TRAINING PROGRAMME ON COMPUTERS AWARENESS AND UTILIZATION IN EDUCATIONAL DATA PROCESSING

(13.10.1997 to 24.10.1997)

A REPORT

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TRAINING PROGRAMME ON COMPUTERS
AWARENESS AND UTILIZATION IN EDUCATIONAL DATA PROCESSING

The rapid development of Computer technology has started to affect every walk of human life. Computers are playing a major role in all areas like administration, management, industry, business, research and education. The major educational uses of computers are i) Educational management, ii) Computer Managed Instruction (CMI), iii) Computer Aided Instruction (CAI), iv) Computer Based Learning (CBL) and v) Research.

Computer is a versatile and powerful device for teacher educators to use in computer aided instruction, computer managed instruction and educational research. In India, most of the teacher education institutions like SCERTs, IASEs, DIETs and DSERTs, CTEs are provided with computers to bring qualitative improvement in education. But most of the faculty members of these institutions lack the skills and competencies in using these computers.

In the light of these facts, a 12-day training programme has been organized from 13-24 October 1997 for teacher educators drawn from Andhra Pradesh, Tamil Nadu and Pondicherry with the following objectives:

i) To bring the awareness among the teacher educators about the potential of personal computer in educational research;
ii) To develop in teacher educators skills of utilizing computers in their day-to-day work and research;
iii) To develop in Teacher educators competency in using SPSS package in educational data processing.

During the programme, the participants were exposed to DOS commands, word processing (MSWORD), DBASE IV, EXCEL, Statistical package for Social Sciences (SPSS), E-MAIL and Internet operations. The main focus was preparation of data file in SPSS environment and data processing for statistical analysis using SPSS software package. The participants were supplied with essential handouts on SPSS.

During the programme, the emphasis was heavily on hands-on experience supported by demonstrations and peer-to-peer interaction.

The participants expressed their satisfaction with the training and wanted to lay hands on the computers available in their institutions immediately after returning.

PROGRAMME SCHEDULE

DATE	SESSION I	SESSION II	SESSION III	SESSION IV
13.10.97	Computers – Hardware, Software (SNP)	Capabilities of a computer (ACJ)	Keyboard - Demonstration (DB)	Keyboard familiarity (Practice) DB/ACJ
14.10.97	DOS Commands (DB)	DOS commands Filing System (DB)	Windows 95 - Introduction (SNP)	DOS - Practice & Invoking programs with Windows 95 (DB/ACJ/RN)
15.10.97	Word Processing (SNP)	Practice on WP DB/ACJ/PRL/DN	Practice on WP DB/ACJ/RN/DN	Practice on WP DB/DN/ACJ
16.10.97	Advanced features of WP (clipping, pasting, printing, etc) SNP`	Practice on WP (Advanced) DB/ACJ/DN/PRL/RN		
17.10.97	Data Base - Introduction, DBASE/EXCEL (SNP)	Introduction to SPSS (DB)	Coding Analysis (ACJ)	Practice Session on Coding Analysis (DB/ACJ/DN)
18.10.97	Creating a data file (DB)	Creating a data file -- Practice Session ACJ/DB	Creating a Datafile in QED (ACJ)	Creating a Data file in QED - Practice Session (DB/ACJ)
19.10.97	File Modification (DB/ACJ)		Field Work - Data Collection	
20.10.97	Common statistical analysis - frequency tables, common graphical representation (ACJ)	Descriptive Statistics (DB)	Practice sessions on Statistical Analysis DB/ACJ	
21.10.97	Correlational Analysis (DB)	Practice Session on Correlational Analysis (DB/ACJ)	Testing of Hypotheses - Introduction (ACJ)	T-Test Application (DB/ACJ)
22.10.97	ANOVA - one way (DB)	Practice Session on ANOVA (ACJ/DB/GV)	ANOVA - Two and more than two way (ACJ)	Practice Session - Two way ANOVA (ACJ/DB/GV)
23.10.97	Regression Analysis (DB)	Practice Sessions on Regression Analysis (DB/ACJ)		
24.10.97	Multimedia , Internet, E Mail (SNP)		Concluding Session	TA/DA Disbursement

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13 - 24 October 1997

PURPOSE	COMMAND	SYNTAX	REMARKS
Clear the screen contents or bring the prompt to the top of the screen	CLS (Clear Screen)	CLS	Just type this command and enter.
Change the active drive (Ex: To go to drive D)	D:	D:	Type this and enter.
Change the directory (Ex: To go to directory SPSS in the same drive)	CD or (CH DIR) (Change Directory)	CD SPSS	If the Directory is on another drive type drive also - say, D: CD SPSS
List the contents of the directory (Ex: All the files in active directory in the active drive say C)	DIR (Directory)	DIR/P or DIR/W DIR AUTOEXEC.BAT	DIR/P lists the files pagewise. DIR/W lists the files horizontally. DIR AUTOEXEC.BAT gives the information about the AUTO EXEC.BAT.
Display the contents of a file (say the contents of the file PAYROLL.INF)	TYPE	TYPE PAYROLE.INF	The contents of the ASCII file only can be seen.
Copy a file from hard disk to floppy disk (Ex: To copy the file PAYROLL.INF from C: drive to A☺	COPY	C:\COPY PAYROLL.INF B:	The file PAYROLL.INF is copied from drive C: to the B drive.
Copy all files from one location to another (Ex: copy all the files in A drive to C drive).	COPY	COPY A: *.*C:	Here *.* indicates all the files - whatever may be the main file name or extension.
Copy all contents on disk in source drive to disk in destination drive (for backup copy)	DISKCOPY	DISKCOPY A: C:	Here all the contents of disk in drive A will be copied to C drive.

PURPOSE	COMMAND	SYNTAX	REMARKS
Remove a file from the active disk (Ex: PAYROLL.INF file on the active C drive)	DEL or ERASE (Delete)	DEL PAYROLL.INF or ERASE PAYROLL.INF	Any one of these can be used.
Getting the deleted files	UNDELETE	UNDELETE	This command should be used only before any further use of that directory.
Remove a directory (Ex: You want to delete WINDOWS directory from C drive)	RD or RMDIR (Remove Directory)	RD WINDOWS	While removing a particular directly, you should first remove all files and go to the higher (one level) directory first.
Preparation of the new disk for use (say 3 1/2 disk in B drive)	FORMAT	FORMAT B:	Before giving this command, the drive may be specified.
Create a new directory (say DIET)	MD (or MK DIR) (Make Directory)	MD DIET	This directory will be created in the active directory (if any) as sub-directory.
Change the name of a file (Ex. To change the name of the file PAYROLL.IF to PAY.INF.	REN (or RENAME) (Rename)	REN PAYROLL.INF PAY INF.	If source file is not active in the active directory, specify complete path.
Set a list of directories to search for commands (Ex : SPSS directory in C drive)	PATH	PATH C:\SPSS	
Display output to the monitor one screenful at a time.	MORE	MORE	While seeing the contents of a file, type this after the file name with gap.
Print a file on the printer (Ex: Print the contents of a file "Accounts:.	PRINT	PRINT ACCOUNTS or TYPE ACCOUNTS > PRN	This option is dependent on the DOS Version.
Display DOS Version	VER	VER	Type this and enter.

