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Revised Project Document*

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Component : Quality and Efficiency
Sub-component: Introduction of New Technologies for Pedagogical Purposes

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** The main changes appear in bold in the document. Consequently, other modifications have been inserted.*

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APPENDICES

1. General Information

1.1 Rationale

The Republic of Lebanon has recently published the document *A Plan for Educational Reform.*

The document proposes sweeping reforms and an overhaul of the education system. Included in these reforms is the introduction of computers to enhance the teaching and learning process.

> *"Experiment the use of "instructional TV" and "the computer for learning" and put them at the disposal of the teaching learning processes."*

The introduction of computers to enhance the teaching and learning process in the Republic of Lebanon is timely. Throughout the Western world, there is a general recognition of the significant and positive role technology can play in improving student learning outcomes.

A recent report[1] to the President of the United States typifies the current world-wide research findings concerning the role of technology in education:

> *"In an era of increasing international economic competition, the quality of America's elementary and secondary schools could determine whether our children hold highly compensated, high skill jobs that add significant value within the integrated global economy of the 21st century or compete with workers in developing countries in the provision of commodity products and low value added services at wage rates comparable to those received by third world laborers.*
>
> *Moreover it is widely believed that workers in the next century will require not just a larger set of facts or a larger repertoire of specific skills, but the capacity to readily acquire new knowledge, to solve new problems, and to employ creativity and critical thinking in the design of new approaches to existing problems.*
>
> *While a number of different approaches have been suggested for the improvement of K-12 education in the United States, one common element of many such plans has been the more extensive and more effective utilisation of computer, networking, and other technologies in support of a broad program of systemic and curricular reform. During the period in which technology has fundamentally transformed America's offices, factories, and the retail establishments, however, its impact within our nation's classrooms has generally been quite modest."*

The Republic of Lebanon has also recently published a new set of curriculum documents as part of its major overhaul of the education system.

As computer technology can assist in creating a more student centred and collaborative learning environment, introducing computer technology in schools now provides the perfect opportunity for teachers to deliver the new curriculum in an environment conducive to improving student learning outcomes.

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[1] Report to the President of the United States on the Use of Technology to strengthen K-12 education in the United States – President's committee of advisers on Science and Technology. 1995

The 3-day training seems to be insufficient. Other sessions should be done, and/or the number of hours of training increased.

The Chief of the Informatics Department advised that CERD will train the required additional Informatics teachers.

1.4 Hardware and software for Informatics Curriculum

Very little hardware and software is currently available in schools. The Informatics course is of a practical nature and teachers will find it difficult to meet the objectives of the curriculum unless they and their students have ready access to suitable hardware and software, set-up in a computer laboratory.

A suitable computer laboratory, therefore, would require a sufficient number of computers (1 computer for 2 students) and one printer as a minimum.

Several technical specifications have been developed, for various projects, for the establishment of computer laboratories in secondary and Intermediate schools. These were developed by CERD, MNEYS, the Infrastructure Refurbishment project, the World Links program and the Distance Education for teachers project.

MNEYS developed computer laboratory specifications and sent them to secondary and intermediate schools on 20 November 1998. The schools were given instructions to seek quotes from local suppliers for a three-year lease arrangement. The publication of this specifications document is premature and was undertaken despite advice to delay the publication until a more appropriate set of specifications were developed and costed.

There is sense of urgency to establish computer laboratories in each secondary and intermediate school to support the Informatics Curriculum which is now being implemented. This may explain the premature publication of specifications.

The Director-General of National Education was advised on November 19 by this consultant that the published specifications are not endorsed and whilst they will provide schools with a working solution, the specifications are not considered appropriate.

All the specifications made available to this consultant during the consultancy period were reviewed and a new set of specifications have been developed in consultation with officers from CERD and MNEYS.

Even though the curriculum don't specify a specific software to be used, the student manuals, require Microsoft Office. Microsoft has advised its willingness to offer a special education price for its software (10% of the cufrent retail price) once the Republic of Lebanon enacts a software copyright law.

Recently a software copyright law was voted into law. An agreement with Microsoft should be done to guarantee that special education prices are provided either by Microsoft distributors or retail companies.

1.5 Educational Technologies

There is a need to balance curriculum based instruction with opportunities for students to use an inquiry based, collaborative approach to solve meaningful problems. Problem based learning lets students build on their own knowledge and incorporate new information with what they have already learned. And when technology is available to students, it not only opens up opportunities to solve problems, it also provides additional tools for communication and collaboration.

Over time, students who have ready access to technology as a tool for learning and with well trained teachers, develop variety of competencies not usually measured. Students in such an environment did the following:

- Explored and represented information dynamically and in many forms
- Became socially aware and more confident
- Communicated effectively about complex processes
- Used technology routinely and appropriately
- Became independent learners and self starters
- Knew their areas of expertise and shared that expertise spontaneously
- Worked well collaboratively
- Developed a positive orientation to the future
- Developed functional competencies and skills
- Developed capacities for critical, lateral and creative thinking
- Developed an ability to deal with ongoing technological change
- Developed an ability to access education at a time, place and pace of their own choosing
- Developed continuity in the approach to learning across all year levels and for a lifetime.

In such an environment, teachers also become confident with the technology, they enjoy their work more and feel more successful with their students. Over time, teachers find that they interact differently with their students – more as guides or mentors and less as lecturers. Teachers

- Are more comfortable with students working independently
- Expect more from their students
- Have more time with individual students
- Are better able to present more complex material
- Are able to tailor work to students` needs
- Are more comfortable with small group activities
- Spend less time lecturing to the whole class

Information and communication technologies certainly has the potential to transform the teaching process from the traditional instructional mode to the extended knowledge constructivist mode.

The following table demonstrates this point:

	Traditional	Extended
Activity	Teacher centred and didactic	Learner centred and interactive
Teacher role	Fact teller and expert	Collaborator and sometimes the learner
Student role	Listener and learner	Collaborator and sometimes expert
Learning emphasis	Facts and replications	Relationships and enquiry
Concept of knowledge	Accumulation	Transformation
Demonstration of success	Quantity	Quality
Assessment	Norm referenced and multiple guess	Criterion referenced and performance portfolio
Technology use	Seat work	Communication, collaboration, information access and expression

There is consensus in current research findings that suggest that computer technology should be introduced to students as early as possible in their formative years. There is however little need for primary school students to undertake formal lessons on technology, rather, they should be exposed to the technology when considered appropriate.

Therefore, in addition to establishing technology as a discipline through the introduction of the Informatics curriculum, computer technology shoualso be introduced in all schools as a tool for learning.

Communication technologies, Internet/intranet can help teachers to be continuously educated and assisted. Teachers can access and select a huge range of resources from the network that help them teaching.

As mentioned by the head of English department, CERD, E-mail, and other means will help teacher-to-teacher interaction. This is relevant for teacher training and exchange of ideas on methodology and innovation. Many sites offer communication services and educational resources in special subjects (English, Maths, ...) and allow teachers all around the world to interact with their colleagues for educational and cultural purposes.

Schools through the school web site, students and teachers can publish their work to make it available to others. This is a very important means for motivating teachers and students; this also will contribute to building a rich learning and teaching environment.

1.6 Major challenges for the implementation of Informatics Curriculum and Educational Technologies

A number of challenges need to be addressed if the implementation of the Informatics Curriculum and the implementation of Educational Technologies are to succeed.

These include:

- Computer hardware does not exist in the majority of schools to support the Informatics curriculum, an essentially practical course which requires students to have ready access to computer hardware.
- There is, at present, a shortage of Informatics teachers.
- The specifications published by MNEYS will not readily assist in the implementation of educational technologies initiatives. The specifications do not allow for easy networking or for the installation software or the storage of student data via a floppy disk drive. The specifications also will create classroom management difficulties for teachers.
- Structures (human and physical resources) do not exist to support the implementation of computer technology in schools.
- Almost all teachers other than Informatics teachers are computer illiterate and may initially resist the introduction of computer technology into the curriculum as a teaching and learning tool.
- The retail cost of Microsoft office is prohibitive for schools. If MNEYS is unable to negotiate an education price for Microsoft Office, then changes will need to be made to the Informatics support material, including the text book to ensure it can be used with alternative and more affordable software.

1.7 Related projects

A number of projects currently underway are directly or indirectly affected by this project. These include the Infrastructure rehabilitation project, the devolution of responsibility to schools, the World Links program and the Distance Education program.

Details of these projects appear in section 3.10.

There is a need for strong co-ordination between these projects to ensure the following is addressed:

- Specifications for the establishment of computer laboratories are consistent across all projects
- Duplication of effort, resources and funding is eliminated or minimized
- The selection of schools to participate in any of these projects takes into consideration technology related factors addressed in this project report

1.8 Available funding

A number of funding sources has been considered to fund this project. These include the World Bank, CERD and MNEYS.

Further, funds available for concurrent projects such as the Infrastructure rehabilitation project, the distance education project and the World Links project have also been considered for this project.

The Chief of the Informatics Department advised that MNEYS is responsible for funding the training of Informatics teachers. He further advised that funds are available to train the required additional Informatics teachers.

If no teacher is available within the school, the school is required to meet the cost of engaging an external Informatics teacher.

Therefore, no additional funding is required for the training or the hiring of Informatics teachers.

The Director General of National Education advised that there are no MNEYS funds available for this project.

The project manager for the infrastructure rehabilitation advised that funds are available within her project for the establishment of computer laboratories for new schools and some schools requiring major refurbishment. This is considered a relatively limited amount with respect to this project.

1.9 Consultation

The strategies recommended in this report were developed after extensive consultation with key officers from within CERD and MNEYS, visits to schools and training centres and discussions within computer industry representatives. **TAB A**.

The strategies also were developed after consideration was given to several factors. These included current limitations of communications infrastructure within Lebanon, available funding from the World Bank, limited funding available through MNEYS and schools and the current level of computer literacy of teachers within Lebanon.

1.10 Data/Statistics

The Chief of the Informatics Department provided a data file of school details which has been the basis for costing models and projections.

Appendix B provides current related statistics of the public education system derived from the school data file.

These include number of schools by category of school, student and teacher population distribution by region.

1.11 Business partnerships

There are opportunities and many benefits, throughout the implementation period of this project, for the MNEYS and CERD to develop a long term business relationship with the computer industry. This will assist in a number of ways.

The computer industry in the Republic of Lebanon is relatively young and small. In order that it is able to provide adequate pre service and post service support, to what should be an exponentially growing number of schools, it needs assistance, and extensive consultation regarding the project, and its time line.

The Ministry and CERD, by having a working business relationship with the Industry, should be able to leverage better prices for schools and in the case of some of the recommendations, for volume acquisition of computer equipment.

The Software industry, including software importation is in its infancy. Very little quality education software is available in the market and the industry itself appears to be unaware of what constitutes quality educational software. Accordingly, the Ministry and CERD, throughout the project should endeavour to work with the industry to develop their awareness of the needs of teachers and students in the field of educational Technologies.

1.12 Copyright issues

Recently a software copyright law was voted into law. An agreement with Microsoft should be carried out to guarantee that special education prices are provided, either by Microsoft distributors or retail companies.

1.13 Project strategy

Focus

The project strategy focuses on supporting the implementation of the Informatics curriculum and the introduction of educational technologies in schools as a legitimate teaching and learning tool.

To facilitate this, the strategy provides for training and support for teachers; allowing for changes in recruitment policies to ensure that the workforce over a period of time will be computer literate and an investment in hardware and software and networking in schools.

The strategy allows for a future growth path including the establishment of a country wide communications network to link all schools for educational and administrative processes.

Timeline

The pace of technology development is such that it is impractical to recommend long activities for the distance future in detail.

Accordingly, the majority of activities recommended in this project span over the first three years of implementation.
There is a second reason for concentrating the activities in the first three years of implementation. This being an attempt to have educational technologies principles introduced at the same time as the new curriculum is being introduced.

This project report argues that the introduction of computer technology in schools can facilitate positivechanges in the way teachers teach and the way students learn. The introduction of a new curriculum at the same time as the introduction of computer technology will make it easier for teachers to adopt new teaching methodologies and adapt to the computer technology as a legitimate teaching and learning tool.

Considerations

In developing the strategy, considerations were given to the current status of the computer industry in Lebanon and its ability to support the implementation of technology in schools; the current status of the infrastructure facilities across Lebanon in general and in schools in particular; and the status of computer literacy and awareness among the teaching service.

Considerations were also given to the overall available budget for the General Education Program and the likely percentage of the overall budget likely to be allocated to this project.

2. Objectives

The objectives of the project are as follows:

Immediate objective

- To support the establishment of computer laboratories in all secondary and intermediate schools linked to secondary school.
- To establish lighthouse schools to demonstrate the use of technology for teaching and learning

Mid term objectives

- To progressively enhance and expand the Informatics curriculum to all intermediate schools.
- To support the development of support material for the use of technology for teaching and learning

Long term objectives

- To establish a computer literate teaching service.
- To promote and support the use of technology as a tool for teaching and learning in all schools.

