

similar things are happening whenever new models of cars, televisions or any other consumer items are launched.

It is true that this is a typical problem of a developed country and we probably need not worry about this, at least for the time being. But neophilia has struck in our society also. This may not be all that subtle but the problem is probably affecting the society, cutting across economic status. And it is not always the attraction for newer consumer items. Attraction for newer academic courses and newer branches or sub-branches, particularly in the fields of science, technology and management that are now being offered as undergraduate courses, needs to be reviewed in this context.

Interestingly, some of the new subjects that are now offered at the undergraduate level were once considered only for post-graduate studies. Management courses, and courses like computer applications, microbiology, biotechnology, environmental studies, nanotechnology are just a few examples. It was earlier felt that students taking such courses must have spent at least three years at the UG level of study, that should be essentially a broad-based one. This line of demarcation appears to have disappeared. Often, the course contents are simply a new packaging for a number of old conventional topics picked up from different allied subjects. A cursory look at the syllabus of B Sc Electronics course of a few universities will reveal an overlapping of about 80–85% of the course content with

that of B Sc Physics. In fact, there are some electronics-based experiments in the B Sc Physics syllabus in some universities that have only been included in the M Sc Electronics syllabus of a few other universities. This is not surprising, but rather expected. Then why should we have a new course? Are we trying to attract the prospective students the way the producers of the consumer items do? Moreover, new subjects are being offered at the B Sc level in some universities that are not even a decade old. A large number of the so-called self-financed, modern courses are taught by guest and part-time faculty. Yet the students are interested in these courses.

Courses related to IT, nanoscience, and Bachelor's management are a few examples. The term 'self-financed' essentially implies that the students will have to bear the expenses of the course they plan to study. Right from teachers' salary to laboratory attendants' remuneration to the materials used in the laboratory, including a part of the non-recurring expenses are being taken from the students, i.e. from the parents who need to pump in significant amount of money for this. And the amount varies from institute to institute. So the viability of a course in a particular institution depends on the student intake. The whole process compels or encourages the concerned authorities to admit more and more students irrespective of their ability and background. Yet these courses with modern names and newer looks attract students. Probably

the new names give an impression to the concerned students and their parents, that anything 'modern' will fetch better jobs in the light of globalization.

It has been pointed out that neophilia does not affect people who are more than forty years old¹. So it appears that though the parents may be hesitant about their wards joining such new courses, the younger people ultimately have their way. The promise of future prospects without substantiating data for these courses is another characteristic of the whole exercise. Proliferation of the so-called institutes offering the 'modern' courses irrespective of quality of the teachers is typically based on the neophilia of its clientele. This is a more serious issue compared to the attraction for a newer hairstyle or for a mobile phone or a particular type of consumer item. The whole composition of the academic world and the profile of educated mass may be changed through the process.

It is time that we take a serious note and have a balanced view regarding this matter.

1. *New Scientist*, 10 June 2006, p. 52.

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Inulin storing plants could be the future source of liquid fuels

Biomass is usually rich in carbohydrates and fuels are oxygen-deficient. Carbohydrates such as starch and cellulose are the major sources of plant biomass. For making biofuels from them, these macromolecules are broken down to hexoses which are then fermented to ethanol using microorganisms. In comparison with hexoses ($C_6H_{12}O_6$), ethanol (C_2H_5OH) is relatively deficit in oxygen. Ethanol is being blended with petroleum in many countries. However, due to diminishing fossil fuels, new sustainable sources of energy are needed.

Dumesic and co-authors at the University of Wisconsin have recently described a

process for converting fructose into 2,5 dimethylfuran (DMF)¹. The process basically involves conversion of starch by enzymatic hydrolysis to glucose and its isomerization to fructose by glucose isomerase. Fructose, rather than fermenting into ethanol, is used for conversion into hydroxymethyl furfural (HMF) by an acid-catalysed reaction which expels three oxygen atoms from fructose. HMF is immediately extracted in an organic phase to prevent side reactions. A carbon-supported copper–ruthenium catalyst allowed removal of two more oxygen atoms from HMF using hydrogen gas and in the process yielded the desired fuel DMF¹.

Figure 1 shows conversion of starch into ethanol and DMF.

Though ethanol is being blended with petroleum in many countries, it has certain inherent drawbacks. Ethanol has low

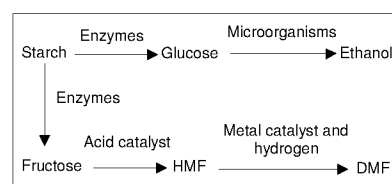


Figure 1. Reactions for conversion of starch into ethanol and DMF.

