



# CURRICULUM GUIDE FOR ICT EDUCATION



**FOR PRIMARY SCHOOLS**

COMPUTER CURRICULUM COUNCIL

THE CENTER FOR EDUCATIONAL PLANNING AND RESEARCH

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Today, the learner (student) is not in an isolated desert, looking for a pond of knowledge. He is floating in an ocean of information. The teacher must modify the meaning of his occupation inside himself. Teachers are not the source of information and the pond of water in desert anymore; rather they are also passengers in the students' boat that must help them to sort information and compose meaning from them.

Dr. Victor Ordenz – UNECSO Conference 1998

We tell children to go to school to get ready for the future, but what will happen if our viewpoint of future is not correct? Do you think the future is more or less a continuation of present? If you think so, then there is nothing more dangerous and more wrong than this thought.

Dr. Victor Ordenz – Melbourne 1998

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# **IN THE NAME OF GOD**

## **INTRODUCTION**

We live in an era, where on one hand, the science and information are developing explosively and on the other hand, access to information, information flow and communication has traveled over the boundaries and the limitations of the past.

We are now able to receive and send information efficiently, using new technology tools, which are mostly computer and Internet, and to exchange our information, ideas and experiences with others using communication facilities.

There are indications that in the near future, citizens can perform many of their daily works, such as paying utility bills, buying groceries, travel and hotel reservations, newspapers and magazines subscription, participating in conferences, mailing letters, and tens and hundreds of other works, all alone and from home.

Surely, the ability to perform these things will become a necessity and mandatory in our life and those who are not able to do these activities will face many problems, and will be counted as illiterates even though they have the ability to read and write. Therefore, one can claim that employing modern tools to exploit information and the ability to communicate is a necessary skill for the present and future life of any citizens in a country.

The notion of computer literacy, which is one of the modern literacy, becomes meaningful here. Several developed and developing countries have paid a lot of attention to computer literacy and the ability to use computer and information and communication technologies (ICT) and right now, ICT learning development has become one of the major worries of these countries. Surely, we cannot be inattentive to these changes and cannot expect a bright future without its supervision and management.

The Organization Of Research And Educational Planning and its dependencies bureaus, especially The Administrator For Compiling Educational Text Books, as the custodians of planning affairs for education, certainly have fundamental and pivotal roles in developing computer literacy and education, because education in Iran is based on developments, which are composed and planned in this organization. Hence, The Administrator For Compiling Educational Text Books made the first effort to prepare an educational planning guidebook for teaching computers at different levels of education. It should be mentioned that schools, which have enough resources and volunteer to implement ICT, could use this guidebook.

## **INTRODUCING THE ICT CURRICULUM GUIDE**

Teaching ICT is a necessity but we must think carefully about the following points:

1. What objectives are considered for students in different educational periods, and to achieve these goals what content should be taught?
2. What method(s) is (are) available for teaching ICT and which method should be chosen.
3. Which equipments should be used for teaching.
4. Which qualifications, knowledge and skills teachers should have in order to achieve a desirable education.
5. How to assess students learning and which standards are available for this matter?

6. Are we going to issue certificates for ICT? In other words, can we give certificates the same way as giving certificates for different educational period?

This guide has been prepared to answer the above-mentioned questions.

It should be mentioned that in preparing this guidebook, experiences of different countries such as Thailand, England, European Union, and also European Computer Driving License (ECDL) in teaching ICT have been considered. After necessary discussions, the ICT Educational Planning decided to prepare this guidebook in three levels for administrators: primary school level, middle school level, and high school level. Thereby, at the first step, the guidebook for the primary school level was prepared, so after getting feedbacks from experts and modifying it, the guidebook for higher levels will be prepared.

In this program, teaching computer was assumed as prerequisites for teaching ICT and the content is prepared in three levels.

Assessment of students is being done based on the content of all three levels and the certificate will be issued if the required grade is meet.

## **GOALS OF ICT IN EDUCATION**

According to the goals related to ICT, approved by the High Council of the Ministry of Education<sup>1</sup>, goals of teaching ICT are as follows:

- To find out the value of information if life,
- To find out the value of communication in life,
- To acquire basic skills for living in today's and future society,
- To foster mentality for study and research,
- To acquire the ability to use new communication technology tools and equipments,

According to the above-mentioned goals, it is expected that students be able to acquire the following knowledge, skills, and attitudes before the end of high school phase:

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<sup>1</sup> The goals of the High Council of the Ministry of Education for:

Primary school level: for all students

- To be aware of value of information and informing others in life
- To acquire the basic skills for living in society

Middle school level: for all students

- To be able to get information from the media
- To know the correct way of studying and
- To know his / her community and occupations within that community and to have necessary skills to live in that community
- To be aware of applications of science in improving methods of doing different jobs

High school level: for all students

- To know the value of correct and broad-spectrum information and to have skills of using new communication tools
- To have necessary skills for living and working in community and studying at higher levels
- To employ suitable technology, having believes in the effect of science to carry out the jobs properly.

## **Knowledge Area**

- 1- To get familiar with the concepts of information and communication technology
- 2- To get familiar with ICT software
- 3- To understand the role of information and communication, now and then
- 4- To understand his / her role in using and producing information
- 5- To get familiar with computer and its parts
- 6- To understand the importance of peoples' rights in ICT
- 7- To know ways of protecting computer systems and information
- 8- To know the health and moral issues when working with computers
- 9- To get familiar with Internet and its useful networks

## **Skills Area**

- 1- To be able to use needed software in ICT
- 2- To be able to acquire needed information using ICT
- 3- To be able to communicate with others using ICT
- 4- To be able to search and research using ICT equipments
- 5- To be able to use software in Learning other subjects
- 6- To be able to choose, classify, and analyze information
- 7- To be able to choose suitable educational websites and software
- 8- To be able to protect equipments, information and personal health and safety
- 9- To be to able to use suitable websites with respect to their level of education

## **Attitude Area**

- 1- To foster self-study and research mentality in oneself
- 2- To observe the laws when using software
- 3- To appreciate the safeguard and protection of information
- 4- To foster the mentality of contribution and experience-transfer
- 5- To observe the health issues when using computers
- 6- To understand the importance of generating thoughts in ICT
- 7- To observe the security issues when using computers

## **GOALS OF ICT FOR PRIMARY PHASE**

According to the goals of ICT education in three areas of knowledge, skill and attitude, for the graduates of educational system, the goals of teaching ICT for the primary phase in the above-mentioned three areas are as follows:

### **Knowledge Area**

- 1- To get familiar with computer and its hardware
- 2- To get familiar with the concepts of personal safety in connection with computer sets and its maintenance
- 3- To get familiar with operating systems at the level of users
- 4- To get familiar with some application programs
- 5- To get familiar with Internet network and some of its features

### **Skills Area**

- 1- To acquire the ability to work with computer and its peripheral devices
- 2- To acquire the basic ability to work in operating system environment
- 3- To acquire the ability to work with some of the application programs
- 4- To observe the safety principles of information
- 5- To observe the health principles when working with computer
- 6- To acquire the ability to work in groups with computers

### **Attitude Area**

- 1- To foster the sense of curiosity, sense of innovation and self-study attitude in students
- 2- To strengthen the attitude of working in groups and contribution in activities
- 3- To feel responsible for his / her own health and safeguarding equipments

**TABLE OF OBJECTIVES AND TOPICS OF INFORMATION AND COMMUNICATION TECHNOLOGY IN PRIMARY SCHOOLS**

<b>Area</b>	<b>Objectives</b>	<b>Subjects</b>	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>
Knowledge	1- to know hardware parts of computer <sup>⊗</sup>	-Input Devices: Keyboard Mouse Microphone - Output Devices: Monitor Printer Speaker - Peripheral Memory: Compact Disk Floppy Disk Hard Disk - Primary Memory - Processor	* *  *   *  *  *  *  *	  *  *  *  *  *  *	             *  *
	2- to get familiar with basic terminologies <sup>⊗</sup>	- Drive - File - Folder -Save - Copy - Enter - Hardware - Software - Windows ...	     *     *  *	*  *  *  *  *  *	*             *
	3- to know different keys in keyboard <sup>⊗</sup>	- Alphabetic Keys - Numeric Keys - Calculator Keys - Arrow Keys - Special Keys	* * * * *		

<sup>⊗</sup> According to the suggested methods of assessment of learning, it is not expected from students to know definition of these concepts and it suffices that they only become familiar with these concepts

