MINISTRY OF PUBLIC EDUCATION
REPUBLIC OF UZBEKISTAN

ICT IN BASIC EDUCATION

PROJECT FEASIBILITY STUDY

FINAL DRAFT REPORT

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Contents

i) Abbreviations

ADB	Asian Development Bank
AL	Academic Lyceum
BEP	Basic Education Project (WB)
BETDP	Basic Education and Textbook Development Project (ADB)
CAR	Central Asian Republics
CED	City Education Department
CISD	Central Institute for Staff Development
CLS	Cluster Leader School
COM	Cabinet of Ministers
CPD	Continuous Professional Development
CRT	Cathode Rag Tube
CSSE	Centre for Senior Secondary Education
DDIP	Digital Development Initiative Programme
DE	Distance Education
DEDC	Distance Education Development Centre
DIDA	Diploma in Digital Applications
DS	Direct Supply
DTP	Desk Top Publishing
EA	Executing Agency
ECDL	European Computer Driving License
EFA	Education For All
ELT	English Language Teaching
EMIS	Education Management Information System
ERIMU	Education Reform Implementation Monitoring Unit
ESDP	Education Sector Development Project (ADB)
EU	European Union
FCUPE	Free Compulsory Universal Primary Education
FSU	Former Soviet Union
FUPE	Free Universal Primary Education
GDP	Gross Domestic Product
GOU	Government of Uzbekistan
IASC	Inter-Agency Steering Committee
ICB	International Competitive Bidding
ICDL	International Computer Driving License
ICT	Information and Communication Technologies
IDEPCL	Institute for Development of Education in Professional Colleges & Lyceums
INSETT	In-Service Teacher Training
IRR	Internal Rate of Return
IS	International Shopping
JICA	Japanese International Cooperation Agency
LCB	Local Competitive Bidding
LCD	Liquid Crystal Display
LRC	Learning Resource Centre
LSA	Living Standards Assessment
MDG	Millenium Development Goals
MLA	Monitoring Learning Achievement
MOE	Ministry of the Economy
MOF	Ministry of Finance
MOHSSE	Ministry of Higher Education and Specialised Secondary Education
MOLSP	Ministry of Labour and Social Protection
MOMES	Ministry of Macroeconomics and Statistics
MOPS	Ministry of Power Supplies

MOPE	Ministry of Public Education
NPBED	National Programme for Basic Education Development
NPER	National Primary Enrolment Rates
NPPT	National Programme for Personnel Training
NPV	Net Present Value
OECD	Organisation for Economic Cooperation and Development
OED	Oblast Education Department
OFD	Oblast Finance Department
PC	Professional College
PEAKS	Participation, Education and Strengthening Project (USAID)
PISA	Programme for International Student Assessment
PRESET	Pre-Service Teacher Training
PSC	Project Steering Committee
RCU	Regional Coordination Unit
REC	Republican Education Centre
RED	Raion Education Department
RITTI	Regional In-Service Teacher Training Institute
RSPL	Republican Scientific Pedagogic Library
SDF	School Development Fund
SDT	School Development Tax
SEN	Special Educational Needs
SES	State Education Standards
SME	Small & Medium Enterprises
SNE	Special Needs Education
SRIPS	State Research Institute for Pedagogic Science
SSEP	Senior Secondary Education Project (ADB)
STC	State Testing Centre
STDP	Second Textbook Development Project (ADB)
SSVE	Specialised Secondary and Vocational Education
SWS	Students' Work Station
TCO	Total Costs of Operations
TFT	Thin File Transfer
TOT	Training of Trainers
TRS	Textbook Rental Scheme
TRF	Textbook Revolving Fund
TVE	Technical and Vocational Education
TWB	Talking Web for the Blind
TWS	Teacher's Work Station
UNDP	United Nations Development Programme
UNESCO	United Nations Educational Scientific and Cultural Organisation
UNICEF	United Nations Children's Fund
UPE	Universal Primary Education
UPS	Uninterrupted Power Supplies
USAID	United States Agency for International Development
UzACI	Uzbekistan Agency for Communications and Information
WB	World Bank
WIMAX	Worldwide Interoperability of Microwave Access
WS	Work Station

I. RATIONALE: SECTOR PERFORMANCE, PROBLEMS AND OPPORTUNITIES

A. Performance Indicators and Analysis

1. Basic Education in Uzbekistan starts at age seven and comprises Grades 1 to 9 with an additional two years of high school in Grades 10 and 11. This 11-year system is due to be phased out from 2010 when it will be replaced by a 12-year system, which will provide 3 years of specialised education after Grade 9 either in Academic Lyceums or in technical and vocationally oriented Professional Colleges. The re-structuring of basic and senior secondary education described above has dominated government education budgets for the past few years and has affected the funding of basic education.

2. According to MOPE official enrolment data, in 2003/4 there were 594,984 pre-school students[1], 6,093,277 students enrolled in basic education and 650,483 students in specialised secondary education. This figure is expected to decrease over the next 5 years. The decrease will result from the transfer of approximately 600,000 grade 10 and 11 students to senior secondary specialised education as part of the planned re-organisation of secondary education. In addition, grade 1 enrolments have already started to decline by approximately 10-20,000 students per year since 2000 as a result of falling birth rates and an aging population[2]. Basic education roll numbers should start to stabilise at around 5.3 million in grades 1-9 in 2010. In 2004, there were 9,757 basic secondary schools, of which 2006 (20.7%) were located in urban areas. This percentage has been relatively stable for the past 10 years. Of the enrolled students approximately 40% are in Grades 1-4. It is estimated that 70-75% of total student enrolment attends basic schools in rural areas.

3. It is currently estimated by MOPE that 98% of the cohort is enrolled in school. However, the level of attendance may be a problem, particularly in poor rural Oblasts such as Kashkadarya, Sukandarya and Karakalpakstan. The 2002 WB Living Standards Assessment Study reported that national average daily attendance at school in 2002 expressed as a percentage of school enrolments was only 78% and that in some poor Oblasts it had declined to below 40%. The real costs and the opportunity costs of education were thought by the WB to be the main factors that had an impact on attendance at school. However, MOPE's records for 2004 record an average national daily attendance rate of 96.4%. In 2004 MOPE figures record that only 0.35% of students did not progress beyond Grade 9, down from around 5% in 2003. Almost 100% of students who enrol in Grade 1 complete schooling up to Grade 5. The ratio of boys to girls in basic education is virtually 1:1 and 99.5% of the population is literate[3]

4. Immediately after independence in 1991 there was a period of decreasing expenditure on education caused by the financial stresses of transition from the soviet system. From the

[1] There are 7 languages of instruction operating in the basic education system – Uzbek, Russian, Karakalpak, Kazakh, Tajik, Khirgyz and Turkmen.
[2] See WB Public Expenditure Review (2003) and JIBC Education Sector Study (2005)
[3] Gender differentials begin to appear in senior secondary education and are quite marked in higher education in terms of significantly lower levels of enrolment and choice of courses for females. In 2004, 45% of enrolment in senior secondary schools was girls and 55% was boys. The girls showed a marked preference for specialities covering education, medicine and social work

late 1990s education expenditure has been re-established as a high GOU priority and has increased every year in both nominal and real terms since 2000. Real education expenditure growth rates have averaged more than 9% per year over the past six years. Growth as a percentage of GDP has remained at over 7% since 2001 and is currently (2005) 8.4%[4]. The OECD average is 5.1% for the same period. Education expenditure as a percentage of total GOU expenditure is provided in Table 7 of Appendix 13.5. Within the education sector, basic education had been relatively under-financed for some years. In 2004 pre-school enrolment was just 8.0% of enrolment in basic and senior secondary education but received 14.1% of the total budget allocated to these three sub-sectors[5]. Per capita expenditure on senior secondary has been more than double the basic education figure for the past few years[6]. However government expenditure on basic education has started to increase again in recent years. From 2000 to 2005, expenditure on senior secondary as a percentage of total education expenditure has fallen from 39.7% to 31.6% and expenditure on Basic Education has risen from 45.5% to 50.3% over the same period and is projected by the MOF to continue to rise. Expenditure on basic education as a percentage of total education expenditure has increased by an average of 0.8% per year for the past 6 years

5. Despite increasing education expenditure in both nominal and real terms, the system continues to be characterised by low (but improving) student:teacher ratios, small (but increasing) class sizes[7], low (but improving) teacher workloads, a large number of support staff in schools and emerging regional differentials in the allocation of funds for basic education.