3. Description of activities to be undertaken and implementation modalities

The objectives of the project will be met if the following activities are undertaken.

The activities are grouped under ten topics.

Background information on each of the topics and a rationale for the activities is provided.

For each activity, the suggested area responsible for its implementation is also listed.

3.1 Informatics curriculum

A Lack of hardware

There is a need to acknowledge that many schools implementing this compulsory course will not have a computer laboratory in the immediate future. It is therefore necessary to ensure that Informatics teachers are aware of strategies to assist them teach the course with available hardware and software.

B Course content

The Informatics course is very much in its infancy stage. It attempts to introduce students to the technology through an essentially training course in office automation.

It is important to notice that the curriculum should not be limited to specific tools (Microsoft office tool). Indeed, the informatics course aims are not limited to the teaching of office automation tools.
Therefore, teachers should provide students with skills on how to produce a document, worksheet, database..., and develop attitudes on how tools could be used to publish relevant information, to make student more creative, to communicate and to solve problems related to other disciplines or from the real life.

The Informatics course will therefore need to be constantly updated to reflect the needs of students and offer a challenging and more rewarding learning experience to them. The course also must acquaint students with the latest computer technologies and technological developments as well as the social, political and economic impact of technology.

A list of additional topics is provided for consideration at **App C.**

An inhibitor to the notion of constant updates of material is the cost, and resource intensive process of paper based publication. Consideration should therefore be given to complementary means of publication.

The electronic publication will not replace student textbooks in the near future because of the lack of computers in students' homes. This is a complementary tool that will provide students and teachers with dynamic and updated technology information.

C Availability of teachers

There is still a need to identify and train additional teachers to teach the Informatics curriculum. **The Director of informatics, CERD advised that 250 teachers are needed for the first year to provide the curriculum for grade 7 at the intermediate level and year 1 in secondary. The number of teachers for the next five years should be evaluated.**

It was proposed that schools might seek teaching services from local service providers. This strategy may result in having the Informatics course delivered by technical staff who have no background in teaching. Furthermore, the strategy will impact negatively on remote schools that do not have ready access to service providers.

Another proposed strategy is to train existing teachers who have been identified as being in excess. These teachers should be selected based on following criteria :

- Minimum computer skills
- Motivation to learn and to teach informatics
- Availability and stability

At a first step these teachers will act as Informatics teachers.

At a second step they will be Information and communication technology co-ordinators (ICT co-ordinators) in the school. These resource persons will be in charge of the following tasks :

- Teaching the Informatics curriculum;
- Training teachers within the school. CERD should provide necessary teaching materials for that;
- In-school support for teachers to help them develop professional practices on using computers for teaching and communication;
- Local technical co-ordinator for the project;
- Actively involved in the development of the school technology plan.

A specific teacher training program should be setup and will include 2 modules :

- Information and communication technologies course;
- Computer laboratory management for schools and organisation of in-school support.

The Director of Informatics, CERD advised that the first training module could be done by CERD for 2 teachers in each schools.

Training on aspects covered by the second module will be organised.

D Informatics for primary schools

There is a strong need to ensure that students are introduced to the computer technology in the early stages of their education. It is not considered appropriate however to introduce formal *Informatics* curriculum for primary school students. Instead, primary schools, along with intermediate and secondary schools should be encouraged to use computers as tools for learning, and to integrate their use into their day to day activities.

Recommended activities

Activity	Responsibility
A1.1 To develop support curriculum material for Informatics teachers that provide practical ideas on how to teach the Informatics course.	CERD
A1.2 To establish a review process to continually monitor and evaluate the Informatics curriculum to ensure that it continues to be relevant to the needs of students.	CERD
A1.3 To establish an alternative mechanism to the publication of future textbooks in recognition of the need for the material to be current. The suggested alternative is CD.	CERD

A1.4 To expand the Informatics curriculum over the next two years to incorporate some or all of the suggested topics in **App C**	CERD
A1.5 To develop a methodology to identify additional Informatics teachers, from the teachers identified as excess to the system.	MNEYS & CERD
A1.6 To train Informatics teachers, to be able to teach informatics curriculum (module 1).	CERD
A1.7 To Train Informatics teachers to be ICT co-ordinators (module 2).	CERD

3.2 Establishment of computer laboratories

MNEYS has asked secondary and intermediate schools to negotiate prices for the leasing of computers to establish a computer laboratory. The Ministry's strategy is for schools to impose a yearly levy on their students to cover the leasing costs.

The leasing strategy is endorsed as it allows for future upgrades and thus provides students with an opportunity to access the latest computer technology while at school.

The specifications sent to schools by MNEYS are not the specifications recommended in this report and fall short from the optimum, cost effective solution schools could achieve. The recommended set of specifications appears in **App D**

Following negotiations with MNEYS and CERD, there has been general agreement to adopt the recomspecifications.

The Director-General of National Education advised that he does not expect more than two hundred schools to be able to fund a leasing program in the immediate future.

This strategy will have its greatest negative impact on:

- small schools (where the levy per student will be higher than in larger schools);
- schools in low socio-economic areas (where students may not be able to afford to pay the levy surcharge); and
- remote schools (where access to services will be more difficult and therefore cost more).

It is clear that there are not sufficient funds available from the various funding sources to establish a laboratory in each school. An estimate of the cost ranges from $9.9M to $14.5M. The $9.9M will fund the provision of an average of ten desktop computers to each secondary and intermediate school as a minimal, while the $14.5M will fund the establishment of a network with Internet access in each of the schools.

It is also not guaranteed that the curriculum will be implemented in all secondary or intermediate schools because of operational difficulties and lack of teachers.

After consultation with the Director of Informatics, it was recommended as a first step to focus the effort of equipment toward the secondary schools, (71 secondary schools and 109 secondary / intermediate schools). This will allow equipping over 180 schools.

For pedagogical reasons, it is recommended that informatics course, which is a practical course, will be limited to classes of 15 students.

For the complementary and complementary/primary schools, it is recommended that the World Bank funding be used to assist schools in greatest need.

Acquisition models

The preferred acquisition model by the MNEYS is to lease the equipment for a three year period. This provides schools with State of the Art computer technology with the added advantage of upgrading the computers each three years.

An alternative proposition is to provide schools with a minimum of computers, thus schools could lease complementary computers locally if necessary, but those schools in communities without adequate means would be assured a minimum adequate computer laboratory.
International call for tender will enable the Ministry to take advantage of lower prices due to economies of scale.

For the first three years the maintenance should be done by the supplier as part of the purchase contract. Subsequent service contracts could be signed with those agencies with proven records.

Controls

The Director General of National Education advised that schools wishing to lease computer equipment will be required to submit details of their acquisition plan to a central body for approval. This control is considered adequate for the immediate acquisition of computer hardware to support the Informatics curriculum. This should be an interim process until a more comprehensive control structure as recommended in section 3.5 is established.

Recommended activities

Activity	Responsibility
A2.1 To adopt the recommended set of specifications. App D	MNEYS, CERD
A2.2 To provide secondary schools and complementary schools linked to secondary with a minimum number of computers within computer labs. Schools to expand the number of computers provided using the MNEYS' leasing model.	MNEYS, World Bank Project Co-ordinator
A2.3 To Identify complementary schools that meet one or more of the three categories. A committee should be established for this purpose.	CERD, MNEYS, World Bank Project Co-ordinator
A2.4 To provide schools identified with computers. This will allow the schools to offer the Informatics curriculum without overly penalising the students. Should any of these schools wish to expand the number of computers provided using the MNEYS'leasing model.	MNEYS, World Bank Project Co-ordinator

3.3 Recruitment policies

To introduce technology as a tool for learning, the Republic of Lebanon faces a major challenge in training existing teachers to use the computer technology in their day to day teaching activities. This issue is addressed in section 3.6

To minimise the need for ongoing training, and to ensure that in the long term the teaching profession in the Republic of Lebanon is well conversant with computer technology, there needs to be some concerted effort to ensure that new teacher recruits meet a minimum set of technology proficiency standards.

A suggested list of minimum computer technology proficiency skills for teachers is at **App E**.

Recommended activities

Activity	Responsibility
A3.1 To review the recommended minimum technology proficiency standards **App E** and use them to negotiate an acceptable set of standards with tertiary institutions.	MNEYS
A3.2 To establish, as a condition for employment as a teacher from 2002, that recruits must meet the minimum technology proficiency standards.	MNEYS
A3.3 To encourage the use of these computer proficiencies as a basis for training existing teachers.	In-service Training Commission
A3.4 To encourage tertiary institutions to develop graduate certificate courses to enable accreditation of computer competencies and special qualifications to teach the Informatics Curriculum on a full time basis or as a second subject.	MNEYS

3.4 Establishment of lighthouse schools

The introduction of computer technology as a teaching and learning tool in **all** schools is an essential component of the overall strategy of this project.

Given the current situation of the education system in the Republic of Lebanon [2], it is not practical to recommend a computer technology immersion program in schools.

A first step would be to increase the level of awareness of the potential of the computer technology to enhance the teaching and learning process and to establish a level of confidence in teachers' minds that utilising technology in their day to day activities is not beyond their capabilities.

This can be achieved by establishing twelve lighthouse schools (two per region). The lighthouse schools will be model schools where all teachers use technology for educational purposes and where students have ready access to the computer technology on a needs basis.

The lighthouse schools should cover secondary and base education (complementary and primary).

[2] ie lack of computer hardware and educational software in schools, lack of computer literate teachers, lack of an awareness of how technology can effect the teaching and learning process),

This approach will enhance the development of the using of technologies in learning and teaching.

Once established and successfully operational, lighthouse schools will be the means by which other schools, their teachers and executive staff will become acquainted with the computer technology, its place in education and how it can be successfully implemented in a school setting. Teachers in the lighthouse schools will progressively receive training to bring their computer technology skills to the level set out in Appendix E in a relatively short period of time.

The establishment of lighthouse schools requires considerable investment of funds and energy, however, the returns to the Republic of Lebanon could not be underestimated.

It is critical that the lighthouse schools are established as a matter of urgency.

The activities recommended below are contingent upon the availability of a full time Lighthouse Schools Co-ordinator (LSC). The LSC's role will be :

- co-ordinate all activities associated with the lighthouse schools,
- managing the computer hardware distribution program for the schools,
- initiating formal and ad hoc training programs
- encouraging participating teachers and directors of schools to share their experiences with neighbouring schools
- evaluation of activities.

The activities are also contingent upon the appointment of an international consultant well conversant with the application of technology across the curriculum. The role of this consultant would be to train and support the teachers in the lighthouse schools during the tow years of implementation.

The intention is to establish a variety of different computer technology set up scenarios in the twelve schools including multiple labs, stand alone computers in classrooms and whole school networked solution using structured cabling.

This will, in time, provide valuable information for MNE, CERD and schools of what is possible to achieve in each of the remaining schools.

