INFORMATION TECHNOLOGY AND OPEN SCHOOLING: COMPUTERISATION AT THE NATIONAL OPEN SCHOOL, INDIA

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Introduction

Modern age is the age of information. Technological advancements have shrinked the whole world. In today's sphere of education, the use of computers not only helps in the process of learning but also in administering the educational system itself. The use of computers becomes more important and necessary in the case of open schooling and distance education to make the process more speedy, accurate and cost effective. The communication and information revolutions have effectively abolished the distance and have made the open schooling system in a real sense of education at doorstep. In fact with the advent of Internet and web technology, the idea is shifting from education at doorstep to education at fingertips. Today, it is possible to have a virtual classroom, where a student can interact with his teacher without being actually organizing a class. This technology has revolutionized the total open schooling system. Today, there are number of institutions available on the Internet offering various courses on-line.

The computerization of open schooling has two aspects. One aspect deals in the automation of the process and methodology of open learning system while the other aspect deals in the computerization of the management of open schooling. This paper deals with the second aspect with reference to computerization in National Open School, India.

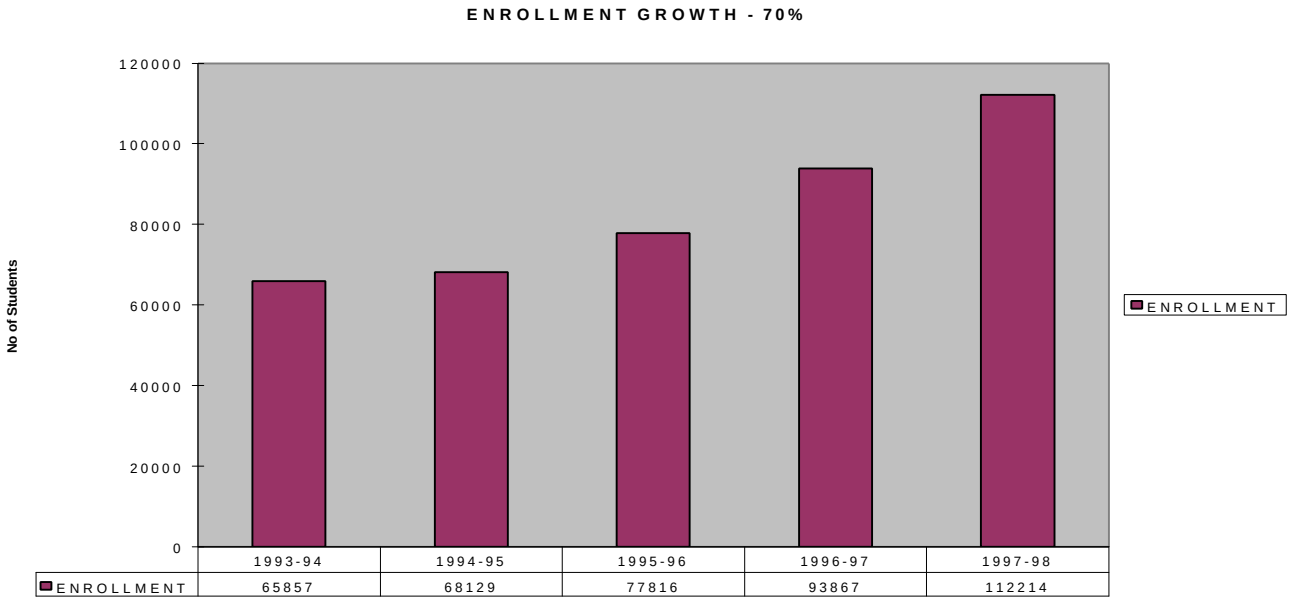
Open Schooling

In India, despite impressive achievement in schooling, about 40 million children are out of school; most of them are school dropouts and possess stable literacy. It is in the interest of the economic & social development of the country that the school dropouts & neo-literate are provided with an effective target focussed alternative channel of learning. Since such people can not go to school, alternative modalities must deliver education at their doorstep. In such educational scenario of the country, the only viable mechanism of delivering good quality school education to such people is through open schooling and distance education mode.

