

the administrative services or private organizations soon after his/her graduation, but the university expects him/her to spend an extra 3–4 years (for doing a Ph D) to attain minimum qualification. Mediocre students who cannot flow in the former stream follow the latter path.

(2) Defective recruitment system – The piling up of ‘temporary’ and ‘ad hoc teachers’ in the universities for many years has badly aggravated the situation. Excellence cannot be attained by these teachers who always fear about their retrenchment. Inbreeding in the appointment is another offshoot of recruitment system in the universities.

(3) Over-flooding of self-financing courses – Delivering a lecture and textbook teaching are quite different. The

former needs thorough knowledge of the subject, which is acquired by perpetual self-studies. A university teacher can efficiently deliver lectures for 12–15 h per week. Today, in universities, almost every department is engaged in self-financing courses without adequate faculty and an average university teacher delivers lectures for 20–25 h per week. Obviously, a compromise has to be made with the quality and contents of the teachings.

(4) Researches in university shifted from part-time to full-time – Entry into and further promotions in university teaching services largely depend on the published work. Unfortunately no method has been developed till date to judge the teaching aptitude of a teacher.

These factors have largely contributed to the lowering of academic standards in Indian universities. The ultimate hopes for lifting up the standard rest on the UGC whose decisions, guidelines and directives have always moulded the curriculum and destiny of the universities. Will the UGC officials listen?

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Beyond the laboratory

This is in response to the correspondence by Gupta (*Curr. Sci.*, 2002, **83**, 542). He has indicated the nature of chemistry practicals at the Intermediate level. However, Fuhrman *et al.*¹ pointed out that practical work plays a central role in chemistry. The main aims of practical work in chemistry are (i) make accurate observations and describe chemical phenomena, (ii) practice identifying problems relating to chemistry and seek ways to solve them, (iii) verify facts and principles already learned, and (iv) develop certain disciplined techniques and logical reasoning.

However most teachers in developing countries use practical work just to verify scientific knowledge² and give little attention to the development of practical skills in students in their assignments and assessments.

Gupta did not indicate the cause for declining trend in chemistry practicals. I would like to mention a few causes which are common for all developing countries like India,

(a) The science curriculum has failed to construct a coherent picture of the subject, its methods and its practices, leaving pupils with fragmented pieces of knowledge³.

(b) Under the impact of information technology, the skills needed in different occupational sectors are converging as more and more jobs demand generic and abstract, rather than sector-specific skills⁴.

(c) Nowadays, the science curriculum is over-loaded because of which the students are demotivated and think that science is ‘difficult’.

(d) The laboratory is in no way providing effective learning environment.

(e) The strategies that can develop the skills of science such as encouraging learners to discuss scientific ideas with their peers, evaluate evidence and develop practical competence for understanding science have been squeezed due to the precarious economic condition of our country.

The following suggestions are being made for sustainable development:

(a) There should be greater emphasis on the explicit teaching of procedural understanding and reduced emphasis on the teaching of conceptual content⁵.

(b) The framing of curriculum should be such that it enables pupils to study up-to-date application in more detail and pursue their particular local and personal

interests via extended project-type investigations.

(c) Practical should be used as an effective method of teaching and understanding⁶.

It is high time our policy makers think about the sort of science education we really need.

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