PURPOSE	COMMAND	SYNTAX	REMARKS
Report Statistics of the files/directories disk (say A drive)	CHKDSK (Check disk)	CHKDSK	Various information about the drive will be reported.
Suspend output to screen	CTRL & S	CTRL & S	Press CTRL & S keys simultaneously and release.
Abort currently active command	CTRL & C or A	CTRL & C	Press CTRL and C keys simultaneously and release.
Set computer calendar date (Ex: To enter 31.10.97)	DATE	DATE 31/10/97	First type DATE then type the values after seeing the instruction. Eg.DD/MM/YY.
Set the computer's clock time.	TIME	TIME	
Change the contents of an ASCII file (Say AUTOEXEC.BAT)	EDIT	EDIT AUTOEXEC.BAT	After typing, you find the contents of the file on the screen. You can change the contents and save the changes.
Enter text in the DOS mode	EDLIN	EDLIN	Type the text after this command at the cursor.
Display the structure of directories	TREE	TREE	Inter-relations of the directories will be shown.
Display the size of the empty memory (space available for further use)	MEM	MEM	This gives memory in number of Bytes.
Reaching the root directory	C:CD\	C:CD\	To reach the original starting Directory . This is used to move from subdirectory to the root directory. Here root directory is C.
Reaching the Directory at one level above (if any) the active directory	C: CD..	C: CD..	This is used to move from subdirectory to the directory at one level above.
Display the list of hidden files	ATTRIB-H	ATTRIB-H C: *.BAT	All hidden files with extension BAT to be displayed.

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SPSS

WHAT IS SPSS ?

SPSS is an abbreviation for Statistical Package for Social Sciences. It is an application software for information processing and mainly for statistical Data Analysis. There are many versions of this software. The present one is SPSS/PC – version 5.0. This software deals with all types of advanced statistical techniques and is a very sophisticated software for data management and file handling.

Capabilities :

SPSS/PC+ is a very powerful tool to deal with data entry, management analysis graphical presentation of data and reporting. For detailed information, one may refer to the following modules, which will be supplied with the software.

1. SPSS/PC+ Base
2. SPSS/PC+ Statistics
3. SPSS/PC+ Advanced Statistics
4. SPSS/PC+ Trends
5. SPSS/PC+ Categories
6. SPSS/PC+ Tables
7. SPSS/PC+ Graphics
8. SPSS/PC + Map
9. SPSS/PC+ Data Entry II
10. SPSS/PC+ CHAID
11. DBMS / Copy Plus

SPSS/PC+ Base module contains all data management and file handling routines as well as basic statistical procedures.

Hardware Requirement :

To install SPSS/PC+, it requires a system compatible with IBM PC (80286 or higher) with a 10 MB or a larger hard disk and at least 640 K of RAM.

Installation

Note that the SPSS/PC+ Version 5.0 will not install the system in the same directory containing an older version of SPSS/PC+. If you have, you must remove it or install version 5.0 in a different directory.

All the files in SPSS/PC+ Version 5.0 normally will be accommodated on, 4 Micro floppy disks named as 1, 2, 3 and 4 (or even 5 ¼ disks). The first contains a file INSTALL. To install the programs, place the disk containing the INSTALL file (i.e. disk 1) in the drive (normally B) and type B: INSTALL (If A drive (type A : INSTALL) and press ENTER. Follow any instruction that appears on your screen.

INSTALL asks you if you want to install SPSS/PC+, remove SPSS/PC+ procedures, or review the status of SPSS/PC+ procedures. Selecting the blinking option by pressing ENTER. Next INSTALL asks the drive in which you will install the software. Select the appropriate one by pressing ENTER. When the INSTALL asks you for your serial number, enter the serial number supplied by SPSS. When INSTALL asks you for a name, enter your name as you want. Type the directory when INSTALL asks (normally SPSS). Select all the modules when INSTALL asks by typing 'Y'. similarly select Base Procedures when INSTALL asks. When INSTALL asks permission to change your AUTOEXEC.BAT file, simply answer Yes.

In all other situations press a key other than ESC. When the above procedures have been completed, system asks you to terminate the process by pressing ESC key. Now you can run SPSS/PC+ by simply typing and entering SPSSPC.

Running SPSS/PC+ :

Before you run SPSS/PC+, make sure that SPSS/PC+ is installed on your computer. From the root directory reach the directory in which SPSS/PC+ programmes are available (normally SPSS directory). Then type SPSSPC and enter. You will find a screen looking like the one below.

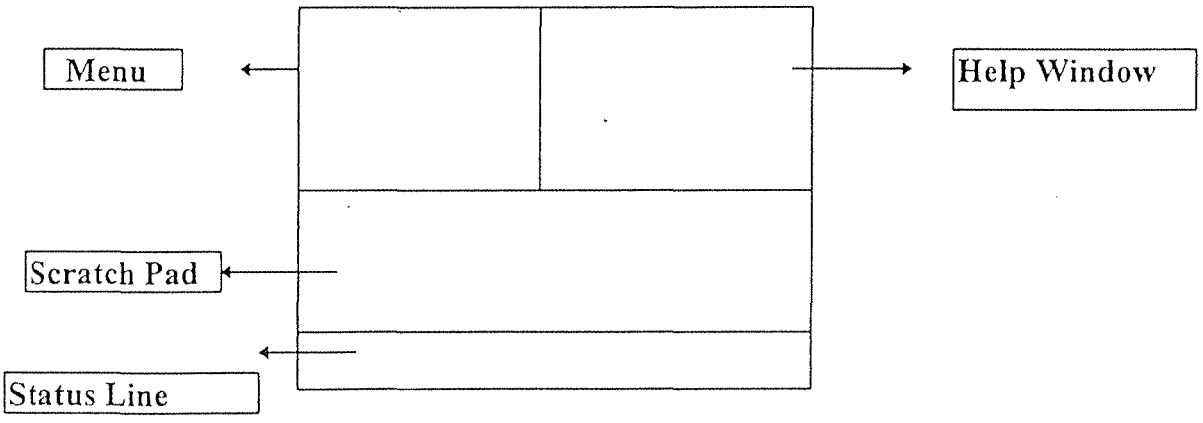

Fig.1 Main Menu and Scratch Pad

At this stage you have to give instructions to the computer to do your work. To give instructions you have to type some words, which are called commands. There are three types of commands.