The Government of India in 1989 established the National Open School as an autonomous organisation under the Department of Education, Ministry of Human Resource Development. The National Open School (NOS) provides an alternative channel to thousands of drop-outs, unemployed or working adults, women, disabled, socially and economically backward classes, socially disadvantaged groups or those learner who wish to update their educational attainments but are unable to be full time learners. NOS offer both academic and vocational courses at Foundation, Secondary and Senior Secondary levels. Besides, NOS also offers basic education and community development programmes. NOS is also venturing into open elementary education programmes from this year. The National Open School operates through strong network of 10 Regional Centres and 886 Accredited Institutions (Study Centres) spread all over the country.

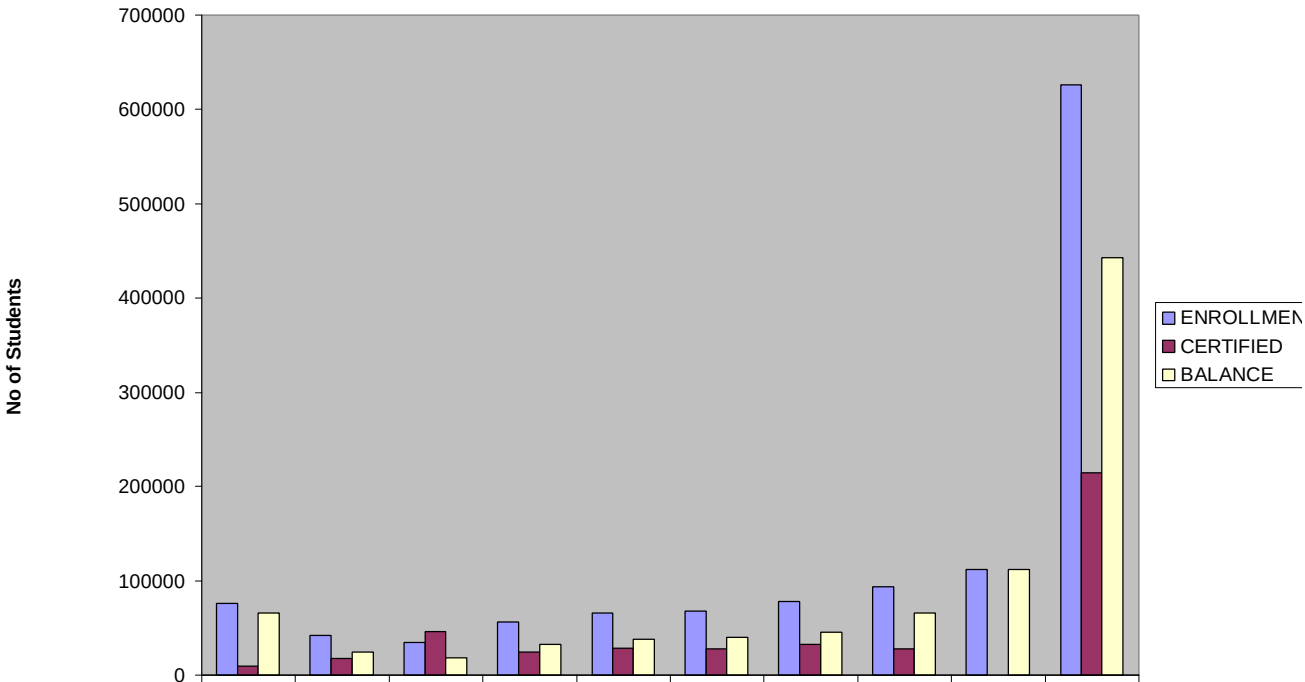
Need & Computerization

The enrolment in NOS is growing every year since its inception in 1989. The percentage growth of enrolment is phenomenal. It is as high as 70%. The Graph-1 shows the percentage enrolment growth of enrolment in NOS.



Graph-1 showing Enrolment growth in NOS

Presently, the cumulative strength of NOS in various courses is about 626 thousand candidates. The cumulative enrolment indicates the total number of students taken admission in NOS since its inception. The graph-2 shows the cumulative enrolment of NOS.