Recommended activities

Activity	Responsibility
A4.1 To identify two schools in each region with the following criteria : • The director must be innovative, educationally driven, and strong leader • **The school must have an Information and Communication Technology co-ordinator. S/He will be the local co-ordinator of the project** • The permanent teaching staff must be willing to adopt computer technology as a tool for teaching and learning and must be willing to attend training courses. • The director and teaching staff must be willing to share their knowledge with other teachers and directors of schools who will visit their school from time to time. • The school must have reasonable infrastructure to facilitate the establishment of technology across the school (for example access to a dedicated telephone line for Internet facilities). • At least four schools should be new or refurbished schools. In these schools, it will be possible to establish whole school networking solutions without additional cost. • At least one school in each region must be primary or primary/intermediate. The other should be secondary or secondary/intermediate.	MNEYS in consultation with CERD and in collaboration with the regional directors

A4.2 To secure the services of an international consultant (IC) for a total of up to six fortnightly visits during the first two years of implementation. The consultant should possess successful training and educational technology implementation experience.	CERD, MNEYS, World Bank Co-ordinator

Activity	Responsibility
A4.3 To select a lighthouse schools co-ordinator – LSC to support the implementation of the lighthouse concept. The co-ordinator should be computer literate, experienced in conducting adult training courses and must posses excellent leadership, project management and communication skills. The Co-ordinator must have the required maturity to demand professional respect within the education field, and in particular from directors of schools and must have a goodunderstanding of the education system in Lebanon, itsdemography and sectarian divisions (language, religion and geography). It is desirable that the co-ordinator is familiar with educational technologies principles. The LSC should work in direct consultation with the relevant officers within CERD and MNEYS. The LSC should be selected by a committee with representation from the World Bank, CERD and MNEYS. The IC should be required to visit only at critical implementation periods during the two years, thus leaving the LSC to take responsibility for the project success.	CERD, MNEYS, World Bank Co-ordinator
A4.4 To establish phase one of the computer setup based on the configuration in **App F**	LSC, World Bank Co-ordinator
A4.5 To develop course material to conduct a seminar for directors of schools on computer technology planning and management issues.	IC & LSC
A4.6 To conduct an introductory basic training course (1) for teachers and directors of schools. The course should focus on the computer as a personal productivity tool and on raising the level of awareness of the educational potential of using computer technology for teaching and learning. The training on computer basis could be done locally by the informatics teacher.	IC & LSC
A4.7 To develop computer technology plans with assistance from the LSC. The completion of the plan will be a condition for further investment.	Directors of Lighthouse schools
A4.8 to develop training programs on the following topics: Software evaluation • Using educational software to support the curriculum • The Internet as a research tool for teachers • The Internet as a learning tool for students • Classroom management	IC & LSC
A4.9 To develop a mechanism to review lighthouse schools' progress and periodically review schools' progress	IC & LSC
A4.10 To conduct developed training courses (2) for teachers on a periodic basis.	LSC & IC (optional)
A4.11 To maintain a journal of their experiences, successful and unsuccessful. Information should be published on an Intranet/Internet server under the lighthouse Web site.	Lighthouse teachers & LSC
A4.12 To (progressively) implement phases two and three of the computer setup (**APP F**).	LSC, World Bank Co-ordinator
A4.13 To arrange for directors of schools and teachers from neighbouring schools to visit a lighthouse school to observe at first hand the impact of technology on the teaching and learning process	Lighthouse teachers & LSC
A4.14 Arrange for Directors of participating schools to address directors of schools seminars on their experiences.	LSC & Regional Directors

Activity	Responsibility
A4.15 To establish and deliver training course (3) within each of the participating schools to focus on higher order teaching and learning skills.	LSC & Training and retraining Commission & Pedagogic Counsellors
A4.16 To use the participating schools to trial changes to the Informatics Curriculum.	Director of Informatics
A4.17 To develop scope and sequence documentation demonstrating how technology is supporting the set curriculum.	Teachers and directors of lighthouse schools

3.5 Quality Control and school strategic technology plans

The implementation of computer technology is essentially a costly exercise.

Many schools can fall prey to the notion that the acquisition of computer technology in itself will improve the teaching and learning process and will neglect to provide a reasonable budget for support, maintenance, future planning, staff training and for educational software. Moreover, successful implementation of computer technology in a school requires reflection and focus on the teaching methodologies, structures and organisation

Regardless of the source of funding, it is essential that schools planning to invest in computer technology develop comprehensive computer technology plans which will guide the introduction and evolution of computer technology across their schools.

When developing their technology plans, schools must be driven by curriculum requirements. Once the learning objectives have been determined, the software and hardware requirements can be determined.

It is therefore essential that a concerted effort is placed in ensuring schools understand the value of technology planning and are guided and supported in developing plans which meets their individual needs.

Recommended activities

Activity	Responsibility
A5.1 To establish a regional **Technology Reference Group (TRG).** The chairperson of the group should be a representative of MNEYS (the regional director or nominee). The TRG must include one director of school, one classroom teacher and a technical representative from CERD. The role of the group is to ensure that there is quality implementation of technology across schools. The group will review school computer technology plans and authorise school computer technology purchases. The group should meet on a monthly basis. **NOTE:** The TRGs will replace the central body recently established within MNEYS to examine secondary and intermediate schools' proposals to lease computer equipment for the establishment of computer laboratories.	MNEYS & CERD

The major difference in the terms of reference between the two groups is that the TRG will evaluate proposals on the basis of educational justification and the existence of a supplementary budget for teacher training, software and long term planning. While the existing central body is concerned predominantly with the cost and leasing arrangements.	
A5.2 To make the Technology Planning courseware (R4.5) available to the Training and Retraining Commission. The courses are to be incorporated into Principals training programs	LSC, Training and Retraining Commission
A5.3 To revise the guidelines developed by MNEYS for technology expenditure in schools based on the concept of technology planning. The guidelines should insist that any technology related expenditure in excess of $ US 10 000 must be approved by the regional TRG and can onlybe approved after the TRG reviews the school's technology plan. As the TRG will not be established until 2000, submissions for approval incorporating the requirement for evidence of technology planning should be forwarded to the central unit established by MNEYS to review submission for the acquisition of leased hardware.	MNEYS

3.6 Establishing Support and Training structures

The successful implementation of technology in schools requires MNEYS' investment in a coordinated approach to training and support of the teaching staff.

Teachers require regular access to training programs which focus on the technology as a personal productivity tool and a tool for teaching and learning. The later programs can be integrated in any training programs currently conducted to support particular curriculum related training activities.

In addition, teachers require access to support material including:

- curriculum support documentation which highlight examples of how computer technology can be applied to support the set curriculum; and
- regular reviews of educational software with ideas on how it can be used in the classroom.

This should be published on Web sites which aims to help teachers on integrating information and communication technologies in each subject.
Collaborative activities between teachers should also be developed.

Ideally, a regional structure would be able to address the support and training needs of schools implementing educational technologies. This regional structure in turn requires central co-ordination.

MNEYS and CERD should investigate support structures already established and determine how best to provide computer technology support and training for schools.

Recommended activities

Activity	Responsibility
To progressively establish regional technology support units (RTSU) of technical and pedagogic leaders. The rate of establishing the units will depend on the take up rate of the schools. An estimate of three units in the first year to support the six regions is considered sufficient. **These teams are composed of technicians and teachers in other disciplines. The technicians could be informatics teachers.**	MNEYS & CERD
A6.2 To establish a central technology co-ordinating team (CTCT) headed by LSC to provide leadership and direction to the regional support structure. **Note: The LSC would be an ideal person to take on the lead role in the CTCT.** **These teams are composed of teachers and/or pedagogic counsellors in different subjects.**	MNEYS & CERD
A6.3 To conduct train the trainer courses for the regional support teams using material produced for lighthouse schools as a basis Course will be conducted twice, once for the first three units, then for the next three units.	LSC
A6.4 To offer training for 5% of teachers in each school in the second year of implementation and an additional 5% in the third year of operation.	RTSU & LSC
A6.5 To develop and publish technology curriculum support material for each subject area in primary, intermediate and secondary. The material should also identify and advise on classroom management issues and technical issues (for example establishing an Intranet, establishing a school wide network ..etc.)	CTCT in conjunction with Pedagogic **counsellors, RTSU, lighthouse**
A6.6 To conduct awareness seminars on the use of computer technology for teaching and learning to Pedagogic Counsellors	CERD, MNEYS and CTCT
A6.7 To co-ordinate the establishment of a database of software and peripheral units reviews. The information to be made available to teachers, first on paper, then electronically	CTCT in conjunction with Pedagogic counsellors
A6.8 To establish a resource rich centre in each region in which software, hardware and peripheral units are made available for teachers to try and evaluate. The Ecole Normale structures could be used for that purpose.	CERD, MNEYS. Management of centres would be the responsibility of the Ecole Normale manager

3.7 Implementing technology for teaching and learning and supporting hardware acquisition by primary Schools

In order to be informed and active participants in society, students need to be self directed learners, able to identify issues, pose questions, synthesise ideas and develop solutions to problems.

In response to demands on students, teachers need to identify the specific capabilities required and provide opportunities for students to develop them.

These capabilities which should be developed as students undertake their studies in each subject area from primary through to secondary education represent the relationship between attitudes, knowledge and skills, and are progressively refined throughout the student's education.

Activities will be similar in successive stages of learning, however, it is the degree of complexity, the sophistication of analysis and the level of independence in the selection and use of computer-based technologies that becomes more demanding throughout a student's school experience.

In each school year, as students use the computer technology as a tool for learning, they should develop their ability to:

- Use computer based technologies to locate, access, evaluate, manipulate, create, store and retrieve information.
- Express ideas and communicate with others, using computer based technologies
- Develop an awareness of the range of applications of computer based technologies in society
- Discriminate in the choice and use of computer based technologies for a given purpose
- Develop the confidence to explore, adapt and shape technological understandings and skills in response to challenges now and in the future.

In primary schools the computer should be used as a focus for group work and as a supplement to other teaching resources. It should rarely take central stage.

Whilst there is no need to introduce a formal informatics curriculum in the primary years, it is essential that through the day to day use of technology to support learning, all primary students reach a minimum set of technology related skills.

In time, these skills will surpass the basic skills which comprise the current Informatics curriculum for intermediate and secondary schools.

Schools should be encouraged to examine their modes of curriculum delivery and modify them by examining how computer technology can be used to enhance the
learning opportunities for their students and to ensure that the skills required of the students are acquired through their normal day to day activities.

To assist primary schools provide these learning opportunities, MNEYS must investigate options for hardware acquisition for primary schools. A model similar to that established for secondary and intermediate schools would be satisfactory. Emphasis, however should be on the distribution of computers across the school instead of the establishment of a computer lab.

Primary school within the intermediate schools classified as in greatest need will be provides by computer.

Recommended activities

Activity	Responsibility
A7.1 To develop a minimum technology skills for primary and Intermediate students and publish these for all schools.	CERD, MNEYS
A7.2 Establish a hardware acquisition strategy for primary schools 2.2 and 2.3. Each primary school to determine its own hardware configuration requirement based on their students' and teachers' needs. Publish acquisition guidelines. Funding would be dependent upon each school developing a computer technology plan which is approved by the regional TRG. The school should have an ICT co-ordinator for local support.	MNEYS, CERD & World Bank Co-ordinator

3.8 Expand the CERD educational web site and use it to promote the use of the Internet for educational purposes

CERD already has an Internet web presence. The website contains general information about CERD and curriculum related information.

The Website should be expanded to contain curriculum support material, and training information and should be a vehicle to foster greater collaboration between schools, teachers and their students.

There is a danger that multiple sites may be created to provide different information for schools. This would make it diffand impractical for schools to access this information. A more appropriate model is to establish one website which hosts information from various areas such as CERD and MNEYS.

Internet access by schools

The value of Internet as an educational and research tool for teachers and students cannot be underestimated.

The annual recurrent cost, estimated at $1000, however may prove to be prohibitive for many schools.

Accordingly, some measures must be pursued to minimise the cost to schools and maximise the opportunities for students to access the wealth of educational material and activities available on the Internet.

Recommended activities

Activity	Responsibility
A8.1 To establish and maintain an educational Internet website using the CERD website as a basis.	CTCT, MNEYS, CERD
A8.2 To negotiate a special price for Internet access for all schools and negotiates with the Government of Lebanon an exemption from timed local calls for use of Internet during school hours.	MNEYS

3.9 Related projects

Network planned to be built for distance education project should not only be used by the Ecoles Normales but by all the education community especially schools. This would eventually become a national academic network (see project Formation à Distance or FAD for details)

A number of projects currently underway are directly or indirectly affected by this project. These are:

1. General Education Project - sub component 21/2.2 and 3.5 – Extension of Schools and Building of New Schools

   This project is responsible for the refurbishment of some of the seriously damaged schools and building new schools. Architectural plans for these schools include specifications for networking a computer laboratory. The project funds allow for the establishment of computer laboratories for intermediate and secondary schools. Discussions were held with the project consultant regarding the specifications. Recommendations were made to ensure that a complete structured cabling solution (fibre

optics and category five) is established in each of the schools. This cabling solution is to provide for two outlets per classroom for data, audio and video connectivity.

2. General Education Project - sub component 1.4 - Devolution of responsibility pilot

This project aims to pilot a process of devolution of management responsibility to school principals. Fourteen schools are being nominated for the pilot. The criteria for nominating these schools is such that the some of the schools could be considered as lighthouse schools as defined in this project.

3. World Links program (World Bank initiative)

The World Links program will fund the establishment of computer laboratories in up to ninety schools in Lebanon over the next three years. The laboratories will be utilised by students to link via Internet mail with students from other World Link participating countries.

4. General Education Program – sub component 3.1 - Distance Education

The Distance Education project plans to implement distance learning for teachers utilising computer technology in schools in the fourth year of the project.

5. EMIS

The Education Management Information System will provide for a devolved structure whereby school information will be collected, recorded and analysed at the regional level. The data will then be available centrally for country wide analysis. The EMIS project also provides for improved management and decision support systems. The project will establish regional support units.