6. In an attempt to diversify funding sources in order to support the strong GOU commitment to maintaining high levels of investment in education, the GOU started to decentralise education financing down to Oblast and Raion levels from 2000. In 2005 65% of the national education budget is Raion financed, 22% is Oblast financed and only 13% comes from the Republican budget. Only 5 out of 14 administrative regions in Uzbekistan raise sufficient revenue to cover their expenditure requirements and the Republican budget is used as a safety net to cover any shortfalls between income and expenditure on a regional basis. Unfortunately, decentralisation without minimum per capita allocations has led to increasing differentials in the levels of funding applied to education at both Oblast and Raion levels. In recognition of this, a USAID/MOF experiment in per capita financing in Akkorgan Raion, Tashkent Oblast, suggests the possibility that there will be a switch away from the current 'norms' based budgeting system. The national adoption of a per capita financing and budgeting system could ensure that every school receives enough money to maintain basic minimum standards

7. In addition to the decentralisation of education funding the GOU has also explored cost recovery and cost reduction strategies, an increase in formal and informal contributions from parents and a campaign of income generation. The higher education sector has been far more successful at this with the introduction of a programme of student financial contracts for higher education entry[8]. Although this has generated substantial extra funds for higher education institutions it has also reduced access to higher education for the poor and has thus had a

[4] This is still a provisional figure. The final figure may be somewhat higher than this when full data is available
[5] MOF data, April 2005
[6] In 2004 per capita expenditure on senior secondary was more than 6 times the figure for basic education, but this is almost certainly a one-off anomaly caused by heavy capital expenditure in senior secondary during this year.
[7] In urban areas teachers complain about large class sizes of 30-35 students.
[8] The average value of these contracts is reported to be around US$500, an impossible sum for many students from poor areas

damaging impact on education equity. Many students in basic education now believe that higher education will be too expensive for them to afford[9].

8. The GOU has attempted, and largely succeeded, in maintaining education investment as a high priority at least since the late 1990s and very particularly since 2001. Simultaneously it has attempted to introduce educational reforms through restructuring senior secondary (supported by ADB's Senior Secondary Education Project), liberalising and privatising much of higher education, re-structuring and decentralising education financing, attempting to reform the curriculum to reflect Uzbekistan's newly independent status, re-motivating an underpaid teaching force and shifting towards a style of education that will prepare Uzbekistan for life in the global economy in the 21st century. It has also attempted to put in place subsidies and additional support for the poor, although at present the targeting of these subsidies needs to be improved

B. Analysis of Key Problems and Opportunities

1. Problem Analysis

9. The re-structuring of educational financing has led to a number of radical transformations in the funding of basic education.

10. **Deteriorated School Conditions and Problems with e-Readiness:** There has been a decline in physical capital investment in the basic education budget. Capital investment costs for basic education suffered during the period of transition up to 2000 and have continued to fall from 4.5% of total budget in 1999 to 1.3% in 2004 and to zero in 2005[10]. Despite the strong priority and the increasing levels of GOU expenditure allocated to education, the long period of under-funding in the basic education sector from 1991 to 2001, and specifically the neglect of the investment budget, has taken a heavy toll on the fabric and condition of the basic school system. Many basic education schools are now in seriously bad condition and are in need of urgent rehabilitation. This problem has been recognised by government and was the underlying motivation for the National Progamme for Basic Education Development (NPBED). It will have an impact on the speed of installation of ICT facilities in schools because many schools do not have adequate premises or satisfactory electrical wiring to accept safely new ICT hardware.

11. **Increased Salary Component of the Recurrent Budget:** Teachers' salary costs as a percentage of the basic education budget have risen. This is partly the result of under-funding on other recurrent budget heads but it also represents an increase in incentives and bonuses paid to teachers' over the past two years. For many years teacher salaries in basic education schools had been losing value. In 2004 the average teacher's salary was reported to be just 65% of the average public sector salary[11]. Teacher morale had deteriorated as a result and many teachers had either sought to leave the profession altogether or had taken on second jobs wherever they could. MOPE's plans for continued curricula and syllabus review and reform as part of the Second Textbook Development Project (STDP), its plans for teacher re-training and upgrading via the Education Sector Development Project (ESDP) and the ICT in Basic Education Project will depend very heavily on teacher support and motivation. Over the

[9] Results of PPTA student focus group discussions in April and May 2005
[10] In 2005 major capital investment to rehabilitate and re-equip basic schools is provided via the extra-budgetary School Development Fund raised through a 1% tax on enterprises
[11] The WB estimate for Gross National Income per capita in 2003 was US$420 per year

past two years the MOPE has introduced a number of reforms in teachers pay, including incentive bonus schemes. Teachers can now receive additional payments for (a) working in rural areas; (b) working in special needs schools (100% top up); (c) for taking on the responsibility of a class teacher in addition to being a subject teacher; (d) for overall good performance as evaluated by colleagues; and (e) for undertaking training to teach ICT in addition to Maths or Physics. The combined impact of these various bonus and incentive schemes has been a significant increase in the costs of teachers' salaries and social payments. While these cost increases are necessary to restore morale and commitment they are also projected to take the salary and associated social costs to close to 90% of the recurrent basic education budget compared to 65% in 2000 and 76% in 2003. This in turn will create pressure on the recurrent operational budget allocations to schools, which are absolutely necessary to support the introduction of ICT facilities and their effective classroom use in subjects across the curriculum

12. **Under-Funding of Teacher In-Service Training:** The WB 2004 Public Expenditure Review commented that the under-funding of basic education had had a particularly severe impact on in-service teacher training, which in turn affects the ability of the system to introduce new curricula and new teaching and learning strategies and methodologies. Effective INSETT delivery is also an essential prerequisite for the large-scale introduction of ICTs into basic education. The most basic disadvantages of the current INSETT system are that the training provided to teachers is occasional rather than regular and is residential rather than close to the school (which is a disadvantage for the high proportion of women teachers who do not necessarily wish to leave their families for 4 weeks at a time). It is also largely unrelated to current school or education priorities. The ESDP is attempting to address some of the current teacher upgrading problems by the development of distance education as an alternative means of INSETT delivery and the development of new course modules in association with A Avloni ITTI. However, the fundamental requirement is to develop the INSETT system so that it is decentralised, closer to the schools and provides more frequent opportunities for continue professional upgrading[12]. These are critical issues for the teacher training support needed to launch a major program of ICT in every basic school in the country.

13. **Declining Operational Budgets for Schools and Increased Parental Contributions:** Government expenditure on textbooks, methodological guides, school libraries, other teaching and learning materials and basic consumables has fallen to low levels. In 1998 the provision of free textbooks to all students was terminated and since then parents have been required to finance basic textbooks themselves, first through direct purchase and latterly via a textbook rental scheme, which significantly reduced textbook costs to parents and was very popular as a result, but which also transferred the costs of textbooks and teachers' guides from government to parent[13]. As learning materials and consumable budgets have disappeared or reduced, so have budgets for most other components of normal operational costs. The result has been increased demands from schools for parental contributions to maintain basic services. This, in turn, has increased the costs of basic education to parents, which has a potentially adverse impact on access to basic education for the poor. Inadequate operational budgets also will have an adverse impact on the rapid development of ICT across the curriculum because ICT operational costs are likely to be relatively expensive[14] and without the necessary supporting budgets there is a strong

[12] In 2005 the profile of in-service courses for teachers includes nothing for teachers of children with Special Education Needs, which appears to be a very low priority

[13] The design and introduction of this initiative was funded by the ADB's BETDP

[14] Current estimates derived from the IREX School Connectivity Project suggests that operational costs to cover maintenance and servicing, electricity and consumables could be as much as US$8 per workstation per month i.e.

likelihood that the equipment will cease to be used because many parents, particularly poorer parents in rural areas, will not be able to afford to pay the required contributions

14. **Curriculum and Assessment:** The MOPE has initiated a number of curriculum reviews but in 2005 the Uzbek curriculum remains recognisably a 'soviet' curriculum characterised by a large number of specialised subjects, often allocated only one or two periods a week[15], a very high level of content and a requirement for the memorisation of facts, rather than the development of skills. The GOU/MOPE remains committed to curriculum reform as the essential basis for a new student-centred and skills-based approach to both basic and specialised secondary education and another curriculum review is included in the STDP. Curriculum Reform is also specifically referred to as a priority by the GOU's National Plan for Basic Education Development (2004)

15. The current student rating system in schools is very unpopular with students, teachers and parents. It is time-consuming for teachers (who often have to use up 50 per cent of lesson time completing the ranking sheets, thus putting further pressure on an over-loaded curriculum), it is not understood by parents and it does not support the kind of education that the GOU/MOPE aims to achieve, because it is based on constant testing, frequently of factual recall. At present it probably represents a significant barrier to the introduction of ICT across the curriculum

16. **Poverty Targeting:** The GOU recognises the plight of the poor and attempts to assist by the continued provision of free textbooks to all Grade 1 students. It also continues to provide each school with textbooks for up to 15% of the school enrolment, which are held in the school textbook library for borrowing by the poorest students. Winter clothes and shoes are also provided to the poorest 15% in each school. Unfortunately, this support to the poor is not well targeted. Levels of poverty vary greatly from school to school[16] but the GOU's poverty support is provided on the basis of a uniform 15% of school roll numbers for every school in the country. Part of the problem is that poverty data is only easily available on an Oblast basis. Establishing accurate poverty data on a raion or a school basis has so far proved to be elusive, although most Makhallas maintain records of economically vulnerable families.