1. Operational Commands
2. Data definition and manipulation Commands
3. Procedure Commands

Operational commands will be executed as soon as you enter it. For example, to display the information about fields in a data file, if you type DISPLAY, computer will execute this command. Other types of commands normally will be executed along with other associated commands.

Entering Commands into SPSS/PC+ :

Usually you give commands to do three things in the following order.

1. Convert data into a format that SPSS can use and then enter the data into the system.
2. Modify the data (if necessary)
3. Analyze the data.

There are three ways to enter commands into SPSS/PC+.

1. Select them from the Command Menus
2. Type them (into a file).
3. Type them at the command prompt.

The first two methods let you review the commands and edit them before asking the computer to execute them. The last method executes the commands immediately.

Typing Commands from Command Menu :

When you first enter SPSSPC, you will be in the environment that lets you select commands from menus as shown in the figure 1. The menu appears in the top half of the screen, on the left. Next to it on the right is a window that describes the currently highlighted menu item. The bottom half of the screen is an area called the Scratch Pad, which is a free place where you can build and edit commands until you are satisfied that they are correct.

You can select a command from Command Menu and paste it (enter) into the scratch pad. As many commands as you want can be entered in the scratch pad before their execution at a time.

Typing commands in a File :

This method lets you type your commands and then submit them for execution. For this, as usual, type SPSSPC and enter. You will reach the environment as shown in the figure 1. Then press ALT + E. Now you can type in the scratch pad.

Enter all your commands in the scratch pad. When you finish typing, press F9 and ENTER keys. In the status line, you find the words File to be Typed : Scratch Pad. At this stage, you type your file name to save all your commands in your file. Then press ENTER. This file containing the commands is ready for execution.

Typing commands at the Command Prompt : After reaching the stage as in fig.1, press F10. Then you find two options in the status line (at the bottom of the screen). Select the right one and press ENTER. This takes you out of the Menu and Help system and scratch pad (clearing from the screen) to the SPSS/PC+ command prompt. At this stage you type your command. The system responds immediately by executing the typed command if the syntax is correct. After execution, the system returns to command prompt.

The advantage of working at the command prompt is speed. If you are using commands that are somewhat lengthy, thus with greater opportunity to make errors, you may prefer typing the commands into a file or selecting them from menus, which gives you a chance to check and edit them.

Executing Commands while in Scratch Pad:

When the commands are entered correctly, you have to tell the computer to execute them. If you want to execute a particular command or the succeeding commands, place the cursor anywhere on the line that contains your command and press F10. This displays two options at the status line (bottom of the screen). The choice you want, run from cursor, is highlighted, so all you have to do is press ENTER. Then computer executes the commands clearing away the Menu and Help system screen. During this process of execution, the word MORE in the upper right corner of the screen appears, indicating that there is more output to come. When you have finished reading the output on the screen and are ready to see more, press any key - normally, the space bar.

If you have saved the commands in a file, first get those commands in the scratch pad or at the command prompt by typing and executing the command Review 'filename'. Then you can execute all the commands at a time as explained above.

THE SPSS/PC+ Editor :

This facility particularly designed to give you special help for entering SPSS/PC+ commands and for viewing their output, by means of the Menu and Help system and the scratch pad, listing and log files. It is also useful for standard editing tasks, such as creating, editing or browsing through any text file.

When you want to use Review simply as a text editor, you can get into it directly from DOS, without using SPSS/PC+ at all. To do this, at the DOS prompt you simply type SPSSPC/RE followed by a space and the name of the file you want to edit. If you

want to edit two files - one in the top window and one in the bottom -enter both file names, the file entered first appears on top. You can also use Review command even within SPSS/PC+. You may use the help of function keys while making changes in the file. In the usual manner, you can save the final file by pressing F9 and ENTER keys.

Types of Files

Generally the files are of two types - program files and data files. Program files consist of set of commands or instructions. Data files consist of organised information for processing.

SPSS/PC+ can read data from several different types of datafiles. They are :

1. Data File: This contains only data values in ASCII characters. This type of file can be created with any text editor like Word Star, MS Word etc. You can read an ASCII data file into SPSS/PC+ by running a DATA LIST command and specifying the filename on the FILE sub command.

2. System File: It contains data and a data dictionary (information regarding the variables, codes etc) for use in SPSS/PC+ . You can create or replace a system file using the SAVE command and retrieve it using the GET command. You cannot edit a system file with a text editor such as Review.

3. Portable File : It is used to transport data and data dictionary to another computer with a different operating system and is created by the EXPORT command. To read a portable file, use the IMPORT command. You cannot edit a portable file with a text editor such as Review.

SPSS/PC+ writes several types of files as indicated below.

1. SPSS.LOG : This contains a copy of all the commands that SPSS/PC+ has executed during your current session, in the order in which they were submitted. From Review you can have the access to this file. For this first hide the menus and place the cursor on the scratch pad. Then press F3 and ENTER. Type the file name SPSS.LOG and press ENTER.

2. SCRATCH PAD: It contains the commands you type or paste into it. This file is saved automatically whenever you leave Review, and when you leave SPSS/PC+.

3. SPSS.LIS : This contains the printable output from your commands. This file is created automatically when you execute the commands.

4. SPSS.PRC: This contains only special results obtained by running some special commands.

Preparation of Data :

Before processing of information, data must be entered into a disk file. This contains only steps - arranging the data into a suitable format and next entering the data into the computer. The first step generally is called coding part.

To enter the data into the computer, you can follow any of the following methods.

1. Using DATA LIST command, if the data is in the text form (ASCII file).
2. Using QED (Quick Editor) command.
3. Using TRANSLATE command, if the data already entered using DBASE, LOTUS or EXCEL.

Before using the above first two methods, you must arrange the data into a suitable form by deciding the variables, coding the variables and data if necessary.

Data Entry Using DATA LIST Command :

If you data are in a text file or you are entering data along with your commands, you must use a DATA LIST command to define the variables and to indicate where the data can be found.

Assume that you are entering the data along with your commands and the data are in the following format.