Recommended activities

Activity	Responsibility
A10.1 To develop detailed structured cabling specifications and incorporate them into the architectural design for new schools and schools scheduled for major refurbishment	Director of Informatics and Infrastructure consultant
A10.2 Specifications for computer lab setup developed for the Infrastructure rehabilitation project are made consistent with the recommended specifications (App D)	Director of Informatics and Infrastructure consultant
A10.3 The schools selected to participate in the devolution of responsibility should be considered for nomination as lighthouse schools provided they meet the specified criteria. Four of the new schools built to the specifications outlined in A10.1 should be nominated as lighthouse schools.	World Bank Co-ordinator
A10.4 Lighthouse schools should be nominated to participate in the World Links program	World Bank Co-ordinator
A10.5 Where possible and practicable, communication systems established for schools nominated as Distance Education Centres should be accessed by other computers used in the schools for educational purposes.	World Bank Co-ordinator

4. Inputs

The required inputs for the implementation of this project appear below. For clarity, the inputs appear in a corresponding manner to the activities listed in section 3.

4.1 Informatics Curriculum

Structures already exit within CERD to carry out each of the recommended activities without the need for additional costs, infrastructure or resources.

In discussions with the Director of the Informatics Department, it was agreed that the cost of publishing curriculum material and text books electronically will actually be less than the current budget for publishing the material in the conventional way.

Input	Estimate cost
I 1.1 Study alternative publication methods to informatics manuals	**$2 000**
I 1. To Train ITC Co-ordinators (module 2).	$34 000[3]

4.2 Establishment of computer laboratories

Input	Estimate cost
I 2.1 **Install 180 labs in secondary and secondary/intermediate schools**	**$1 854 000**[4]
I 2.2 **Install 400 computers in 160 intermediate schools and primary schools linked to intermediate schools in great need.**	**$600 000**[5]

4.3 Recruitment policies

Input	Estimate cost
I 3.1 Establish a team to review the recommended minimum computer technology proficiency standards for teachers in App E.	**$1 000**

[3] $20 x 5 days x 340 schools = $34 000;

[4] 1080 computers x $1000 per computer = $1080 000; 180 schools x ($2600 for a server + 300 $ for Hub + $400 for printer + $300 for modem) = $648 000; $100 per desk = $126 000. TOTAL $1 728 000

[5] 400 computers x $1000 per computer = $400 000; 160 schools x (300 $ for Hub + $400 for printer + $300 for modem) = $160 000; $100 per desk = $40 000. TOTAL $600 000

4.4 Establishment of lighthouse schools

Input	Estimate cost
I 4.1 Appointment of an International consultant	**$60 000**[6]
I 4.2 Equipment for LSC	**$10 000**[7]
I 4.3 Implement stage one	**$404 800**[8]
I 4.4 Implement stage two	**$134 000**
I 4.5 Implement stage three	**$258 000**

Note: As there are four schools the will be nominated from the newly built schools, funding for these schools may not be required immediately

4.5 Quality Control and school strategic computer technology plan

Input	Estimate cost
I 5.1 Develop and publish guidelines for the acquisition and lease of computer technology	**$13 500**[9]

4.6 Establishing Support and Training structures

Input	Estimate cost
I 6.1 Equipment for RTSU	**$99 600**[10]
I 6.2 Equipment for CTCT	**$20 100**[11]
I 6.3 Train 5% of workforce. Estimate 1 400 teachers @ $20 for 3 days	**$84 000**
I 6.4 Train an additional 5% of workforce.	**$84 000**
I 6.5 Develop and publish curriculum support material. Estimate of twenty days per subject @ $5 000 by ten subjects. Publication costs $ 10000	**$60 000**

[6] $10 000 per two weeks visit comprising $2000 flight, $5000 fees, $2250 per diem allowance; $750 ground travel; 6 visits = $60 000

[7] $10 000 for hardware and software

[8] Costing for stages one, two and three appear in App F.

[9] $13 500 per three weeks visit comprising 2000 flight, $7500 fees, $3000 per diem allowance; $750 ground travel

[10] 24 computers x $1000 per computer = $24 000; 6 regions x ($2600 for a server + 300 $ for Hub + $400 for printer + $300 for modem + $1500 for router+ $11000 for software and peripheral) = $96 600; $100 per desk = $3 000. TOTAL $99 600,

[11] 4 computers x $1000 per computer = $4000; $2600 for a server + 300 $ for Hub + $400 for printer + $300 for modem + $1500 for router + $11000 for software and peripherals; TOTAL $20 100

I 6.6 Establishment over a four year period of computer technology rich regional centres. Estimate at $25 000 per region	**$150 000**
I 6.7 **Training for regional support units RTSU and CTCT (8 weeks)**	**$57 000**[12]

4.7 Expand the CERD educational web site and use it to promote the use of the Internet for educational purposes

Input	Estimate cost
I 8.1 **Develop and maintain an educational web site.**	**$20 000**

5. Outputs

5.1 Informatics Curriculum

O1.1 Informatics Support Document distributed to all schools
O1.2 Revised Informatics Curriculum and support material distributed to schools in an electronic format.
O1.3 50 teachers identified and trained to deliver informatics curriculum in 1999
O1.4 180 teachers identified and trained to deliver informatics curriculum in 2000.
O1.5 A teacher in each secondary is identified and trained to be an Information and Communication Technologies co-ordinator in 2000.

5.2 Establishment of Computer Laboratories

O2.1 Recommended set of specifications distributed to all secondary and intermediate schools.

O2.2 Secondary schools will be provided by minimum hardware according to the specifications set up.

O2.2 300 schools identified to receive funding assistance for the acquisition of hardware.

O2.3 Hardware acquired and supplied fully configured to the 400 identified schools.

5.3 Recruitment policies

O3.1 Minimum proficiency standards established and published
O3.2 Recruitment policy established to incorporate minimum computer technology standards
O3.3 New teacher recruits are appointed on basis of possessing minimum computer technology skills

[12] Training and support sessions $14 250 for two weeks comprising $2000 flight, $10000 fees, $2250 per diem allowance; 4 training and support sessions = 57 000,

5.4 Establishment of Lighthouse

O4.1 Twelve lighthouse schools selected
O4.2 International consultant selected and services secured
O4.3 National Lighthouse School Co-ordinator appointed
O4.4 Phase one of hardware installed in schools
O4.5 Directors of schools and teachers attend level one training program.
O4.6 Computer Technology plans developed and published by each of the twelve schools
O4.7 Phases two and three of hardware installation completed
O4.8 Scope and sequence material developed by teachers for each subject area
O4.9 Lighthouse schools open for other schools to visit

5.5 Quality Control and school Strategic Plans

O5.1 Guidelines for computer technology acquisition developed and distributed to all schools
O5.2 Regional technology Groups established
O5.3 procedures in place to enforce computer technology acquisition guidelines

5.6 Establishing Support and Training structures

O6.1 Two staff members appointed as computer technology support officers in each region

O6.2 Central Technology Co-ordinating team established

O6.3 2 700 teachers trained on the use of technology for teaching and learning

O6.4 Pedagogic counsellors develop an awareness of how technology can support the teaching and learning process.

O6.5 Curriculum support material developed and distributed to schools

O6.6 Database of educational software and peripheral units reviews established

O6.7 Ecole Normale training centres equipped with software, hardware and peripheral units

5.7 Implementing technology for teaching and learning and supporting hardware acquisition by primary schools

O7.1 Minimum technology skills for all students are published and distributed to all schools.

O7.2 400 computers installed in 160 intermediate schools and used for educational purposes.

5.8 Expand the CERD educational web site and use it to promote the use of the Internet for educational purposes

O8.1 Enhanced and growing educational website for teachers and students.

O8.2 A special country wide pricing structure established for Internet services for all schools.

5.9 Technology Supporting Administration

O9.1 Guidelines developed for schools on how to use computer technology to improve administrative tasks.

O9.2 An average of administrative two staff members attend training courses on office automation available for school staff to attend

O9.3 Project established for the development or acquisition of a school administration system for use by all schools.

5.10 Related projects

O10.1 Specifications for the acquisition of computer hardware for schools is standardised across all projects

O10.2 Co-ordination between the various projects undertaking to install computer hardware in schools leads to efficiency and cost savings and minimises replication and duplication.

6. Implementation schedule

Appendix G provides a schedule for each of the activities identified in section 3.

The following high level matrix gives a birds eye view of the implementation schedule by year of implementation.

Many of the activities that appear in the earlier years of the project timeline are ongoing activities and will recur for the duration of the project life cycle.

Year	Activity
2001	• Implement phase three of computer setup in lighthouse schools • Establish regional training structures (in other three regions) • Conduct train the trainer courses for support officers in last three regions • Train 5% of teaching staff • Develop and publish curriculum support material for first group of subjects • Expand the technology rich centres • Expand and maintain website • Establish a project to acquire a school administration system • Conduct lighthouse schools training course (3) • Teachers from lighthouse schools develop scope and sequence material

Year	Activity
2002	• Develop and publish curriculum support material for second group of subjects • Continue to expand the evaluation database • Expand the technology rich centres • Train 5% of teaching staff • Negotiate special price for Internet access by all schools through one Service Provider
2003	• Implement recruitment policy. All teacher recruits must posses minimum skills in computer technology • Develop and publish curriculum support material for second group of subjects

7. Implementation modalities

As this project contains a large number of unrelated activities, details of responsibilities for each activity has been listed in section three.

8. Current Institutional framework and institutional measures to be foreseen for the execution of the project.

The implementation of educational technologies in public schools in Lebanon as outlined in the previous sections will succeed provided certain critical measures are undertaken. These are:

8.1 To support the implementation and evolution of the Informatics Curriculum

Critical

1. Establishing quality control processes to ensure that computer acquisition is based on educational objectives

2. Teachers training

Necessary

1. Adopting a standard set of hardware specifications

2. Revising the Informatics Curriculum and the production of additional support material

8.2 To introduce educational technologies In all schools

Critical

1 Developing and publishing minimum computer technology skills required for students.

2 Estabof lighthouse schools, and all the associated activities

3 Identifying intermediate / primary schools in greatest need and providing them with computer hardware.

3. Developing recruitment policies

4. Establishing central and regional support structures and their associated activities

Necessary

1. Conducting training for current teachers

2. Establishing a web presence with educational support material

3. Establishing an Internet service contract for all schools that is affordable

8.3 To introduce administrative computing

Critical

1. Developing and publishing support documents on how to use computer technology to automate current manual administrative processes

2. Conducting training courses on office productivity tools.

Necessary

1. Establishing a project to investigate the introduction of a centralised school administration system.

9. Cost estimates by category of expenses

Each *Input* item in section four is listed with its associated estimated cost.

Appendix H provides the required Cost estimate Annexes with details of how costs were calculated.

It should be noted that the computer technology industry is volatile and that the currency period of cost estimates is relatively short.

10. Indicators for activities assessment and impact. Define evaluation methods for measuring objective achievements.

Indicators of activities and evaluation methods are listed against the project objectives as defined in section two.

A suggested area within CERD or MNEYS which would be best suited to assess the relative success of the objective is also listed below.

Objectives	Evaluation/Measures of success	Responsibility
Immediate		
To support the establishment of computer laboratories in all secondary schools.	180 schools to offer the Informatics curriculum in 1999	Project Co-ordinator
To establish lighthouse schools to demonstrate the use of technology for teaching and learning	Twelve schools established as lighthouse schools and their teachers attend training courses	Project Co-ordinator
	Directors of Lighthouse schools develop comprehensive technology plans	LSC
	Teachers of Lighthouse schools use computer technology in their day to day classrooms to support learning in the majority of subject areas	LSC and Pedagogic Counsellors
	Neighbouring schools attend seminars and demonstrations conducted by lighthouse schools	LSC and regional directors

Objectives	Evaluation/Measures of success	Responsibility
Mid term		
To progressively enhance and expand the Informatics curriculum.	New topics for the Informatics Curriculum introduced with emphasis on collaborative learning and educational rather than vocational objectives	MNEYS and CERD
To develop support material for the use of technology for teaching and learning	Material produced demonstrating how computer technology can be integrated into the curriculum	MNEYS and CERD
	Website expanded and enhanced to include computer technology support material	MNEYS and CERD
Long term		
To establish a computer literate teaching service.	Minimum proficiency standards published and used as basis for teacher recruitment	MNEYS
	10% of teachers trained in computer literacy The training and retraining commission in conjunction with the Informatics Department should be able to maintain accurate figures	MNEYS and CERD
To promote and support the use of technology as a tool for teaching and learning in all schools.	As a minimum, the cumulative number of schools seeking to integrate computer technologies in the teaching and learning process should be as follows: 1% in 1999 5% in 2000 20% in 2001 50% in 2002 70% in 2003	TRGs and TCTC to maintain a record of schools implementing educational technologies. Pedagogic Counsellors to determine the extent of implementation in each school.
	Minimum technology skills for students are published and schools develop programs to ensure these skills are obtained by their students.	Pedagogic Counsellors
	160 intermediate / primary schools in greatest need identified and provided with computer hardware and software to support the teaching and learning process.	Project Co-ordinator

11. Conditions necessary for the project implementation, hypotheses made, risks foreseen, and sustainability of the project.

