lenger disaster is partly attributed to communication failure. The technical experts were apprehensive about the cold weather launch, but could not convince the decision makers; ultimately several valuable lives were lost because of an O-ring.

In the Indian context, there is no doubt that scientists need communication skills throughout their career, whether in the University setting or in government-funded research organizations. From defending their theses to preparing project proposals to presentation of achievements to assessment boards for promotion to submission of progress reports to review committees/ funding agencies to the highest level of submission of annual plans for allotment of budget; each and everyone needs to present the case in a convincing and clear manner to achieve the desired results.

Presently, such communication skills covering language, rhetoric, style, etc. are not taught to scientists and engineers in India at any level. Logic as a subject is an option in undergraduate science courses in some universities. The recently introduced subject of 'Communicative English' in an autonomous college in Bangalore is hugely popular. Here the students learn how to write prose for a variety of purposes. Serious thought needs to be given about having a similar course in 'Technical Communication' as a part of science and engineering curricula.

1. Parasnis, A. S., *Curr. Sci.*, 2005, **88**, 847.

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On the plight of research and teaching in state universities

In the last few decades, scientific research in Indian universities has gone from bad to worse. Thanks to the policies of the Government, which treat universities with prejudice and give undue privilege to research institutes as far as allocation of funds is concerned. There was a time when UGC was the only grant-giving body which funded research at both the institutional and university level. However, now there are many institutions like CSIR, DBT, DST and ICMR, which fund scientific research in India. Though more funds are available, their allocation seems improper; majority of the funds goes to the research institutes and the universities remain starved as before.

The argument of the Government funding departments regarding distribution of funds is that since there is almost no quality research in universities, lesser amounts of funds are allocated to them. What they fail to recall is that the cost of chemicals, laboratory equipment, their maintenance, etc. have gone up several-fold. How can one do good research without these? So in absence of funds there is no good research and vice versa. This forms a vicious circle and universities become the victim.

If we see the condition of research in state universities, especially in North India, the condition seems grim. Although UGC provides some funds but the matching grants by the state government remain pending for years. As a result, the UGC grant also remains unutilized and is often returned by the university. Some teachers at the universities get funds through projects, but this number is small. And in any case research at any institution cannot be based on one or two stray projects. There should be a full-fledged system to promote research. Practically no funds are available in the state universities to pay research scholars a stipend, which would motivate more students to pursue research. No special arrangements are made for the chemicals needed for research work. The authorities make do by sparing some of the practical resources available for the graduate and postgraduate practical classes. Each year, we find this number increasing. So the total funds are now inadequate to fulfil the demand.

There was once a time when a dedicated worker only needed to put in hard work to do good research. This does not hold good anymore. Now state-of-the-art infrastructure and expensive chemicals are needed to ensure that one is not left behind. Moreover, shortage of staff has also become a death knell for research at the university level. For instance, almost no new appointments have been made since the last decade in most of the universities owned by the UP Government. However, the number of students continues to increase each year. With more and more students qualifying at the plus-two level, the Government directs the universities and colleges to accommodate them. The corresponding increase in teaching facilities, better infrastructure as well as appointment of new teachers is lacking. In order to restore the correct teacher–taught ratio, the Government should also create new posts for faculty in proportion to the increasing number of students, according to the guidelines of the UGC. Otherwise the situation would get worse each year.

A shortage of teaching faculty lays great burden on the available teachers, who have to take more classes. This leaves almost no or little time for research activities. How can one expect an over-burdened teacher to do any good research? Moreover, since a new teacher joins the department a long time after most of his predecessors have left (since there were no new appointments in between), he is not able to get proper training from the first line of devoted workers. Thus, he has to waste a lot of time getting used to the stressful conditions where he has to teach a large number of students. The motivation for good work remains as low here as in any other Government department, which makes him only an average worker over his entire service period.

Since the avenues for getting a job at the university level are so low, most of the bright students take to other careers, leaving the less brighter ones to come into this field. Research scholars have to pay for most of their requirements from their own pocket, and thus few are able to do good research. The motivation level for a research scholar is also low, since the opportunities for job are few. Most of them are aware that they will have to work on an ad hoc basis for a paltry sum of money. Now, if there is no quality research in universities, it should not come as a surprise.

That situation can change if we pump more funds into the universities and make sure that they are utilized efficiently. An example can be cited from the experience of Allahabad University in the past one year or so. Change of status from a state-funded to Central University has seen a rise in the number of students getting enrolled in the Ph D programme. A Central University has funds for providing stipend to research scholars, to develop good infrastructure and maintain the same. The condition of research is bound to improve in a few years as it has already in BHU and AMU. Government agencies should realize that without funds good research is not possible.

Since research institutes have been created by the Government to further the cause of research, they have to be supported by the Government. This should not be done at the cost of the universities. Just as in the case of reservation for scheduled castes and tribes, the Government would have to support universities without the expectation of any quick results. Research institutes should also be directed to work in harmony with the universities. Their infrastructure should not become the property of the scientists working there. There should be special arrangement of scholarships for research scholars in the universities like in the research institutes.

It would be worthwhile to conclude the discussion with a quote from the editorial in *The Hindu*[1], '... unfortunately in India the growth of research in national laboratories and scientific institutions has, for decades, occurred at the expense of universities. When a university department has the faculty and facilities for sound scientific research, it is usually able to attract the steady stream of good students. Urgent reform and upgradation of Indian universities and colleges, therefore holds the key to the country's ambition of becoming the scientific power house of the future...'.

1. *The Hindu*, Editorial, 8 January 2007, p. 10.

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Scientific productivity and citation of scientific papers: Where do we stand?

A country-based analysis of cited papers by Thomson Scientific, where countries have been rated in terms of citations received by their papers in the *WoS* in 1996–2006 is reported here. (The coverage of *WoS* currently stands at 8500+ journals across all disciplines in science.) The question asked was the following: How many papers authored by scientists of any country are in the top percentile (1%) of a list, where papers are arranged in decreasing order of citations received? (Papers constituting the top 1% of the list of papers arranged in decreasing order of citations received, will hereafter be re-

Table 1. Country ranks in *Web of Science* by percentage of papers in top 1% cited papers

Rank by productivity (papers)		Total papers, 1996–2006	Papers among top 1% most cited	Percentage of country's papers among 'Top Cited'	Rank by percentage of papers in top 1% cited papers
	Country				
1	The United States	2,907,592	54,516	1.87	1
2	Japan	790,510	5,662	0.72	9
3	Germany	742,917	9,427	1.27	4
4	England	660,808	10,090	1.53	2
5	France	535,629	5,967	1.11	6
6	China	422,993	2,189	0.52	10
7	Canada	394,727	5,301	1.34	3
8	Italy	369,138	3,825	1.04	7
9	Spain	263,469	2,155	0.82	8
10	Australia	248,189	2,804	1.13	5
11	India	211,063	694	0.33	13
12	South Korea	180,329	929	0.52	11
13	Taiwan	124,940	550	0.44	12
	Regions				
1	Americas	2,907,592	59,817	1.81	1
2	Europe	2,571,961	31,464	1.22	2
3	Asia	1,729,835	10,024	0.58	4
4	Oceania	248,189	2,804	1.13	3

Source: King, C., *Science Watch*, May/June 2007, 18(3).