	PRE-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	TOTAL
ENROLLMENT	76015	41952	34425	56459	65857	68129	77816	93867	112214	626734
CERTIFIED	9482	17979	45969	24196	28229	27625	32883	27323	304	213990
BALANCE	66533	23973	18456	32263	37628	40504	44933	66544	111910	442744

Graph-2 showing Cumulative Enrolment in NOS

The large volume of enrolment itself is suggestive of using information technology for its success. Secondly, the time bound delivery and accuracy are the crux of the open schooling system, which can be achieved only by means of computerization. Thirdly, provision of efficient and effective student support services needs a higher degree of automation. Fourthly, providing required and accurate information to the students in the quickest possible time can be achieved only by means of using computers. Last but not the least, one can not remain untouched with the technological advancement all around and think of progress.

Above all, with the advent of Internet and web technologies, the whole educational scenario, particularly the open schooling and distance education, is changing. It is greatly felt that only by means of information and communication technology, it is possible to reach the masses.

In order to provide better, fast, accurate and efficient services and support to the students in terms of academic as well as administrative, all major areas of application were undertaken for computerization. Before we discuss the application areas in detail, let us take a view of the infrastructure and the set up available in NOS.

Infrastructure & set up

The Computer Centre of NOS has come a long way since it made a small beginning with only two personal computers in 1989. The Computer Centre is now equipped with latest hardware and software. There is Local Area Network (LAN) with centralise database system having a powerful Pentium-II based file server and fifteen nodes called intelligent terminals. The Local Area Network is based on star topology using 16 port hub and UTP connections. The individual units/sections/departments have also been hooked up in the network. In addition to main Computer Centre, desk computers of Pentium series and HP Desk Jet printer were provided to senior officers and other functionaries for their smooth functioning and promoting greater efficiency. To make the information more on-line, these individual officers have also been hooked up in the network. A separate DTP unit with Seven Pentium-II machines and four Laser jet printers have been set up to look after the voluminous work of printing and production. In order to cope up with large volume of printing of student data, two high-speed line printers are installed.

In addition to the above set-up at the head office in Delhi, the regional centres are also provided with one/two computers and printer to facilitate the services further to the students.

Besides, Pentium-II based Laptop computers have been provided to the Chairman and three Heads of the Departments making their mobility more effective and efficient. Looking to the induction of

Internet technology, NOS is provided with six different Internet connections enabling its staff members to have access to Internet.

The basic Operating System installed is Advance Novell Network 4.0 as the main operating system for LAN and windows-95 at the user end. Besides, the following system software are used; RDBMS, Visual FoxPro, MS-Office, Page-Maker. Indica & Akshar for windows are used as Hindi Fonts. In addition the Application Development Team develops all the User Application Software in house. The following areas of applications have been computerised in NOS

Student Information System

The admission/registration in NOS is done once in a year during July to September in the academic stream and twice in a year during March/April and September/October in the vocational stream. Starting from punching of registration/admission form to the issue of the certificate, all the processes are computerised and fall under Student Information System. The system is further designed for handling two different stream i.e. Academic and Vocational stream. The complete integrated software package called NOS-REG is developed in-house.

The Student Information System has been divided into three parts:

- Registration/Admission Processing
- Pre-examination Processing
- Result Processing

Registration/Admission Processing

As part of the computerization, the admission form of NOS was redesigned as per need of computer and efforts were made to codify most of the items of the admission form. In this direction we developed a 9-didgit registration number for each student. In the on-line system of Student Information System, giving enrolment number of any student brings the complete and updated status of that student. This helped greatly in dealing the query from any student. The registration/admission forms are collected at the A.I. From each A.I., the forms are sent to headquarter in Delhi. After registration each student is given a unique 9-digit registration number which is called enrolment number of the student. This number remains valid for all purposes during the five years of registration. The enrolment number of student is quite meaningful. Let us take an example of 020573005. The first two digit indicate the state code, 02 stands for the state Assam, third and fourth together indicate the study centre number of that particular state, 05 stands for the fifth centre in Assam. The first four digit together indicates the A.I. number from where the student has taken admission. The fifth digit indicates the year of registration, 7 stands for 1997, the sixth digit indicates the level of course, 1 stands for Bridge course, 2 stands for Secondary course and 3 stands for Sr.secondary course. The last three digits 005 indicate the actual serial number of the student.

