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TIPAN

Transformation and Integration of the Provincial Agricultural Network

Northwest Frontier Province, Pakistan

Office of International Agriculture
University of Illinois at Urbana-Champaign

In collaboration with
Southern Illinois University at Carbondale

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CONSULTANT REPORT - ANTHONY S. KERBER

MICROCOMPUTER INSTRUCTION AND COORDINATION

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the Northwest Frontier Province
Agricultural University
Peshawar, NWFP, Pakistan

and

the U.S. Agency for International Development
Mission to Pakistan

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I. INTRODUCTION

The request for short-term technical assistance for the installation and start up of the microcomputer laboratory at the Northwest Frontier Province Agricultural University was proposed and approved in December, 1985. In addition, a request for someone to serve as a resource person and to instruct the initial microcomputer course offering for the undergraduate students was proposed and approved at approximately the same time.

The computer team arrived 10 February 1986 in order to perform the initial set-up of the microcomputer laboratory. This work continued until 3 March 1986 when the microcomputer laboratory was officially opened. The computer team consisted of Dr. Gary Johnson (computer team leader, UIUC), Zainul Azizan (consultant from Malaysia), Inamul Haq (NWFP AU), and myself.

After the opening of the computer laboratory, Dr. Johnson and Mr. Azizan returned to Champaign-Urbana and Malaysia respectively. Continuing the training sessions and maintaining the computer laboratory became the responsibility of Professor Haq and myself. It was my personal responsibility to serve as a consultant in computer applications for the faculty.

Objective and Scope

The proposed scope of work follows.

1. To aid the TIPAN team for the installation and start-up of microcomputer services at the Northwest Frontier Province Agricultural University at Peshawar, Pakistan in all their tasks.

2. Instruct the initial offering of the undergraduate introduction to microcomputers with the aid of Inamul Haq. This included the planning of the course and the development of the course materials. One of the goals of this was to further the development of Inamul Haq as the primary instructor of the course.

3. Act as a continuing microcomputer consultant for the faculty, research, and administrative staff.

4. Conduct short-term classes in various software programs for the faculty, research and administrative staff.

5. Act as the on-site member of the TIPAN staff concerned with planning the expansion of microcomputer services (both class and nonclass uses) at the Northwest Frontier Province Agricultural University and at outlying agricultural research stations.

6. Oversee the repair and parts procurement for the existing microcomputers during the first nine months of their use.

II. MICROCOMPUTERS AND DISTRIBUTION

Initially, eleven microcomputers and printers were shipped to NWFP AU. Of these eleven, eight microcomputers were placed in the microcomputer laboratory. Two of the remaining three microcomputers are used by the TIPAN team for word processing and database development. One microcomputer is currently located in Room 4 to serve the needs of the University Directors and the Registrar.

Nine of the computers are configured as follows:

- 512 kilobytes of memory
- 1.2 megabyte floppy disk drive
- 20 megabyte hard disk drive
- monochrome monitor
- 80287 math coprocessor

The remaining two computers are configured as above but have enhanced graphic adapter boards installed in them. These boards allow the computers to display graphics.

An additional 38 computers have been purchased and are being shipped to the University. The new computers are Zenith 200's and are fully compatible with the IBM PC AT. These microcomputers will have the following configuration:

- 640 kilobytes of memory
- 1.2 megabyte floppy disk drive
- 360 kilobyte floppy disk drive
- 40 megabyte hard disk drive
- monochrome monitor
- enhanced graphic adapter board
- 80287 math coprocessor

One of the machines will be equipped with a color graphics monitor.

The 38 new computers will be assigned as follows:

Eight will be assigned to the computer laboratory for the purpose of training and instruction.

Six will be placed in the IDS computer laboratory for research use by all University faculty (on-campus and off-campus) with an approved research topic.

Six are to be installed at the research stations.

Two are to be reserved as backup units.

The remaining machines are designated for the offices of the Directors and Deans at the University. A machine should be made available for Professor Haq. He needs time away from the laboratory so he can develop course materials and lectures and also continue his training on the computer.

III. COMPUTER LABORATORY

Equipment

The computer laboratory currently has eight work stations. Each work station is made up of an IBM PC AT computer, an IBM monochrome monitor, a keyboard, and a printer. Four computers have an extra double density disk drive and two computers have IBM Enhanced Graphic Adapters.