Area	Objectives	Subjects	Level 1	Level 2	Level 3
<b>Knowledge</b>	4- to know main parts of Windows operating system	<ul style="list-style-type: none"> <li>- Desktop</li> <li>- Icons</li> <li>- My Computer</li> <li>- My Document</li> <li>- Recycle Bin</li> <li>- Start</li> <li>- Restart</li> <li>- Shut Down</li> <li>- Program</li> <li>- Date Settings</li> <li>- Time Settings</li> <li>- Background Settings of desktop</li> <li>- Accessory Programs</li> </ul>	* *	*	* * * * * * * *
	5- to know computer viruses	<ul style="list-style-type: none"> <li>- Virus</li> <li>- Virus Transfer From Diskette</li> <li>- Protection Against Viruses</li> </ul>		* * *	* * *
	6- to get familiar with health and safety issues when using computers	<ul style="list-style-type: none"> <li>- Distance Between Eyes And Monitor</li> <li>- Continuous Duration to Use Computers</li> <li>- Height of Computer Desk</li> <li>- Height of Chair</li> <li>- The Correct Way of Sitting When Using Computers</li> </ul>	* * * * *		
	7- to get familiar with the Internet network	<ul style="list-style-type: none"> <li>- Information</li> <li>- Communication</li> <li>- Network</li> <li>- Internet</li> </ul>			* * * *
	8- to get familiar with properties of Internet	<ul style="list-style-type: none"> <li>- E-mail</li> <li>- Chat</li> <li>- Search</li> </ul>			* * *
	9- to get familiar with the national network of Iranian schools	<ul style="list-style-type: none"> <li>- Introducing the goals and the contents of the national network of Iranian schools</li> </ul>			*
	10- to get familiar with the copyright	<ul style="list-style-type: none"> <li>- Copyright Laws</li> </ul>			*

Area	Objectives	Subjects	Level 1	Level 2	Level 3
<b>SKILLS</b>	1- to be able to turn the computer on / off	- Power On - Power Off: - Shut Down - Restart - Standby - Reset - Ctrl + Alt + Delete	*		
	2- to be able to use mouse	- Moving Mouse - Left Click - Right Click - Interactive Frame of Right Click - Double Click - Scroll - Drag & Drop	*	*	*
	3- to be able to use keys in keyboard	- Using: Alphabetic Keys Numeric Keys Calculator Keys Arrow Keys Special Keys	*		
	4- to acquire the ability to work with main components of Windows operating system	- Opening Icons - Drag and Drop Icons - Finding Path in My Computer - Time and Date Settings of System - Changing the Background of Desktop	*	*	*
	5- to acquire the ability to use auxiliary programs in Windows environment	- Executing: - Calculator Program - Paint Program - WordPad Program - Sound Recorder Program - Windows Media Player Program	*	*	*

Area	Objectives	Subjects	Level 1	Level 2	Level 3
<b>SKILLS</b>	6- to acquire the ability to work with windows	<ul style="list-style-type: none"> <li>- Opening / Closing a Window</li> <li>- Opening / Closing Windows</li> <li>- Moving a Window</li> <li>- Moving Windows</li> <li>- Changing Size of a Window</li> <li>- Changing Size of Windows</li> <li>- Reducing / Enlarging a Window</li> <li>- Reducing / Enlarging Windows</li> </ul>	*  *  *	*  *  *	
	7- to acquire the ability to work with folders	<ul style="list-style-type: none"> <li>- New</li> <li>- Open</li> <li>- Rename</li> <li>- Delete</li> <li>- Copy - Paste</li> <li>- Cut - Paste</li> </ul>		* * *	* * *
	8- to acquire the ability to work with files	<ul style="list-style-type: none"> <li>- Create a new Text or Graphic File</li> <li>- Open</li> <li>- Rename</li> <li>- Delete</li> <li>- Copy - Paste</li> <li>- Cut - Paste</li> <li>- Save: In a Folder On a Disk</li> <li>- Print</li> </ul>		* * *  *  *	* * *
	9- to acquire the ability to draw in Paint environment	<ul style="list-style-type: none"> <li>- Draw Lines and Shapes</li> <li>- Erase</li> <li>- Color</li> <li>- Enlarge</li> <li>- Save</li> <li>- Restore</li> <li>- Print</li> </ul>	* * * *	*  *	*   *

Area	Objectives	Subjects	Level 1	Level 2	Level 3
<b>SKILLS</b>	10- to acquire the ability to type a simple text into WordPad	<ul style="list-style-type: none"> <li>- Typing Texts</li> <li>- Editing Texts</li> <li>- Page Layout</li> <li>- Save</li> <li>- Restore</li> <li>- Print</li> </ul>	*	<ul style="list-style-type: none"> <li>*</li> <li>*</li> <li>*</li> <li>*</li> </ul>	*
	11- to have the ability to use floppy disks or CDs that are already installed or are auto run.	<ul style="list-style-type: none"> <li>- Educational</li> <li>- Games</li> <li>- Audio</li> <li>- Visual</li> </ul>		<ul style="list-style-type: none"> <li>*</li> <li>*</li> <li>*</li> <li>*</li> </ul>	
	12- to acquire the ability to send and receive electronic mails	<ul style="list-style-type: none"> <li>- Entering One of The Persian E-Mails by Entering National Network of Iranian Schools (Roshd Network) or one of the other Persian networks</li> <li>- Registering For an E-Mail With The Help of Teacher</li> <li>- Entering Personal E-Mail Account</li> <li>- Reading Received E-Mails</li> <li>- Typing And Sending</li> <li>- Saving E-Mails</li> </ul>			<ul style="list-style-type: none"> <li>*</li> <li>*</li> <li>*</li> <li>*</li> <li>*</li> </ul>
	13- to acquire the ability to chat in National Network of Iranian Schools	<ul style="list-style-type: none"> <li>- Chat in National Network of Iranian Schools</li> </ul>			*
	14- to acquire the ability to chat	<ul style="list-style-type: none"> <li>- Chat In National Network of Iranian Schools</li> </ul>			*

## **ATTITUDE AREA**

### **Goals:**

- 1- To have students' positive attitude regarding computer learning
- 2- To have students' positive attitude regarding computer as a technology tool
- 3- To foster the sense of curiosity, sense of invention and innovation in students
- 4- To foster the attitude of self-learning in students
- 5- To foster the sense of responsibility in students regarding the maintenance of computer equipments
- 6- To foster the sense of responsibility in students regarding the health issues
- 7- To respect the copyright law
- 8- To motivate student to interact with his / her friends and teachers regarding courses and practical projects
- 9- To foster the attitude of group work and partnership in student using the communication potentials of ICT

## **TEACHING-LEARNING PROCESS IN ICT**

Using ICT in education is based on a simple idea, which says that most learning activities are kind of information processes<sup>1</sup>. Listening, speaking, reading, writing, evaluating, analyzing, solving math problems, memorizing words, memorizing poems, and memorizing Quran verses are examples of mental information processing. Information processing is only one aspect of learning process; the other aspect is the creation and production of new knowledge in the process of teaching- learning. In any case, a major part of learning process is information processing, which until now was mostly performed mentally, using tools such as pencils, papers, chucks, and blackboards. But, right now, modern tools, like computers, can help us to experience advance methods and education. Actually, using ICT in the process of teaching-learning is not independent of other courses and methods for information processing. Therefore, ICT should not be considered as a special and separate course in primary schools . ICT should be considered as an interdisciplinary and cross-curriculum subject. There are different methods for teaching ICT. These methods constitute a wide spectrum, with one end being ICT education (directly) using ICT tools, and the other end being ICT education (indirectly) through teaching of other courses. Of course, each one of these methods has advantages that should be selected according to the goals of education; for instance, in teaching typing, one can teach that while asking students to type a text so as to improve their pace and accuracy. Moreover, the teacher can ask students to type their project report. In this way, without direct teaching, the student has been forced to learn some basic commands; as a result learning how to type and edit a text. Hence, in addition of typing the report, the student improves his skills. Therefore, it is claimed that one of the best methods for ICT education is the project-oriented teaching-learning method. In this way, students and teachers gain skills using computers and software, and learn it in practice. Also, as it was mentioned before, some of the concepts and elements should be taught before making project.

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<sup>1</sup> Information for Primary Education, UNESCO, ITE, 2000.