Data Entry of admission forms is done study centre wise with a number of in-built checks provided in the software package. The in-built checks are valid student's enrolment number, valid subject codes, valid date of birth, valid course level course etc. After data entry and its verification, study centres wise Database file as well as the cumulative student database as the central database is generated.

After Finalisation of student data, study centre wise checklist, Identity card and confirmation letter for each student is printed and dispatched to each study centre. For the year 1997, the admission forms of 112 thousands students data were processed.

Printing of study materials distribution report for each study centre indicating the medium-wise/subject-wise number of candidates. This enabled the mailing branch to dispatch the study materials to the study centre for each student. Earlier the study materials were used to be dispatched on expected number of students, which used to create number of problems. With the help of this dispatch report, the distribution of study materials got smoothened and error-free. In addition various statistical reports such as Course wise, Medium wise, Sex wise, Region/state wise, Subject wise, Age wise, Category wise, etc are printed and provided to the management as MIS reports. During the processing, we also capture the background information of each student such as parent's education, family income, rural or urban etc. Based on these information reports are provided which help in taking decisions for policy making.

Pre-examination processing

NOS conduct two examinations in a year i.e. one in May and the other in November. Prior to computerization, each student from each study centre used to fill up an examination form and they used to mention even those subjects whom they had cleared in earlier examinations or such subjects, which have not been taken in their admission. Secondly, putting these examination forms in sorting order of enrolment number was a big problem and time consuming. Thirdly, the handling such large number of examination forms was another big problem faced by NOS as the number of students for NOS examination have grown from 60,000 in 1991-92 to 165,000 in 1997-98. With the help of computer we could generate a database containing only the enrolment number, name and not-cleared subjects of all such students by updating students admission database from the result database for over all result status of the candidate as well as each subject status of each student record. Then such list of all eligible students for each study centre is printed and dispatched to them for collection of examination fee. This helped the students in knowing their not-cleared subjects and smoothened the collection of examination at each study centre as 25 students could deposit their fees only on one page. This also helped in scraping and reducing the tedious and duplicate work of verification of examination forms. The fixation of examination centres was another area of problem. The requirement of number of examination centres all over India was not known. With the help of computer a report is generated indicating district wise expected number of students appearing and the number of examination centres required in that particular district. Prior to computerization, the requirement of total number of Question Paper was a problem area as it was difficult to know how many students are going to appear in the examinations. This used to lead either wastage or shortage of question paper and that too at a very critical time, when the examinations were on. Based on expected number of students and its trend, with the help of computer we could generate Cumulative Question Paper Requirement statement which helped in printing the total number of question paper required for the examinations. Then many reports are required for the smooth conduct of examination, which are now printed with the help of computer and made the total conduct of examination smooth, fair and error-free. The pre-examination work involves the following activities:

*Updating of students admission database from the result database, updating the over all result status of the candidate as well as each subject status of each student record.
*Preparation of database of all eligible students for the forth coming examination taking into accounts the last 5 years student database. Only not cleared/not-attempted subjects of those students who were not certified are taken into the database.
*Printing of list of all eligible candidates for each study centres indicating their Roll No. Name and Subjects for collection of examination fee. For 1998 examinations, we printed such list for 270 thousand candidates. These Lists are sent to examination branch for further dispatch to each study centre.
*Preparation and printing of commutative Question Paper statement based on the expected number of students going to appear in the examination.
*Receipt of the above lists from examination branch when they receive it back from the study centre.
*Punching of student data from the list/examination form for each study centre with a number of in-built checks provided in the package, and generation of students examination database for each Study Centre/Exam Centre.
*Updating of above such examination database with the admission database for its validation.
*Printing of study centre wise examination list of candidates along with the edit list indicating the reasons for which the candidates are rejected, if any, and send it to examination department.
*Corrections marked by examination branch on the List of Candidates and on the edit list and are sent them back to computer centre.
*Corrections carried out as marked by the examination branch and a updation list is provided to examination branch for its cross checking.
*Consolidation and preparation of final examination database and printing of following reports for smooth conduct of examination.