Other equipment included in the laboratory are four UPS (un-interruptable power supplies), four 750 watt step down transformers, and four 1000 watt voltage regulators. The UPS systems provides temporary back up power in the event of a power outage. In addition, the UPS systems protect the computers from electrical spikes and noise. The step down transformers are used to provide 110 volt current to the monitors and printers. The voltage regulators provide a constant 220 volts to the UPS systems. Each combination of the UPS system, transformer, and voltage regulator provides power for two work stations.

Also in the laboratory are two cabinets in which the program manuals, floppy diskettes, printer ribbons, and paper are stored.

Computer Supplies

The laboratory has enough floppy diskettes, paper, and printer ribbons to last through the fall semester. At the conclusion of the fall semester, supplies should be re-evaluated to determine if the University should make additional purchases.

As a guideline, the supplies should be ordered with the following usage in mind:

1. A printer will use approximately three ribbons for each semester of use. This amount may vary depending on the amount of use. Ribbons for different printers vary in price. As a guideline ribbons should be purchased at a cost of Rs. 180 - 255 per ribbon.

2. Under normal circumstances, one and a half boxes of paper will be used per printer per semester. This amount may vary depending on usage. Paper prices depend on the weight of a single sheet of paper. A general price guideline for 90 gram, 9" X 11" paper is Rs. 360 - 450 per box of 2000 sheets.

3. A minimum inventory of 200 high density disks and 150 double density disks should be on hand at the beginning of each semester. High density diskettes may range in price from Rs. 68 - 102 each and double density diskettes may range in price from Rs. 34 - 51 each.

The initial supply of diskettes and paper were purchased by TIPAN and shipped from the U.S.. Additional purchases, by TIPAN, were made from Pak Paper in Islamabad. The printer ribbons were purchased from Electronic General Services (EGS) which is also located in Islamabad. However, a new microcomputer supply firm, called System N' Services, has been opened in Peshawar. A price list has been obtained from Pak Paper, EGS and System N' Services. These price lists should be used as a guide to make the optimal purchase. Each firm should be requested to update their price list every one to two months.

For hardware[1] purchases, both EGS and Systems N' Services can supply printers and other computer accessories.

Computer Maintenance

During the month of April, a maintenance contract was signed between EGS and TIPAN. For an annual fee of Rs. 157,000.00, EGS will conduct bi-monthly on-site maintenance checks and will repair any machine that is defective. The annual fee covers eleven microcomputers and printers. As a courtesy, EGS will repair the UPS systems under the same agreement.

I have been very pleased with the service of EGS. They are well qualified and very accommodating. EGS provides not only the actual repair services, but also consults on how to protect the microcomputers from voltage fluctuations, improper wiring, and dust. This is critical to obtain the projected working life of the microcomputers.

It is my recommendation that the University retain EGS as the computer maintenance firm for the microcomputer laboratory. The need for EGS will be even more important when the additional microcomputers arrive. At that time, the University should negotiate a new contract with EGS that includes the new microcomputers.

Dust can be extremely damaging to computer equipment. It is therefore critical that the amount of dust in the microcomputer laboratory be kept at a minimum. In order to achieve this, the following steps should be taken:

- The floor of the laboratory should be swept and mopped daily.

- The computer work stations should be dusted daily.

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[1] Hardware refers to the actual machinery, i.e. CPU unit, printers, monitors, etc.

- Monitor screens should be cleaned with a soft cloth at least once a week.

- The filters in the air conditioning units should be cleaned once a week.

It should be the responsibility of the computer laboratory staff to ensure that these steps are taken.

Another critical factor is the temperature in which the computer operates. The computers should only be operated in a temperature range of 10 - 35° Celsius. If the temperature is not within this range the laboratory should be shut down until the temperature can be established in the required operating range.

Computer Performance

There have been no major equipment problems. The computers have worked flawlessly except for two separate occasions when a power unit failed in one computer and a minor electrical problem in another computer required that they be repaired by EGS in Islamabad. Both computers were returned within three days.

The microcomputers are durable machines. However, the main reason for their good performance is due to the precautions we have taken in the laboratory and the bi-monthly maintenance checks by EGS.