Columns 1 2 3 4 ... 7 8 9 10 11 12 13 14 15..18 19 20 21 22 25 26.. 29 30 31 32

```
1 2 3 4   RAGHAVAN        MALE        24     M.Sc
1 2 3 5   TARADEVI        FEMALE      22     MA
1 2 3 8   NAGENDRA        MALE        23     MA
1 2 4 3   JYOTHI          FEMALE      24     M.Sc
```

explaining the information regarding the Register Numbers, Name, Sex, Age and Qualifications of four persons named as records. Assume that the information regarding each variable entered in the fixed columns respectively in case of each record.

To enter the above data, use the following Procedure.

```
DATA LIST
      /RNO 1-4 NAME 7-15(A)  SEX 18-23(A)
        AGE 25-26 QUAL 29-32.
BEGIN DATA.
1234   RAGHAVAN        MALE        24     M.Sc
1235   TARADEVI        FEMALE      22     MA
1238   NAGENDRA        MALE 23     MA
1243   JYOTHI          FEMALE      24     M.Sc
```

END DATA.

Here RNO, NAME, SEX, AGE and QUAL are the variables and the numbers immediately after these indicate the columns where the data can be found respectively. The letter after the columns indicates the type of the variable as alphanumeric or numeric. The letter "A" denotes the alphanumeric variable. The lines between BEGIN DATA and END DATA indicate the values of the variables (Data). You may note that each value of each record starts at fixed column. Therefore we call this format as fixed format. The specification of the names in DATA LIST may be in any order. If the values are in more than one line indicate those columns and variables after putting /.

Now suppose each value of each record is not starting at the same column but separated with a gap in the same sequence (i.,e. not in a fixed format) as given below.

```
1234  RAGHAVAN  MALE      24     M.Sc
1235  TARADEVI   FEMALE   22     MA
1238  NAGENDRA  MALE             23     MA
1243  'PJYOTHI'   FEMALE   24     M.Sc
```

In this case use the following procedure to enter the data.

```
DATA LIST FREE
     / RNO  NAME(A)  SEX(A) AGE  QUAL.

BEGIN DATA.
1234  RAGHAVAN  MALE      24     M.Sc
1235  TARADEVI   FEMALE   22     MA
1238  NAGENDRA  MALE      23     MA
1243  'PJYOTHI'   FEMALE   24     M.Sc

END DATA.
```

Indicate the alphanumeric value containing a space using quotations as above. The word FREE after the DATA LIST command indicates that the values are not available at fixed columns. Also note that the variables and their values should be in the same sequence.

If the data values mentioned above are already entered in the text file, you need not type the values again. Therefore, you can omit also the commands BEGIN DATA and END DATA from the above procedure.

Entering Data in QED :

Please see the Pages.

Entering Data using TRANSLATE Command :

The data file procedure by another software application can be used by SPSS/PC+ by using the following command.

TRANSLATE FROM = 'PAYROLL.DBF'.

Here PAYROLL file is produced by Data Base software. Similarly a file produced by Spread Sheet software can be read by SPSS/PC + by using the command

```
TRANSLATE FROM = 'PAYMENT.WKS'
    /FIELD NAMES
    /RANGE = A1..H12.
```

IMPORTANT SPSS COMMANDS

PURPOSE	COMMAND	SYNTAX
Aggregates groups of cases in the active file into single cases based on the value of one variable values.	AGGREGATE	AGGREGATE OUTFILE ='FILENAME' /BREAK = Variable name.
Performs analysis of variance	ANOVA	ANOVA VARI= Variable Name BY Variable Name (1,2) /STATISTICS = Some value within range 1 to 13.
Creates new numeric value.	COMPUTE	COMPUTE 'Target variable name' =Expression. (like AGE = 30 etc).
Produces Pearson Product-Moment correlations	CORRELATIONS	CORRELATIONS VARI= list of variables.
Counts the occurrence of the same value of a numeric variable.	COUNT	COUNT num = SEX(1).
Produces Contingency Tables	CROSSTABS	CROSSTABS AGE BY SEX.
Defines an ASCII data file.	DATA LIST	DATA LIST /NAME (1-15(A) AGE (17-18). Or DATA LIST FREE /NAME AGE.
Computes univariate statistics like mean, sd.	DESCRIPTIVES	DESCRIPTIVES Variables list. DESCRIPTIVES variable list /STATISTICS = some number between 1 and 13.
Exhibits information about variables in the active file.	DISPLAY	DISPLAY or DISPLAY variable list.
Terminates an SPSSPC+ session and returns control to DOS.	FINISH.	FINISH.
Changes the print and write formats of variables.	FORMAT	FORMAT income (F5.2) or FORMAT Name (A15).

PURPOSE	COMMAND	SYNTAX
Produces tables of frequencies.	FREQUENCIES	FREQUENCIES VARI = list of variables. OR FREQUENCIES VARI = list of variables /STATISTICS =7 /HISTOGRAM /FORMAT NOTABLE.
Reads an SPSS/PC+ system file.	GET	GET FILE = 'Name Of The File'.
Joins two or more system files	JOIN	JOIN MATCH FILE = 'name of the file' /FILE = 'name of the file'. /BY Variable name or JOIN ADD FILE = 'name of the file'. /FILE = 'name of file'.
Displays values in the active file.	LIST	LIST list of variables
Displaces means, SDS and group counts.	MEANS	Means tables = Variable list by Variable Name.
Limits the number of cases	N	N 100
Produces a one-way analysis of variance.	ONEWAY	ONEWAY VARI = Variable Name BY Variable name (or Group).
Designates cases for inclusion in the next procedure.	PROCESS IF	PROCESS IF (relation).
Reads and Writes System files	QED	QED ENTER F2 for Reading
Changes, rearranges or consolidates the values of the existing variable.	RECODE	RECODE sex (0-1) (1-2) (ELSE=SYSMIS).
Calculates multiple regression	REGRESSION	REGRESSION VARI = list of variables /DEPENDENT = Variable name.
Editing the text tiles (ASCII files)	REVIEW	REVIEW ' file name'. Or SPSSPC/RE 'file name' (in DOS mode only).
Saves a system file	SAVE	SAVE OUTFILE = 'file name'.

PURPOSE	COMMAND	SYNTAX
selects the required cases	SELECT IF	SELECT IF (condition)
indicates the preferences of the user	SET	SET PRINTER ON / LISTING OFF / LENGTH = 22 /EJECT ON.
Displays all the current settings on the SET command.	SHOW	SHOW.
Reorders the sequence of the cases	SORT CASES	SORT CASES BY variable name (A)
Creates a system file from another software file or translates a system file into another software file.	TRANSLATE	TRANSLATE FROM = 'file name.wks' /FIELDNAMES /RANGE = A1...G9.
Compares population means	T-TEST	T-TEST GROUPS = Variable with two values /Variable list. T-TEST PAIRS = Variable list.
Deletes or specifies Value labels to the variables.	VALUE LABELS	VALUE LABELS /Sex 0 'Female' 1 'Male'.
Deletes or specifies labels to the variables.	VARIABLE LABELS	VARIABLE LABELS /QUAL ' Highest Qualification'.
Writes cases to an ASCII file.	WRITE	WRITE VARI = variable list.