- Subjects wise all centres Question Paper statement.
- Centre wise Question Paper statements.
- Centre wise/subject wise challans/acknowledgement card.
- Centre wise Answer Book statement
- Centre wise Answer Book Acknowledgement Receipt.
- Centre wise statement for Centre Advance.

- Study Centre wise final List of candidates.
- Centre wise/subject wise List of Roll Nos. for sitting plan for both theory and Practical.
- Centre wise/subject wise Answer-book proforma for theory and practical.
- Centre wise/Subject wise Blank-award for theory and practicals
- Blank-award strips detail statement.
- Answer Book receipt proforma.
- Secrecy plan statement.
- Intimation Letter to each candidate indicating his centre and date sheet for his subject (s).

Result processing

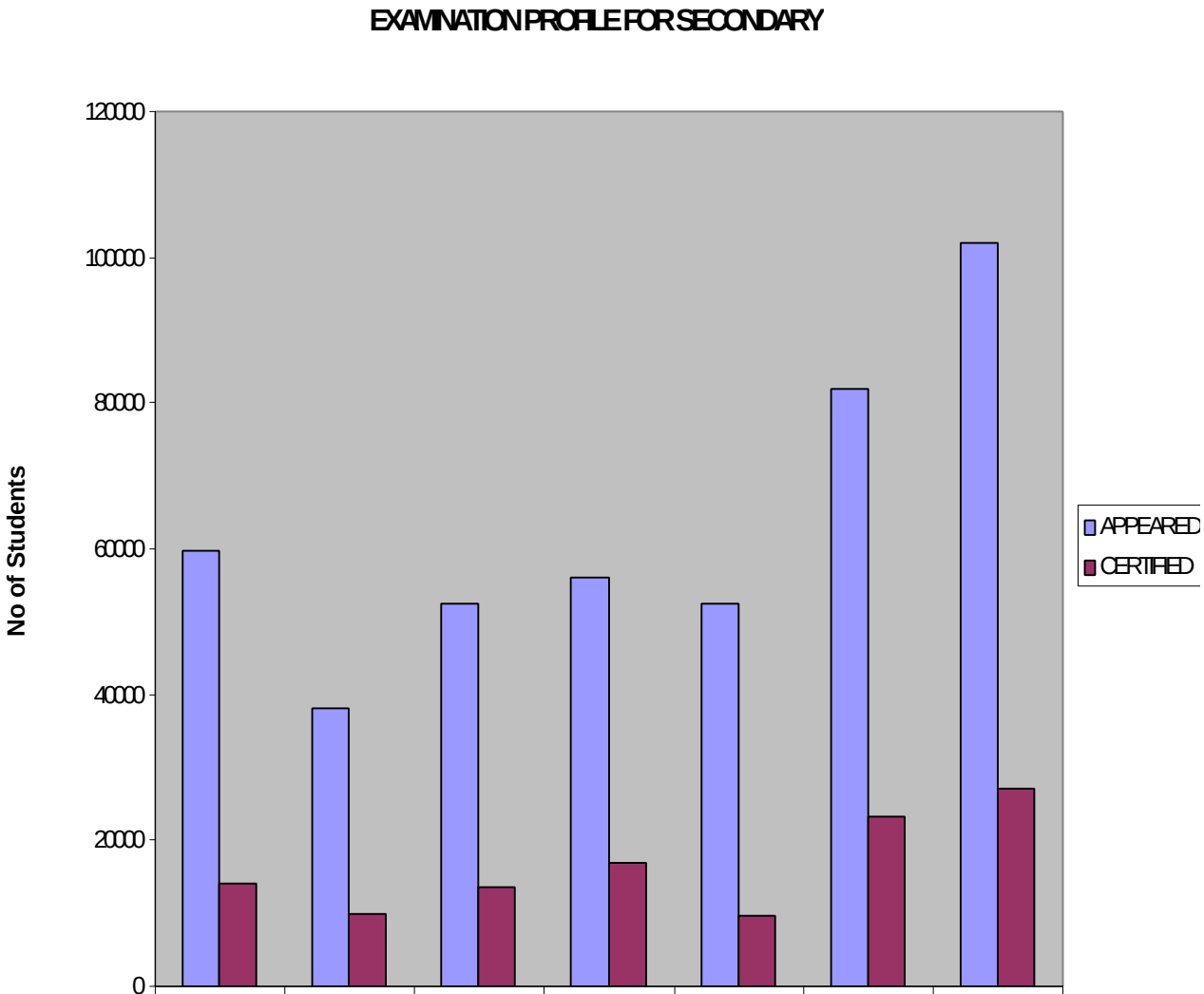
In NOS, there is a system of credit accumulation where the awards achieved by a student are maintained in a student result database as his credit. This database is updated with every examination result till the candidate gets a certificate. In total, the student gets nine chances to get a certificate during the five years of registration period. Due to credit accumulation system the processing of result is more cumbersome as the awards achieved by the students in earlier examination are also taken into consideration. The student gets a combined result showing his current and old awards together. This was possible only by means of computer, as such exercise was not possible manually. For every examination, we developed a concept of current student result master and cumulative student result master. Processing the current awards file and merging it with the old master result database generates the current result master. The following activities are involved in the result processing.