Computer Laboratory Rules

A set of laboratory rules regulating conduct of computer users in the computer laboratory need to be developed. Professor Haq and the laboratory assistants should be given complete authority to enforce those rules. Students and other laboratory users need to be informed that the use of the computers is a privilege that can be revoked.

A computer users privilege should be revoked if his or her actions may result in damage to the equipment or are disruptive to other users.

During periods of heavy computer use, a person should not be allowed to use the computer for more than 45 minutes at a time. After 45 minutes, the person should be requested to let someone else use the computer. Upon waiting 15 minutes, the same person should be eligible to use a computer again. A sign-in procedure should be used in order to determine how long a person has been at the computer.

IV. TRAINING

It was decided in February to postpone the teaching of students from the spring semester to the fall semester. In reflection, this was a wise decision. The postponement not only enabled the training of more faculty members and researchers but it also provided Professor Haq and myself an

opportunity to develop and test the teaching materials that are currently being used for the introductory microcomputer course. So far, 130 participants have received training in the microcomputer laboratory.

Faculty

The training of the faculty was an on-going process for the duration of my appointment at NWFP AU. Two training sessions for the faculty were conducted covering the following topics:

- WordPerfect, a word processing program.
- DOS, the IBM disk operating system.
- Lotus 1-2-3, a spreadsheet, database, and graphics program.
- Systat, a statistical program.
- Knowledgeman, a database program.

The first training session had an initial attendance of 48 participants. As the training session continued, the number of participants who attended regularly dropped to 16. The second training session had a better attendance. Initially, 46 participants signed up to attend the session. At the completion of the second training session, 25 of the participants attended on a regular basis.

It was decided to give the participants of both training sessions a certificate of competency for computer skills. In order to receive the certificate, the participants are required to obtain a passing score on a skills test. The number of participants willing to take the skills test has been a disappointment. Only six have taken the skills test, all of which did passing work and will be receiving certificates.

Plans were made to continue training faculty members through the first semester of 1986-87. However, because of the severe staffing shortage in the microcomputer laboratory, these plans will have to be postponed.

Researchers

There have been two training sessions for the researchers. These training sessions coincided with the ESL classes conducted at NWFP AU. The first session consisted of 17 researchers and the second group consisted of 19 researchers.

The training for the second group of researchers is being coordinated with a research class in which they are required to write a research proposal. Because of this requirement, we have emphasized the use of the word processing program.

M.Sc. Training

The Vice-Chancellor has requested that a training program be offered for the M.Sc students. To honor that request, a training program similar to

the program for the faculty is being conducted. There are 18 M.Sc students attending the session. Another 30 - 40 M.Sc students have requested that they be trained as well.

Future Workshops

Efforts should be made to conduct workshops at the University which utilize the computer laboratory. NWFP AU now has the best microcomputer laboratory in Pakistan. This distinction should be taken advantage of and workshops are a way of doing it.

There are a number of people outside the University who would be interested in a workshop. The National Agricultural Research Center Training Institute has expressed interest and a willingness to help put on a workshop. Peter Hobbs, Wheat Agronomist for CIMMYT, is another interested party.

Suggested topics for the workshops are: Introduction to Microcomputer Applications and Using Microcomputers for Statistical Analysis.

V. COURSE DEVELOPMENT FOR STUDENTS

The Introduction to Microcomputers course began 25 September. The course was offered to third-year students. There are 117 students enrolled in the course. The students are divided into two groups for lectures and five groups for laboratory practicals. For each practical there are approximately 24 students. The ratio of three students to one computer is not ideal by any means. The addition of eight more computers in the laboratory should help to alleviate the problem.

Course Content

The course syllabus appears in Appendix A. The objective of the course is to teach the students how to use the computers to assist their educational process and also to give a basic understanding of how a microcomputer functions.

The course will cover the PC operating system (DOS), word processing, spreadsheet, and statistical programs. An introduction to basic programming is also included. The course is being taught through a 45 minute theory lecture and a one and a half hour practical, in which the students have hands-on experience with the computer.

So far ten lessons have been prepared for the word processing program, seven lessons have been developed for the spreadsheet program, and five lessons have been created for the statistical program. A non-technical DOS booklet has also been prepared and is being used in the course. The database program will not be taught to the students but because of the faculty training, ten lessons have been developed.