## **SUGGESTED METHODS FOR IMPLEMENTING ICT TEACHING**

**First Method:** in this method, the computer teacher gives lectures during over- time, according to the predefined course outlines. For students' practical activities, teacher, with coordination with teachers of other subjects, defines the program of study and guides students in practicing them.

**Second Method:** in this method, some specific hours will be assigned for ICT course in every week. During this time, the computer teacher is in computer room and the teacher and students of any other classes go to the computer room. In this case, for practicing suggested activities, the teacher of the subject gives guidelines for contents and the computer teacher tells students how to execute them. (During the first few sessions, the computer teacher will teach the basic concepts and simple practices.)

- ⊗ For the case of students in one group but with different levels, the teacher of that group will define different activities appropriate for the levels of students, and the computer teacher gives needed guidelines to each group in the computer room.
- ⊗ School principals can give promotions to the teachers according to their level of use of computers, and also mention that in the teachers' assessment forms.

## **NECESSARY EQUIPMENTS FOR ICT EDUCATION**

ICT education is dependent intensively on equipments. The necessary equipments for this matter are as follows:

### **1- EDUCATIONAL MATERIALS**

Since educational materials can contribute significantly in developing educational goals and also have important roles in better understandings for learner, they must be taken into special considerations.

Basically, for teaching any subject matter, in addition to equipments and manpower, there are also needs for special educational materials. These materials for ICT education are as follows:

#### **A- Books**

One of the educational materials, which has great importance in most countries of the world, is book. Books can come as kits containing textbooks, instructor's books, student's work and practice books, and assessment books.

In the process of book preparation, it is important to consider facts such as elements of psychology, editing, page layouts, and graphics for every educational period (i.e. primary school, middle school, and high school); especially to get the attention of primary school students, one can use more attractive and colorful pictures.

In ICT education, in order to maintain updated information and latest scientific developments, we believe that the maximum lifetime of a book should be considered 3 years.

Books can be written or prepared in different ways and then provided to the learners and teachers:

- 1- A book is exclusively prepared and is used by learners nationwide (the current situation of text books in Iran). In this case, obviously, learners and teachers don't have any options choosing the books.
- 2- More than one book is prepared (compiled), and then every district or school can choose its own book. In this case (i.e. multiple books), in addition to the possibility of selection for teachers and learners, other experts can contribute to the writings as well. Furthermore, private publishers can also publish the books. This can create some competitions among private companies, and can yield better books with better contents.
- 3- Instead of writing books, only the topics are provided to the teachers and then, they can find the right book from the existing books in the market.
- 4- The textbooks can be written as self-learning books, so the learners can follow the tutoring step by step.

## B- Educational Compact Disks

Since Compact Disks (CDs) came to the market, computers became more resourceful. Now, CDs in many different areas, from music and films to application software and games, have created attractions for computers.

In recent years, CDs are widely used in all areas of education, from mathematics education to foreign language education and from painting education to tailoring education. Furnishing schools with computers but without using educational CDs is a non-optimal utilization of this equipment. Educational CD producers in Iran have shown that they have strong production ability in this media provided that their intellectual productions are supported. Therefore, along with equipping schools with computers, ordering and purchasing educational CDs must also be considered. Vast market for schools can bring lucrative profit for producers of educational CDs to create motives in them.

It is worth noting that game CDs are distributed nationwide and children and adolescences have easy access to them. It is important to think about game CDs and whether students should be permitted to bring them to schools. Many people, who are involved with education and ICT, believe that using game CDs is a mistreatment of computers and consider computer games as time wasting. On the other hand, some people believe that game CDs can be effective in improving children and adolescences' skills in ICT, especially games that contain some kind of educations about ICT and computer, provided that it doesn't become a habit for them. With this condition in mind, some game CDs can be selected and recommended to schools.

## C- Educational Films

Educational films are another important educational material for learners and even teachers. Films can be produced as supporting educational films, or even as instructors' teaching guide films.

## 2- HARDWARES

Computers and different generations are developing so rapidly that daily reports are made public about enhancement of speed of information processing, increase of memories, and quality of computers. This pace of development creates some difficulties about making decision for equipping schools with computers. The situation is such that even making decisions about purchasing several computers can be considered as a decision process, which can be changed. On the other hand, the idea that elementary school kids need lower version of computers as compared to the high school students, cannot be right. In fact, due to the attractions and features of more powerful computers and the possibility of interactions, elementary school students must work with more advanced computers. In contrast, teaching special programs, such as Office, Visual Basic, Q-Basic to the high school students, doesn't need computers with high potentials.

The other important issue in buying computers is the prices. Usually, latest computer models have a high market price for about a year until the prices become steady. After that, the prices of these computers decline until they get gradually out of the market.

Taking the above points into consideration, it is suggested that at least the following hardware equipments be purchased for elementary schools:

1. Pentium II computers (if possible, Pentium III computers or more advanced models)
2. 20 to 40 GB Hard disks
3. 14" (or higher) color monitors
4. Keyboards
5. Mouse
6. 6. CD drive
7. Floppy drive
8. At least 64MB of RAM
9. Multimedia (if possible)

If it is possible, a 6L-laser printer or 1100, or ink-jet printers should be bought. If they want to use the Internet or the Intranet, it is necessary to have modem and telephone line.

The number of computers depends on the budget and the plan for equipping schools. It is suggested, at this moment, that regarding the number of students, every school to be equipped with 5 to 11 computer sets.

## **TEACHERS' PROFESSIONAL QUALIFICATION RELATED TO ICT**

Nowadays, looking at the role of teachers as a knowledge transferee and as a source that knows the answer to everything has been drastically changed. Socio- and econo-technological changes and new educational approaches have affected the role of teachers to some extent. In the new perspective, teachers are facilitators in learning process and in the teaching process acts as one of the – and not the only major- elements.

Perhaps, ICT development had the most important effect on the change of teachers' role, because these developments have given the public, among them teachers and students, easy access to information sources and hence, a vast amount of information be accessible everywhere, especially in homes, using ICT tools. In this atmosphere, the role of teachers as learning facilitator, is not only not faded but also they must assume more effective responsibilities. This requires some teachers' knowledge and abilities and their positive thinking about ICT tools, especially computers. Teachers must not only have some knowledge about computers and how to use it, but also they must be able to use this tool effectively in students' education. With this way of looking at teachers, one can say that teacher is someone, who knows learning and its methods, and is not only a source of information for students, but also (s)he can teach how to look for knowledge and how to use sources.

As it was mentioned in the introduction of this guide, ICT education for the future generation is so important that many countries have started teaching it from primary schools. We also cannot be indifferent to this reality and doing nothing about it. On the other hand, despite the important role of teachers in ICT education, it is obvious that most teachers, especially primary school teachers, were not grown or did not have any education in an environment, where ICT exists or is taught. Most teachers even refuse to touch computers, and are not psychologically prepared to work with computers. The experience of the writers of this guide shows that most of the lecturers of the teachers' training centers also lack skills to work with computers.

Therefore, it is clear that if we want to start the ICT education from primary schools, we must define certain qualifications and abilities for the teachers and must provide them educations as well. In fact, all people in charge must make every effort to create an atmosphere, where teachers get familiar with computer as a tool and learn its potentials as a learning environment.

Teachers' education must be considered from different point of view. Moreover, the current situation and the large number of teachers in primary schools force us to choose different options for entering ICT into public education. In fact, these options are answers to the following questions:

- 1- Who will be in charge of ICT education?
- 2- What are the teachers' educational needs and in what level?
- 3- What methods should be used for teachers' training?
- 4- What methods should be employed to encourage teachers to participate in ICT courses?
- 5- Which institution or organization is in charge of teachers' training?
- 6- Should teachers receive certificates for computer trainings? How?

## **1- WHICH GROUP OF TEACHERS WILL PARTICIPATE IN TEACHING ICT?**

ICT education in schools faces challenges. These challenges are due to the lack of teachers' skills in using ICT tools, especially computers. Right now most of the middle and higher-class parents, in big and small cities, believe that buying a computer for their home is a necessity. Although their ability to use computers is not based on specific objectives and every one of them has learned how to use computers according to the options and suggestions offered to them, but ICT education in primary schools using computers, and based on the aims of this guide, requires schoolteachers to have proper educations. But, because educating all teachers is not feasible in a limited time, therefore, this might be done in three consecutive steps:

**First step-** Educating enough number of lecturers for the capital of provinces (period of training lecturers)

**Second step-** Selecting one of the interested teachers from every primary school for receiving education. Moreover, educating interested school principals in all primary schools (school selection).

