendations on these important issues:-

- ❖ National Knowledge Commission, 2006 (Headed by Mr Sam Pitroda)
- ❖ Committee to Advise on Renovation and Rejuvenation of Higher Education, 2009 (Headed by Prof Yashpal)
- ❖ UGC Review Committee, 2015 (Headed by Dr Hari Gautam)
- ❖ AICTE Review Committee, 2015 (Headed by Mr M K Kaw)

Integration of basic research skills: Students should be inducted in the first year through CUR's 'professional skills workshops' that train them in basic skills such as writing research papers and reports, designing posters, conference presentations, networking with resources, identifying paper competitions, fellowships and graduate programmes, among others.^[45] They can also be asked to write mock papers on topics in the textbooks. In the second year, students can choose their area of interest and

attach themselves with either an ongoing research or initiate one with the help of their mentors/instructors. However, the choice to participate in UG research should be voluntary and optional. In the third year, students should undertake writing their papers and submitting papers for conferences. There should be continuous capacity building of mentors by senior faculty or external resources, assuring high-quality mentoring to students. Research-educated UG students will also be informed PhD students; thus in India, while accepting a PhD proposal, preference should be given to students with UG research experience.

Conclusion:

Institutes around the world are reaping the benefits of adopting UG research as a practice; there are some universities such as the MIT that have moved over to a second phase of Super UROP as advanced UG research. In India, to control the dwindling number of researchers and tackle the problem of substandard research output, it is imperative for both central and state governments to experiment with a concept that has proven results in many other places across the world. The Indian education system has about 20 million first-generation learners, who will eventually need systematic induction to utilise education as a tool to tackle real-world challenges. Moreover, the girls among them will need particular attention to encourage them to pursue fields in STEM. The Indian education system must explore ways by which it can upgrade its current, textbook-heavy learning system. Introducing UG research in institutes will not only enhance the quality of students and faculty in the system, but also help India generate relevant scholarly research that will contribute to the country and beyond. Announcement of Make-in India, Digital India, Pradhan Mantri Jan Dhan Yojana, 100 Smart Cities, e-Governance, Start-up India and several other policies by the Union Government will definitely require a new look towards both school education and higher education.

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