11.1 Conditions

A number of conditions should be imposed to ensure that the project is successful. These are:

Proposal	Conditions
Hardware funding proposals for secondary and intermediate schools	Developing additional support documentation for the Informatics curriculum
	Identifying, training and recruiting suitable Informatics teachers to teach in the nominated schools.
	Adoption of the recommended hardware specifications as the standard for all schools
Establishing phase one for lighthouse schools	Selection of the twelve participating schools is based on the criteria defined in this document
	Full time lighthouse schools co-ordinator
	Securing the services of an International consultant should be a condition for the establishment of the Lighthouse schools
Establishment of regional support centres and central technology co-ordinating team	Increased interest in the establishment of computer technology as a tool for teaching and learning.
Implementing phase two and three of lighthouse schools. Note: The implementation program for each school will vary. Implementation should be based on each individual school's readiness.	Development of comprehensive technology plans by participating schools
	Ongoing training provision for teachers of participating schools
	Actual changes in teaching methodology and adoption of computer technology as a tool for teaching and learning
	Teachers and directors of schools from neighbouring schools regularly visit lighthouse schools
Hardware funding for intermediate / Primary schools	Participating schools must be selected on a needs basis and must have developed appropriate technology plans after visited lighthouse schools.

11.2 Hypothesis made and foreseen risks

The project strategy is dependent on a number of factors. Delays in completing certain activities or failure to undertake some activities would jeopardise the success of the project.

The following lists the foreseen risks and the hypothesis associated with this project

Consultation with key officers from CERD and MNEYS regarding the risks and hypothesis took place during the writing period of this report.

1. Computer industry is able to provide computer hardware and support following a relatively sudden and large growth in their client base.

2. Computer industry able to provide volume discounts as indicated by their representatives during the consultation period

3. Ability for CERD and MNEYS to establish an independent body to select the secondary and intermediate schools and later on the primary schools most in need.

4. Ability for CERD and MNEYS to select the lighthouse schools most able to take carriage of this

5. Ability of the lighthouse schools to generate enough interest for other schools to express a desire to implement educational technologies

6. A suitable officer with appropriate background is identified for the position of lighthouse schools co-ordinator

11.3 Sustainability of the project

World Bank funding is being utilised in this project to establish support, training and demonstration structures that can foster a high level of interest in educational technologies at the school level.

Every effort should be made to ensure that during the next five years, as many schools as possible adopt educational technologies as standard tools for learning.

Once schools readily adopt educational technologies as part of their day to day routine, and once teachers are conversant with the computer technology, ongoing use of computer technology in schools will continue well after the conclusion of the project.

If the benefits of implementing educational technologies are translated into measurable improvements in student learning outcomes, as has been the experience in other countries, then funding for future upgrades, additional software, training and the development of support material will be readily justified.

Information was gathered from various sources ithe process of writing this report:

The International consultant wishes to acknowledge the assistance, information and advice obtained from the various officers listed below during the consultancy period.

A **Meetings were held with the following officers representing the World Bank, MNEYS and CERD**

Ministry of Education, Youth and Sport
Mr Nicolas Jammal, Director-General of National Education
Mr Toufic Homsi, Director of Secondary Education
Ms Najwa Fleihan, Pedagogical Counsellor
Ms Nachatt Habhab, Nabatiyeh Regional Office
Mr Chahadeh, Tripoli Regional Office
Informatics trainee teachers

National Centre for Educational Research and Development
Mr Kamal Stephan, Head of External Affairs, CERD
Mr Nabil Constantine, Chief of Informatics Department
Ms Bernadette Wakim, CERD consultant
Ms Yolla Charaf, CERD
Informatics department staff
Informatics trainers

General Education Project – Co-ordination Unit
Mr Benoit Millot, World Bank
Mrs Maria Luisa Fornara, World Bank Project Co-ordinator
Ms Youmna Sfeir, World Bank Assistant Co-ordinator
Ms Lina Fares Aoun, Infrastructure Rehabilitation consultant

B **National Consultant**

The International consultant was ably assisted for a period of two weeks by a National Consultant, Ms Grace Matta.

C **Visits were conducted to the following venues**

Ecole Normale training centres at
Bir Hassan, Jounieh, Saida, Nabatiyeh and Tripoli

Schools at
Almalaab Secondary school in Tripoli
Almina Secondary school in Tripoli
Bchamoun Secondary school in Mount Lebanon
St Charbel school K-secondary
Jesus and Mary School K-secondary

C **Meetings were held with the following industry representatives**
Digisys
HP
Microsoft
New Horizon
Computer Generations
Future Kids
Data Management

D **Presentation**

A major presentation on the role of computer technology in education was conducted on December 2. The presentation was attended by

Professor Abou Assali, President of CERD,
Heads of various Bureau at CERD
Chiefs of various Units at CERD
Chiefs of various academic/subject departments at CERD
Pedagogical Cousellors
Pedagogical Inspectors
School Principals
Mrs Maria Luisa Fornara, World Bank Co-ordinator
Ms Youmna Sfeir, World Bank Assistant Co-ordinator
Ms Grace Matta, National Consultant for this project

Appendix B

The following tables were derived from a data file of school information provided by the Director of the Informatics Department.

School distribution by region

Count of number	mouhafaza						
Name	**1**	**2**	**4**	**5**	**6**	**8**	**Total**
PS		5	28	1			34
P	1	8	34	5	3	6	57
P/PS	18	38	117	76	46	26	321
I	4	19	5	15	6	8	57
I/P/PS	14	147	137	126	72	65	561
I/P	10	27	66	5	3	7	118
S		29	18	14	5	5	71
S/I	14	24	24	18	17	11	108
S/I/P/PS		1					1
I/PS					1		1
Grand Total	**61**	**298**	**429**	**260**	**153**	**128**	**1329**

School distribution by size

Count of number	Population							
Name	0-50	51-100	101-200	201-500	501-800	801-1000	>1001	Grand Total
S	9	8	6	11				34
P	29	3	15	9	1			57
P/PS	124	75	68	46	5	3		321
PS	1							1
I/P/PS	38	76	154	231	50	7	5	561
I/P	11	15	21	46	22	2	1	118
	7	9	15	22	4			57
S/I		4	22	46	29	3	4	108
S/I/P/PS				1				1
	8	15	23	17	7		1	71
Grand Total	**227**	**205**	**324**	**429**	**118**	**15**	**11**	**1329**

Teacher population distribution

Name	1	2	4	5	6	8	Grand Total
PS		45	279	1			325
P/PS	346	611	1147	628	647	312	3691
P	18	126	285	32	10	56	527
I	82	417	108	294	99	116	1116
I/PS					4		4
I/P	289	826	1785	100	73	163	3236
I/P/PS	476	3997	3384	2640	1816	1407	13720
S		795	296	264	93	136	1584
S/I	684	821	794	517	662	254	3732
S/I/P/PS		38					38
Grand Total	**1895**	**7676**	**8078**	**4476**	**3404**	**2444**	**27973**

Recommendations for the evolution of the Informatics Curriculum

Pedagogic statement

The evolution of the Informatics curriculum should focus on the development of educational objectives that relate to the development of an understanding, and an appreciation, of the role of technology in the society and its application in business, commerce and the home. The practical nature of the curriculum should however be maintained throughout the evolution process.

The current Informatics curriculum is essentially an office training program. It can best be described as a vocationally driven curriculum. While this may be necessary in the current climate, it is essential that the curriculum evolves to be educationally driven.

Students should be given opportunities for example to learn to be discriminating users of technology, able to select the appropriate technology to solve a particular problem, rather than being exposed to one type of technology to be used to solve all types of problems.

The supporting textbook and teacher's guide should focus on an environment which fosters student collaboration and discussion as well as group work.

Expanding and extending the curriculum

The following topics should be considered for incorporation in any future development or review of the Informatics curriculum.

Some of the topics offered in the curriculum at present will no longer need to be covered in as much detail as they will be introduced in time by non Informatics teachers a tools for learning. This will provide the opportunity to revise the curriculum and incorporate some of the following suggested topics.

At the intermediate level:

People and technology applications
Computer systems are designed by people for use by people and their use affects other people. It is therefore necessary that students are aware of the people concerned with the design, construction and maintenance of a computer system such as analysts, designers, engineers, programmers and support personnel and with other people affected by computer systems such as direct users, intermediary users and indirect users.

Students also need to develop an understanding of the ways in which each of the applications being learnt is used by the community.

Stages in developing a computer solution
Students need to develop an awareness of the system development life cycle.

Defining the problem
Planning a solution
Designing a solution
Implementing the solution
Reporting the solution
Documentation

Communications
Students need to develop an awareness of data transfer processes within a computer system, between computer systems and between a computer and peripheral items.

Graphics
Students need to develop an awareness of the various input and output devices used in communicating messages in graphical forms. These include graphics tablets, light pens, video cameras, mouse, joystick, video recorders, plotters, color monitors, video tapes ..etc.

Modelling and simulations

Students need to develop an appreciation of the extent of which computers are used for modelling and simulation purposes. Examples from real life should be explored with students. Examples include computing formulae, flight simulators, business simulation, financial modelling, ecological simulations ...etc.

Monitoring and Control Systems

Students need to study computing as it applies to the monitoring of conditions in an environment and the processing of inputs from sensors to produce output signals which control the actions of some devices. The introduction of Lego Technics/Logo to extend the Logo course would be an advantage.

LOGO

The current content is based on rigorous mathematical concepts. Students with weak geometric skills will encounter great difficulty meeting the course requirements. Logo is included in the curriculum to introduce students to a problem solving environment and to programming concepts. This can be achieved with simpler examples and exercises which would not disadvantage a student who lacks geometry skills.

It is recommended that Logo be introduced to Mathematics teachers as an aid to teach geometry.

At the Secondary Level

Students should be exposed to a variety of technologies throughout the course.

Each student should also be given an opportunity to select one technology or topic and use it for a major study or assignment.

Discrimination

Students, having been exposed to a variety of application software and being confronted with a problem, should develop problem dissection and analysis skills leading to the selection of the appropriate technologsolution to effectively and efficiently solve the problem.

Graphics

The graphics component of the syllabus should be extended to incorporate vector based graphics and animation.

Desktop publishing

Students should produce a variety of documents that incorporate many of the features of accepted good design practices.

Computer Communications

Students should develop an understanding of network configurations (LANS, WANS) and topologies (Ring, Star, Bus) as well as network operations (mail, file and printer servers)

Internet technologies

Students need to develop an awareness of the impact of the Internet on the society in general and on the individual. Component features and services of the Internet should be explored including bulletin boards, eMail, electronic banking, electronic shopping, news, travel...etc.

Web publishing

Students should develop skills in publishing web pages to communicate different messages to the readers. E.g. personal, commercial, information provider web pages.

Social implications

Students should be able to identify issues, appreciate the effects and discuss the implications of the use of computers in society. The issues should include for example privacy, copyright and security issues, effect of technology on services to the public for example banking and shopping.

Recommended hardware configuration

1 Stand alone or workstations

The following configuration allows for the following options

a Stand alone computers to be used in individual classrooms

b Peer to Peer network with Win 95 or NT as the operating system to be used in a computer laboratory

c Workstations connected to an NT server to be used in a computer laboratory or across the school.

Component	Base stand alone/workstation	
Number		Between 1 and 12 depen
CPU	Pentium II 266 - 300 Mhz MMX	
RAM	64 Mb	
Hard drive	6GB IDE	
Floppy drive	1.44 Mb 3.5"	
Case	Desktop	
CD ROM	32 x CD ROM drive	
Video	4Mb SVGA	
Monitor	15" SVGA colour	
Keyboard	Enhanced 104	
Mouse	Microsoft compatible	
Sound		Creative Lab sound blast
Operating system	MS Win 95 or Windows NT workstation	
Ports	2 high speed serial, one parallel	
Network interface	PCI 10/100	
Cabling	Cat5	
Warranty		3 year parts and labour "r
Software to support the		Office 98 (Office Pro for I
Informatics curriculum	LOGO for Windows	
Other software	Netscape, VET virus protection software or equivalent	

Approximate cost per unit		$1,200
Approximate cost per 1000 units	$1,000	
Approximate cost per 9000 units	$750	

NOTES

- These costs have been derived at after discussing pricing structure with industry representatives. There is a likelihood of further reduction in prices if the MNEYS and CERD foster a good working relationship with the computer industry, as suggested in the report.

- Microsoft has established an Education Price Structure for its products for the Middle East region. This Education Price Structure offers up to 90% off the recommended retail price of any of its products. The costs also assume that improved pricing structures are offered by Microsoft for Microsoft Office.