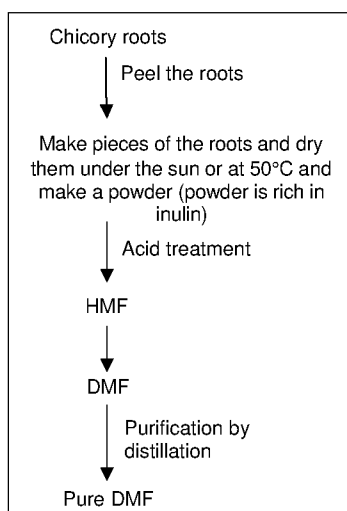


Figure 2. Procedure for preparation of DMF from chicory roots.

energy density, high volatility, is hydrophilic and can absorb water from the atmosphere. On the other hand, DMF has

a 40% higher energy density, a higher boiling point and is not soluble in water.

Glucoseisomerase catalysed conversion of glucose to fructose leads to an equilibrium where fructose is about 42% and glucose is 50%. Separation of fructose from glucose adds to the cost of production of this sugar². Chicory (*Cichorium intybus*) stores inulin, a β -1 polymer of fructose in its roots³. The concentration of inulin-type fructans can be as high as 15–20% on fresh weight basis and 80% on dry weight basis^{2,3}. A simple procedure for isolation of inulin from chicory roots has been developed in our laboratory⁴. The yield of chicory roots (dry biomass) varied from 10.6 to 16.5 t/ha. Inulin content in these roots was approximately 8–12 t, which can yield 5–7 t of DMF. According to Kuster⁵, fructose and inulin are especially good starting materials for HMF production. Therefore we propose a simple procedure for preparation of DMF from chicory roots (Figure 2).

However, toxicological impact of DMF needs to be looked into carefully.

1. Román-Leshkov, Y., Barret, C. J., Liu, Z. Y. and Dumesic, J. A., *Nature*, 2007, **447**, 982–986.
2. Gupta, A. K. and Kaur, N., *J. Sci. Ind. Res.*, 1997, **56**, 442–452.
3. Gupta, A. K., Mamata and Bhatia, I. S., *Phytochemistry*, 1985, **21**, 1249–1253.
4. Gupta, A. K., Kaur, N. and Kaur, N., *J. Sci. Ind. Res.*, 2003, **62**, 916–920.
5. Kuster, B. F. M., *Starch*, 1989, **42**, 314–322.

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Unintentional redundant retrospective studies

In India and Nepal, medical records data are easily available for researchers to take up retrospective studies (secondary data analysis). Unfortunately, the approach to access these data is not streamlined in most of the medical institutions. There is always a possibility that the medical records data would be analysed for retrospective studies with similar aims and objectives by two or more different groups of researchers. One group of researchers may not be aware that the same data are being analysed with similar aims and objectives by another group. The two different groups of researchers may be from the same or from different departments in the same institution. The results of such retrospective studies are often disseminated in the form of publications in reputed peer-reviewed scientific journals. At the postgraduate level, a dissertation or thesis is essentially an element of completion of the Master's degree course. The chances of the same data being analysed in a similar or different manner by postgraduate students of different departments cannot be ruled out. For example, a retrospective study on poisoning can be of interest to researchers from the departments of pharmacology, forensic medicine

and toxicology, community medicine, and internal medicine. Similarly, important public health issues like suicide usually are studied by researchers from the departments of forensic medicine and toxicology, community medicine, and psychiatry. The true problem in an ethical sense, though not intentional, would arise much later on when the data are being published. The same data analysed in a similar manner would be published in different scientific journals by different authors. Such redundant studies turn out to become redundant publications, although unintended.

In medical institutions where the scope for prospective studies is limited, retrospective analysis of medical records data for dissertation/thesis should not be discouraged. However, care should be taken that it is not just for the sake of completion of the dissertation or thesis. It is time to revolutionize our attitude of doing a dissertation based on retrospective studies for the sake of completion of the course, though late than never. Moreover, every effort should be made to ensure that duplication of studies is avoided. Research and ethical committees are set up in most of the institutions and their approval is an essential part of any research under-

taken. Usually not much attention is given to the conduct of retrospective studies. Moreover, prior to publishing a study, approval of the institutional ethical committee is usually not required for some journals. The bulk of unintentional redundant publications can be avoided at the grassroots level by streamlining the appropriate and effective measures/guidelines to gain access to medical records data in institutions. A computerized database should be maintained at the institutional level to avoid redundant or duplicate retrospective studies analysing medical records data.

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