

THE INTERNATIONAL JOURNAL OF SCIENCE & TECHNOLEDGE

Learning Chemistry at a Distance in India: Issues and Challenges

Dr. Mishu Singh

Head of the Department, Department of Chemistry
Maharana Pratap Govt. P.G. College, Hardoi, Uttar Pradesh, India

Abstract:

Open Distance Learning concept entails immense potentiality to reach the unreached so that millions are extricated from the mire of illiteracy they seem to have stuck deep into. The task of inculcating scientific temper amongst students mainly lies with ODL so that country moves in the right earnest on path to the sustainable development for which the most traditional institutions of learning can't solely be relied upon more so when most of them, of late, have become archaic, anachronistic and to a great extent moribund. ODL can cater to the needs of many such persons who want access to education and are somehow physically unable to attend the traditional classroom. It affords sort of flexibility that students find appealing. The concept is fast becoming popular the world over and it has promises and relevance for a country like India which has been beset with the problem of staggering growth of population. However, the biggest challenge in this type of teaching-learning process lies in offering laboratory-based science programmes. The difficulties arise as teaching laboratory-based science subjects like chemistry is taken up. The maintenance of infrastructure and the cost involved therein along with a compulsory presence of the students for experimental work pose a greater challenge to ODL. Since we are living in the age of post-modernism in which high mass consumerism is the order of the day that in turn makes the world highly competitive. In such a scenario, we cannot afford to lose even the pace in respect to the comity of nations lest we would lag far behind. Here lies the importance of imparting education in science subjects particularly in chemistry for which the ODL has a tough task cut out for itself. ODL can also help provide many an arrow in the repertoire of the students to meet the challenges that lie ahead of them in this competitive world of ours.

This paper intends to study the issues and challenges the Open Distance Learning (ODL) programme faces in establishing the credibility and authenticity in teaching laboratory-based science subjects.

Keywords: *Open Distance Learning (ODL), Distance Education Council (DEC), laboratory, chemistry.*

1. Introduction

Any type of national development worth the name has to coincide with the development of human resources; the components to it are education and health. Imparting quality education to people at large in a developing country like India which has been plagued with virtually geometric progression in the growth of population is a challenge of great magnitude. As such, the stupendous task of providing access to facilities of standard education to the millions can't be entrusted to traditional or formal centres of learning. So the system of ODL is needed to be availed of to play a significant role in imparting education that has been attuned with time. It is an abiding conviction that the greater the level of education in the subjects of natural sciences particularly in Chemistry, higher would be the rate of national development and better the chances of keeping pace with the world. Thus, only ODL can bridge the gap in imparting knowledge in subjects related to natural sciences as the formal centres of higher education are simply not capable of meeting such colossal challenge alone. However, inadequate access to education has resulted in people not participating meaningfully in national development. Hence, the need arises for open and distance learning to act as support. Open and distance learning approach focuses on open access to education and training programmes where the learners are free from constraints of time and distance. It also offers flexible learning opportunities to learners which include correspondence study education, distance learning, adult literacy education programmes and Open University.

The concept and practice of Open Distance Learning (ODL) system are rapidly changing and catching up the speed in a remarkable manner in India. Despite the challenges, the ODS has shown tremendous growth in quality of open learning system. Before 1970, there were few conventional universities which had provisions for distance education programmes and courses. As on date, there are more than 104 ODL units in conventional Universities and deemed Universities. All these institutions have emerged as a trendsetter in providing a wide range of programmes and courses through distance mode in India and abroad. These ODL units in the institutions are not only providing education to a large number of students in the higher education system and catering to their educational needs and requirements but also accomplishing major responsibility of maintaining standards in the country through Distance Education Council (DEC).

Science and Technology have always been viewed as an effort to systematize knowledge and inculcate a logical approach in the study of any subject and laboratory work as an important and integral component of Science and Technology-based programmes in order to understand the basic concepts associated. It has been always a concern of educators to deliver laboratory-based science programmes and courses through distance mode. However, establishing a laboratory with a lot of expenditure involved is predestined to realise this and at times, it becomes a complicated task.

2. Chemistry and Its Challenges

There is always a sense of uncertainty in everybody's mind as far as the deliverance of the lab based Science Programmes through distance mode is concerned. The main factors, which discourage laboratory-based science programmes, are the cost of equipment, chemicals etc. and safety issues. Because of this only a very few institutions that offer distance education programmes have been reported a substantial number of laboratory-based science courses or complete science programmes (Millar R. 2004, 2010). As on date in India, out of fourteen Open Universities five are offering Bachelor's degree programme in sciences. Madhya Pradesh Bhoj Open University (MPBOU) is providing education at the level of Masters in laboratory-based science disciplines; IGNOU is one amongst the five mentioned offering laboratory based Science and Technology programmes.

Considering the nature and requirement of the subject, students studying chemistry are expected to engage in first-hand experiences such as observation, measurement and testing hypothesis particularly in higher education. This can be a serious challenge, for distance education institutions when offering undergraduate and post-graduate science courses because of infrastructure and the fewer occasions for students to be on a campus where laboratory facilities, relevant equipment, and teaching staff are provided. Much debate has been going on, however, as to the role, value and effectiveness of practical work in chemistry not only in distance teaching settings but also in education, in general, chemistry as it puts a strong emphasis on laboratory work, using mixed approaches through campus-based laboratories, regional laboratories, and home-study laboratories. Technologies such as video, CD-ROM, the internet, and computer-mediated instruction can be alternative modes of teaching but simulated experiments cannot replace hands-on laboratory work (Kahveci 2003; Kannepolh, D (2001).

3. Suggestion

However, the author has certain suggestion for the same:

1. Establishment of teaching laboratory sites through arrangements with different universities in reinforcing student's motivation towards the subject matter.
2. Developing within students a positive attitude towards learning and intensifying interpersonal relationships with tutors and peer group.
3. Research projects for talented students with an appropriate university faculty member in laboratories close to where the students reside.
4. Support for student research experiences in the form of scholarship.
5. Establishment of arrangements for analyses using instrumentation (such as an NMR spectrometer) through service units of other universities, for analysis of samples prepared by students.
6. Establishment of framework agreements with universities
7. Providing more resources in the way of supplies, equipment, and graduate student support.
8. The virtual learning environment should be created by on-line library access by linking the video links to the laboratory.
9. Molecular modelling software can also be used as practical training aid

But before using any new technology we should keep in mind the suitability to our learners, effectiveness of present mode of instructions and views regarding web-based counselling.

4. Conclusion

It can be concluded that the significance of practical work in chemistry has been widely accepted even in distance education and has been acknowledged that it can promote the engagement and curiosity of students in developing skills, knowledge and conceptual understanding. Despite the fact that their learning takes at a distance the students still believed that it will be more challenging learning chemistry in distance mode without making provision to engage in hands-on and minds-on activities. However, practical skills for distance learners can be developed using home experiment kits and occasional intensive face-to-face laboratory sessions. The internet can also provide new opportunities for teaching practical chemistry.

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