The students have been doing very good work with the word processing lessons they have learned. The major difficulty for the students is finding a computer that is not being used. There is a definite need to extend the hours of the computer laboratory. The laboratory should remain open until at least 4:00 p.m.. However, this cannot be done until additional staff have been hired to assist in the computer laboratory.

Future Courses

It is my understanding that no computer related courses have been scheduled for the spring semester. I would advise the development of other computer courses related to agriculture. A good course would be to teach the students programming with an emphasis on agricultural applications. The programming language could be any high level language such as BASIC or PASCAL.

Another suggested topic is statistical analysis using the microcomputer. This course could play a dual role: teach the students statistical concepts and analysis and instruct them how to use the computer to do the analysis.

VI. DATABASE DEVELOPMENT

The databases developed for the NWFP AU are given in Table 1 and those for the resident TIPAN team in Table 2. The development of the databases was a combined effort. Mr. Zainul Azizan was responsible for the development of the Student Admissions and the Student Grades database. The Faculty Personnel Records were developed by Arshad Malik Salim, the Registrar. The remaining databases were my responsibility.

The current status of the databases are such:

- The Student Admissions database is complete. The records need to be reviewed and corrections made where needed.

- The Student Grades database is incomplete. The pertinent information relating to the students' grades needs to be collected and entered.

- The Faculty Personnel Records database is for the most part complete. There are a few records with missing information.

- The Researcher Personnel Records database is awaiting data entry. The database structure has been approved by the Director of Research.

- The Library Catalog database has not been implemented. An alternative database program will most likely be used. This will be discussed later in my report.

- The Participant Training database structure is complete and approved. A survey of all NWFP AU personnel is being conducted to complete the database.

- The Equipment Inventory database is completed and the entry of data is being done as equipment arrives.

- The English Language Class database is complete and is being used by Dr. Waananen to follow the progress of the ESL students.

Table 1. Databases for The Northwest Frontier Province Agricultural University
1. Student Admissions 2. Student Grades 3. Faculty Personnel Records 4. Researcher Personnel Records 5. Library Catalog

Table 2. Databases for The Resident TIPAN Team
1. Participant Training 2. Equipment Inventory 3. English Language Class

Library Catalog Database

A library database was designed for the University library using Knowledgeman. Its purpose was to keep track of literature and the availability of books in the library. The database was not implemented. An alternative database is being considered that will make the NWFP AU library compatible with the library located at the National Agricultural Research Center (NARC). NARC uses a database called INMAGIC Bibliographic Database. This is also the same database that links NARC with an international database. This database allows searches based on keywords, authors, or titles. It will also print out index cards based on subject, author and title.

The computer laboratory at the Agricultural University has the INMAGIC database software. A database should be designed according to the database used by the library at NARC. Professor Haq and I visited with Mr. Niaz Ahmad, Science Officer at NARC, who was in charge of the library database. He expressed a willingness to help Professor Haq design a similar database for the library at NWFP AU. Discussions should be held with the librarian at the University to determine what other information should be stored on the database.

Database Operators

The major databases have been created and the next step is to train University employees how to use the database program. The Knowledgeman program was covered in the second faculty training session. However, further training is needed for those people that will use the databases on a regular basis.

VIII. FUTURE NEEDS AT NWFP AU

Computer Laboratory Staffing

The most pressing need of the computer laboratory is to get additional staffing. Help is needed to continue the training of faculty, researchers, and students. Additional staff will also be needed to extend the operating hours of the laboratory. The University is taking steps to hire additional staff.

After discussions with the Vice-Chancellor, it was agreed that the lecturers for the computer laboratory should have the following qualifications. The lecturers should have a minimum of a M.Sc. in Computer Science. Emphasis should be placed on experience in using microcomputers. A high priority should be placed on those persons with a M.Sc. in Computer Science and a vast knowledge of statistics.

A secondary requirement should be that the applicants for this position should have experience with microcomputers, with special emphasis on such software packages as word processors, electronic spreadsheets, statistical packages, and databases.

The new staff will be involved with computer practicals and will also serve as resource persons for microcomputer applications. In addition, the new staff will be responsible for the day-to-day maintenance of the computer laboratory.

Short-Term Training

In September, three members of the University faculty were sent to the Asian Institute of Technology in Bangkok (AIT) for advanced training in microcomputer applications. They are expected to return to the University at the end of November, 1986. When they return they will be required to help in the operation of the computer laboratory and also serve as resource persons for the University. They should be expected to perform work using the microcomputers on a daily basis.

