

## Development of an Academic Database and Network

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### **1. Introduction**

Education is the most important ingredient of socio economic development. So advanced industrial societies provide education as a matter of right to all citizens. Education and training are forms of capital accumulation in the process of development. The resource development capacity of human beings is greater than that of any other forms of capital and therefore investment in human beings in the form of education, training in skills etc. is the most useful form of capital accumulation. Human resource is the ultimate basis of the wealth of nations for it is people who accumulate capital, exploit natural resources, and build social, political and economic organizations (Schultz). Hence human resources not capital nor income, nor material resources constitute the ultimate basis of the wealth of nations, and carry forward national development. A country that is unable to develop the skills and knowledge of its people and utilise them effectively in the national economy will be unable to develop anything else.

The policy paper of the World Bank on Education considers education as a basic human need to acquire a broad base of knowledge, attitudes, values and skills which provide to learn to respond to new opportunities, to adjust to social changes and to participate in political, cultural, technical and economic activities. All these statement reminds us of the importance of content of academic programmes and the need to continuously evaluate it in comparison and update according to the requirements of the time.

Education especially higher education and training in specialised branches of knowledge has an unbroken tradition in India that can be traced back to the ancient times when Gurukula system of education prevailed. Gurukula gradually expanded to include several teachers and grew into community of scholars engaged in intellectual debate. As these communities stabilised, centres with various faculties evolved which can be considered as the genesis of university education in India. Centuries before the establishment of universities in European countries India was having very large systems like Nalanda University which had as many as 10 000 students. Subjects ranging from Metaphysics to Astronomy were taught there.

## **2. Facilities for Higher Education**

In India there are about three hundred university-level institutions including traditional and technical universities and institutes. Of the professional and technical universities 33 provide education in agriculture, forestry, diary, fisheries, and veterinary science. Twelve universities specialise in medical sciences and seventeen in engineering technology. There are also universities specialising in Sanskrit, music, population science, regional languages, law and other areas. There are more than eight thousand colleges providing facilities for higher education in India. They include colleges specialising in agriculture, medicine, ayurveda, homeopathy, pharmacy engineering and the like. Then there are also about 15 institutes of national importance. Of these five provide education in technology and science at higher level, one provides education in statistical techniques, three in medical sciences and for in advanced management.

## **3. Structure of Courses**

Most of the traditional or conventional universities follow 10+2+3 pattern for the degree programme. But, in respect of Engineering and architecture degree courses consist of 4-5 years that is 10+2+4/5. In case of agriculture it is 4-year degree course. For veterinary, it is a five-year degree programme. For medicine it is a four and half year degree course followed by one year of internship. All post graduate degree programmes except engineering involve two years of study. The third stage of education is M Phil programme of one and half-year duration which is a preparatory programme for doctoral level studies. PhD is course and research study for three years normally. All the subjects under the whole universe of knowledge are covered by thousands of courses of the different levels specified above. The

different specializations and combinations of subjects available altogether at these levels is estimated to be above eighty thousand.

Knowledge explosion results in birth of new fields of study at an unprecedented number. Hence hundreds of courses with new combinations of subjects or specializations are added to the existing number every year. Higher education in India is also passing through a critical phase. With increasing number of young men and women clamouring for opportunity to acquire knowledge and skills, stringent financial constraints facing the education system, the public demanding quality services and education assuming a global dimension, important structural and functional changes in the system of higher education are a natural and necessary consequence. Hence educational institutions are to grow beyond their regional limitations, extend the facilities established with rare resources to the apt and talented students ranked through national level selection. Wide publicity should be given to all the academic programmes of an institution so that no one is denied the chance of selecting their preferred specialisations and regions. This necessitates the development of an information system on academic programmes offered by various higher educational institutions in India. Databases of academic programmes should be developed at institutional, regional and national level. They should be accessible online to the public and also to the educational institutions through existing information networks. Such databases can help the students to select apt courses and field of study and institution. Such databases can also enable universities and institutes to assess need for the introduction of a specific programme in a particular locality. It can also help universities to comparatively evaluate their curriculum and programmes with similar ones of other universities and effect improvements.

#### **4. National Curriculum Information Centre (NCIC)**

The present society is considered to be in an era of information explosion. Information on courses offered by Indian institutions of higher education is also vast and varied and it remains without timely coordination for use. But authentic speedy accurate information on various courses and their syllabi is inevitable for the public and also the decision makers in educational administration. Hence the information on courses offered during an academic year should be should be collected and made available at a central place in India from the beginning of the academic year. Association of Indian Universities at Delhi that is publishing the Universities

Handbook or INFLBNET that is maintaining computerised database for the use of the universities and colleges can establish a National Centre for Curriculum Information (NCCI) with the following objectives.