**Third step-** Extending education to all teachers and school principals through following methods (general education):

- a) Lecturers;
- b) Collogues and already educated teachers;
- c) Students; that is, education of teachers by strong students;
- d) Self-learning packages (CD and books).

## **2- WHAT IS THE TEACHERS' EDUCATIONAL NEEDS AND IN WHAT LEVEL?**

Regarding the goals of ICT education and its applications in educations, and for the sake of improvement of students' ability for today's and future's living, we can define the needs of primary-school teachers in three levels: acquiring general abilities, semi proficiency abilities, and full proficiency abilities.

### **A- General Abilities**

- Acquiring the necessary awareness about importance of ICT in today's world and the role of new technologies in communications, knowledge development, trade, business, every day's life, cultural exchanges, etc.
- Acquiring necessary knowledge about computers, operating systems, application programs, and computer potentials in educations.
- Acquiring necessary skills to use Windows operating system and its various programs and the skills to use one application program and their various potential.
- Fostering the positive thinking about using computers in educations.

To achieve the objectives of teachers' common potentials in the three mentioned steps, the coordination and cooperation of all units and internal and external organizations in the ministry of education is necessary, in order to organize classes and courses, purchasing required equipments, and giving necessary facilities to principles and teachers for buying computers.

## B- Semi Proficiency Abilities

Regarding individual differences between teachers and principles and students' level of knowledge and skills, there can be more advanced trainings under the name of semi-proficiency trainings for using ICT. In these courses, teachers and principles acquire the following objectives:

- Acquiring necessary knowledge about using computers in education.
- Familiarity with some of the software for educational planning.
- Familiarity with application software.
- Strengthening the positive thinking about using computers and application programs in educations.
- . Familiarity with the concepts of networks, information highways, Internet, web, electronic libraries, electronic mail, news groups, how to search Internet, chat, ...
- Acquiring skills to use application programs for preparing lesson plan and representing it.
- The ability to communicate with related groups in the world (e.g. the society of science teachers, the society of math teachers).
- The ability to exchange information through Internet and its potentials.
- The ability to use Internet for improving skills and knowledge.

In semi-proficiency courses, teachers and principles get familiar with PowerPoint, and find the skills of how to use these programs in lesson planning. They also can guide students in preparing their projects using computers. In these courses, teachers and principles get familiar with Internet and some of its potentials.

## C-Full Proficiency Abilities

After the first and second courses and developing ICT education in schools, it is essential to take proficiency courses about using computers in education. Teachers and managers will acquire the following skills in these courses:

- Acquiring proficiency on various educational software.
- Ability to work with spread sheets.
- Ability to work with application program for managing Data Base.
- Educational managing using computer.
- Using educational CDs in education.
- Designing plans and delivering courses using software and CDs.

### **3- WHAT METHODS SHOULD BE EMPLOYED TO TRAIN TEACHERS**

Because of the huge number of teachers and the necessity of using modern methods for teachers' training, we have to employ different methods and tools to train teachers. Using technology makes this to be done easier and therefore more teachers can be trained.

#### **A- Distance Learning**

Distance learning, due to its less need to learning facilities and lecturers and also the possibility of self-study for teachers, is one of the desired methods in ICT education. Moreover, the large number of teachers and lack of possibility for training them in-class are two other reasons for distance learning in ICT education.

Furthermore, in distance learning one can get a better advantage of ICT tools and can practically make teachers familiar with ICT products in education. For this kind education, one can produce short educational films and broadcast it from television. These films can also be copied on videotapes and distributed to districts, so in this way, teachers can use them in special centers or at home. Educational CDs, Internet and Intranet can also be considered as ICT tools in education.

In long term, virtual training centers or virtual universities, not only can be used for teaching ICT to teachers but also other necessary teachers' trainings can be performed through these centers.

#### **B- In-Class Learning**

Although, using distance learning for teaching ICT to teachers has many advantages, but no one can ignore the importance and effects of in-class learning. Lecturers can be educated by expert professors in-class for provinces, and for educating teachers, we can use trained lecturers in learning centers of provinces. In these cases, certificates must be issued to qualified lecturers, who can prove their teaching abilities.

### **4- HOW TO ENCOURAGE TEACHERS TO PARTICIPATE IN IN-SERVICE ICT PROGRAMS**

Experiences of other countries show that the policy of encouragement for teachers to participate in ICT or computer-learning courses is effective<sup>2</sup>. In general, teachers do not sense the importance of using computers for teaching concepts, which they have taught without using any specific tools for many years. Still, they might find learning computers difficult or even useless. Thereby, teachers may not assume any obligations in teaching ICT to students or using computers in designing courses. Of course there would be resistance for any new program that can fade teachers' motivations to participate in computer courses. Hence, the following promoting policies are some of the efforts, which can be employed to create some motivations in teachers to participate in courses using computers in education:

- Issuing certificate for computer course.
- Preparing In-service training courses.
- Giving promotions to teachers, who have obtained specialized certificate.

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<sup>2</sup> For example, we can mention the policy of encouragement of the government of Malaysia or that of the government of the United States in financing, assisting to buy computers or giving computers away.

- Facilitating the purchase of computers for teachers, who have obtained the general certificate of computer courses.
- Awarding computer to teachers, who use them for their lecture design and guide the course projects to the use of computers.

## **5-WHICH ORGANIZATION, IN MINISTRY OF EDUCATION, SHOULD BE RESPONSIBLE FOR TRAINING ELEMENTARY-SCHOOL TEACHERS?**

The necessity of acquiring skills in using computers, which is presumably a relatively new tool in this century, requires the cooperation of all organizations in the area of education. Hence, from the managerial point of view, there must be comprehensive and accurate planning in order to achieve desired goals. In this regard, the Organization for Research and Educational Planning, as the administrator for compiling text-books, must undertake the education of teachers; the curriculum officers should prepare the required educational contents; and the General Office of Human Resources and the Teachers' Training Center should cooperate in the executive part. Moreover, in order to reach the desired outcome, the province offices, the Teachers' Training Centers, and the Office of the General Educations should cooperate as well.

## **6- SHOULD TEACHERS RECEIVE ICT CERTIFICATE?**

Issuing ICT certificate is one the constructive attempts that many societies and countries have considered that. The certificate or degree shows that the bearer has sufficient skills to use computers. This certificate can be used for many purposes in education; for instance, for computer teaching permit. Right now, there are the following international and European certificates for computers:

- International Computer Driving Licenses (ICDL)
- European Computer Driving Licenses (ECDL)

These certificates are issued in seven different levels, each level representing certain skills of the bearer. Similar certificates can also be issued in Iran for teachers of different level of education. The next section gives details about the proposed syllabus' certificates for primary-school teachers according to the three predefined levels. It should be mentioned that in defining the skills for every level, we have considered the ICDL standards.

## SYLLUBUS' CERTIFICATE OF GENERAL ABILITIES OF COMPUTER USERS FOR PRIMARY SCHOOL TEACHERS AND PRINCIPALS

<b>Goals</b>	<b>Objectives</b>	<b>Content and Topics</b>
To get familiar with the role of technology in society	<ul style="list-style-type: none"> <li>- To know the characteristics of Today's Communities</li> <li>- To know the Role of Information in Communities</li> <li>-To know concepts of technology</li> <li>- To know applications of Information Technology in Daily Life</li> </ul>	<ul style="list-style-type: none"> <li>- Types of Communities</li> <li>- Specifications of the Present Community</li> <li>- Need For Change in Communities</li> <li>- The Trend of Changes in Information Communication</li> <li>- The Role of Information Communication in Today's World</li> <li>- The necessity of Using Information</li> <li>- The methods of Information Communication</li> <li>- Application of Information Technology in Education               <ul style="list-style-type: none"> <li>- Data</li> <li>- Information</li> <li>- Information Technology</li> <li>- ...</li> </ul> </li> </ul>
To get familiar with Information Networks	<ul style="list-style-type: none"> <li>- To get familiar with types of networks</li> <li>- To know applications of each network</li> </ul>	<ul style="list-style-type: none"> <li>- Tools Used in Networks</li> <li>- LAN, WAN, And MAN, Networks and their applications</li> <li>- Internet and Intranet</li> </ul>
To get familiar with hardware of a computer	<ul style="list-style-type: none"> <li>- To know hardware parts of a computer</li> <li>- To compare abilities of different computers</li> </ul>	<ul style="list-style-type: none"> <li>- Definition of Hardware</li> <li>- Types of Computers</li> <li>- Input Unit</li> <li>- Output Unit</li> <li>- Processing Unit</li> <li>- Peripheral Memories</li> <li>- Peripheral Devices</li> <li>- General specification of computer</li> </ul>