Using SPSS/PC+ (Ver 5.0.2) for Data Processing (QED Mode)

1. Collect data using tools (Tests, Questionnaire, etc.)
2. Keeping in view the data entry requirements of SPSS (QED mode), prepare a master table from which data will be entered into SPSS (Coding etc).
3. Prepare the Data Entry screen in SPSS.
   (Give F name, define Variables, etc).
4. a) Before entering data into Cptr, check / edit Master Table for inconsistencies, abnormalities in data, missing data etc and take proper decisions
   b) Enter the data into SPSS in a file.
5. a) Give SPSS commands, get results on the screen.
   b) Copy results or take a print out.

6. Interpret the results, write the Report.

Computer Work (Step 3 and 4b).

↵ = ENTER. = Press Enter.

PART I : Get into the QED menu, the Door, create a new file.

Step 1 : Invoke SPSS/PC+, get to the Main Menu.
Step 2 : Select Read or Write Data and press ENTER.

Result (Res) : Sub-menu opens up : QED, GET, etc.
QED selected/highlighted.
Step 3 : ENTER, to paste the command QED in the scratch Pad.

Res: QED pasted in the scratch pad along with the square cursor blinking, with . inside it.
(A command can also be typed into the scratch pad - for that first press ALT + E : Edit mode). ALT + M : Menu Mode. Selecting and pasting a command can be done only in the Menu Mode.

4. a) F10. Res: Message Run 'Run from cursor' highlighted meaning : Use/Press the ENTER key to execute F10 command. Other Option : Exit to Prompt (SPSS Command Prompt).

   b) ENTER. Res: Current file (none), Main Menu, Ctrl Menu.
   Part II A : Open the door (QED Menu) and create the file.

F = File

Step 5 : F7 (New File), do not enter. Res: Current File (none)

6. a) Type file name in the 'New File' box.
   b) ENTER. Res: Fname appears with SYS if extension name not given.

Next Step :

To specify the variables, get into the Dictionary Branch of QED.

7. Inside the Main Menu, locate F4 and press it
   Res: A new window appears "Create/Edit Dictionary" with F1 to F7 inside it. Locate F2 here : Define Var.

Step 8 : F2 Res: Current File with the name given by you and a window (Variable) Definition Window) : Entry boxes for Variable Name, Var. Label etc. Use ENTER to select and see each.

Step 9 : Make entries into each box and press to confirm ENTER the information regarding var 1, in that box. After reaching 'Dec. Places', ENTER; the entry goes down to 'Missing'....ordinarily no entry is made in this box.

Step 10. Ctrl + F10 Res: Var. Def. Window is cleared since entries for Var.1 is over...ready for Var. 2.

Step 11: Repeat steps 9 and 10 for each variable (indicating completion by pressing (Ctrl + F10).

Step 12: a) To see the list of variables entered, press Esc. Res: The entered variables displayed in a Mini-Window.
b) To edit any variable : Highlight it and press ENTER or F3. Small changes only possible for variables already entered.
c) Res: Var. Def. Window of the selected Var. appears. Do small changes, if required.
Step 13: Again Esc . Res: Back to mini window.

PART II B : Get the empty Data Table/Form required for Data Entry (Session 1) or partly filled table (Session 2).

14. Esc Res: QED Menu.
15. F5 (Data) Res: Data Branch of QED appears !
16. Inside the D.B.Menu, locate F6 (Add cases on/off).
    Res : The empty table with the entered variables OR previously filled table (if session 2).

PART III : Enter the values into the Table.

Case1, case2, 3,4, ...etc. Suppose you want to terminate data entry after entering 10 cases, quit the Table, save it and stop work or process the data of 10 cases entered. Suppose 6 entries for the last case (10^{th} case).

17. Type in 1^{st} value, then ENTER, 2^{nd} value ENTER. Like that

i. enter the penultimate value, 5^{th} one.
ii. Press ENTER. Res: Entry box moves to 6^{th}, last place.
iii. Don't enter value in the 6^{th} place, but press F6. Res: Message 'Add cases ON' disappears, it is OFF.
iv. Enter value in the last place (6^{th}). Res: Message appears whether you want to Add cases ON or not ? You don't want.
v. So, press Esc. Res: Come out of Table, Main Menu (If you change your mind and want to continue entry for Case-~~7,8 etc.~~ 11, 12 press F6 in sub-step iv.)

In QED Main menu, use FINISH, F10, ENTER, come to DOS mode OR start session 2 with Get File... in scratch pad and some commands, execute and see the results.

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INTERNATIONAL SEMINAR ON INNOVATION AND REFORM IN TEACHER EDUCATION FOR THE 21st CENTURY

TEACHER EDUCATION FOR THE EFFECTIVE USE OF NEW INFORMATION MEDIA IN SCHOOLS

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HIROSHIMA, JAPAN

COUNTRY PAPER

INDIA

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National Council of Educational Research and Training

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1. School Education in India

India is a country with an ancient civilisation well known for its system of education. It had evolved an unique system of education called **gurukul** , which meant teacher's home, as the training of the student took place at the home of the teacher [1]. The system was developed to meet the need of study of the Vedic texts and was elitist, as only a small proportion of young men could be educated in gurukuls. Most boys probably learnt their trade from their fathers. With Buddhism education shifted from the home of the teacher to the monastery. In the Middle Ages some of the monasteries developed into true universities. The most famous was the Buddhist monastery of Nalanda in the 3rd century AD. The 7th century account of Nalanda of Hsuan Tsang reveals that this institution vibrated with intellectual activity and training was imparted not only for the study of Buddhist texts but of Hindu philosophy, logic, grammar, medicine and other disciplines. In monasteries, in addition to oral recitation, teachers used a variety of teaching methods such as exposition, debate, discussion, question-answer, stories and parables. Inductive method was effectively employed for sharpening the intellect of the disciples [2].

More than 10000 students of different faiths from within the country and abroad, who had passed strict oral entrance examination, were provided with free education in Nalanda. Many other monasteries all over the country developed as centres of learning.