17. **Lack of ICT Facilities in Schools:** There has been particular concern over the slow pace of development over ICT facilities in basic education. Only 18% of basic schools have a "modern" computer set (defined as IBM compatible, Pentium I or better PCs). A further 41% of schools still maintain Soviet generation computers (e.g. Privats, Zenits, etc) but 40% of schools have no access to any computer facilities whatsoever. Informatics is a compulsory subject in the curriculum and the informatics syllabus (taught from grades7-9) has been designed to be theoretical rather than practical. As a result, many schools teach informatics with very little practical, hands on computer activities for students. COM Decree 200 of June 2002 established a broad national strategy for long term ICT development in Uzbekistan. In 2004 National Programme for Basic Education Development (NPBED) required the provision of computer laboratories to every school in Uzbekistan by 2010.

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a school with 10 workstations plus a teacher's workstation might need 11 workstations x US$8 x 12 months = $1056 per year as a basic operational budget

[15] In Sept 2005 a new Informatics Syllabus will be introduced into grades 5, 6 and 7. In grades 5 and 6 this subject will be allocated just 30 minutes per week (1 period) and only 60 minutes per week in grade 7.

[16] In a recent survey of 30 Makhallas in 14 regions the percentage of economically vulnerable families living at or below the local poverty threshold varied from 2% to 97%.

18. **Financial Sustainability:** ICT is expensive in terms of initial investment, hardware replacement costs, direct school-based recurrent costs (consumables, servicing and maintenance and electricity/telecommunications) and in indirect recurrent costs (teacher training, e-Materials, supervision, monitoring and management, curriculum and assessment reform etc). The GOU must develop financial strategies to ensure that the current planned large-scale investments are provided on the basis of strong planned preparation (availability fo INSETT, e-Materials etc), can be used effectively when installed (access to direct adequate operational budgets) and can be replaced and sustained at the end of their expected replacement cycle

190. **Prioritisation of Subjects and Grade Levels for ICT:** The MOPE wishes to provide a basic computer suite of variously 10 + 1, 14+1 or 18+1 work stations to every school in the country, irrespective of location or poverty level by 2010. This level of provision would create a computer:student ratio of between 1:35 and 1:50, which is insufficient to support the use of ICT across the curriculum in all subjects and all grades. Thus, the MOPE will have to prioritise subjects and grade levels where ICT can be used. Following the experience of other FSU countries it is possible that MOPE's prioritisation will be Languages, Maths and Science for grades 5-9

20. **Infrastructural Issues:** The GOU's plans to provide every basic education school with a computer suite are inhibited by widespread problems in power supply throughout the country outside Tashkent, which range from consistent lack of power during the school day, to sudden power surges, which can damage equipment, to unpredictable load-shedding. Telecommunications are also not sufficiently well-developed to support Internet use nationally and many rural areas would not easily be able to utilise Internet access unless Wireless or V-SAT connections were available. Costs are also very variable with rural areas using dial-up connection sometimes paying up to 5-10 times more for Internet than users in Tashkent

21. The GOU/MOPE recognises through the National Program of Basic Education Development that the fabric, condition and learning outputs of the basic education sector are in urgent need of investment and re-financing. It recognises that a significant injection of funding will be required in order to restore quality to the sub-sector and has created the School Development Fund as an extra-budgetary source of finance in order to achieve comprehensive and rapid upgrading. It recognises also that substantial increases in recurrent budgets will be needed in order to support the capital investments. The process of re-allocation of funds in basic education has been underway for some time with significant cuts in the percentage of education budget allocated to the specialised senior secondary sector over the past five years and significant increases in the basic education budget over the same period. Further increases in basic education recurrent budgets are projected from 2006 onwards as a means of addressing the recurrent budget issues associated with increasing basic education quality. Finally, the government is concerned with the content of basic education and wishes to use investment in basic ICT facilities to all schools as a means of levering changes in learning objectives and outputs and in learning/teaching methodologies.

22. In the achievement of the government's goals specified above there are a number of obstacles to overcome. These can be summarised as follows: (i) many of the target basic education schools are not in a condition to receive sophisticated computer hardware. This problem will be resolved in time by the GOU's major programme for the rehabilitation of schools, which has already started in 2005 and which is scheduled to cover every school in

the country by 2009 but it will inhibit attempts to increase the pace of ICT installations; (ii) many schools in rural areas in some of the poorer Oblasts (Kashkadarya, Sukhandarya, Karakalpakstan) do not have reliable access to power supplies during the school day. This problem might be resolved by having schools reclassified as priority electricity users, which would mean that they would only rarely be affected by load-shedding and power cuts. Self evidently, there is no point in providing schools with equipment that requires constant electricity if there is no reliable power supply; (iii) Many schools lack any knowledge of computers of any kind and have no knowledge or expertise with which to manage and maintain computer suites or the basic school networks with which they will be supplied. They also have no concept or experience of using computers in cross-curricula learning. It is inevitable that there will have to be a major in-service training component just to enable computers to be installed, used and managed in schools. GOU/MOPE plans suggest that between 3000 and 6000 schools could be equipped with modern computer rooms in the next 18 months. The ideal minimum training requirement is that there should be at least one staff member (and preferably two) in each school who have been trained to manage and maintain the computer rooms and the school network and that this training should precede hardware installation. Thereafter, there will be an on-going need for constant subject teacher up-grading, which in turn will depend upon the development of a 'close-to-school' in-service training capacity; (iv) the computer facilities will rapidly become inoperable if arrangements are not in place for efficient maintenance and servicing. It is already clear that the maintenance and servicing arrangements even for the 18% of schools that already have IBM compatible computer facilities are often notional rather than effective and this requirement will have to be addressed by the project; (v) basic operational budgets to purchase electricity and consumable supplies for all new equipment (chemicals, paper, ink cartridges, toner, disks etc) must be in place. Experience already demonstrates that lack of operational budgets has a major impact on the services that schools can provide. MOPE/MOF are aware that the effectiveness of their investment proposals will depend upon the provision of adequate operational budgets. Thus, the MOPE's decision to invest in school rehabilitation and re-equipment could lead to the resolution of the total operational budget problem for schools. It should be a conditionality of any ICT project that adequate operational budgets are guaranteed by MOPE/MOF.

23. It is clear that the GOU investment in ICT facilities for all basic schools will have very substantial cost implications. The provision of a computer suite of 10+1 computers to every school would require an initial capital investment of around US$100 million and a combined annual replacement and recurrent cost budget of around US$30-35 million thereafter. A GOU decision to aim for an 18+1 computer suite for every school would obviously almost double these financial requirements. Under these circumstances the GOU has requested the ADB's assistance in the development of a National ICT Strategy for Basic Education and a draft of this strategy document is attached as Appendix 2. The need for active cost reduction strategies is clear from the size of the required investments and the scale of the likely on-costs needed to maintain and utilise the initial investments effectively in pursuit of GOU/MOPE educational objectives. Thus, the strategy document underlines the urgent need for government to consider the "Thin Client" option in the supply of computer suites to schools[17]. Thin client options suffer from a degree of inflexibility (although improved technology is addressing this problem) and do not permit full multi-media use but at the current early stage of Uzbekistan's ICT development plans this is likely to be of less significance because the basic school system needs considerable work to make it ready for ICT introduction into schools. On the other hand there seem to be substantial cost advantages in the use of the

[17] A description of the differences between thin and Fat Client options is provided in Appendix 18

Thin Client option, which could reduce investment costs by 10-30%, and replacement and recurrent costs by around 50%

25. The costs of ICT provision are unlikely to be very much cheaper in Uzbekistan than in economically developed countries. As a result ICT related costs will represent a much higher percentage of the total basic education budget in Uzbekistan than in developed economies. Under these circumstances there is a clear need for the GOU to plan its ICT investment strategy carefully in order to ensure maximum effectiveness and sustainability. This in turn requires a consideration of the longer term cost implications of all investment decisions and a conscious policy of cost reduction wherever possible and expedient. It is entirely understandable that MOPE wishes to push ahead with computer provision as fast as possible but it is also important to recognise that the basic education system (including individual schools) needs to be thoroughly prepared for the arrival of ICT hardware in order to avoid expensive and wasteful mismanagement potential non-usage. The proposed national ICT strategy for basic education is intended to assist GOU/MOPE to develop prudent, sustainable and cost effective strategies.