## SYLLUBUS OF GENERAL ABILITIES OF COMPUTER USERS FOR PRIMARY SCHOOL TEACHERS AND PRINCIPALS

<b>Goals</b>	<b>Objectives</b>	<b>Content and Topics</b>
To get familiar with software of compute	<ul style="list-style-type: none"> <li>- To understanding the concepts of computer software</li> <li>- To get familiarity with different types of computers</li> </ul>	<ul style="list-style-type: none"> <li>- Definition of Software</li> <li>- System Software</li> <li>- Application software</li> </ul>
To be able to work with Word Processor	<ul style="list-style-type: none"> <li>- To be able to work with Word</li> </ul>	<ul style="list-style-type: none"> <li>- Application program Word:               <ul style="list-style-type: none"> <li>- Parts of Word window</li> <li>- Typing a text</li> <li>- Editing a text</li> <li>- Page layout</li> <li>- Adding sound and picture</li> <li>- Inserting table</li> <li>- Setting printing specifications</li> </ul> </li> </ul>
To get familiar with the role of computer in life	<ul style="list-style-type: none"> <li>- To know applications of computer at Home</li> <li>- To know applications of computer at work-place</li> <li>- To know applications of computer in education</li> </ul>	<ul style="list-style-type: none"> <li>- Performing daily calculations</li> <li>- Sending and Receiving E-mails</li> <li>- Searching needed information using computers</li> <li>- Using computers in Entertainment</li> <li>- Applications of computers in Industry</li> <li>- Application of computers in commerce</li> <li>- Application of computes for office work in schools ( Book-keeping system, registration, Accounting..)</li> <li>- Applications of computers in Teaching to Facilitate Learning Process</li> </ul>

## SYLLUBUS OF GENERAL ABILITIES OF COMPUTER USERS FOR PRIMARY SCHOOL TEACHERS AND PRINCIPALS

<b>Goals</b>	<b>Objectives</b>	<b>Content and Topics</b>
To get familiar with security issues in ICT	<ul style="list-style-type: none"> <li>- To get familiar with issues in security of information</li> <li>- To get familiar with methods of protecting information from computer viruses</li> <li>- To observe security principles</li> </ul>	<ul style="list-style-type: none"> <li>- Importance of security of information</li> <li>- How to save and retrieve information</li> <li>- Approaches to protect information</li> <li>- Type of viruses and their effect</li> <li>- How to fight viruses</li> <li>- Rights and security principles in ICT</li> <li>- Paying attention to proper shields of electric wires, putting in a proper environment</li> </ul>
To get familiar with the health and safety issue	- To know health and safety issues using computers	- Health Principles When using computer

## Syllabus of semi professional abilities of computer users for primary school teachers and principals

Goals	Objectives	Content and Topics
To acquire the ability to work with presentation programs	- To be able to work with Power Point	<ul style="list-style-type: none"> <li>- Creating Presentation</li> <li>- Power Point tool bar</li> <li>- Ways of presenting slides</li> <li>- Inserting chart</li> <li>- Adding sound, picture, and film</li> <li>- Creating effects (Custom – Animation, Action Setting)</li> <li>- Arranging slides</li> <li>- Hyper Link of slides</li> <li>- Preparing slides for different Output devices (Paper- Screen- 35 mm Slide- Overhead)</li> <li>- Print setup</li> </ul>
To get familiar with Internet	<ul style="list-style-type: none"> <li>-To get familiar with concepts of Internet</li> <li>-To get familiar with applications of Internet</li> <li>- To get familiar with Internet services</li> </ul>	<ul style="list-style-type: none"> <li>- Internet (HTML, URL, Web...)</li> <li>- Application of Internet in:               <ul style="list-style-type: none"> <li>Communication,</li> <li>Education,</li> <li>Commerce.</li> </ul> </li> <li>- Services of Internet such as:               <ul style="list-style-type: none"> <li>E-mail,</li> <li>Voice-mail,</li> <li>File transfer (FTP),</li> <li>Telnet,</li> <li>Web</li> </ul> </li> </ul>
To Acquire the ability to work with Internet.	-To acquire the ability to work with: <ul style="list-style-type: none"> <li>Internet browser,</li> <li>E-mail,</li> <li>Searching tools.</li> </ul>	<ul style="list-style-type: none"> <li>- How to access desired Web pages (On-line, Off-line)</li> <li>- Standard toolbar and its parts</li> <li>- To access Hyper text addresses               <ul style="list-style-type: none"> <li>How to save a web page</li> </ul> </li> <li>- Working with Favorites' abilities</li> <li>- Working with History's abilities</li> </ul>

## Syllabus of semi professional abilities of computer users for primary school teachers and principals

Goals	Objectives	Content and Topics
		<ul style="list-style-type: none"> <li>- Changing Default Address</li> <li>- Adjusting contents of web page (Voice, Picture, Animation...)</li> <li>- Adjustments related to storing information</li> <li>- Searching Engines</li> <li>- Searching strategies (List, Operators, Key-words, Phrases...)</li> <li>- Persian sites: NoAvar, Parsimail, Postchi .....</li> <li>- English sites: Yahoo, Hotmail, MSN....</li> <li>- Outlook Express</li> <li>- Opening E-mail</li> <li>- Writing an e-mail</li> <li>- Saving a letter</li> <li>- Sending and receiving an attachment to a file</li> <li>- Spell checking</li> <li>- Sending an e-mail to more than one address</li> <li>- Ways to answer a mail: Reply, Forward .....</li> <li>- Organizing e-mails:               <ul style="list-style-type: none"> <li>- Creating a folder</li> <li>- Deleting an e-mail</li> <li>- Saving an e-mail in a folder</li> <li>- Arranging e-mails</li> </ul> </li> <li>- Using address book: Add, Delete Update</li> <li>- Chat</li> </ul>
o acquire the ability to do educational planning using computers.	To prepare a lesson plan using Word, and Power Point.	Preparing lesson plans based on criterion and concepts of educational planning

## SYLLUBUS OF PROFESSIONAL SKILLS OF COMPUTER USERS FOR PRIMARY SCHOOL TEACHERS AND PRINCIPALS

<b>Goals</b>	<b>Objectives</b>	<b>Content and Topics</b>
To acquire the ability to work with Spread Sheets.	To acquire the ability to work with Excel.	<ul style="list-style-type: none"> <li>- To create a workbook and worksheet</li> <li>- Excel toolbar</li> <li>- Entering data in a worksheet</li>   <li>- To format cell</li> <li>- Charts in Excel</li> <li>- Functions</li> <li>- Macros</li> <li>- Print set up</li> </ul>
To acquire the ability to work with Data Base management program.	To acquire the ability to work with Access.	<ul style="list-style-type: none"> <li>- Elements of a Data Base (Field, Record, Folder, Index)</li> <li>- Creating a folder</li> <li>- Creating a Data Base folder</li> <li>- Working with Query window</li> <li>- Designing data entry form</li> <li>- Making connections among data base files</li> <li>- Reporting</li> <li>-Setting data base password</li> </ul>
To make educational management using computers.	To carry on a project related to educational management using Excel and Access.	<ul style="list-style-type: none"> <li>- Planning and working on a project related to educational management</li> </ul>

## **ASSESSING PROCESS OF LEARNING ICT**

Assessing process of ICT learning in primary level would be done for issuing ICT certificate for learners. This process has two parts: continuous assessment and final assessment.