Peripheral units & furniture

Quantity	Item
1 or 2	Inkjet parallel printer capable of 600dpi and more than 8pp ($400)
1	External modem - 33.6 K ($300)
10	Desk with a reasonable height and reasonable work bench area ($100 each)
1	16 port hub to support peer to peer and NT networking ($300)

Additional cost	$2,000

2 File server

The following configurations provide for an NT server to support a computer laboratory or across the whole school

OPTION 1	RAID SCSI drive
Component	**Fileserver**
Number	One
CPU	Pentium 2 300 Mhz MMX
RAM	192 Mb
Hard drive	2x9GB SCSI + 2 GB SCSI for system software
HDD Controller card	PCI SCSI RAID controller for Hard Drives PCI SCSI Controler for CD ROMS and Tape Backup
Floppy drive	1.44 Mb 3.5"
Case	Full Tower
CD ROM	1x32 speed CD ROM
Video	4 Mb PCI SVGA
Monitor	15" colour
Keyboard	Enhanced 104
Mouse	Microsoft compatible
Sound	Creative Lab sound blaster with stereo speakers and headphone jacks
Operating system	Win NT server
Ports	2 high speed serial, one parallel
Network interface	PCI 10/100
Backup	4/8 GB SCSI tape backup unit with appropriate NT compatible backup software.
Cabling	Cat 5
UPS	300VA nominal output capacity, Step sine wave, 16 min autonomy,
On battery alarm.	
Warranty	3 year parts and labour On site warranty
Software to support the Informatics curriculum	Office 98 (Office Pro for Intermediate/Primary schools LOGO for Windows
Other software	Netscape, VET virus protection software or equivalent
Approximate purchase cost	**$3,000**

OPTION 2	CD Juke Box	
Component	**Fileserver**	
Number	One	
CPU	Pentium 2 300 Mhz MMX	
RAM	192 Mb	
Hard drive	6GB IDE	
HDD Controller card	PCI SCSI Controler for CD ROMS and Tape Backup	
Floppy drive	1.44 Mb 3.5"	
Case	Full Tower	
CD ROM	4x32 speed CD ROM installed in server with SCSI controller card	
Video	4 Mb PCI SVGA	
Monitor	15" colour	
Keyboard	Enhanced 104	
Mouse	Microsoft compatible	
Sound	Creative Lab sound blaster with stereo speakers and headphone jacks	
Operating system	Win NT server	
Ports	2 high speed serial, one parallel	
Network interface	PCI 10/100	
Backup	4/8 GB SCSI tape backup unit with appropriate NT compatible backup software.	
Cabling	Cat 5	
UPS	300VA nominal output capacity, Step sine wave, 16 min autonomy, On battery alarm.	
Warranty	3 year parts and labour On site warranty	
Software to support the Informatics curriculum	Office 98 (Office Pro for Intermediate/Primary schools LOGO for Windows	
Other software	Netscape VET virus protection software or equivalent	
Approximate purchase cost		**$2,600**

3 Internet access

A Level one

Assumptions:

School already has a dedicated telephone line for use for the Internet
School wishes to use multiple eMail accounts for students using web based mail (e.g. Hotmail)
School wishes to cache websites for use offline and for quick online access
Costing is based on annual recurrent

Internet connection
Telephone charges
Router - Wingate
Net Nanny/Cyber Patrol filtering

Estimated cost per annum **$1000**

B Level two

Assumptions

Schools wishes to provide multiple non web based eMail accounts
Schools requiring an efficient and controlled environment

Mail server	Use one of the workstations
Proxy server	Use the NT Fileserver
	Can you use the same machine for both

APPENDIX E

Minimum computer technology skills for teacher recruits and for pre-service learning

Recommendations

1. All graduates of initial teacher education training courses will have as a minimum proficiency, skills in the following areas:

- Basic computer operational skills

The skills required should be:

An understanding of the function of the various components of the computer.

Use of a variety of software, including basic word processing, database and spreadsheet functions.

Information retrieval using CD-ROMS, Internet and other commercial programs

Preparation of graphics and art works

Simple desktop publishing

Drill and practice activities

- Information technology skills

The skills required should be:

Using multimedia and interactive presentation

Using the Internet and electronic mail program

Awareness of overall developments in communications and information technologies and of the potential these have for student learning.

Ability to find information, select appropriate applications and software for the classroom, organise material sequentially, assess the relevance of information and present it appropriately.

- Software evaluation skills

The skills required should be:

Ability to select and evaluate technology based learning materials

Ability to determine underlying pedagogical assumptions, gender bias, educational relevance, social impact and suitability for the class environment, for co-operative learning and for peer interact.

Ability to generate lesson plans

Ability to match computer applications to specific curriculum content and processes

Ability to evaluate computer software for educational purposes.

Ability to structure subject programs and lessons to incorporate useful and appropriate computer activities

Ability to evaluate learning from computer based activities

- Pedagogical skills for the classroom management such as the ability to create student centred learning environments, to develop innovative ways of using technology to enhance the learning environment and to encourage students creativity and research.

The key issue for computer proficiency is pedagogical

Important skills include

An understanding of how computer technology can enhance student learning and help learners explore their world

The management of classroom environment and school resources

The ability to use computers for administrative functions.

- Awareness of values and ethics related to the social and educational use of computers and associated software and applications.

  Recognising plagiarism

  Understanding issues of copyright, of censorship and of privacy

  Recognising issues of appropriate access to and verification of information gained from such sources as the Internet

  Interpersonal skills for working in environments where colleagues have a wide range of abilities in using the new technologies

Appendix F

Basis of costing for lighthouse schools

Costing is based on an average number of students per school = 500 (i.e. 6000 students)

Phase one

For each school:

- *Establish Computer laboratory with ten workstations and an NT Fileserver with Internet access for one year (less four schools to be funded by the Infrastructure Rehabilitation project.($16 000 for eight schools = $128 000)*
  $4000 Internet access to the four schools funded through the Rehabilitation project
- *Provide additional stand alone computers to bring about a ratio of students to computers of 20 to one (180 computers - $180 000)*
- *Provide $5000 budget for purchases of software and peripheral units for each school ($60 000)*
- *Provide $3000 budget for training for each school ($36 000)*

TOTAL $408 000

Phase two

For each school

- *Provide $3 000 budget for software and peripheral purchases ($36 000)*
- *Provide $3 000 budget for training ($36 000)*
- *Provide funding for annual Internet access ($12 000)*
- *Provide $50 000 budget for establishing a whole school network including structured cabling in a select number of schools.*

TOTAL $ 134 000

Phase three

For each school

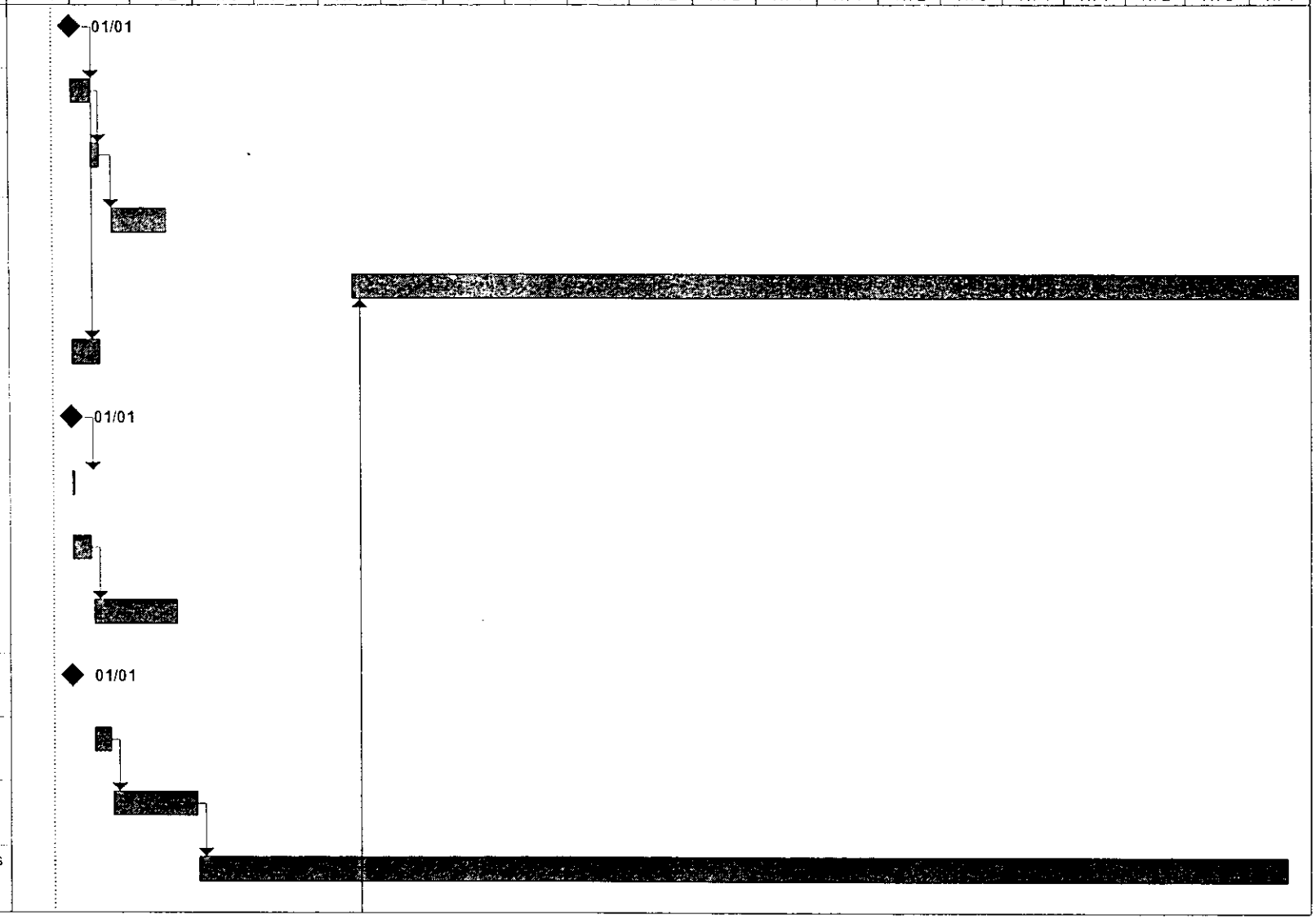
- *Provide additional stand alone computers to reduce the ratio of students to computers to 15 to one (100 additional computers $100 000)*
- *Provide funding for annual Internet access for three remaining years ($36 000)*
- *Provide $3 000 budget for software and peripheral purchases ($36 000)*
- *Provide $3 000 budget for training ($36 000)*
- *Provide $50 000 budget for establishing a whole school network including structured cabling in a select number of schools.*

TOTAL $ 258 000

Grand Total $800 000

Appendix G

N°	Task Name
1	**1.Informatics Curriculum**
2	1.1 Develop Informatics curriculum support material
3	1.2 Establish review process
4	1.3 Establish alternative mechanism for publication
5	1.4 Expand Informatics curriculum
6	1.5 Identify and train additional teachers
7	**2. Establishment of computer l;aboratories**
8	2.1 Adopt specifications
9	2.2 Identify schools in need
10	2.3 Install hardware in identified schools
11	**3. Recruitment policies**
12	3.1 Establish minimum skills requirements
13	3.2 Establish recruitment policy
14	3.3 Use proficiencies as basis for T&D