26. The National Strategy for ICT in Basic Education recognises that Uzbekistan is not ready financially, educationally or infrastructurally for a major ICT development. It therefore proposes a phased approach to ICT Development in Basic Education with the period 2006-2010 as the 1st Phase. The objectives of this phase would be to (a) provide access to modern computers to all basic schools; (b) to create a national network of school clusters, which could be used to focus initial investment and training into Cluster Leader Schools (CLSs), which in turn would then be able to work with other schools in the clusters to develop e-Readiness to receive and use hardware installations and to provide local level training, practical support and collaborative working as the basis for the creation of a school-based programme of continuous professional development for teachers; (c) to provide intensive training via the RITTI system to teachers and school staff in school network management, ICT use in priority curriculum subjects and grades, continuous professional development and school administration and management using computers; (d) to start the process of developing and making available software and e-Learning Materials in Uzbek and other school languages; (e) to reform SES, syllabuses and assessment systems to support the use of ICT within the curriculum; (f) to develop sustainable financial capacity in order to support ICT development; and (g) to launch a national Monitoring and Evaluation system, which will provide the detailed feedback on which the next phase of development can be planned.

2. Government Strategy

27. The government impetus for ICT development in Uzbekistan was launched by a Presidential speech in Parliament in May 2001, in which the President urged the Government to formulate a general ICT development strategy in support of the country's social, cultural and economic future. A Presidential Degree - ***On Further Development of Computerisation and Introduction of Information and Communication Technologies*** of May 30, 2002 established a national ICT Steering Committee, and created the Uzbek Agency of Communication and Information (UzACI) to act as the executive body for the Steering Committee. The wider national ICT strategy has been supported by UNDP

28. The promulgation of the ***Programme of Further Development of Computerisation and Introduction of Information and Communication Technologies for the Period 2002-2010*** (COM Decree #200 of June 6, 2002 plus numerous later attachments) confirmed the policy directions and the priority given to national ICT development. Within the Basic

Education sub-sector the funding for the initial investment in hardware and systems (estimated at around US$100 million over the next 5 years) will come largely from the SDF but the GOU has reached agreement with the Chinese government for a trade credit of US$20 million for hardware provision to the sub-sector and the GOU is also in discussion with the US and Korean Governments on additional financial support for hardware provision.

29. In recognition of the need for major investment in the sub-sector, the GOU/MOPE launched the ***National Programme for Basic Education Development 2004-2009*** in May 2004, and in June 2004 launched the **School Development Fund** as an off-budget financing mechanism designed to provide the substantial investment funds required to upgrade buildings, facilities and equipment to adequate minimum standards in all basic education schools.

30. The National Program for Basic Education Development aims to provide emergency support to the basic education system by (a) providing financial support to improve poor physical conditions through capital reconstruction and repairs to school buildings and facilities; (b) equipping all basic schools with new laboratories and modern computer rooms with furniture and equipment; (c) providing free textbooks and pedagogical materials to teachers; (d) reviewing and improving all curricula and syllabuses; (e) ensuring that rural areas are provided with highly qualified teaching staff and new approaches to classroom methodologies through improved INSETT and PRESETT as well as increasing teacher incentives to work in the more deprived areas; and (f) developing the sports activities in schools through the provision of sports equipment to all basic schools

31. in order to finance the NPBED for the period 2004-2009 the School Development Fund (SDF)[18] has been established. The main objectives of the SDF are (a) to accumulate sufficient funds to meet priority upgrading needs; and (b) to finance civil works for the rehabilitation of basic schools and the provision of a minimum package of furniture and laboratory, computer and sports equipment. The Fund is financed by a 1% tax on enterprises and by contributions from sponsors and local government. The Management Council of the SDF is chaired by the Prime Minister.

32. In 2005 the SDF is targeted to raise 146 billion UZS (approximately US$145 million), of which 71% will be spent on civil works and repairs and 29% will be spent on equipment procurement and installation. The procurement of ICT hardware for basic schools represents 5.8% of the total spend from the SDF for 2005

33. It is still unclear whether the SDF mandate will go beyond 2009, when the NPBED will be fully implemented. The current mainstream education financing system does not seem likely to provide sufficient resources to maintain the incremental costs incurred as a result of the NPBED to cover both replacement and recurrent costs of equipment (particularly for the ICT program for basic schools) as well as the need for continued and on-going maintenance and further rehabilitation of schools. The future of the SDF beyond 2009 is thus a potentially critical issue for future education financing policy. In the meantime the MOPE and MOF are now aware of the implications for the longer-term recurrent budget of a major investment in equipment, which will require provision for replacement costs and operational budgets in order to make the investments effective.

[18] COM Decree No. 263 of 7 June 2004.

34. The GOU/MOPE's aims for investing in ICTs in Basic Education are consistent with Uzbekistan's overall long-term development goal of raising people's living standards, and with the strategic objectives of the education sector as set out in the National Program of Personnel Training as well as the National Program of Basic Education Development. GOU/MOPE aims (a) to improve the quality and relevance of education for all students in Uzbekistan by the introduction and stimulation of new learning and teaching approaches and methodologies, which focus on the development of skills and higher order thinking across all curriculum subjects rather than on the accumulation and memorisation of factual knowledge; (b) to create as quickly as possible a computer literate workforce and society that can compete and prosper in the global market place of the 21st century; and (c) to apply a conscious "Pro-poor" strategy in the provision and development of ICT services to basic education schools so that no school should be excluded from participation as a result of cost or location. It is intended that all schools – rich/poor, urban/rural – should receive as far as possible the same services and benefits from the GOU's investments in ICT

35. The proposed ICT in Basic Education Project is therefore perceived by the GOU to be the first step in the creation of a solid platform within a revitalised basic education sub-sector, on which a much longer term developmental process toward the integration of ICT into the education system and into the wider social and commercial life of the country can be based. The draft National Strategy for ICT in Basic Education in Uzbekistan (see Appendix 2) clearly articulates this incremental approach to ICT development

3. ADB Strategy

LAN WU TO PROVIDE TEXT FOR THIS SECTION

36. The ADB's education strategy in Uzbekistan continues to be conformable with its wider objectives of poverty reduction, human development and economic growth with special emphasis on pro-poor strategies, equality of educational opportunity and the achievement of gender equity

37. Three out of four recent ADB education projects in Uzbekistan (BETDP, ESDP and STDP) have focused on the basic education sub-sector because this is the sub-sector that has the most impact on the lives of the majority of Uzbek children and citizens and on the lives of the poor.

38. ADB's past education investments in basic education in Uzbekistan have concentrated on quality improvements, capacity building, the liberalisation and privatisation of educational materials production, improved operational transparency, equity issues, cost reduction and financial sustainability strategies, and strategies to improve the targeting of support to the poorest.

39. The ICT in Basic Education Project seeks to maintain and develop all of these policy principles

4. External Assistance to Education in Uzbekistan

40.. The ADB has been by far the single biggest source of external funding for the education sector in Uzbekistan. The most significant other donors are listed below:

41. USAID have a number of relevant education projects including an Internet connectivity project covering approximately 60 schools that has provided valuable information on the costs and issues involved in developing ICT in basic education schools in both rural and urban areas. USAID also has interventions on a pilot school basis in teacher re-training and materials development to support student-centred learning and Community Mobilisation in support of schools. It is also financing the decentralised per capita school financing pilot project and supporting donor coordination in the education sector

42. UNICEF has also been a long time supporter of education in Uzbekistan. They have tended to operate through pilot project activities rather than national interventions. However, their school-based EMIS will be adopted by MOPE and extended to national coverage. UNICEF has also invested in the concept of Child Friendly Schools, Early Learning, Monitoring Learning Achievement, Inclusive Education and Global Education. A new MLA exercise is currently in planning and should be launched in June 2005, which should provide important feedback on school and student performance.