*Punching of awards at two different places from the computerised award lists as well as manual awards. This is done to ensure the 100% accuracy in the result processing.
*As a result of the above process two databases are prepared of the awards. These two databases are then collated and the discrepancy is eliminated, if any.
*Posting of current awards for each subject to each student record prepared as the examination database.
*Processing of result as per the passing and other examination criteria of NOS already laid down in the scheme of examination and conversion of fictitious roll number with the original roll number. The credit transfer cases from CBSE are also taken into consideration while processing the result.
*Merging of the above-prepared current result database with the old student master which contains the old achievement of each such student.
*Creation of the final student result database from where the following documents are printed :

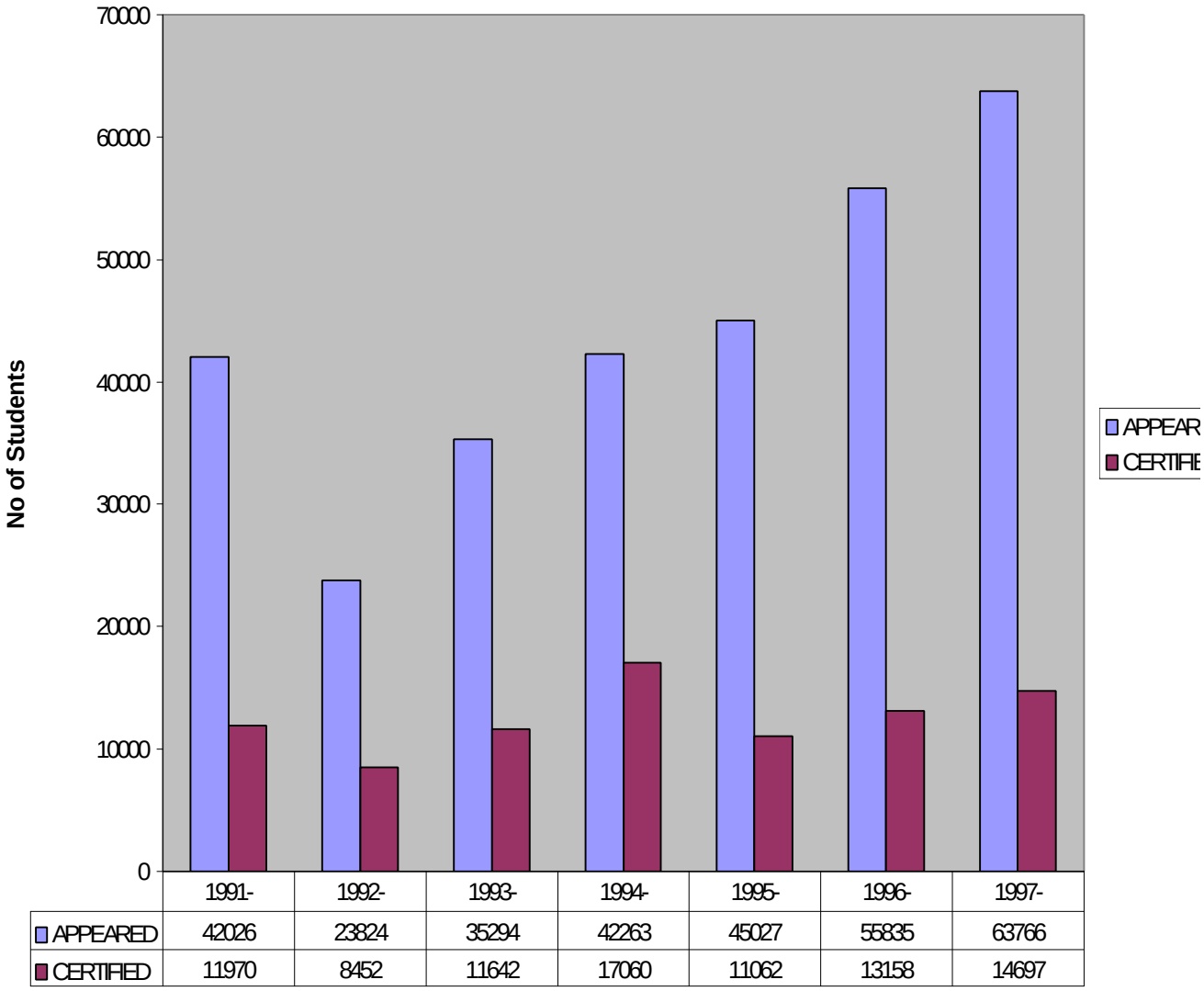
- Student result gazette
- Mark statement for each student on pre-printed stationery
- Migration certificate for all certified candidate
- School certificate for all certified candidate

*Dispatch of these documents to study centre for further information and distribution to each student.
*Processing of Result Withheld cases for Unfair Means committee. The decision of this committee is taken into consideration and the result of such candidates and processed as per the procedure discussed above. In similar manner the result processing of Result later cases are dealt with. The Graph-3 and Graph-4 indicate number of students appeared and certified in NOS in Secondary and Sr.secondary examinations.