Short-term training should be a continuing process. New faculty members and researchers should be identified as candidates for training at AIT. In-country training should also be considered. NARC has been conducting workshops on microcomputer applications. Whenever possible, either the computer laboratory staff or a member of the University faculty should be sent to these workshops.

Professor Haq should be considered for advanced training in microcomputer applications. Professor Haq has been in contact with the personnel at NARC and the experience of attending their workshops would be very beneficial to both Professor Haq and the University.

Equipment and Software

The computers are used nearly all of the time available; the computer laboratory is always at full capacity. There is a very serious need for additional computers. This need should be fulfilled upon the arrival of the new Zenith computers. The new computers will double the number of computers in the computer laboratory and will reduce the student to computer ratio. In terms of equipment, the University will be well supplied.

The software currently available at NWFP AU will satisfy most needs. However, each department should start to look for additional software that will better suit their specific needs. The software should be compatible with the IBM PC AT and the Zenith 200's.

I have had a number of requests that compilers for COBOL and FORTRAN be purchased and installed on the computers. I concur with this idea. The computer science curriculum in Pakistan teaches programming in COBOL and FORTRAN as opposed to the U.S. where PASCAL has become the most widely used language to teach programming. The lecturers for the computer laboratory

that are being recruited by the University as well as some of faculty of the University have experience in programming in either COBOL or FORTRAN. This experience should be put to use by purchasing the compilers.

Research Stations

Plans have been made to supply some of the research stations with microcomputers. Room specification guidelines have been developed for the research stations that are to receive microcomputers. These guidelines are found in Appendix B. Before a research station receives a microcomputer, it is very important that the proper environment be available. Only after the room has been prepared should the research station receive its microcomputer.

Some of the researchers have received training on the microcomputers. Further training sessions specifically for the researchers should be conducted. On-site seminars on selected topics would provide additional information and training. A list of potential short-term training candidates should be created. Professor Haq should assist in the selecting of those persons for short-term training.

XI. SUMMARY

The computer laboratory, in my opinion, has been a success. It is the most visible sign to the University faculty and researchers that progress is being made in upgrading the University and that the TIPAN project is effective. Nowhere else in Pakistan can a microcomputer laboratory be found that has the same capability as the laboratory at the Agricultural University. This in itself should be a great source of pride.

The University is fortunate to have such dedicated staff as Professor Haq and Mr. Said Rehman. They have both worked tirelessly and relentlessly to improve their own skills as well as the skills of others. I am confident that upon my departure, the computer laboratory will be left in good hands. The University is also fortunate to have faculty members who are willing to make sacrifices to ensure the smooth operation and effectiveness of the computer laboratory. With this kind of support, the continued success of the computer laboratory will be assured.

There is a matter of great concern. There have been instances where faculty members have been sent by the University to attend workshops and upon completion of the workshop, refused to share their knowledge. It should be a requirement that anyone who attends a workshop must conduct a similar workshop for the University faculty. If they refuse, they should not be considered for any future training of any kind. Their refusal to share their knowledge must be considered as an indication that their biggest concern is for themselves and not the University.

Acknowledgements

My deepest thanks and appreciation go to the TIPAN team members. Their input and friendship has proved to be invaluable. I would also like to thank the wives and families of the TIPAN members who took special care to make me a part of their families. A special thanks go to Dr. E.D. Rodda for his continuous support, advice, and concern for my welfare.

I would like to thank Mr. Maurice Fleming for his help in locating my personal goods and for his efforts in recovering my passport.

Finally, my appreciation is extended to the Agricultural University faculty for their support and Pathan hospitality. A very special thanks goes to Professor Inamul Haq whose kindness and helpfulness made my stay in Pakistan most enjoyable.

APPENDIX A.