With foreign invasions and changes in the political structures, the indigenous educational system also changed. During the medieval period, Mohammedan rulers in India founded schools (Maktabs), colleges (Madrassahs) and libraries in their dominions. The ancient indigenous educational system got increasingly marginalized. The final nail on the coffin was the decision of the British government to promote through education the European literature and science among the natives of India. In 1826, the first normal school was started in Madras. For preparing teachers for an expanding school system new teacher training institutions were established throughout the country. By 1892, 116 training institutions for men, and 16 for women came into existence.

The reach of the school system in India during the colonial period was limited. More persons were out of it than who had access to it. This is clearly revealed by the literacy figures at the time of the independence. According to the census of 1951, only 271 in every 1000 men and 88 in every 1000 women could read and write [3]. There has been a phenomenal expansion of education in the past fifty years. The magnitude of the change can be seen from the table below [3]

School Education 1951 - 1955		
Class 1 to Class 12	1951	1955
schools	230683	837162
enrolment	23.8million	171.7million
teachers	751thousand	4.282million
teacher training institutions	208	1125

The initial handicap got compounded with high population growth. It has offset the gains of the expansion of the school system. The goal of achieving universal literacy receded faster than the effort put in to catch up with it. After forty years of independence there were more illiterate persons than the total population of the country at the time of independence. According to the census of 1991, out of every 1000 men 641 and out of every 1000 women 392 could read and write [3].

The quantitative expansion of the school system entailed dilution in the quality of education. Sometimes untrained teachers who did not possess the prescribed level of education had to be appointed. The financial constraints and the lack of required resource support at the grassroots level came in the way of providing quality inservice education of teachers. Even after 50 years of independence the colonial legacy of an impersonal school system, marked mainly by its utility as a passport for employment and for upward social mobility, continues as the driving force for running it.

It may be appreciated that the present school system in India is one of the largest in the world. Therefore, introduction of innovations to cover the system uniformly, if not impossible, poses a daunting task. Because of the size of the system and the financial constraints innovations in school education have generally been first tried at pilot scales, with the hope of scaling up them using advanced communication technologies.

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In the following two case studies, one on the introduction of computers in schools and the other on the use of teleconferencing for inservice education of teachers have been described in detail. In both experiments training of the teachers in new skills was crucial to their success.

2. Information and Communication Technologies in School Education

The CLASS Project

The Indian experiment of taking computers to schools involved participation of a large number of institutions for tasks such as supply of hardware and software, development of Computer Assisted Learning (CAL) packages and the training of teachers. This project called the Computer Literacy and Studies in Schools (CLASS) was a joint initiative of the Department of Education, Ministry of Human Resource Development, the Department of Electronics and the National Council of Educational Research and Training (NCERT) .

The CLASS is an ongoing pace-setter programme of the Government of India for introducing computer education in schools. It was started in 1984. The initial objectives of this project were [4]

- **-to provide students with broad understanding of computers and their use;**
- **-to provide "hand-on" experience;**
- **-to familiarise the students with the range of computer applications in all walks of human activity and the computer's potential as a controlling and information processing tool;**
- **-to demystify computers and to develop a degree of ease and familiarity with computers which would be conducive to developing individual creativity in identifying applications relevant to their immediate environment**

In the first year of the project, 250 schools were selected for the pilot phase of the experiment. Each year the Project was expanded by adding new schools to the programme. At the end of 1990, the total number of schools covered under the CLASS Project was 2582.

Each of these schools was given two BBC microcomputers and a software package comprising of computer-assisted learning programs on different school subjects, database, spreadsheet, word processor and LOGO.

The responsibility for the academic planning and the co-ordination of the implementation of the project during the pilot phase of the programme was of the NCERT.

Forty two Resource Centres for the project were located in some of the leading institutions of higher education and technical education. Each Resource Centre was given the responsibility of a cluster of project schools. The tasks entrusted to the Resource Centres were providing initial training to the teachers, maintenance and back-up of hardware, and meeting the continuing academic needs of the teachers.

In 1986 an evaluation of the pilot phase of the project was carried out by the Space Applications Centre (SAC), Ahemdabad. The broad findings were

- **need for greater interaction between the Resource Centres and the project schools;**
- **criteria for selection of teachers for the project activities to be reformulated;**
- **need to reduce time gap between training of teachers, installation of systems and initiation of activities in schools;**
- **content of teacher training and its effectiveness to be reviewed;**
- **adequate "hands-on" experience for teachers to be ensured;**
- **computer literacy to be given a place in the school time table;**
- **need of developing software in regional languages;**
- **students to be given more hands-on experience.**

In 1986, the **National Policy on Education** was announced by the Government of India. The new policy stated that the programme of computer literacy was to be organised on wider scale at the school stage. The Policy also emphasised that in order to avoid structural dualism, modern educational technology must reach out to the most distant areas and the most deprived section of beneficiaries simultaneously with areas of comparative affluence and ready availability [5].

Also, in 1986 the programme objectives and the system specifications were reviewed by an expert group [6]. The experience obtained from the pilot phase of the **CLASS** project became an important input for this task. Some of the findings of the review committee are given in the following paragraphs.

The CLASS Project was recognised as a pioneering experiment for introducing computers in schools. Its potential for developing innovativeness in teachers and students suggested that progressively it should be made an educational computing programme around simulation, interactive learning, computer interfaced laboratory experiments and use of CAL software.

The shortcomings and weaknesses in the programme could be overcome by bringing in changes in implementation strategy and strengthening support arrangements.

As the students and also their teachers faced difficulty in handling software in English, computers selected for schools should have the capability of using regional language software.

Although the teacher is the key to the effective implementation of this programme support given to the teachers by the Resource Centres wanes with time. This was not unexpected if the Resource Centres did not have natural linkage with the school system. Therefore, Resource Centres should be located preferably in teacher education institutions.

The expectation that teachers will supervise the computer literacy activities after the school hours and on holidays was not always fulfilled .

Teachers' feedback was that though the introductory training enabled them to handle the computer, it did not help in integrating its use into pedagogy. Teachers could not handle with confidence computer-based activities in the classroom. The end result was that CAL software remained underutilised and the effort that was put in their development became infructuous.

The Project reached an asymptotic level basically for reasons given above. Therefore, for scaling up the project and for making it an effective tool for teaching-learning a re-engineering of its implementation strategy was required. A revised strategy for the CLASS Project was adopted in 1993-94 [7] . In the revised scheme the schools already covered in the pre-revised scheme were made to continue with the BBC microcomputers. For the new schools, the selected hardware was a PC-AT(386)DX with 4 dumn-terminals, which was to be used with UNIX based application programs. But the revised scheme also has not been able to bring in the desired improvement in the programme or in its scaling up. The reasons for it are not hard to see. Basically, the major flaw in the revised scheme is that it has not taken note of the recent advancements in computer hardware and software. When computers using Pentium processors are available for the price paid for the BBC microcomputers, persistence with the machines that were supplied to schools in eighties is bound to result in lack of interest in the programme. The BBC microcomputers, which even if they are in running conditions today, are out of time when computers with Windows operating system have gained universal acceptability. With the selection of UNIX based computer education the thrust of the programme has shifted more towards computer science from educational computing. To top it all, in the revised scheme training in computers to students is being given by full time instructors hired from outside the school system. Alienation of teachers from the school computer education is now complete.

