

Chapter 9

Education and Training in Modern Biotechnology in India: Bridging the Academia–Industry Divide

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ABSTRACT

Modern biotechnology made an explosive entry about three decades ago, taking advantage of elegant and ingenious new protocols that promised very precise and highly refined products in every sector of the industry. However, the claims and hype generated were highly disproportionate to ground realities. Two fundamental errors contributed to this situation: a) treating biotechnology as single subject, to be taught from the first degree level itself, when modern biotechnology is a collaborative effort between and among experts of a dozen cognate disciplines, and b) the explosion of teaching shops pretending to impart education, without properly trained faculty and appropriate and adequate laboratory and library facilities, with the acquiescence of university administration and the governments, which created a chasm between the poor manpower generated and sophisticated needs of the industry, with an enormous campus intake compounding the damage. This resulted in an anomalous situation peculiar to India. This chapter examines the problems and possible remedial measures, in order to deliver to the society in times to come, the full benefits of the myriad developments in modern biotechnology.

1. INTRODUCTION

Amidst an array of definitions of biotechnology, a more widely adopted one is ‘*the use of organisms and/or their products on the large industrial scale to provide goods and services*’ to the society, in the

agricultural, medical, environmental and industrial fields (Kameswara Rao, 2000). Biotechnology in itself is over six millennia old with numerous and diverse uses of organisms or their products in every sphere of human life, more importantly food and medicine. Till the late 1980s biotech-

nology has handsomely served us providing with continuously improved products. The industry drew from the innovations from the contributions of the academic and research institutions in the public sector all the time, not overly complaining about the gap between the academic training and industry's needs. This phase can be identified as 'classical biotechnology' (CBT) (Kameswara Rao, 2010a). The current phase that emerged during the 1990s uses new elegant, ingenious, sophisticated, complex and but more precise modern methods of genetic engineering for product development, biosecurity evaluation¹ and deployment, and provides an unprecedented diversity of goods and services. This phase constitutes 'modern biotechnology' (MBT) (Kameswara Rao, 2010a), which is only a small fraction of today's biotechnology industry, which is still dominated by CBT.

The application of a broad definition of biotechnology blurred the difference between CBT and MBT which is rooted in the protocols used, and this paved the way for a band wagon of players, immensely more from CBT than MBT. While the focus and benefits from the governments are rightly aimed at promoting MBT, the vast number of players in CBT hijacked the agenda and resources.

MBT's explosive entry nearly three decades ago, over-ignited the imagination of the governments, industry and the public as well. The Government of India (GoI) established the Department of Biotechnology (DBT) in 1985, almost the first such government department in the world. The industry rushed to taking advantage of ingenious new protocols that delivered refined products, in the hope of unprecedented business opportunities. The public, parents and students erroneously drew a parallel with the already booming Information Technology (IT) 'revolution' that gave India a prominent international presence and the hope of unlimited opportunities for high paying jobs and overall development from MBT as realized from the IT.

The superscripted numbers refer to the Explanatory Notes given at the end of the chapter to help those readers who are not familiar with biotechnology and related issues.

Benefitting from MBT needs competent teachers and infrastructure to produce adequate numbers of appropriately trained manpower to suit the diverse needs of the educational institutions, research and industrial establishments. MBT also requires precise and elaborate planning, enormous financial and time inputs, and purposeful and efficient management practices, to reach the goals and to realize the hope.

In the 1990s the University Grants Commission (UGC) supported vocational under graduate (UG) courses in MBT in selected institutions throughout India. The successful candidates were expected to go into business, but failing that they came back for post-graduate (PG) education, a fundamental right that could not be denied, but which defeated the purpose of a vocational program. A number of Universities and colleges soon caught up and started both UG and PG courses in MBT, some of them being supported by the DBT. Over time the DBT has also introduced several schemes to promote research, entrepreneurship, business partnering, etc., in different areas of MBT, as detailed on DBT's website. The GoI extended several benefits to encourage the MBT industry while the governments of most States have ended up in permitting a large number of glamorous teaching shops, though a few States have constituted Vision Groups and such other bodies to promote MBT.

The private educational institutions saw a great opportunity to commercialize biotech education which resulted in an explosion of colleges particularly in the private sector, pretending to impart education at enormous financial and emotional costs to students, without properly trained faculty and appropriate and adequate laboratory and library facilities, with the acquiescence of university administration and/or the government.

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