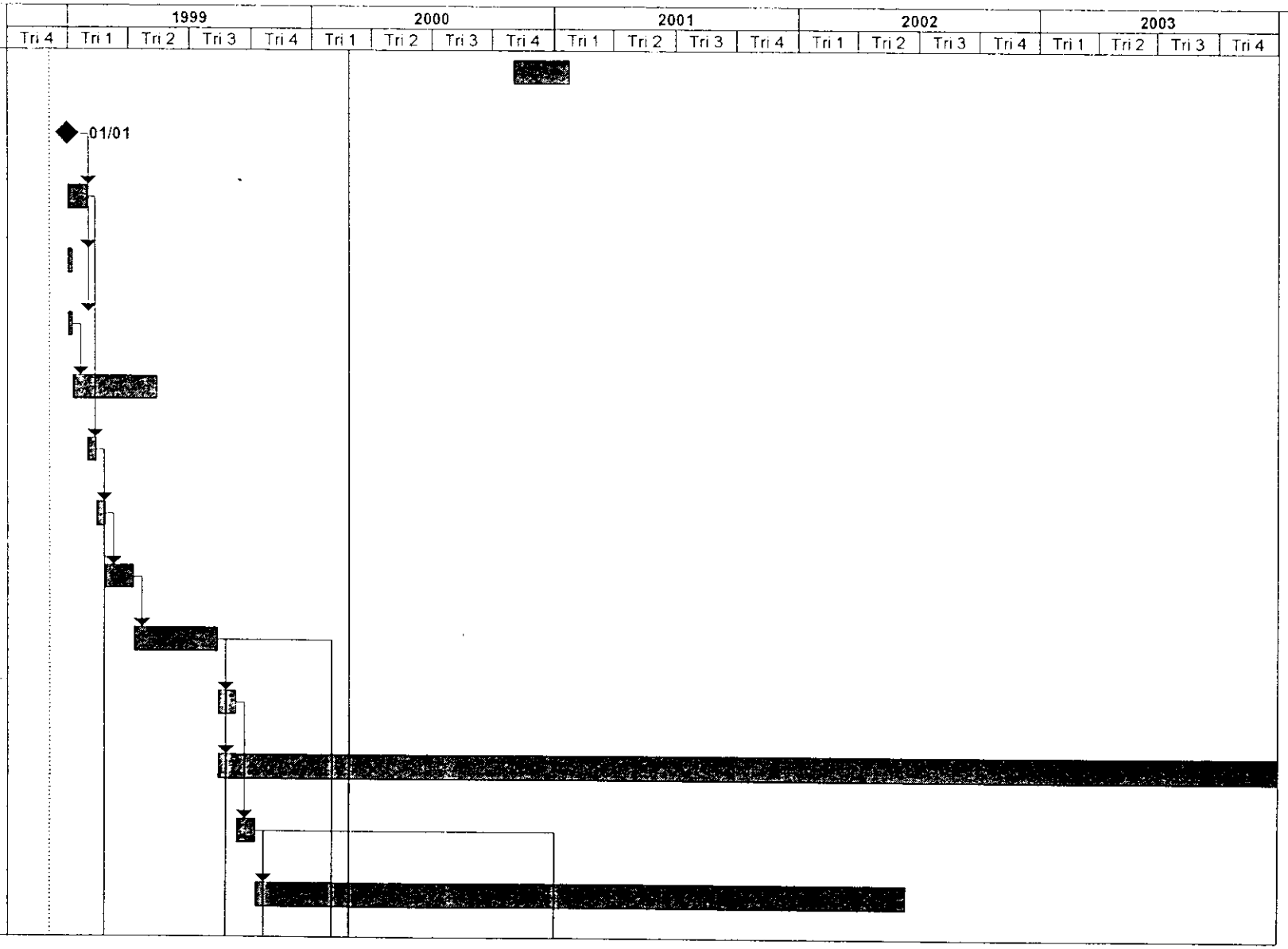


Project:
Date: 03/12/98

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

To be revised -

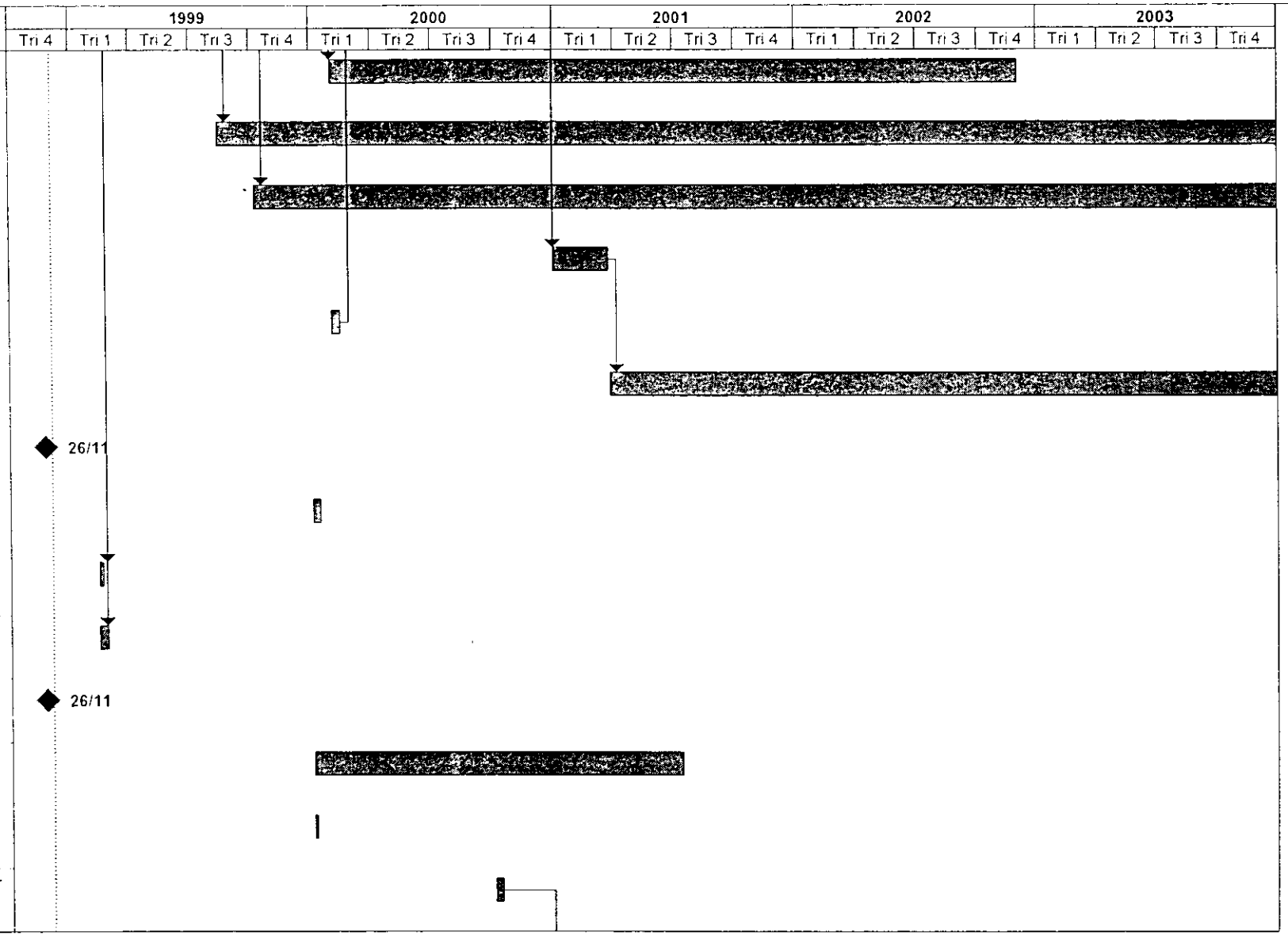
N°	Task Name
15	3.4 Tertiary institutions develop graduate certificate courses
16	**4. Establishment of lighthouse schools**
17	4.1 Identify schools
18	4.2 identify International consultant
19	4.3 Appoint Lighthouse school co-ordinator
20	4.4 Implement phase one of computer setup
21	4.5 Develop and conduct technology planning course for directors of schools
22	4.6a Develop training course material (1)
23	4.6b Conduct training (1)
24	4.7 Schools develop technology plans
25	4.8 Develop training program (2)
26	4.9 Develop review mechanism & periodically review progress
27	4.10 Conduct training course (2)
28	4.11 Teachers maintain journal



Project:
Date: 03/12/98

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

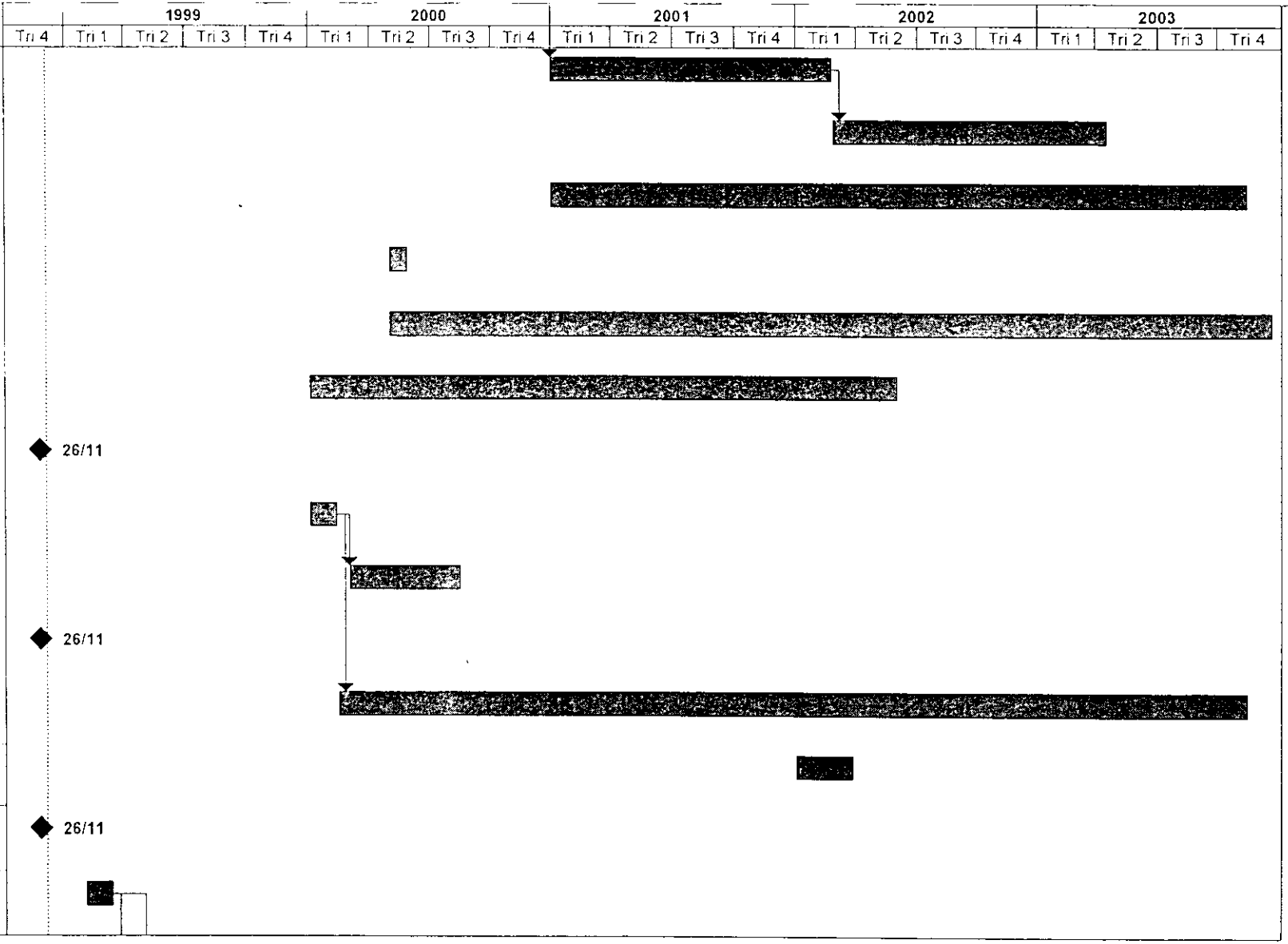
N°	Task Name
29	4.12 Implement phases 2 and 3 of computer setup
30	4.13 Arrange visits from neighbouring schools
31	4.14 Directors address seminars
32	4.15 develop and deliver training program (3)
33	4.16 Trial Informatics curriculum changes in schools
34	4.17 Develop scope and sequence documentation
35	**5. Quality control**
36	5.1 Establish TRG
37	5.2 Provide technology planning couseware to Training commission
38	5.3 Develop and publish acquisition guidelines
39	**6. Establish support and training structure**
40	6.1 Establish regional structure
41	6.2 Establish CTCT
42	6.3 Conduct Train the Trainer courses