Introduction to Microcomputers Course Syllabus

I. Introduction to the computer

- A. Hardware definitions
- B. Software definitions
- C. Explanation of computer processes
- D. Information storage methods

II. IBM PC Disk Operating System (DOS)

- A. Purpose of DOS
- B. Definition of terms
- C. DOS commands

  1. Internal commands

     a. COPY
     b. DIR
     c. ERASE
     d. RENAME
     e. CD\(change directory)
     f. BREAK
     g. TYPE
     h. DATE
     i. TIME
     j. VOL
     k. VER
     l. CLS

  2. External commands

     a. FORMAT
     b. CHKDSK (check disk)
     c. DISKCOPY
     d. LABEL

  3. DOS Editing Keys

     a. Cancel
     b. Backup
     c. Repeat
     d. Break
     e. Echo
     f. Screen Copy
     g. Pause

  4. Directories

III. WordPerfect (Wordprocessing)

A. Centering, bolding, and underlining
B. Printing and saving document
C. Retrieval of documents
D. Deletion and insertion of text
E. Page centering and justification
F. Definition of terms

1. Pitch
2. Tabs
3. Margins
4. Spacing

G. Spelling correction

IV. Lotus 1-2-3 (Spreadsheet)

A. Definition of terms
B. Spreadsheet applications
C. Graphic applications

V. BASIC Programming

A. Programming commands
B. Program development
C. Practical applications

VI. Systat (Statistical Program)

A. Data entry and coding of data
B. Basic statistical analysis
C. Graphic display of data

1. Scatter plot
2. Histogram
3. Stem and leaf plot diagram

D. Correlation
E. Regression and analysis of variance

LIST OF TEXT BOOKS

S.No	Name of Book	Author's Name/Company
1.	The ABC'S of the IBM PC	Joan Lasselle and Carol Ramsay SYBEX
2.	Wordperfect Manual Version 4.1	SSI Software Company 1985
3.	Systat Manual	SYSTAT, Inc. 603 Main Street, Evanston, IL60202
4.	Lotus 1-2-3	Lotus Company
5.	PC-DOS Introduction to High-Performance Computing	Peter Norton Charles Press Publishers

RECOMMENDED TEXT BOOKS

S.No	Name of Book	Author's Name/Company
1.	Business Graphics for the IBM PC	Nelson Ford SYBEX
2.	Basic Exercises for the IBM Personal Computer	J.P Lamoitier SYBEX
3.	Useful Basic Programs for the IBM PC	Stanley R. Trost SYBEX
4.	PC DOS User's Guide	Chris De Voney Que Corporation
5.	MS-DOS and PC-DOS on the IBM PC	Microtrend Inc. & Charles Jackson Prentice Hall
6.	Disk Operating System Manual Version 3.00	IBM Software for IBM Personal Computers
7.	The IBM Personal Computer Made Easy	Robert M. Rinder Monarch Press
8.	Data bases	Peter Laurie Chapman & Hall
9.	Personal Computer Buyer's Guide	Dennis J. Grimes and Brian W. Kelly Bailinger Publisher

APPENDIX B.

Computer Room Specifications for Research Stations

1. The computer room should be clean and dust proof. Dust and smoke particles can damage the hard disk drives and spoil floppy disks. A dust and smoke free environment is an absolute necessity. In order to maintain the cleanliness of the computer room the following steps are recommended:

   a) Vinyl flooring should be used and cleaned on a daily basis.

   b) Computer equipment should be dusted daily with a soft clean cloth.

   c) Windows (if any) should be sealed to avoid entry of dust and should be cleaned each week.

   d) The entry to the computer room should be fitted with a type of door that when closed will provide a seal against dust.

   e) Foot mats and wire scrapers should be placed immediately outside the door so that shoes may be cleaned before entering the room.

   f) No smoking should be allowed in the computer room. No smoking posters should be displayed.

   g) No food and drink should be allowed in the computer room. Posters prohibiting eating and drinking should be displayed.

2. The computer room should have a reverse cycle AC unit to maintain the temperature between 15 and 30 degrees centigrade and the relative humidity between 20 and 80% throughout the year during the working hours.

   a) The air conditioning units should have the filters cleaned each week.

   b) The air conditioning units should be operated on a circuit other than the circuit the computers utilize.

3. The electrical supply must be stabilized and should not exceed 220 volts. In addition, the wiring system must be grounded. The equipment should only use electrical cords with grounded plugs.

4. The computer must be placed in the room so that it is not in direct sunlight.

5. Software received with the computers should be stored in a clean dry area, away from any electrical or magnetic devices.

6. Fire extinguishes rated for electrical fires should be placed and kept in the room at all times.