### **Continuous Assessment**

In order to assess the students' activity continuously, the following checklist should be completed along with the learners' improvement regardless of their level of education:

#### **a) General Considerationa**

- Interest in learning (2 points)
- Contribution in group works (3 points)
- Observing health principles (how they sit) (2 points)
- Observing safety issues and safeguarding and protecting equipments (3 points)

#### **b) Working With Systems**

- Turning on / off the systems (1 point)
- Using mouse (1 point)
- Using CD and floppy (2 points)
- The ability to work with keyboard:
  - Typing (4 points)
  - Using different buttons (2 points)

#### **c) The Ability to Work With Windows**

- Using Windows keys (2 points)
- Path finding and accessing existing programs (4 points)
- The ability to work with Windows:
  - Opening / closing (1 point)
  - Changing the size (1 point)
  - Moving (1 point)
- The Ability to work with folders
  - Creating new folder (1 point)
  - Opening (1 point)
  - Renaming (1 point)
  - Deleting (1 point)
  - Copying (1 point)
  - Moving (1 point)
- The Ability to work with files
  - Creating new file (1 point)
  - Opening (1 point)
  - Renaming (1 point)
  - Deleting (1 point)
  - Copying (1 point)
  - Moving (1 point)
  - Saving (1 point)

The ability to search in Intranets (4 points)

- The ability to send and receive e-mails:

- Entering One of The Persian E-Mails by Entering National Network of Iranian Schools (Roshd Network) or one of the other Persian networks (3 point)
- Entering personal E-mail (2 points)
- Reading received e-mails (2 point)
- Typing and sending e-mails (4 points)
- Saving e-mails (2 point)

### **Final Assessment**

1- Learners should present a report containing text and pictures (or drawings), individually or as group work (maximum 3 students) and related to one of the subjects of the course, at the end of the primary school.

The following points should be considered in reports assessments:

- Proper page layout (5 points)
- Error-free typed text (10 points)
- Using pictures or drawings in report (10 points)
- Learners should be able to restore and save their files (5 points)

2- a) Learners should be able to make their own e-mail accounts. (5 points)

b) Learners should be able to send e-mails to their teachers. (5 points)

## **THE METHODS OF EVALUATING ICT CERTIFICATE FOR PRIMARY SCHOOLS**

The evaluation would be done as “very good”, “good”, “average”, and “needs more work”. The contribution of each part of assessment for issuing certificates is as follows:

40% for final assessment, including:

30% final report based on the above-mentioned points

10% making e-mail address and sending e-mails

60% continuous assessment

Evaluation of certificates is based on the following grades:

90-100: “very good”

70- 89: “good”

50- 69: “average”

Less than 50: “needs more work”, no certificates awarded

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**MINISTRY OF EDUCATION**  
**ORGANIZATION OF EDUCATION IN THE PROVINCE OF-----**

Photo of  
the bearer

**CERTIFICATE OF COMPUTER USERS FOR PRIMARY SCHOOLS**

THIS CERTIFICATE HAS BEEN ISSUED BASED ON ASSESSING ABILITIES OF  $\frac{\text{MR.}}{\text{MS.}}$  -----  
BORN TO ----- IN THE YEAR OF----- BIRTH CERTIFICATE ISSUED IN -----  
IN USING COMPUTER IN PRIMARY SCHOOLS AND ACCORDING TO THE COURSE OUTLINES APPROVED BY  
THE MINISTRY OF EDUCATION . THE ABOVE NAMED INDIVIDUAL HAS CONCLUDED THE COURSE IN THE  
SCHOOL OF ----- WITH FINAL GRADE ----- OUT OF 100, WHICH IS EQUAL TO -----  
DEGREE.

NAME OF THE INSTRUCTOR

SIGNATURE

NAME OF THE SCHOOL PRINCIPAL

SIGNATURE

# **APPENDICES**

## **APPENDIX A: PURCHASING COMPUTER SETS**

One of the issues influencing ICT education in the country is how to purchase and furnish schools with computers. Purchasing computers can be done in two different ways: this can be done by a center and then distributed to schools or schools would purchase computers by themselves. The other methods would be a combination of these two, which have their own advantageous and disadvantageous. But perhaps more important than these is the support after purchase. Those, who work with computers, know very well that without a good support of service and equipment maintenance, there is no guarantee to use computers continuously.

### **A- Method of Centralized Purchasing and Furnishing**

In This method, the Ministry of Education would purchase computers by making contracts with one or more computer companies. Then, these companies agree to furnish schools with computers and support them. This method has the following advantageous and disadvantageous:

#### **Advantageous:**

- 1) Since it is a volume purchasing, computers should cost less.
- 2) Experienced and accredited companies can be chosen for this matter.
- 3) It is possible to track computer purchases and furnishing schools for the whole country from one center.

#### **Disadvantageous:**

- 1) It prevents development of small companies in small cities.
- 2) It is not in agreement with the principle of school-base.
- 3) School problems will not be easily solved.
- 4) Due to centralism, the slow procedure of repairing computers will cause displeasure and decline in motivation among teachers.

### **B- Method of Decentralized Purchasing and Furnishing**

In This method, the required budget would be given to the province capitals, school districts, or even schools, so they furnish their schools. In this method, the central administration in Tehran should make a list of needed hardware and accredited brand names to the province capitals along with a sample of contract with companies. The advantageous and disadvantageous of this method are as follows:

#### **Advantageous:**

- 1) Improvement of the abilities of province capitals, school districts and schools in relation with ICT.
- 2) Reaching objectives of school-base, decentralization and making decision based on capabilities and needs of districts.
- 3) Reducing the tasks of central offices.
- 4) Easier follow up of equipment repairing and supporting.
- 5) Financial contribution of private sectors in provinces, school districts, schools and students' parents in purchasing and furnishing schools.

#### **Disadvantageous:**

- 1) Price hike.
- 2) The lack of accredited companies in small cities.

## **Types of Computer Workshops**

Appropriate approaches can be employed for providing computer services to students, based on existing circumstance. Different approaches to institute computer workshops are:

### **a) Central Workshops**

In cities and villages, where the number of students is low and disparity of students is high, central workshops are recommended. A model for this purpose can be boarding schools, which were good experience in education.

#### **Advantageous**

Since establishing workshops have high expenses, even for workshops with minimum facilities, therefore, by having central workshops and sharing their equipments and facilities, it would be easier to maintain and update these workshops.

#### **Disadvantageous**

In areas with difficult-to-pass roads or hazards threaten students, commuting students between schools and workshops would involve problems. Moreover, since using computer in all subjects and also in courses is inevitable, a lot of time must be allocated for using computers, which requires several commuting to the workshops.

### **b) Mobile Workshops**

Another type of workshops that can be used if needed is mobile workshop. Using city buses one can also set up this workshop.

#### **Advantageous**

Using this kind of workshop has more safety for students, because commuting students to central workshops may involve several hazards.

In this method, one specialist can give service to several schools.

#### **Disadvantageous**

One cannot use computers for all courses.

### **c) School Workshops**

This is the best workshop provided that there are enough equipments and human resources, because with accurate planning one can take advantage of computers in different courses as well as to keep the workshop active at all time, and achieve the goals of ICT education.

In all the workshops, there is need for one or a group of persons to repair and update computers. This brings us to mention the importance of having an official position for the person in charge of computers.

## **Providing Permission for Donating Computers to Schools**

Some of the hardware equipments can be supplied by providing permission of donation to the government institutes. That is, computers, which are not used in government organizations and must remain in storages because of official seals, be donated to schools.

## **APPENDIX B: COOPERATION OF DIFFERENT ORGANIZATIONS WITH THE MINISTRY OF EDUCATION IN TEACHING ICT**

Since Information Technology brings great changes all over the country and it affects all areas, therefore, it requires the cooperation of all institutions within the Ministry of Education as well as the outside institutions. This will be explained in the following sections.

### **Internal Institutions**

**a) The Office of the Undersecretary for General Education:** The Office of the Undersecretary for General Education can play an effective role in providing a better ICT education. If the plans for writing books, CDs, films, and in general all educational softwares and hardwares are programmed by experts and distinguished specialists and according to the international standards, then an important part of the ICT education is completed. In this regard, revision of programs and updating contents according to the considered standards is one of the cooperations that this office can provide.

**b) The Office of the Undersecretary for Human Resources:** In order to position a communicating device in schools and consequently the expectations from teachers for their new roles, there must a wide spread education for teachers. If teachers are not justified, the education cannot have robust pillars in community. The responsibility of The Office of the Undersecretary for Human Resources is considerable and worthwhile to emphasize.

**c) Kanoon Parvaresh Fekree :** Since Kanoon Parvaresh Fekree has made a special place for itself, based on the extend of its activity, all over the country, and publishes various books for different ages of children, it also can publish books in ICT education, or using its potentials can offer summer courses and uses the free time of students for the ICT education.

**d) The Office of Information Technology:** This office should strive to use information technology for a better education by using the available potentials for making software packages under the supervision of the curriculum officers of the Office of the Planning and Compiling Educational Books.

**e) Research Institutes:** The Research Institute for Education and Training, The Institute for Educational Research and Innovation, Research Institutes for Teachers in provinces can recommend appropriate approaches in educational research area as well as suggesting the methods of how to synthesize teaching courses with ICT syllabuses and also how to adopt these methods.