43. UNESCO' maintains in Bangkok an ICT Unit within the Asia and Pacific Regional Bureau for Education which concentrates on sharing and disseminating information on ICT developments from all of the countries in the region. Within Uzbekistan UNESCO has (a) developed a number of software programmes for education, which are now available on the IREX website; (b) provided funding (along with other donors) for the development of a national EMIS; (c) developed informal ICT approaches via the Silk Road Radio "edusoaps"; and has (d) funded 10 Community Learning Centres with a variety of training activities ranging from pre-school education, to skills training in crafts and basic business skills (e.g. marketing, *accounting etc*)

44. The WB is preparing a basic education project, which is scheduled for implementation in 2006. The WB project has consulted with ADB and there is no significant overlap between the WB intervention and the activities of any of the ADB projects, past or in planning. Indeed, the current WB Basic Education Project seeks to build on innovations from other projects. For example, it will be funding library materials to go into the pilot libraries created as part of STDP and it seeks to extend the per capita financing system currently being pilot tested by USAID/MOF. It also plans to supplement the 70 ADB Learning Resource Centres with up to 200 additional LRCs. It will also contribute to the improvement in school and teacher quality through an investment on improved school management

5. Lessons Learned

45. A recent UNESCO report on ICT experiences in the Asia and Pacific region underlines the importance of an integrated ICT policy approach, which combines investment in hardware side by side with the sustainable professional development of teachers, the integration of ICT within the curriculum and syllabuses and close monitoring and evaluation of activities. The UNESCO report comments that an integrated approach is essential in order to avoid expensive project failures[19]. This is very relevant for Uzbekistan where ICT strategy for basic education still tends to be hardware led and dominated with inadequate consideration for the other factors which will largely determine whether the hardware investment will be successful.

[19] Infoshare Sources and Resources Bulletin UNESCO ICT Unit for Education in Asia and the Pacific 2004 Volume 6 page 2

46. A majority of countries (e.g. the UK, France, Finland, Russia, Romania etc) have confirmed the importance of on-going teacher training both in upgrading teachers' ICT skills and confidence and in the use of ICT as part of normal teaching and learning in the classroom. The point here is that intensive in-service teacher and technician training are needed not just to prepare the system and launch the strategy but are required to be provided as on-going support. A Cambodian project – *Establishing the Effective Use of ICT in Education for All* – has as its main objective the strengthening of the training and professional development of teacher trainers, teachers and non-formal education facilitators in the integration of ICTs into mainstream education.

47. A number of countries of the FSU have the same basic curriculum problem as Uzbekistan because their existing curricula are so overloaded that they represent practical barriers to methodological change and thus to the effectiveness of plans for the introduction of ICT. It is encouraging that GOU/MOPE now recognise this problem and that curriculum reform is now highlighted as a major objective of the NPBED

48. Projects and Policies in Ukraine, Russia, Armenia and Romania have all recognised the importance of a rapid development of software and appropriate e-Learning materials in national languages of instruction. Without a good stock of appropriate software for teachers and students to use across a variety of subjects and grades the large investments in hardware are rapidly rendered ineffective.

49. The integration of ICT into education started a long time ago in France, and thus there is much previous experience, both good and bad, to learn from. The main programme failures in the past have come from disseminating hardware without enough software content and without sufficient teacher training and from the difficulties in maintenance and technical assistance – all important issues in the Uzbekistan context. As a result clear priorities have been established in France for developments over the next few years and these include (a) the development of a Masterplan for the design of work environments; (b) a major investment in content provision and design; and (c) the development of teacher training standards and certification specifically for ICT[20]

50. Romania has developed a national strategy for ICT development in school education, which is supported by a number of donor funded and private sector initiatives. The aims of the Romanian strategy are (a) to develop a technical and information environment to support educational reform; (b) to ensure that ICT is widely used in education; and (c) to improve the processes of teaching and learning. In order to achieve these aims it has developed the following core strategies: (a) development of the necessary infrastructure at all levels of education; (b) intensive training of teachers to use ICT as a resource for teaching; (c) training school heads in ICT; (d) training students to use ICT as a learning resource; (e) producing educational software geared to curricular requirements; (f) boosting open and distance education in support of ICT; and (g) involving the private sector in the acquisition of equipment and materials and in teacher training. It is clear from the Romanian experience, and from the experiences of most other countries, that hardware led investments without adequate system preparation and training are likely to be doomed to failure.

51. Past experience in many other countries has also demonstrated the importance of adequate operational budgets in schools and the adverse impact on teaching and learning

[20] Information about ICT in Education in France can be found on the web site http://www.educnet.education.fr/eng/

created by the need to constantly call on parents to make up budget shortfalls with contributions in cash or kind. Such a requirement also makes education less attractive and less possible for poor families. Thus, the issue of recurrent budgets to support basic education in general and ICT in schools in particular is now an issue of very wide significance, which is essential not just for the effective introduction of ICTs into Basic Education, but also underpins a wide range of other learning and teaching activities in schools. Armenia has recently attempted to launch a computer revolving fund to encourage parental contributions for at least a part of the substantial cost of ICT hardware but has run into problems in finding a commonly affordable level of contribution that is acceptable for both rich urban and poor rural areas. Uzbekistan could easily face similar problems with parental contributions to meet ICT cost of operations

52. A brief Summary of ICT Experiences in other countries is provided in Appendix 31

II. THE PROPOSED PROJECT

A. Goals and Objectives

53. The ICT in Basic Education Project aims to improve the quality and relevance of basic education for all students by the introduction of new learning and teaching strategies and methodologies, which will focus on the development of skills and higher order thinking ability, and to create as soon as possible computer literate basic school graduates who will be able to contribute to a computer literate society that can compete and prosper in the global market place of the 21st century .

54. In addition to the broad project goals described above, there are a number of more detailed and quantifiable GOU/MOPE objectives, associated with the project, which demonstrate the need for practical solutions to the outstanding issues. These are: (i) to provide access to computers and basic ICTs for every basic school in Uzbekistan by 2009; (ii) prior to supply and installation, to train personnel in every school who can manage a school network, use ICT across the curriculum and who can help other teachers in the school to develop familiarity and skills; (iii) to develop and make widely available an Uzbek language educational e-Learning resource that can be easily accessed and used by all schools and that will encourage the use of ICT across the curriculum; (iv) to ensure that by 2009 all school leavers will have an understanding of the importance of being able to manage and process information and the capacity to use basic software applications; (v) to use ICT in schools as a learning/teaching tool across a range of curriculum subjects in order to develop student centred, activity based, independent learning capability in Uzbek students as preparation for life and work in the 21st century. All of these objectives clearly reflect the lessons learned from other projects in order to ensure a successful implementation

B. Components and Outputs

55. There will be four project components. These are: (i) Formation of 650-700 Cluster Leader Schools with ICT equipment and Internet connectivity; (ii) Development of a de-centralised in-service teacher training system; (iii) e-Materials Development to support ICT usage across the curriculum in high priority subject areas and grade levels; (iv) Management Support.

56. Component No 1 is based on the premise that the ADB Project should not simply finance hardware in support of school upgrading but instead should seek to, develop, support and establish a national ICT strategy for Basic Education as a result of its intervention. This position is also supported by the GOU/MOPE. Thus the ADB support to schools will be targeted to achieve the following: (i) each ADB financed school will be the leader of a group of approximately 10-20 schools working together collaboratively to improve standards and upgrade knowledge of both ICT and its application as an education tool in a number of high priority subjects and grade levels. There are 9,700 basic schools in Uzbekistan and the selection of 650-700 Cluster Leader Schools enables the school clusters to average 15 schools per cluster depending on accessibility; (ii) Cluster Leader Schools should be Internet-connected. This will provide and information delivery system for MOPE, Oblasts, Raions and LRCs and could create also a low-cost national delivery system for the development and supply of new e-Learning materials, which can then be passed on to other schools in each cluster by disk or flash-drive[21]. It also ensures that the Internet is not simply restricted to rich schools in urban areas but is also accessible to poor schools in rural areas as well. It limits Internet funding by ADB to relatively few schools and thus allows time for the national telecommunications networks to develop and for telecoms prices to fall to reasonable levels[22]. Under the circumstances there is a great benefit in investing in a few schools with Internet, selected to act as foci for a small group of schools in a cluster, without over-investing at this time in systems which are still likely to be expensive and relatively inefficient; (iii) Cluster Leader Schools should work to the 70 Learning Resource Centres to be established under ESDP[23]. On average, each ADB funded LRC will have to service 3 raions or about 150 schools. On this basis, each LRC would work closely with approximately 10 Cluster Leader Schools who would be responsible for disseminating training down to the individual schools in each Cluster; Because Cluster Leader Schools will have to act as training centres for the other schools in the cluster, CLSs should have more work stations (up to 25 rather than the standard 11, 15 or 19) and should have additional presentational equipment for loan or use by individual cluster schools (e.g. data projectors, colour printers, scanners, digital cameras, web cams etc). Ideally a CLS should have a computer classroom for its own students and a training room with ICT hardware for the cluster schools.