The objectives of the NCIC should be to build up a digital repository and information dissemination centre on various courses and their syllabi of Indian as well as foreign universities; to collect, store, process, organise, retrieve and disseminate information on academic programmes and their syllabi of various institutions of higher education in India; to make available online the curriculum information to public, to standardise databases, to plan guide and implement Curriculum information systems at universities, to evolve and implement standard for preparation of prospectuses, handbooks and yearbooks of universities and colleges; and to publish in electronic or printed media yearbooks, handbooks and databases on syllabi of academic programmes offered in India.

## **5. Existing Information Sources**

In most of the countries various publications disseminate information about educational opportunities. Most of them are annuals and are published as education yearbooks, handbooks etc. From UK and USA various periodicals like Study in UK, etc are published giving information about courses, prospectus etc. At present there is no authentic database on courses and their syllabi at least in the developing countries.

World of Learning prepared by Commonwealth of Learning, Netherlands and published by Europa Publications annually is one of the few authentic information sources on higher education institutions worldwide. It gives a list of worldwide academic mailing list, names over 1,50,000 academic staff and officials, includes every year the new appointments and change of addresses, and gives details of over 400 international organizations concerned with higher education. But it is also not providing sufficient information on courses and syllabi. The publication reaches institutions in the middle of the concerned year. Information given is not up-to-date to enable a student to select a course by its syllabi seek admission immediately. Hence if the publication could provide sufficient information on names of courses with their syllabi it will become a very valuable database on curriculum.

Universities Handbook published by Association of Indian Universities is a database

giving details of academic programmes offered by institutions of higher education in India. It contains information about 300 universities, deemed universities and institutions of national importance. The details provided cover; officers and deans of faculties, library and research facilities, scholarships and fellowships, courses of studies, names of professors, names of colleges and other details. But it is published every alternate year and cannot be used as a reference source for immediate actual requirements of students. But it is also not providing sufficient information on courses and syllabi

## **6. Computerised Databases**

NCIC can produce various data bases that can provide to the students in India and abroad information on our academic programmes, syllabi, research guides, universities and colleges and facilities offered by them. If connected to databases maintained by NIC and other agencies even information about the location in which a college or university stands, the climate, food, libraries, important institutions located near the college or university etc which are of interest to a student seeking specialised course can be provided. NCIC should prescribe some standards for the development of databases on Curriculum. The databases can be developed at university level and merged with the National Database held at NCIC. The colleges and universities can prepare their annual prospectus for admission according to the standards prescribed for that by NCIC and the prospectuses can be maintained in the university or regional level databases and also transferred electronically to NCIC. This will enable NCIC to provide information on a programme conducted anywhere in India even before the announcement of admission to that programme in the regional press.

### **6.1 NCIC Databases**

New innovations in computer and communication technologies have made revolutionary changes in the field of data communication and its transfer. With the impact of this new technology universities in western countries have already started creating computerised databases on various subjects and linking them to access information at fingertips as and when needed, even from the remote corner.

NCIC can develop a Curriculum database and also databases on teachers, institutions and other aspects using some existing software of accepted standard.

CDS/ISIS is one such software available to educational institutions. This paper suggests a sample for the database that can be developed using CDS/ISIS.

## **6.2 CDS/ISIS**

CDS/ISIS is a menu-driven information storage and retrieval system designed specifically for the computerised management of structured non-numerical databases. Although it deals with text and words, and offers therefore many of the features normally found in word processing packages, it does more than just text processing. This is because the text that this programme processes is structured into data elements that one defines. This programme is a combination of Computerised Documentation Services (CDS) and the Integrated Set of Information System (ISIS). The library division of United Nations Educational Scientific and Cultural Organization (UNESCO) developed it. The package is developed in the context of UNESCO General Information Programme. In 1993 UNESCO had released version 3.07 of the software. The software is available most of the libraries of universities in India that were automated and so it will be very easy to use this programme immediately for creation of Curriculum databases. NISSAT under Department of Science and Technology and also Library and Information Science Departments of universities are offering training programmes on this software.