### **External Institutions**

**a) The Ministry of Science, Research and Technology:** Since there is need for long-term and continuous research in order to have a steady and structured plan, this ministry can help significantly this plan by providing related projects to university students. Moreover, this ministry can lead university students, majoring in high-school teaching, and students in Teachers' Training Centers towards this project by providing syllabuses related to ICT education.

**b) The Ministry of Industry:** In provinces, where the industries related to education have considerable presence, do not have significant problems for equipments. But, it is necessary that the Ministry of Industry pass a resolution in order to properly facilitate schools in unindustrialized cities.

**c) Radio and Television:** Everyone knows that all people, even in remote areas, make use radio and television, and most provinces have their own local radio and television networks. These media can be used to broadcast suitable general ICT educations in every province.

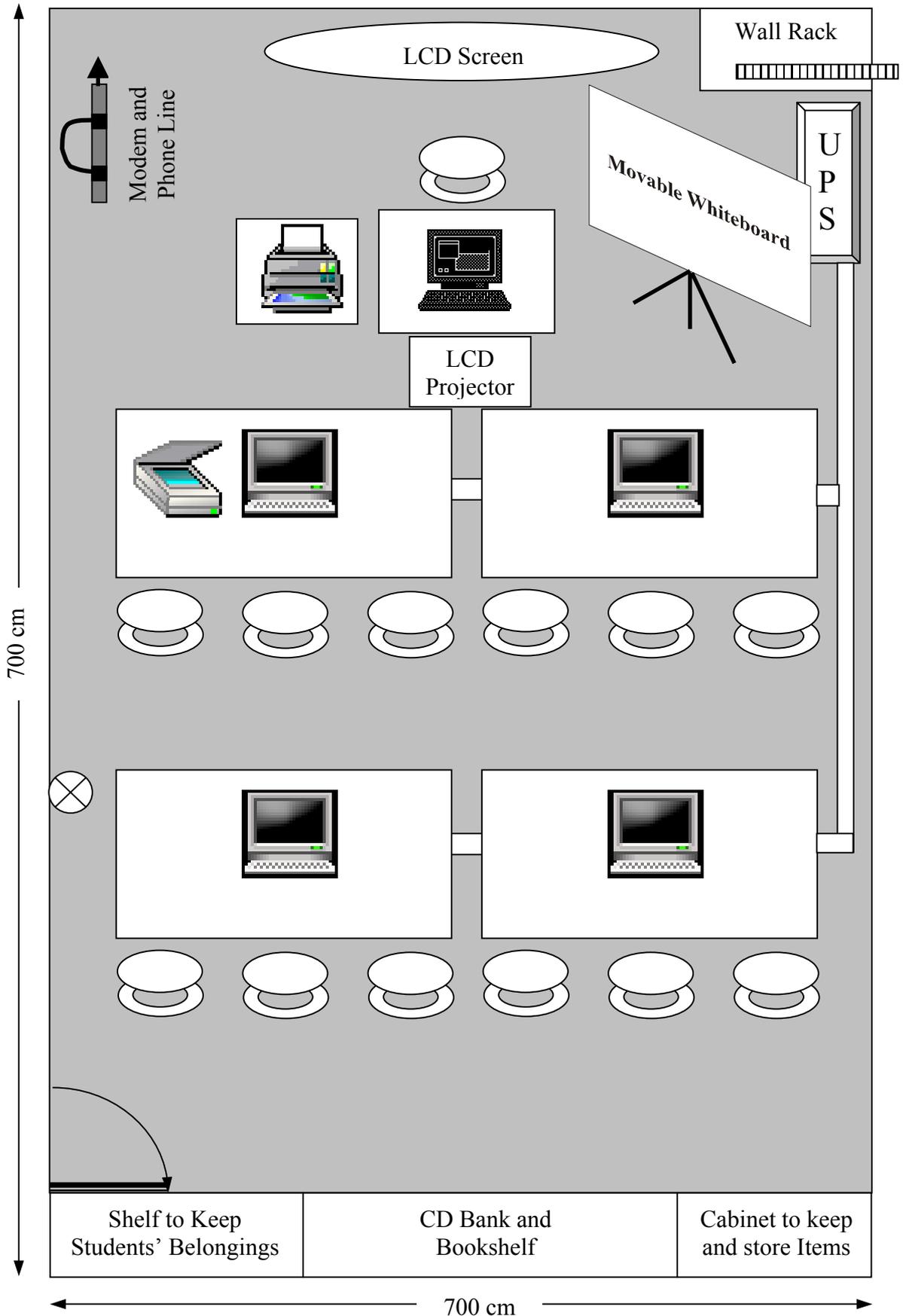
**d) Municipality:** In some of the European countries, municipalities give the most assistance (e.g. purchasing desks, benches, and books, and provide places for education) to the Ministry of Education. The municipality in our country can also cooperate in the same way.

**e) Telecommunications:** In some areas of Iran the problems of equipments and human resources have already been solved, but the problem of telecommunication still exists. Obviously, if the problem of telecommunication remains unsolved, the use of equipments and expert human resources will encounter difficulties.