57. This component will also aim to supply one free-standing PC to each CLS to be used for the specific purpose of school management and administration. This computer will be expected to operate the UNICEF-designed EMIS system, school timetabling software, school financial records and accounting, computerised textbook ordering from STDP and other management and administration requirements as specified by schools, Raions, Oblasts and MOPE.

58. Component 2 will be focused on developing a more de-centralised and flexible approach to teacher re-training and upgrading in support of specific ICT training requirements. Initially, the cluster approach should bring collaborative working and in-service training down to a local level and there is no reason why teachers should not be able to spend at least one day per week in training activities based in Cluster Leader Schools[24]. Initially, the clusters will

[21] Teachers could also collect new educational software when they attend INSETT subject oriented training courses.
[22] Low cost, high quality wireless telecoms systems (e.g. Wimax) should also be coming on stream within two years or so, which could revolutionise Internet connectivity to schools in remote rural areas.
[23] The proposed 200 additional LRCs to be funded by the WB could also act as support to CLSs but the exact nature of the cooperation with depend on the locations and equipment, which are not yet known in detail.
[24] At present teachers' Terms and Conditions of Service specify that they are paid for 4 days per week of teaching and one day for professional development. Thus, a teacher with 20 contract hours should spend 16 hours teaching

focus on ICT related training and on ICT use across the curriculum but the cluster approach should evolve into a more wide-ranging teacher training/professional development service delivery mechanism encouraging school and teacher networking for a wide range of local level training in a wide variety of subjects and topics. To this extent, the cluster approach develops the capability of the ESDP to penetrate the basic education system deeply and creates an organised regional/raion level training structure under the direction of the LRCs. CLSs could be used as distance education centres and as the site for librarianship training (*vide* STDP) and school management training (vide ESDP and the WB funded BEP). Clusters could also be used as the collection and despatch points for the de-centralized school textbook ordering system, due to be launch by STDP in 2006

59. The rapid upgrading and training programmes needed to train school network managers as a condition of the supply of ICT suites to basic schools is not a training function suited to the cluster system. This will have to be designed and delivered via the existing residential RITTI system of in-service training working closely with ESDP. This is a high priority activity if the investments already planned by MOPE in school ICT suites are not to be wasted. School visits have already demonstrated what can happen if a school with no ICT capacity is provided with a suite of modern computers (See Appendix 16). The development of a realistic protocol for ICT Management in Basic Schools, which is supervised and enforced is a high priority target activity

60. The RITTI system will also be required to provide the basic training for prioritised subject and grade level teachers on the use of ICT in specific curriculum subjects. Other RITTI courses that will need to be delivered and made available in support of ICT in basic education will include computerised school administration, continuous professional development via cluster collaboration, managing ICT in schools for school directors and skills and techniques for educational software development for RITTI and ORC staff and for any schools interested in developing their skills.

61. Component 3 will create an e-Learning Materials Development Fund (see Appendix 30) which will be aimed to support good ideas for e-learning resources development in the Uzbek language and other minority languages used in schools. It will be competitive, in that submissions should be judged competitively against criteria still to be developed. It will support private sector involvement in materials development by being open equally to state, private sector and individual submissions. The objective will be to create a multiple e-learning resource in Uzbek and other minority languages that can be provided to schools on CD, or downloaded and cached onto individual school servers and accessed by using existing Internet browsers. . Thus schools without Internet connectivity could have access to a growing electronic portal on their own servers, which they would access in exactly the same way as they would access the Internet. The e-Learning Materials development Fund is similar in concept to the Software Development Fund launched as part of the STDP and there would be benefit in joint management of both Funds[25].

62. Component 4 is the Management Support component. It will be particularly concerned to support effective management of ICT in Basic Education and financial reforms within the

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and 4 hours of training and professional improvement each week. In practice, the lack of budgets for in-service teacher training at local level and the lack of any significant re-training activities means that the salary provision for professional development is simply not used by most teachers and becomes either paid free time or a simple 20% salary supplement.

[25] In the early days there would be great benefit in localising and translating established educational software into Uzbek and other minority languages from English, Russian and other international language websites.

system and should supply specialist technical assistance to MOPE in the development of practical management systems and annual financial plans and budgets and to MOF and the Regions/Oblasts in support of wider financial planning centrally and at raion and oblast level. It should ensure that there is sufficient operational budget available to every school to support the facilities already provided. The project will support the provision of operational budgets to Cluster Leader Schools and this would be the focus of continued piloting and extension of de-centralised financing experiments to schools. The operational budgets should also ensure that high priority teaching and learning services using ICT facilities are delivered without recourse to additional informal parental contributions. The component should also experiment with income generation opportunities (e.g. establishing rural tele-centres for the use of the community and local businesses), with a permanent programme of cost reduction and with potential initiatives such as computer revolving funds. It should be concerned with developing better targeting of subsidies for the poor and for ensuring that the poor and vulnerable are fully included. It should be concerned with piloting potentially important new technological developments and it will also be responsible for publicity, and for the design and effective implementation of a Monitoring and Evaluation methodology and instruments in order to guide a second phase of ICT development at a later date

63. The management component of the project cannot, in itself, be responsible for managing the total programme of ICT development in basic education. However, it will be responsible for the management of the development of the cluster leader schools and their working relationships with other cluster schools. To this extent it should be in a position to report regularly on progress and problems and thus to be able to liaise with MOPE and with individual Oblasts and Raions in identifying and building on good practice and identifying and resolving problems and constraining factors.

B1. Component 1: Formation of Cluster Leader Schools

64. The objective of this Component is to create a national network of School Clusters, each led by a Cluster Leader School (CLS) , which will form the strategic focus for investment in ICT hardware, Internet connectivity, training in key ICT development skills, e-Materials development and important research projects.

65. The main output of the Component will be an operational network of approximately 700 School Clusters where no cluster school will be more than 25 kilometres from the CLS, and where the CLSs will provide local, close-to-home training, support, assistance and guidance to other cluster schools (particularly in pursuit of e-Readiness prior to hardware installation), and collaborative working to achieve CPD for all teachers in the cluster

66. The detailed rationale and main activities are provided below

67. The concept of small groups of schools working collaboratively in "clusters" in order to upgrade their skills and professional capacity and to share information, facilities and equipment has been tried successfully in a number of countires (e.g. Nepal). In the Uzbekistan context the establishment of Cluster Leader Schools (CLSs) to provide strong and focused support for the introduction and development of ICT in Basic Education has a number of specific advantages, as follows: (a) the CLS approach enables good technical expertise and skills to be developed and concentrated in a limited number of high priority schools, each of which has a group of collaborating schools working in close proximity. Thus, relevant technical skills can be brought close to every school in the country; (b) investments in hardware and systems targeted on the CLSs will provide a clear priority for the GOU/MOPE school

rehabilitation program. Thus CLSs will be rehabilitated, equipped with computer rooms, re-wired etc prior to the installation of hardware so that these schools will all be well prepared to receive their computer suites and will be in a position to assist other schools in their cluster to prepare for hardware installations; (c) the CLSs will also enable the initial manpower training to be focused so that every school cluster should have access to a staff member trained as a school network manager and to subject specialist staff trained to use ICT in targeted curriculum subjects and grade levels; (d) the CLSs can also be supplied with additional equipment (data projectors, web cams, colour printers, scanners, digital cameras etc) intended specifically to support teaching and learning, which can be borrowed by other school clusters after their use has been demonstrated and their care and maintenance explained[26]; (e) the Learning Resource Centres established by the ESDP will be able to work through the CLSs and thus achieve much more effective coverage of and penetration into the basic education system; (f) the cluster system will provide the structure for the rapid development of de-centralised INSETT based on collaborative working by small groups of schools; (g) the CLSs will provide a convenient and efficient delivery system to all schools for educational information and e-Learning materials as they are developed; (h) the CLSs can be used to pilot test innovative and experimental programmes related to the establishment of ICT in Basic Education (see Component 4, below); and (i) the CLSs will be the core of the Monitoring and Evaluation of ICT development in Basic Education.

68. There are approximately 9,700 basic education schools located in 212 raions in 14 Oblasts/ Regions. ESDP will construct 70 LRCs, five to each Oblast/Region. On average, each LRC will have 3 raions as their catchment area for training and school/teacher upgrading and each raion will comprise approximately 50 schools. The school "clusters" are currently envisaged as consisting of an average of 15 schools per cluster but the determining factor in including schools in a cluster should be ease of access. If possible, all schools in a cluster should be within 25 kilometres of the Cluster Leader School (CLS). In some cases, this will mean that the cluster may have to comprise fewer than 15 schools (or even fewer than 10 schools in some remote locations) in order to maintain easy accessibility for all schools. In urban areas a cluster may be larger than 15 schools. If the 70 LRCs, all located in schools, are also designated as CLSs in addition to their larger role as LRCs, these will be up to 770 CLSs providing an average cluster size of less than 13 schools. If WB BEP LRCs are included as CLSs the average cluster size could be further reduced, which would increase accessibility and the effectiveness of the clusters. Appendix 34 provides a sample clustering in Bustonlik Raion, Tashkent Oblast.