## **6.3 Features of CDS/ISIS**

It will be essential for NCIC to create and maintain various databases like those on courses, teachers and research guides, colleges etc. For this CDS/ISIS is an apt programme for unlimited number of database can be created in an information system using this software. Estimated records for course combination are eighty thousand to one lakh. In an ISIS database more than 16 million records can be created. Maximum record size is eight thousand characters and that is sufficient for entering details of a course. Maximum number of fields possible in this programme is two hundred and the number of field identified in a sample database defined by these authors is one hundred only. In a single field up to eight thousand characters can be accommodated and it is sufficient for even the largest fields like paper etc of the database to be defined for Curriculum. The other features and limitations of the programme are 200 FST lines, 19 fields in a worksheet page, 20 pages in a work sheet, seven hundred stop words etc which will cause no hindrance for the proposed curriculum database.

## 6.4 Indexing Facilities

Indexing and search facilities are very important for an information retrieval system.

An option to identify the terms, which are to be indexed, could be useful. Otherwise all terms will be indexed which will increase the size of the inverted file. CDS/ISIS provides facilities for identifying those terms, which will be indexed. A stop word list file can be created to drop non-significant words from the inverted file. The programme has five indexing techniques. They are given a numeric code from 0 to 4 as explained below:

- 0 Used to index whole field or sub fields,
- 1 Used to index each sub field of a given field,
- 2 Used to index each term or phrase enclosed within angular brackets,
- 3 Used to index each term or phrase enclosed within brackets,
- 4 Used to index each and every word from a specific field.

## 6.5 Search Facilities

CDS/ISIS offers a number of sophisticated search facilities. The search language of CDS/ISIS is based on Boolean algebra, which provides a convenient way of expressing logical operations between classes. Each search term associated with a given record in fact can be viewed as representing the class of all those records associated with that term. Thus by expressing logical operations between search terms one can define precisely the class of records to be retrieved in response to ones need. The major features of the programme are Boolean operators AND, OR and NOT; proximity searching within the same field or individual occurrences of repeatable field; right truncation; precise terms search and any term search.

## 7 Database of Curriculum Information (DCI)

A sample Database of Curriculum Information that this paper discusses is based on the prospectus for PG and UG courses of Kerala Agricultural University. The field coverage is incomplete. But while NCIC develops such a database it should evaluate the prospectuses of all the universities and the thousands of colleges existing in India to finalise the required fields. Common Communication Format (CCF) developed by UNESCO should be followed to enable standardisation and exchange of

information with other similar centres that may come into existence in other parts of the world. Following of the CCF can also enable the development of a Curriculum Database at international level. The following are the fields selected for the sample database:

### 7.1 Fields of Curriculum Database

- 011 Faculty: Eg. Agronomy
- 012 Discipline: Eg. Agriculture
- 013 Degree: Eg. Bsc(Ag)
- 014 Eligibility: Eg. 10+2 with 50 percent marks in Physics, Chemistry and Biology
- 020 Institution: the full address and other details of the institution will be provided here
- 021 Affiliation: the university or organization to which the institution is affiliated will entered here
- 031 Academic Year: details of date of admission, date of examination etc will be provided in this field
- 032 Application: procedures for applying, the cost of application form, date from which forms are available, last date for applying and other details will be provided in this field
- 033 Selection: Selection procedures, reservation details etc will be give in this field
- 034 Foreign Students: Detailed information required for foreign students will be given in this field
- 035 Fee: Fee, fee concessions available and related matters
- 036 Fellowships
- 041 Accommodation: details of hostel facilities available, boarding and lodging charges and details of accommodation available outside the institution for students will be given in this field



- 042 Library and Research Facilities
- 042 Region: Details of the locality in which the institution stands, the climate, other nearest specialised research institutions, etc. will be provided in this field
- 051 System: system of teaching, examination and evaluation followed in the institution will be given here
- 101 Paper 1: Details of the first paper of the course can be entered in this field. These fields for the papers will also have sub fields which will give name of teachers handling that paper together with their academic titles and achievements
- 102 Paper 2
- 299 Paper 199: Fields from 101 to 299 provides facility for entering details of maximum 199 papers of a course

## 7.2 Features of DCI

The DCI created using CDS/ISIS can allow end user to search through the database by the name of a course, subject of specialization, keywords related to various subjects contained in the course, name of institution, the location in which the institution is situated, the scientist or teacher who is offering lectures in a particular specialization and also through many other search points. The programme can display the search results on the screen. If the numbers of records are more than one it can allow the user to scan the next record and previous record. It can also allow the user to write full statement for the search or part statement with the right truncation.