Project:
Date: 03/12/98

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

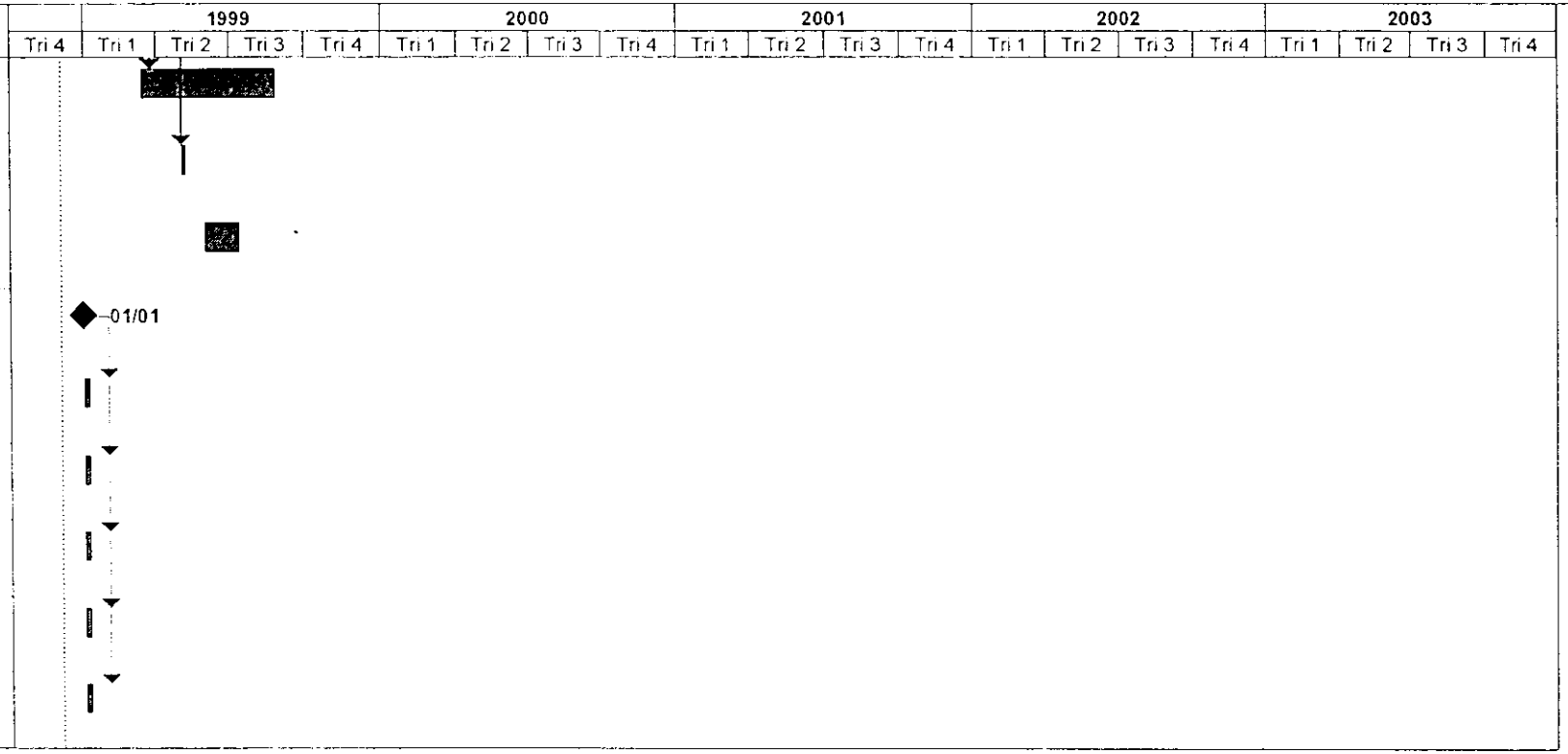
N°	Task Name
43	6.4 Train 5% of teachers
44	6 4a Train an additional 5% of teachers
45	6.5 Publish curriculum support material
46	6.6 conduct awareness seminars for pedagogic inspectors
47	6.7 Establish evaluation database
48	6.8 Establish resource rich centres
49	**7. Implement technology for T&L**
50	7.1 Develop minimum technology skills
51	7.2 Identify primary schools in greatest financial need
52	**8. Expand Website**
53	8.1 Expand and maintain website
54	8.2 negotiate a special price for Internet access for all schools
55	**9. Technology supporting administration**
56	9.1 Publish guidelines



Project:
Date: 03/12/98

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

N°	Task Name
57	9.2 Conduct training
58	9.3 Allow schools to submit data electronically
59	9.3 Establish separate project for the implementation of a nation wide system
60	**10. Related projects**
61	10.1 Incorporate detailed structured cabling specifications into building
62	10.2 Hardware specifications are made consistent across all projects
63	10.3 Consider nominating schools selected for devolution as lighthouse
64	10.4 Nominate lighthouse schools for the world links project
65	10.5 Investigate if lighthouse schools can host the distance education teacher training



Project:
Date: 03/12/98

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

Appendix H

Annex 1/a
Cost estimates by activity and quantity/year

General Education project: Lebanon
Ministry of National Education/NCERD - World Bank

Component: Quality and Efficiency
Sub-component: introduction of new technologies for pedagogical purposes

Objectives	No. ***	Activity	Timeframe	Cabling	Equipment	furniture	National consultants	International consultants	Workshops seminars	Operational costs *	TOTAL
Support establishment of computer labs	I 2.1	Install 180 lab in secondary and secondary/complementary schools	Year 1		$1,728,000.00	$126,000.00					**$1,854,000.00**
	I 2.4	Install 400 computers in 160 complementary schools	Year2		$560,000.00	$40,000.00					**$600,000.00**
Establish lighthouse schools	I 4.1	Appointment of International consultant	Year 1					$60,000.00			**$60,000.00**
	I 4.2	Equipment for LSC	Year 1		$10,000.00						**$10,000.00**
	I 4.3-5	Implement stages one, two and three	Year1-Year 4	$100,000.00	$580,800.00	$8,000.00			$108,000.00		**$796,800.00**
Enhance Informatics curriculum **	I 1.1	Establish a team to investigate alternative publication modes and enhancements to the Informatics curriculum	Year 1							$2,000.00	**$2,000.00**

Annex 1/a
Cost estimates by activity and quantity/year

General Education project: Lebanon
Ministry of National Education/NCERD - World Bank

Component: Quality and Efficiency
Sub-component: introduction of new technologies for pedagogical purposes

Objectives	No. ***	Activity	Timeframe	Cabling	Equipment	furniture	National consultants	International consultants	Workshops seminars	Operational costs *	TOTAL
Develop support material to support T&L	I 5.1	Develop and publish technology planning guidelines	Year 2					$13,500.00			**$13,500.00**
	I 8.1	Develop and maintain an educational website	Year 1				$20,000.00				**$20,000.00**
	I 7.1	Research and publish minimum computer technology skills for students	Year 2							$2,000.00	**$2,000.00**

Annex 1/a
Cost estimates by activity and quantity/year

General Education project: Lebanon
Ministry of National Education/NCERD - World Bank

Component: Quality and Efficiency
Sub-component: introduction of new technologies for pedagogical purposes

Objectives	No. ***	Activity	Timeframe	Cabling	Equipment	furniture	National consultants	International consultants	Workshops seminars	Operational costs *	TOTAL
Establish computer literate teaching service	I 3.1	Establish a team to review minimum computer technology proficiency skills	Year 1							$1,000.00	**$1,000.00**
	I 6.3	Train 5% of teachers	Year 3						$84,000.00		**$84,000.00**
	I 6.4	Train 5% of teachers	Year 4						$84,000.00		**$84,000.00**
Promote and support use of technology for T&L	I 6.1	Equipement RTSU	Year 2		$99,600.00						**$99,600.00**
	I 6.2	Equipment CTCT	Year2		$20,100.00						**$20,100.00**
	I 6.5	Develop and publish curriculum support material	Year3-Year5				$60,000.00				**$60,000.00**
	I 6.6	Establish computer technology rich centre	Year3		$150,000.00						**$150,000.00**
	I 6.7	Training for RTSU and CTCT	Year2					$57,000.00			**$57,000.00**
	I 1.7	Training ITC co-ordinators	Year1						$34,000.00		**$34,000.00**
TOTAL				**$100,000.00**	**$3,148,500.00**	**$174,000.00**	**$80,000.00**	**$130,500.00**	**$310,000.00**	**$5,000.00**	**$3,948,000.00**

** The cost of producing curriculum support material electronically will be offset against the existing budget for the production of this material in printed form
*** **Numbers above correspond to the activity numbers in section four (INPUTS) of the project document**

Annex 1/b

Cost estimates by activity and quantity/year

General Education project: Lebanon
Ministry of National Education/NCERD - World Bank

Component: Quality and Efficiency
Sub-component: introduction of new technologies for pedagogical purposes

(*) Hardware breakdown by unit cost			Sec/Int		Int/Pri		Lighthouse	
	Item	Unity cost	Units	TOTAL	Units	TOTAL	Units	TOTAL
Schools	Workstation	$1,000.00	1,080	$1,080,000.00	400	$400,000.00	360	$360,000.00
	Hubs	$300.00	180	$54,000.00	160	$48,000.00	8	$2,400.00
	Modem	$300.00	180	$54,000.00	160	$48,000.00	8	$2,400.00
	Printer	$400.00	180	$72,000.00	160	$64,000.00	8	$3,200.00
	Server	$2,600.00	180	$468,000.00			8	$20,800.00
	Internet access	$1,000.00					12	$12,000.00
	Internet access for four more y	$4,000.00					12	$48,000.00
	Software and peripherals	$11,000.00					12	$132,000.00
				$1,728,000.00		**$560,000.00**		**$580,800.00**
	TOTAL			**$2,868,800.00**				
Centres	LSC			$10,000.00				
	CTCT			$20,100.00				
	Regional centres (RTSU)			$99,600.00				
	Technology rich centres			$150,000.00				
	GRAND TOTAL			**$3,148,500.00**				

Annex 1/b

Cost estimates by activity and quantity/year

General Education project: Lebanon
Ministry of National Education/NCERD - World Bank

Component: Quality and Efficiency
Sub-component: introduction of new technologies for pedagogical purposes

(*) Hardware breakdown by year of expenditure

	1	2	3	4	5	TOTAL
Lighthouse	$360,800.00	$48,000.00	$148,000.00	$12,000.00	$12,000.00	**$580,800.00**
Secondary	$1,728,000.00					**$1,728,000.00**
Complementary		$560,000.00				**$560,000.00**
LSC funding	$10,000.00					**$10,000.00**
CTCT		$20,100.00				**$20,100.00**
Regional centres (RTSU)		$99,600.00				**$99,600.00**
technology rich centres			$150,000.00			**$150,000.00**
TOTAL	**$2,098,800.00**	**$727,700.00**	**$298,000.00**	**$12,000.00**	**$12,000.00**	**$3,148,500.00**

(**) Workshops breakdown by unit cost

Unit cost for training is $20 per day per person		Number	cost	incidents	TOTAL
Training of 5% of teachers	1400 @ $20 per day	1400	$20.00	3	**$84,000.00**
Training of 5% of teachers	1400 @ $20 per day	1400	$20.00	3	**$84,000.00**

Annex 1/b

Cost estimates by activity and quantity/year

General Education project: Lebanon
Ministry of National Education/NCERD - World Bank

Component: Quality and Efficiency
Sub-component: introduction of new technologies for pedagogical purposes

Special funding for lighthouse schools		12	$9,000.00	1	**$108,000.00**
Training ITC co-ordinator	1 person per equipped school for	340	$20.00	5	**$34,000.00**
TOTAL					**$276,000.00**

(**) Workshops breakdown by year of expenditure

	1	2	3	4	5	TOTAL
Training of 5% of teachers			$84,000.00			**$84,000.00**
Training of 5% of teachers				$84,000.00		**$84,000.00**
Special funding for lighthouse schools	$36,000.00	$36,000.00	$36,000.00			**$108,000.00**
Training ITC co-ordinator	$34,000.00					**$34,000.00**
TOTAL	**$70,000.00**	**$36,000.00**	**$120,000.00**	**$84,000.00**	$0.00	**$276,000.00**

(***) National consultants by unit cost

	unit cost	number	years	
Develop and maintain an educational website	$20,000.00	1	1	$20,000.00
Develop and publish curriculum support material	$60,000.00	1	1	$60,000.00
TOTAL				**$80,000.00**

(***) National consultants by year of expenditure

Annex 1/b

Cost estimates by activity and quantity/year

General Education project: Lebanon
Ministry of National Education/NCERD - World Bank

Component: Quality and Efficiency
Sub-component: introduction of new technologies for pedagogical purposes

	1	2	3	4	5	TOTAL
Develop and maintain an educational web	$20,000.00					**$20,000.00**
Develop and publish curriculum support material			$30,000.00	$30,000.00		**$60,000.00**
TOTAL	$20,000.00	$0.00	$30,000.00	$30,000.00	$0.00	**$80,000.00**

(***) International consultants by unit cost

	unit cost	number	years	
Appointment of International consultant	$60,000.00	1	1	$60,000.00
Develop and publish technology planning guidelines	$13,500.00	1	1	$13,500.00
Training for RTSU and CTCT	$57,000.00	1	1	$57,000.00
TOTAL				**$130,500.00**

(***) International consultants by year of expenditure

	1	2	3	4	5	TOTAL
Appointment of International consultant	$30,000.00	$30,000.00				**$60,000.00**
Develop and publish curriculum support material		$13,500.00				**$13,500.00**
Training for RTSU and CTCT		$28,500.00	$28,500.00			**$57,000.00**

Annex 1/b

Cost estimates by activity and quantity/year

General Education project: Lebanon
Ministry of National Education/NCERD - World Bank

Component: Quality and Efficiency
Sub-component: introduction of new technologies for pedagogical purposes

TOTAL	$30,000.00	$72,000.00	$28,500.00	$0.00	$0.00	$130,500.00

(***) Cabling

	unit cost	number	
Cabling of hightlight schools	$250.00	400	$100,000.00

TOTAL $100,000.00

(***) Cabling

	1	2	3	4	5 TOTAL
Cabling of hightlight schools		100000			$100,000.00

TOTAL $100,000.00

Republic of Lebanon
Office of the Minister of State for Administrative Reform
Center for Public Sector Projects and Studies
(C.P.S.P.S.)

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