69. The identification of school clusters will be undertaken on a raion by raion basis. Each raion will be asked to produce a map showing the location of all basic education schools in the raion, which will then be divided by the raion into proposed clusters based primarily on the principle of easy accessibility. All isolated schools, which may be more than 25-40 kilometres from any other school in the raion, must be specifically identified and their location described so that special arrangements can be made to cover the requirements of these schools. The raion will also be asked to nominate the CLSs for each named cluster. Criteria for the selection of CLSs are provided in Appendix 22.

70. In order to promote the pro-poor aspect of the proposed programme a minimum percentage of CLSs should be deliberately selected from schools designated as poor or very poor by the Raion Education Department. In these schools the CLS would have a dual role as

[26] It is not yet suggested that colour printers should be borrowed but cluster schools can print materials in colour using the CLS printer *in situ*

both a CLS providing support to other schools in the cluster but also as an ICT community centre offering access to the community to ICT facilities and information and the provision of basic ICT skills training for a nominal fee. In Appendix 34 the sample clustering exercise identified five clusters. Of the five schools nominated as CLSs three were designated as "poor" schools by the RED.

71. There are some very large Raions in Uzbekistan e.g Kungrat Raion, Peshku Raion, Muynak Raion, Romitan Raion, Bukhara Oblast and Chirokchi Raion. Very large raions tend to occur in desert or mountain areas where some schools are located at considerable distances from both the Raion centre and from each other. In Navoi Oblast some schools are 300kms from the Raion centre. Special attention will be needed to the design of clusters in these large Raions with remote schools. Appendix 35 is a sample clustering from one of these large Raions demonstrating both the possibilities and the problems.

72. The proposed hardware specification for CLSs is provided in Appendix 21. At present, it is likely that most CLSs will operate on the basis of standard Fat Client networks because they will need the greater flexibility provided by this option for teacher training purposes. CLS schools, will have extra work stations because they will need them not only for use in their own school, but also for teacher training purposes.

73. Many of the ordinary (non CLS) cluster schools may well do better in the 1st Phase of ICT development by using Thin Client options because of (a) the potential investment and replacement cost savings; (b) the reduced power requirements of the Thin Client option; (c) the reduced servicing and maintenance requirement, which is an important consideration in a system where servicing and maintenance are still not well-developed[27]; and (d) the reduced risk of introducing viruses into the system. It is obviously important to establish national procurement policy for school hardware profiles as soon as possible so that the project investment in hardware can support school ICT development strategies

74. In addition to the basic work station and server(s) set-up, CLSs should also be fully equipped with appropriate UPS to protect against irregular and unpredictable power supply in many parts of the country. CLSs should also be provided with a stock of user friendly peripherals that will support teaching and learning using ICTs and which can be loaned as required to individual cluster member schools. The full list of additional peripherals is provided in Appendix 6, but should include data projectors, digital cameras, colour printers, scanners, web cams etc. A storeroom to maintain this equipment will need to be provided to all CLSs and a simple loan system also needs to be designed and provided to CLSs as part of their training

75. STDP will establish 1,000 school libraries with ICT facilities, including Internet connections wherever possible. It is important that the development programme for STDP funded school libraries should be closely tied to the development of wider ICT policies and strategies. Thus, so far as possible, every CLS should also be a location for an STDP school library. This will ensure closer working relationships with existing projects

76. All CLSs will also be Internet-connected and should be funded for this purpose for the life of the project to ensure that Internet facilities are maintained, tested and developed.

[27] While it is probable that the dumb terminals in a Thin Client network will require less maintenance, it is likely that the server will require more. This is an issue where the balance of maintenance will be determined by the project M and E system.

Eventually, GOU/MOPE will have to accept budget responsibility for Internet connectivity, but in the short term, project support will provide GOU/MOPE with valuable information on the costs, difficulties, benefits and operational, pedagogic, educational, and technical issues surrounding Internet connectivity in schools in Uzbekistan in preparation for the 2nd Phase of ICT Development (see National ICT Strategy for Basic Education provided in Appendix 2)

77. The GOU/MOPE school rehabilitation programme will need to give priority for school upgrading programmes to those schools identified as CLSs, so that each CLS can become operational as soon as possible in order to assist other schools in the clusters as and when they are scheduled for installation. Thus, the identification of clusters and CLSs should start as soon as possible, if necessary prior to project effectiveness. This will have the benefit of prioritising school upgrading so that all high priority work is scheduled to come early in the rehabilitation programme. It should be noted that this will treat urban and rural schools, rich and poor schools on an equal basis because the school clusters are equally spread around the country. In reality, because there are far more schools in poor rural areas than in rich urban areas, the prioritisation of CLSs will be an effective pro-poor initiative.

78. Adequate servicing and maintenance arrangements must be available to support the CLSs in particular and the school clusters in general. This may well be as basic as making funding available to the CLSs to pay direct for servicing and maintenance agreements, which are easily available in their local catchment areas. In this case a model servicing and maintenance agreement will need to be drafted to fully protect schools and raions who wish to enter into such agreements. It is expected that the provision of servicing and maintenance budgets to all ICT equipped schools will create a market so that adequate servicing and maintenance emerges to fulfil a clear local market need

79. CLSs should also have access to operational budgets for the duration of the project. Eventually, GOU/MOPE will have to absorb operational costs into general MOPE/Oblast/Raion budget allocations, but in the short term it is obviously essential that the investment made in the provision of facilities of high strategic value in CLSs should be guaranteed operational costs in the critical formative period of their work and establishment. The use of de-centralised funding for the operational costs of the CLSs should lead to a widening of the de-centralisation funding pilot project already underway in Akkorgan Raion, Tashkent Oblast.

80. The issue of power availability is critical. A high percentage of schools visited during the school surveys reported power-outs at unpredictable times, which made it difficult to get full use from the hardware supplied and which also undermined timetabling for maximum use of facilities. It is reported that the solution could be relatively simple and that all basic education schools should be granted priority power supply status, thus giving them the same power priority as military, police and medical facilities. This option needs to be fully explored and resolved at a policy level as soon as possible

81. Every CLS, and if possible, every school with installed ICT, should also be supplied with one free-standing computer for school management and administration purposes and should be supplied with a suite of basic software to support essential school management and administration requirements. This should include, but should not necessarily be restricted to (a) the UNICEF school-based EMIS system; (b) textbook ordering software (from STDP); (c) school timetabling software; (d) basic school accounting software etc

B2. Component 2: Development of De-centralised INSETT Capacity to Support ICT in Basic Education

82. The Objective of this Component is to create the trained manpower that will make the implementation of the GOU/ADB's project objectives possible.

83. The main outputs will be the intensive training of 240 RITTI staff in the high priority training requirements of ICT development requirements in Uzbekistan, the development of intensive high priority course modules, the priority training of CLS staff in year 1 of the project and the subsequent training of key staff in all basic schools as ICT hardware is scaled out prior to the close of the project.

84. The rationale and key activities of the component are provided below.

85. The ICT in Basic Education project will place intense new demands upon teachers and, in particular, on in-service teacher training and on teachers' professional development. The current INSETT system, despite its many strengths and good points, needs to respond to new in-service challenges by adapting to new needs.

86. The high priority INSETT requirements needed to support an ICT in Basic Education project are as follows: the development of trained staff within RITTIs via a TOT programme which should cover: (i) ICT skills in school network management, maintenance and support and mastery of generic software programs; (ii) subject based courses in languages, maths and sciences aimed to provide RITTI lecturers with an understanding of the potential ICT use in specific curriculum subjects; (iii) the use of ICT in school administration; (iv) the concepts, theory and practice of a system of performance management and continuous professional management which can be implemented within individual school clusters and which can form the basis of collaborate working and self help.

87. After the completion of the TOT in the above high priority areas should work with nominated, trained RITTI staff in the development of course modules for training CLSs and non CLS schools.

88. With trained and upgraded RITTI lecturers and specially designed course modules with course materials it will then be necessary to start the programme of training directed at schools. In the first year priority should be given to the training of nominated staff from CLSs because these staff will be responsible for assisting and supporting other cluster schools in their areas. Other designated high priority staff for training should be staff from the LRCs and technicians from local servicing/maintenance organisations or institutions (school network management only). After the CLSs have been trained an ongoing programme of training should be prioritised within the RITTI system to provide all of the above courses on a regular basis and in sufficient intensity so as to ensure that all schools with new ICT installations have received basic training in the above priority areas before the installations have been completed.