**APPENDIX C:**

**STANDARDS OF EDUCATIONAL  
WORKSPACES**

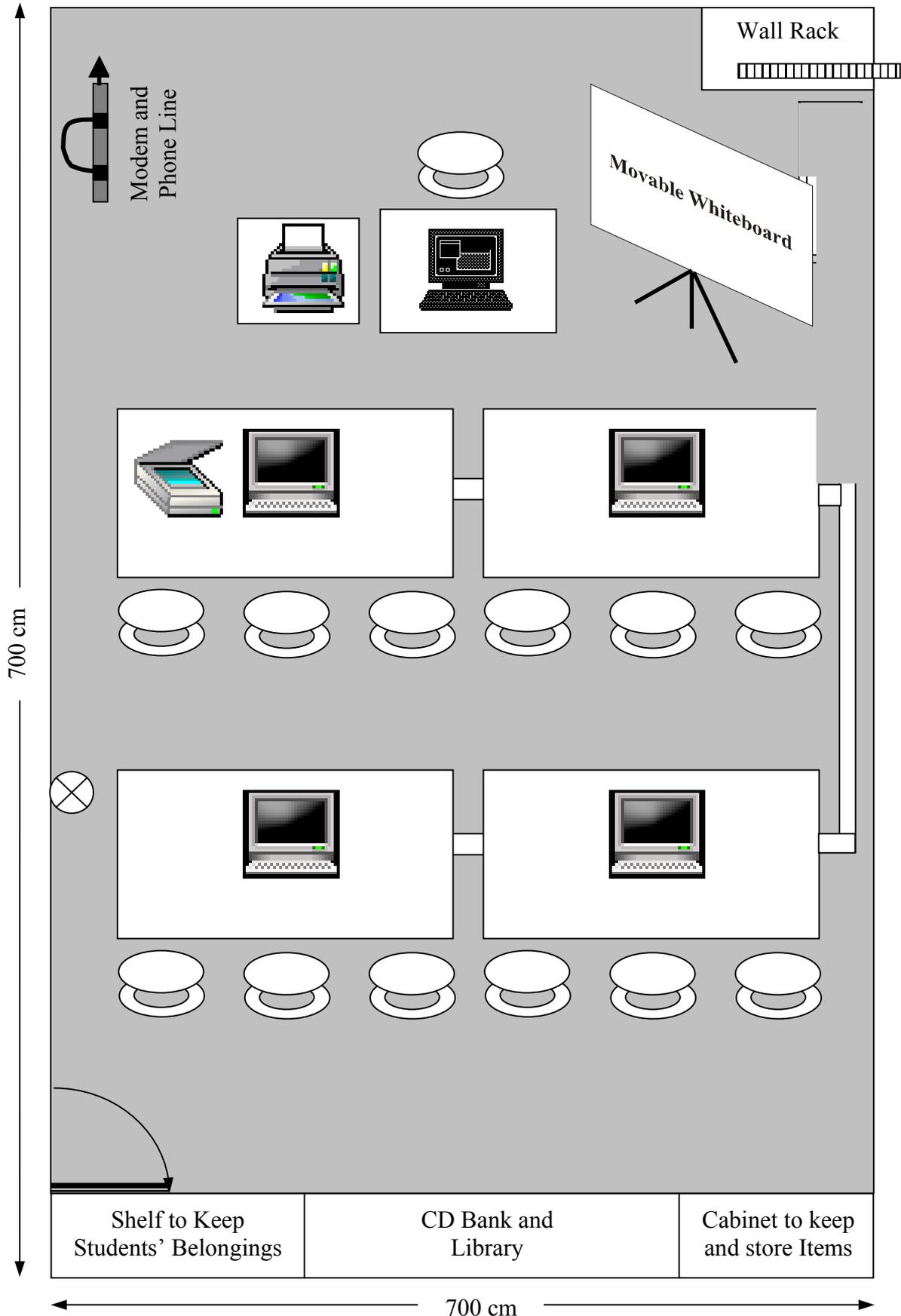
# FIRST CLASS LABORATORY



## REQUIRED EQUIPMENTS FOR FIRST CLASS LABROTARY

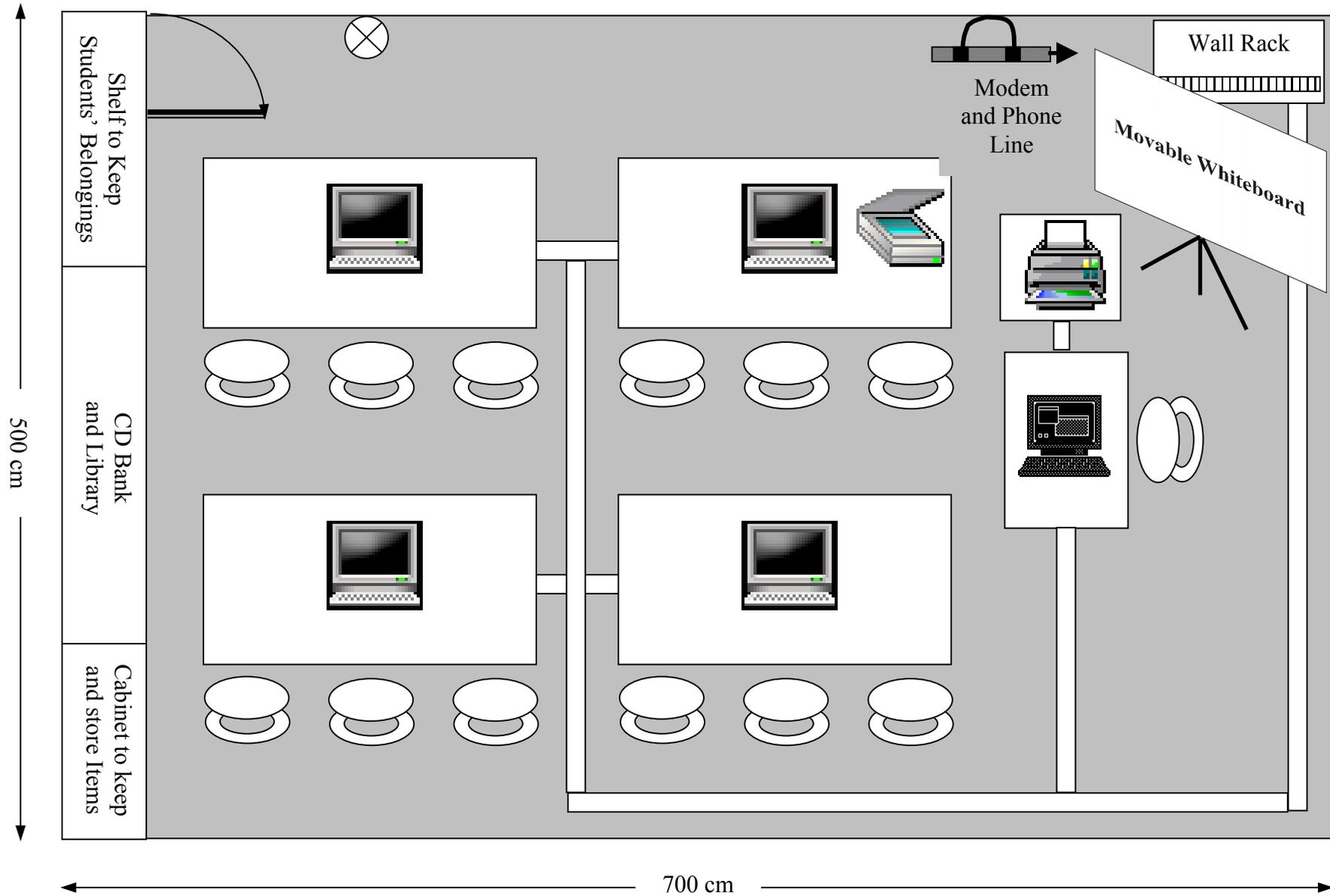
It.	Equipment	Qty.	Comments
1	LCD Projector	1	LCD Projector must be mounted on ceiling. If it is not possible, then it is recommended to install a 29" TV on a suitable height, or to use softwares like Net School Support.
2	UPS	1	
3	Light Switch and Appropriate Wiring and Cabling	1	Earthing systems must be considered in wiring.
4	Modem, Phone Line	1	For connecting to the Internet, if necessary.
5	Cabinet	1	To keep and store items.
6	CD Case	1	
7	Bookshelf	1	
8	Backpack Shelf	1	
9	Movable Whiteboard	1	To prevent penetration of chuck dust into the computers.
10	LCD Screen	1	
11	Computer Chair	One for every person	
12	Computer Desk	One for every computer set	The minimum length is 1.5 m.
13	Computer Arrangements		It is better to look like a classroom.
14	Curtain		To prevent sunbeams entering the classroom.
15	Hub	1	To connect computers with star strategy.
16	Wall-mounting Rack	1	At least with 24 ports.
17	Air Conditioning System		
18	Cooling System		Desert (water functioning) air conditioner is not allowed.
19	CD Writer	1	
20	Microphone		
21	Burglar Alarm and Fire Extinguisher		
22	Suitable Floor Covering		Linoleum or ceramic tiles, if possible.
23	Students	Max. 12	
24	Workshop Dimensions	Min. 7x7 m.	

## SECOND CLASS LABORATORY



## REQUIRED EQUIPMENTS FOR SECOND CLASS LABROTARY

It.	Equipment	Qty.	Comments
1	Protective Relay for Electric Equipments	1	Made by Faratel company, if possible.
2	Light Switch and Appropriate Wiring and Cabling		Earthing systems must be considered in wiring.
3	Cabinet	1	To keep and store items.
4	CD Case	1	
5	Bookshelf	1	
6	Backpack Shelf	1	
7	Regular moveable Whiteboard	1	To prevent penetration of chuck dust into the computers.
8	Computer Chair	One for every person	
9	Computer Desk	One for every computer set	The minimum length is 1.5 m.
10	29" TV	1	Connected to computer
11	Curtain		To prevent sunbeams entering the classroom.
12	Hub	1	To connect computers with star strategy.
13	Wall-mounting Rack	1	At least with 24 ports.
14	Air Conditioning System		
15	Cooling System		Desert (water functioning) air conditioner is not allowed.
16	Fire Extinguisher	1	
17	Suitable Floor Covering		Linoleum or ceramic tiles, if possible.
18	Computer Arrangements		It is better to look like a classroom.
19	Students	Max. 12	
20	Workshop Dimensions	Min. 7x7 m.	



**THIRD CLASS LABORATORY**

## REQUIRED EQUIPMENTS FOR THIRD CLASS LABROTARY

It.	Equipment	Qty.	Comments
1	Protective Relay for Electric Equipments	1	
2	Light Switch and Appropriate Wiring and Cabling		Earthing systems must be considered in wiring.
3	Cabinet	1	To keep and store items.
4	Book and Backpack shelf	1	
5	Whiteboard	1	To prevent penetration of chuck dust into the computers.
6	Computer Chair	One for every person	
7	Computer Desk	One for every computer set	The minimum length is 1.5 m.
8	29" TV	1	Connected to computer
9	Curtain		To prevent sunbeams entering the classroom.
10	Hub	1	To connect computers with star strategy.
11	Wall-mounting Rack	1	At least with 24 ports.
12	Air Conditioning System		
13	Cooling System		Desert (water functioning) air conditioner is not allowed.
14	Fire Extinguisher	1	
15	Suitable Floor Covering		Linoleum or ceramic tiles, if possible.
16	Computer Arrangements		It is better to look like a classroom.
17	Students	Max. 12	
18	Workshop Dimensions	Min. 7x7 m.	