The singular lesson that we have learnt is that not only the state-of -the-art computers that are available today be provided for the school computer education programme but all the teachers of the school should be helped in developing the competence for using computers for accessing educational resources and their integration in the teaching - learning. Fortunately, Internet offers itself as an effective mode for providing resource support to teachers and learning material to students. Even when access to computers linked to Internet is made available in schools, training of all the teachers for enabling them to make effective use of resources from the cyberspace will be crucial.

For giving new skills to a large number of teachers, instead of depending on experts alone, alternative strategies for large scale training will be required. Recently, the NCERT used satellite based inservice training of teachers using two-way audio and one-way teleconferencing mode. A state-wide classroom

was created for the training of primary school teachers of Karnataka, a State in the Southern India, and the training was given on-line by experts from the studios in New Delhi. As this experiment is a success story of use of a modern information medium for the training of teachers, it is described next.

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Interactive Video Technology: An Alternative Strategy for Inservice Training of Teachers

As an alternative training strategy to the cascade approach interactive video technology has been effectively used in some of the developed countries. In the United States and Israel it has become popular to impart education and training programmes at a distance, through the use of a variety of telecommunication technologies. These technologies offer access to learning opportunities to groups and even to individuals who, because of distance and other life circumstances, cannot take advantage of programmes given through face-to-face approach. The teleconferencing approach to education uses one-way video and two-way interactions via satellite, pre-recorded videotaped instruction, computer systems, cable television, telephones, and radio and television broadcasts.

The NCERT Experiment

The NCERT has the responsibility to facilitate the conduct of training of primary school teachers in the 32 States and Union Territories with over 20 language groups. It decided to make use of interactive video technology on an experimental basis for conducting inservice training [8].

In the NCERT experiment interactive video technology and face-to-face support of facilitators were suitably integrated. The training methodology involved using two-way audio and one-way video interactions for imparting training to a large number of teachers of a single language group by creating a 'state-wide classroom'. The interaction between the teachers and experts was co-ordinated by an anchor person. Teachers undergoing the training used Straight Trunk Dialling (STD) on telephone to ask questions to expert panellists. Their answers were transmitted live from the studio of the Indira Gandhi National Open University (IGNOU), New Delhi, which had an uplink with a transponder on an INSAT satellite operated by the Indian Space Research Organisation (ISRO). This transponder is dedicated to communication and training . The TV Uplink Earth Station basically configured for TV Broadcast Service is ext. C-band. It uses one 6.8m diameter solid antenna, High Power Amplifier (HPA), Up-convector, wideband FM modulator and audio video combiner.

Locale of the Experiment

The State of Karnataka in the Southern India which has 20 revenue districts was chosen for carrying out the experiment as its 20 District Training Institutes (DTIs) had dish-antennas for receiving TV signals directly from satellite transmissions. Each district in Karnataka has a functioning District Institute of Education and Training (DIET) and its faculty were actively involved in conducting training in face-to-face mode. Also, the infrastructure for holding the training was readily available in the DTIs.

Implementation of the Experiment

For the experiment on inservice training using interactive teleconferencing technology the existing training design was suitably changed. Video clippings to be used by experts in their presentations and the activity sheets to be used by the participants were specially prepared. Schedules for monitoring of the training programmes and concurrent evaluation during the period of training were prepared in advance.

The Development & Educational Communication Unit (DECU), Ahmedabad, a constituent unit of ISRO, was one of the collaborating agencies of the experiment. It managed the uplink of signals from the studio of the Indira Gandhi National Open University (IGNOU) and ensured that the signals were

received by all the centres taking part in the experiment. The other major responsibilities of the experiment, such as preparation of training design, production of software, training of facilitators, conduct of evaluation were with the NCERT and were discharged through synergetic involvement of its various constituents - Department of Teacher Education and Extension (DTE&E), Central Institute of Educational Technology (CIET), and the Regional Institute of Education, Mysore.

Pre-Training Activities

(a)Training Curriculum and Training Design

A group of about 20 content and media experts planned the content and process of the programme and provided thirteen training sessions with equal number of activity sessions. Each televised presentation session was linked with an interactive question answer session with the experts.

(b)Software Development

A set of 20 Video clippings of 5-10 minutes duration were produced in advance by recording classroom teaching in actual locations of schools. The clippings were on some concepts generally found difficult to teach. These video clippings were used by experts during live transmissions and were suitably integrated in their lesson plans.

(c) Arrangements for Uplink & Receiving Facilities

The uplink facilities of the IGNOU for the programme transmission were booked from January 7-13, 1996. Twenty District Training Institutes (DTIs) were approached through Administrative Training Institute (ATI), Karnataka State for allowing the use of their receiving facilities. These institutions were used as training centres for the experiment.

(d) Selection of Teachers and Facilitators

The State Department of Education, Government of Karnataka was approached to identify 50 primary school teachers for attending training at each of the 20 training centres.

From the District Institutes of Education in Karnataka 60 faculty members were selected for working as facilitators in the training camps. They were given a 2-day orientation in the context of their role in the interactive video training. They were given information about the agencies to be contacted in case of hardware problem, failure of signal, etc.

Activity sheets for the participants to be used during the training were prepared by groups of teacher educators. These sheets specified group activities related to the concepts planned to be covered in the training. As mentioned, the facilitators were expected to supervise the activity of the participants in pre-telecast and post-telecast sessions. The activity sheets were developed keeping in view the various topics transacted during the seven- day training programme.

Pre-telecast tasks were mainly to tune the teachers to the live transmission that followed. Teachers were asked to go through individually the self-instructional written material on the topic to be covered in that session. The activity sheets for pre-telecast work were common for each of the sessions and enabled the participants to identify the key ideas of the module to be covered by the expert and to prepare questions that they might ask during the teleconferencing. The activity sheets for the post-telecast work were around development of specific competencies attempted by the experts and involved group work for writing of lesson plans, preparation of teaching aids, use of science and mathematics kits etc. The facilitators also assisted the teachers in asking questions from the experts by establishing telephone links and sometimes by sending facsimile (FAX) transmissions. In all 850 teachers and 60 facilitators at 20 district centres participated in the training programme.