## 8 Strengthening Academic Divisions

During the last decade various information systems, networks and services have come into existence at international, national and regional levels like, Telenet, NICNET, INFLIBNET, ERNET, ARIS, and DELNET. Most of the universities and research institutes in India are presently having the powerful computer and communication systems made available to them under various programme and are capable of developing and maintaining large databases. The systems are sufficient

for extending online and work facilities to each and every department, scientist, research scholar and teacher in the university as well as developing databases like that of curriculum discussed above. But one who surveys the functioning of computer and communication systems in our educational institutions can see that their utility is not extracted even to the minimum. The costliest systems that can be used to establish LANs and also develop and access international databases are heaped in some instrument divisions and used only for mail transfer or word processing. The scientists and scholars are unaware of the existence of such tools and also of the current developments. Skills to perform online information searches and competence required to utilise the systems and equipments can be created only if necessary awareness is created among all and access is provided to them.

Many universities which are having required computer systems, DTP software and database packages that can manage their academic programmes information and also generate prospectuses still use letter presses or outside facilities for producing those items. These are all because of the fact that the divisions, which are to apply the technology, are not having the technology. Those who are having the systems are not specialised divisions on information services and so are not bound to extend the services. Academic Divisions of the universities are the apt divisions where curriculum database of the region can be developed. Hence such divisions require necessary connections to networks and also computer and communication systems for processing curriculum information.

Creating a curriculum database at regional and national level means being able to develop standards for prospectuses, collect together related items of information from the prospectuses of institutions in the concerned region or nationwide and deliver it in a computer readable form and providing access to the information to the public. The production of electronic database of curriculum information can enable the student community all over the country irrespective of location and distance to have access to information about the courses of their interest. This can allow healthy competition for education, students to select apt courses and help institutions to get the best candidates for their specialised programmes. Also institutions get the facility to compare and improve their course content. The resources utilised for higher education thus can reap maximum returns.

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प्रो. कृ. भ. पवार  
महासचिव  
Prof. K.B. Powar  
SECRETARY GENERAL

Meet: Seminar: 96:

November 13, 1996

Dear Vice Chancellor/Director,

I am enclosing the following papers received in the Association for discussion at the AIU National Seminar on "Higher Education in the Era of Information Technology" to be held at Rabindra Bharati University, Calcutta, on November 27, 1996.

1. AIU Background paper on Higher Education in the Era of Information Technology.
2. Information Superhighways in Higher Education & Research: Problems and Prospects in Indian Context - Dr M P Kapoor, Director, Thapar Institute of Engineering and Technology, Patiala.
3. Emerging Information Technology and Transformation of Learning and Teaching - Prof K Aludipillai, Vice Chancellor, Madurai Kamaraj University, Madurai.
4. Information Technology : An Overview - Prof R Ramamurthy, Vice Chancellor, Sri Venkateswara University, Tirupati.
5. Teaching & Learning Scenario in the light of Information Technology - Prof K M Pathak, Vice Chancellor, Tezpur University, Tezpur.
6. Higher Education in Era of Information Technology - Dr. V. M Mehta, Vice Chancellor, Gujarat Agricultural University
7. Impact of Information Technology with a slant to Nagpur University Library - Prin. M T Gabhe, Vice Chancellor, Nagpur University, Nagpur.
8. Emerging Information Technology - Digital Libraries in Higher Education - Dr M Muniyamma, Vice Chancellor, Gulbarga University
9. Information Technology in Higher Education: Challenges and Opportunities - Dr N Babu, Vice Chancellor, University of Kerala

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10. Harnessing Information Technology for Educational Development - Dr M G Muthukumarasamy, Vice Chancellor, Annamalai University,
11. Development of an Academic Database and Network - Prof R Raman Nair and Dr U Mohammed Kunju, Kerala Agricultural University, Thrissur
12. Information Technology for the Delivery of Flexible Higher Education of Quality - Shri S K Misra, Additional Apprenticeship Adviser, Department of Education, New Delhi.
13. Emerging Information Technology - Dr G M Khan, Bashir Ahmad, Sher-e-Kashmir University of Agricultural Sciences and Technology, Srinagar.
14. Higher Education and Information Technology- Nagaland Governor's Secretariat.

With regards,

Yours sincerely,



(K. B. Powar)

Encl: As above.

All Vice Chancellors/Directors  
of member Universities/Institutions