

# SCIENCE AND CULTURE

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## PROTOCOL TO IMPROVE UNIVERSITY SCIENCE EDUCATION : PREACH MULTIDISCIPLINARY, TEACH NARROW SPECIALISATION ?

**I**N true sense, education is freedom, enlightenment empowerment. It frees man from the bondage of traditional socially imposed restrictions, from a small cage of physical and mental space. Education means a continual process of ever expansion of mental space to infiniteness. It is enlightenment as it leads us from the darkness of superstitions, faith and irrationality to the light of rational thinking that makes a biological man 'human'. Education is empowerment not because it gives one the power of economic independence (surely it does), but more so because it makes one aware of the nature of the physical environment and one's own nature and equipped with this awareness, one can make individually or collectively, intelligent decisions in adjusting to his present environment or to change it to a better one if he finds the present one unsuitable. It is through education in some form that culture is passed on from generation to generation and grows further due to the innovative creative minds, the great thinkers. Science is very much a part of culture. As Glenn T. Seaborg says : "The cultured man of today can no more ignore science than the cultured man of the middle ages could ignore the Christian church or the feudal system." This type of broad-based education was the dream of Rabindranath Tagore which he visioned as "Freedom of Mind" and Vivekananda called "the manifestation of perfection already in man." This broad-based education calls for some study of basic tenets of science, by all students, of not only sciences but also humanities and social sciences, along with developing special expertise in one's discipline of interest.

Any science subject is now interdisciplinary. This is more so is Biology today. This idea has been adequately discussed with many examples in an opinion article in this issue by D. P. Burma (p. 337). In any branch of biology or more appropriately life science, if one wants to go a little deeper than observation and description – to the mechanism of functioning of a living system – one can not escape

studying it in terms of physics and chemistry – in terms of material and energy transactions and quantitation by mathematics. The living system from a tiny microbe to an elephant being more complex, we have to deal with a host of informational macromolecules, their nature and interactions – not found in nonliving systems. But again, the manifestation of life is the result of interactions of nonliving matter and energy. In the last half a century or so, we have been able to understand much of the process of living through the development of the interdisciplinary subject called molecular Biology. Though reductionist in view, molecular biology is expected to explain also the higher levels of manifestation of life phenomenon such as cognition, language, consciousness and creativity. All life science students and teachers – be they in plant science, animal science, physiology, microbiology, agriculture, biochemistry, biophysics etc. – should have some basic idea of this interconnectivity, this holistic view in mind. This will mean devoting part of their study time to the study of "whole biology" while gaining "specialisation" in one narrow field.

Environmental study is one such discipline introduced as a compulsory subject in graduate level of all streams in West Bengal, with obvious good intention. But reluctance of students and more of the teachers, is trying to kill this attempt. The questions of what to teach and who will teach are not unsolvable, if we accept the idea as politically correct. Students are made to believe that this introduction will add to their already too heavy syllabus. If true, what prevents the cutting down of the memorising information type syllabus and instead, give them some idea of the environment (in the widest sense – the physical, biological, social, political and cultural) a student lives in. The teachers can train themselves through refresher courses offered by the Academic Staff Colleges run by most universities under UGC sponsorship.

In the right spirit of the thing, UGC-CSIR jointly conduct NET in life science as one subject. In the same spirit many universities started life science department and not Botany or Zoology departments long before e.g. Madurai Kamaraj and Jawaharlal Nehru Universities. But again some universities fell back to the conservative demands of the faculty to partition into separate animal science or plant science departments, while JNU is still flourishing in both education and research keeping the integrated life science concept. It is a pity that in many universities including all general universities in West Bengal, the classical Biology Departments like Botany, Zoology, Physiology are run as water tight compartments with no cross talk between them. As if this is not sufficient. Each department in the M.Sc. level teaches five to six special papers. In some departments, there are not even adequate number of competent teachers to teach the special subjects. Even one teacher may run two special subjects. During selection of a Lecturer even to teach Biochemistry in a Botany department, one has to be M.Sc. in Botany with specialisation in Plant Biochemistry, NET qualification notwithstanding. Thus, very purpose of NET qualification of a suitable candidate for lecturership is carefully screened out by specifying mother subject and the narrow specialisation, to appoint particular persons of the departments' choice. In the same way, in Zoology departments, there will be no entry of a competent teacher who is not an M.Sc. in Zoology (even M.Sc. in life science is unsuitable) and has not the special paper mentioned in the advertisement. Some universities even go further to the extent of appointing teachers to teach proclaimed interdisciplinary subject like Biotechnology, but would in fact appoint one with masters degree in the subject of the main department which runs the Biotechnology, Molecular Biology or Microbiology as a sister department. I may again

give examples of JNU Life Science department or the Department of Biophysics and Molecular Biology of Calcutta University where the faculty members are from different disciplines and these two departments are excellent in teaching and research by any national or international standard.

One can not deny that there is dearth of good teachers in the university departments (exceptions are there to prove the rule), teachers who inspires, kindles the light of curiosity, the quest for knowledge, the boldness to interact with the teacher and ask questions, about anything – not only the course content taught by the teacher, but also the relevance of all these to himself, to his surroundings and beyond. Along with this, there is need for enough flexibility in the curriculum and examination system and scope for experimentation by individual teacher or department. University PG departments have some autonomy, in this respect. The one to one interaction of the student and the teacher in an optimum ratio classroom can not be replaced totally by distance learning or computerised classrooms conducted through internet. By these processes, one can improve the skill or knowledge of the taught, but can not educate them. Education is an evolving, continuous and dynamic process where both the teacher and the taught have to participate to make it better and better. And finally, keeping the interdisciplinary teaching in mind, joint faculty appointment by more than one department, even jointly with national research institute (which have no teaching like DST or CSIR institutes), as is practised by some American Universities, may be thought of. □

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