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3. Implications of the Experiments

Increasing use of satellite communication and information technology in teaching-learning processes and in inservice education of teachers is becoming a reality. The present pilot project has shown that the use of interactive video technology holds far reaching promise for improving classroom processes and inservice education of teachers specially in the context of developing countries such as India, Pakistan, Bangladesh and Sri Lanka where the number of teachers to be provided recurrent training is very large. It may be added here that once the necessary infrastructures for interactive video technology are set up, the unit training cost using this mode will be favourable in comparison to that of the traditional face-to-face training methodology. In terms of its impact, this alternative strategy can substantially reduce training loss at successive cascades which invariably accompany multiple level training. In addition, the use of interactive video technology is well suited for distance education of remotely located teachers, a situation common in countries like India and Bangladesh. Training is essential for mastering any new skill, whether it is effective use of television in school or using a multimedia programme in a classroom. Experience has shown that teachers after they have been demystified of a new technology can creatively put it to use in improving learning of their pupils. The interactive video technology therefore holds a challenge to countries like India for providing training on common skills to a large group of teachers and for offering learning opportunity in distance education mode.

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During the past decade, there has been a world wide expansion of information in electronic medium. Our experience of 1984 when we introduced computers in schools in India is not relevant today. Computers today instead of being used in isolated stand-alone mode are being increasingly connected with each other through local area networks and global networks. Within a year it is estimated that 50 million users globally will be accessing information on Internet. Information on every conceivable topic of human interest is being put on the Internet by individuals and institutions. With Internet and knowledge-based resource support for K-12 such as CyberLibrary, the world has come into the classrooms of the developed countries. Information on education, specially school education, covering wide spectrum of fields such as early childhood education, lesson plans for teaching of all school subjects at different grade levels, assessment items, tests and tools for educational research, to mention a few, are available on the Internet in an organised and easy to access form.

Accessing and dissemination of educational material is now available globally for near zero cost to all those who want it. However, knowledge of mere existence of information in the World Wide Web will not be enough unless we know how to access it, classify it and process it for solving some problem. The Internet offers itself as an "expert system" which can reduce the dependence on direct training by experts. It is an ideal medium for interactive learning as it allows information to be put up in multimedia format, effective in self-learning. Therefore, a paradigm shift is needed in teaching-learning for making optimal use of educational resources from the Intenet. A crucial ability for taking advantage of the Internet will be learning to learn. The ability of learning to learn can then be used individually for developing the ability of learning to do . This can be acquired by processing information available in the web in solving problems of human interest. In the following paragraphs some recent efforts in creating on the Internet a resource for school education have been given.

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4. Cyber Resource for School Education

It is not surprising that the support for teaching-learning to the school system in which 150 million students study in about 800,000 schools under 4 million teachers has not gone much beyond the availability of the textbooks. As more than 20 regional languages are used as medium of instruction there is a vast diversity of requirements. Teachers' guides and supplementary materials even when

available have not reached the target groups. Inexpensively brought out publications are generally not preferred by booksellers.

The Internet, though today is in an infant state in the developing countries like India, is expected to become, before long, widely accessible. Therefore, Internet offers itself as a serious candidate for sharing with teachers resources like lesson plans, test items, demonstration experiments, etc. It can also be used by them as an inexpensive communication medium for interaction with experts and among themselves. The Intenet is user friendly as it can be accessed at any convenient time and the user can inexpensively copy material, without infringement of copyrights.

Procedure for setting up on the Internet an Electronic Educational Institution is fairly straight forward. What is required is space on a server-computer connected to the Internet. The size of the electronic space required will be determined by the amount of information that is planned to be put up on the server. In addition to text and graphics, information can be in the form of audio and video clippings. Unlike a book which is a physical object and is read by its owner by turning pages after browsing the content and index pages, the "electronic book" cannot be held in one's hands and can be read only through a computer by using software called browsers. This apparent disadvantage is more than offset by the new feature that the same resource can be accessed simultaneously by a vast number of persons from any part of the world or at a time of one's choice, and unlike the restriction of the print medium the material can be in multimedia. More than one hundred million persons from all over the world each day visited the NASA site on the Pathfinder landing on Mars. This experience of global sharing of an information resource is unprecedented. Another advantage is that information on the world wide web is arranged in "three" dimensions instead of two for printed text. It enables the user to "jump" from one location to another location on the same file, to jump to some other file placed in the directory of the same electronic institution , and to information on any of the millions of electronic institutions on the Internet. Accessing of information from Internet resources through search by following directions available on the information superhighway is called navigation or surfing the cyberspace.

How is information prepared in a form suitable for placing on a server on the Internet? The procedure for converting materials produced using standard computer tools such as wordprocessor or authoring system to a form suitable for the Internet, though initially unfamiliar, is straight forward. It is done by converting the information as HTML files. HTML is an acronym for Hyper Text Markup Language (HTML). Facility in HTML is easy to acquire as it is a set of codes which are affixed in a file as tags. What is more challenging than learning HTML is the preparation of material in a self instructional mode using the multimedia features of the computer. This calls for collective involvement of subject experts, teachers, experts in cognition, media experts and information technologists for preparation of information to be made available to the target group from an electronic educational institution on the Internet. A rudimentary exercise carried out by the author to experience different steps required for creation of an electronic educational resource on the Internet can be seen by opening the site whose URL is
http://www.geocities.com/Athens/Parthenon/2686 .

The impact of Internet on the mankind as a global resource of information will be to not only shrink the world in space and time but to democratise the human knowledge.

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5. Summary

Information technology and communication technology in their integrated form such as Internet are expected to play crucial role in enhancing access to educational resources and in improving the quality of learning. Teachers in spite of their academic isolation can update themselves using Internet with the latest learning resource put up by institutions from all over the world. This approach, though intimidating unless experienced first-hand, is extremely user friendly. As of now, in developing countries of Asia access to it might be limited to a few institutions and persons, but considering its cost effectiveness as a learning resource, specially when compared with the cost of expansion of schools and colleges, this technology will gradually be preferred for providing access to resources for developing

new skills and competencies.

Even when access to Intenet has been arranged in schools it may not get fully used unless teachers are trained on how to use such a resource in teaching-learning. This will require inservice training in information technology skills and in new pedagogy, for which the required expertise might not be available at the grassroots. The NCERT's experiment is a pointer that advanced communication technology such as teleconferencing can be used by experts in conducting interactive training at the location of the teachers. Training will have to be arranged periodically to update teachers on changes in the resources and on how to use effectively the support of the Internet for the attainment of curricular objectives.

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