Graph-3 showing Year wise pass percentage for Secondary Examination



	1991-	1992-	1993-	1994-	1995-	1996-	1997-
APPEARED	59829	38190	52453	56060	52554	81927	102027
CERTIFIED	14060	10028	13571	16966	9587	23223	27157



	1991-	1992-	1993-	1994-	1995-	1996-	1997-
APPEARED	42026	23824	35294	42263	45027	55835	63766
CERTIFIED	11970	8452	11642	17060	11062	13158	14697

Graph-4 showing Year wise pass percentage for Sr.secondary Examination

Publication Management System

As the number of enrolment and programmes has been increasing, so was the requirement of more number of books. The growth in number of books produced is remarkable and is directly proportional to the growth of enrolment. During, the year 1998-99 6.5 million books were printed. For printing of this huge volume of books, 1200 MTs of printing and 150 MTs of pulp paper were required. We developed a Publication Management package NOS-PUB. Right from calculation of paper requirement to the processing of printer's bill all the activities fall under this system. The following activities are done under the in-house developed Publication Management Package.

*Assessment is done for the total number of candidates to be admitted taking into account the trends of last three years admission.

*Assessment of subject-wise/medium wise total number of student.

*Calculation of paper requirement for the printing of study materials after taking the balance stock into consideration.

*Creation and maintenance of database of Empanelled printing presses.

*Random allocations of printing jobs to the empanelled printing presses.

*Processing of Printer's bills.

Store Management

The store is completely computerised through in-house developed Inventory Management System. The inputs in the system are only purchase voucher and item issue indents. On the basis of these inputs the inventory master file and inventory transaction files are updated on-line. The system takes care of

daily Receipts, daily issue, balance stock as on date, re-order Level, Stock register, Consumption reports & requirement reports. Besides, various other daily, monthly and annual reports are taken.

Financial Accounting

The Accounts and Audit of NOS is fully computerised. For basic accounting the readymade package TCS-EX of Financial Accounting is used. With the help of this package the annual budget is taken out well in time. The package provides on line updating of all accounting files. This helped in bringing trial balance and Income and Expenditure statement at any point of time in the financial year. Besides, a package NOS-FIN is developed in-house which takes care of salary Slips, annual GPF Account, Income-tax statement and various other accounting work.

Library

The Library is computerised with UNESCO information storage and retrieval package CDS-ISIS. There are about 10,000 books and other items in the library. There are about 100 CD-titles on different subjects available in the library. It is also connected with Delhi Library Network and has an Internet connection. The Internet connection at library has eased the academics in getting information on any field or topic within no time. One multi-media workstation is installed in the library. The availability of any book or item becomes very easier with the help of computer and also the location and status of any book or item. With the help of the in-house developed package NOSLIB the issue & return of any book or item is located. The in-house developed package NOSLIB has been integrated with the UNESCO package CDS-ISIS to make it more user friendly.

DTP JOBS

NOS has a large production of instructional study materials. About 600 titles are prepared for printing as study materials for the students. Data entry of all academic and vocational study materials are done in-house using MS-Word and later page making & typefaces are done for preparation of CRC. Besides, the quarterly magazines, leaflets and other publications are prepared in-house

Question banking

It has been taken up as a very important project where a databank would be created for item after its due evaluation. Such item bank would be used for setting of question paper. Random set of papers would be done without repetition of the same item in different sets of paper. The whole project is computerised and at present we are in the process of creation of item databank.

NOS on the Internet

Keeping in view the growth of information technology and the prominent position that education has occupied on the Internet, the National Open School is also in the process of developing a web based environment in order to enable students to have access to high quality education.
NOS have its web site at www.nos.org helping to disseminate information about itself. Clicking this site address will bring the user to the NOS Home Page indicating its address and telephone numbers and provides different menu buttons with hyperlinks to reach the different information pages of NOS. We have also planned to put the results on the Internet for its access to the students.
With the development of its own web site, NOS would soon be offering courses on-line through Internet, the first one being a one year Certificate in Computer Applications (CCA). By harnessing the power of one of the most impactful technology, NOS also hopes to offer all its courses and programmes on-line in the near future.
Another ambitious project is the development of an electronic network of Internet based school known as **Indian Open Schooling Network (IOSN). IOSN** will bring together a large number of Internet based schools all over India and will have great potential to enhance the teaching and learning process by providing a common communication platform. **IOSN** will also have linkages with **the Commonwealth Electronic Network for School and Education (CENSE**), thereby expanding its scope to become a national grid which in turn will be linked to its international counterparts. At present about 30 schools have been connected under **IOSN**.

Training

As part of the computerization, all the staff members were given training in computer for enhancing their work efficiency. Few staff members were given specific training in DTP work and few in Database management system as per their requirement. As part of in-service training, the staff of computer centre were given training in Internet, HTML and JAVA.

Future Scenario

The following are the future thrust areas of NOS for effective and efficient management of open schooling:
*Connecting all the regional centres for their smooth functioning and quick data transferring.
*Decentralization of the processing of Student Information Services to make it more effective
*Courses to be offered through Internet

Summary

Open learning/Distance Education is the methodology in which the learner does not go to educational institution but the education comes to his doorstep. To achieve this objective the technological advancement the world over is tapped by the individual/institution as the success of this system very much depends upon the optimum utilization of the technology in the field of education and communication.
NOS has attempted to utilize the applications of information technology in the management of open schooling. Right from the development to the delivery mechanism of NOS is fully computerized. NOS is also attempting to use Internet and Web technology which have proved effective in the teaching and learning process especially in the field of Distance Education.