89. The necessary intensity of training needs to be carefully calculated in order to ensure that high priority training targets can be met on schedule. Thus, 700 CLSs will require, ideally, two staff to be trained in computer skills, school network management and generic software programs. This will require 1400 staff to receive three weeks training in the first year, which is equivalent to 4,200 person weeks of training. On the assumption that each three week course should be attended by no more than 30 participants in order to ensure maximum access to

hands on use of the hardware then it is easy to calculate that 140 three week courses will need to be run during the first year in order to accommodate the requirements of the CLSs alone. Spread over 16 RITTIs this represents nine three week courses in the first year. Similar calculations will be needed for all of the other high priority training courses and to cover the needs of non CLS courses in subsequent years.

90. The initial high priority training requirements specified above will require that all RITTIs are well equipped with modern ICT facilities comparable to those being provided to schools. ESDP will be providing hardware upgrading to the RITTIs and there will need to be liaison between the ICT in Basic Education Project and ESDP to make certain that the specifications and requirements are consistent with policies being developed by MOPE for its own ICT strategies.

91. Wherever possible the INSETT course modules developed to support ICT in Basic Education should be adapted for distance education delivery.

92. Expert consultancy services and training support will be needed for (i) training RITTI trainers; (ii) working with RITTI trainers in the development of course modules and materials; and (iii) initial support to RITTI trainers in the initial delivery of the high priority ICT support training courses.

93. Within each school cluster a system of performance management (PM) should identify, on an annual basis, the continuing professional development needs (CPD) of school staff and would link this to training and remuneration. Each teacher would agree personal targets for the coming year; these would include targets for the achievement of the students for whom the teacher is responsible as well as CPD targets for teachers themselves. Targets would be reached by mutual agreement between teachers and their immediate line managers. Typical CPD Pro Formas are provided as samples in Appendix 25.

94. Teachers CPD needs should be framed in the context of the needs of the school and could be aggregated to achieve economies of scale (e.g. in the early days CPD on the use of ICT across the curriculum will be a common feature of most CPD/ PM plans).

95. Training and CPD would be delivered as short half day or one day courses in geographical locations close to the school on a "just-in-time" basis rather than at distant oblast centres according to a formal curriculum. The system obviously requires the establishment of many more raion and sub-raion based training centres and the proposed LRC/CLS system provides these 'close-to-school' training venues.

96. The creation of a performance management system in a school will require the prior training of key people within clusters and schools who can then cascade this expertise within the school. The performance management system implies that there should exist, within the school, a management structure with School Director, senior management team and middle managers (e.g. Heads of Department). Each performance management team would have a leader and no more than five other members. Performance would be judged on the basis of direct observation of professional practice in the classroom coupled with the achievements of the students, and the teacher's success in completing the annual CPD targets. Performance judged against objective performance criteria and CPD targets to be agreed should be logged and tracked.

97. Prior to the introduction of a PM system, there should be considerable training and preparation of managers and middle managers (NB: In small schools it is likely that the School Director and Deputy would undertake all the performance interviews and monitor in-year performance). This process, which empowers middle managers in schools, could be a prelude to the introduction of more de-centralised school management and governance practices. Training in school management and governance could provide a helpful bridge between this project and the ESDP and STDP projects.

98. Initial training in CPD and school management should be offered to LRCs (2 per LRC = 140) and to School Directors and two other senior staff in each CLS (650 x 3 = 1950), which is a total requirement of 2090. The initial training, also to be delivered via RITTIs should be one week in duration. On the basis of two, one-week courses per month for 40 trainees in 10 RITTIs, the initial training could be completed in less than two and a half months.

B3. Component 3: E-Materials Development

99. The objective of this Component is to encourage the rapid development of appropriate e-Learning Materials in Uzbek and other local languages of instruction to support ICT as a teaching and learning tool in priority subjects and grades

100. The main outputs will be the creation of a national e-Learning Materials Development Fund, which will encourage the localisation, adaptation and translation of successful software from other countries and the origination of local materials. The component will also create a national e-materials portal in Uzbek/other languages and will provide specialist training in the techniques of localisation, translation and origination of e-Learning Materials

101. The rationale and activities for the component are provide below

102. ICT across the curriculum requires the development of electronic teaching and learning resources. These will support teachers in using ICT in their classes and will enable students to start working independently. Most schools will not have Internet connections and will need to develop as quickly as possible an information-rich electronic resource within the school. Typical E-learning resources could be:

- generic software tasks e.g. spreadsheets, databases, graphics, etc
- Web-based materials
- E-books
- Subject specific educational software

103. In schools without Internet access, school-based e-learning resources could sit on a school server and be accessed using a normal browser interface (e.g. Explorer, Navigator, Firefox etc). It would feel like using the Internet but access would be limited to what was on the school server. When Internet is finally supplied, no re-training will be needed because the access methodology will be the same

104. E-textbooks currently being developed by MOPE do not maximise the use of the medium. They are still linear textbooks on disk with some user questioning and electronic interaction. There is a need to widen horizons to demonstrate what is possible[28]. This will require training by subject experts in e-Materials development for educational purposes. The

[28] Text was not designed to be read comfortably off screen. Screen resolution is too poor – typically 40 dots/sqcm compared to 1,000+ dots/sqcm for print on paper.

training should be provided as quickly and as widely as possible and not just to state organisations. RITTIs could be used to host training in these skills and some RITTI and LRC staff could start to develop software ideas.

105. Good quality e-Learning resources enable the user to quickly determine what they want and enable them to skip through what they don't need. Clearly, the range of e-learning materials required cannot be made available at once and thus a step-by-step approach is needed. This suits an initial limitation on the use of ICT across the curriculum to specific subjects and specific grade levels. It will also require a gradualist introduction even within specific subjects and grade levels e.g. half a dozen ICT modules per subject per grade level for the first year, which can then be gradually developed. In this situation there is a need to provide schools with educational software as quickly as possible and early e-Learning materials development in Uzbek and other local LoIs should concentrate on adapting, localising and translating proven educational software used in other school systems. Training in e-Materials development techniques by subject experts should focus on providing relevant examples and supporting local adaptations.

106. E-Learning Resources differ from other learning resources in their capacity to be interactive with the learner and thus to be able to measure and monitor the learner's progress and understanding. Learning objects are self-contained pieces of learning which the learner may use independently or which a teacher can use for guiding students. Learning objects can be navigated between and/or aggregated so that they can be re-used in many different contexts. Typically a learning object would represent about 20 minutes of learning and would contain several activities, interactions and assessments for the learner. Typically software authoring, animation and interactivities take about three times the scripting time of a learning object. Thus, one hour of e-content would take about 12 person days. On this basis a rate for the production of software can be calculated

107. Current technology enables multi-language versions of all the electronic resources to be readily available. The facility to have multi-language versions is made possible using web-authoring software, which separates the structure, the graphics and the interactivity files from the language and content files. This enables minority language resources to be produced at a fraction of the cost of producing them in the medium of print. MOPE should, however, ensure the provision of e-learning resources to minority language schools by pursuing a pro-active policy of regional cooperation in the development of e-learning resources with neighbouring countries.

108. On the basis of the above the following sub-components are identified:

a) Training of selected RITTI staff (5 per RITTI) and LRC staff (2 per LRC) in existing software in other languages and licensing, adapting, localising and translation techniques. This will require 220 staft to be trained in 6 x 4 weeks courses each comprising 35 trainees
b) Expert consultancy and training inputs will be required to train and to develop course modules.
c) LRCS will then be expected to support school clusters in the development of localised, home-based e-resources. Good examples can be shared using the Internet. This is already one of the strong features of the UzConnect educational portal developed by the IREX School Connectivity Project

d) RITTIs can then offer courses in software development to oblasts, raions and schools and even to the private sector and private individuals on a cost recovery basis. Teachers nominated from CLSs would get priority on RITTI courses because of the potential wider impact on school clusters of such training

109. The component would also create an "E-Resources Development Fund", which would exist for the specific purpose of offering cash support and incentives for the development of e-resources in Uzbek and in other minority languages. In the early stages these should be a concentration on the localisation and translation into local languages of existing educational software with a proven track record of effectiveness. The operational rules of the Fund are provided in Appendix 24

B4. Component 4: Management Support Component

110. The objective of this component is to provide support to the reforms proposed in Components 1-3, above.

111. It's main outputs will be (a) the provision of support to the MOF/MOPE in the development of annual financial plans and budgets, including a sensible and adequate annual operational budget to support the effective workings of ICTs in schools, which have been upgraded and re-equipped with SDF funding; (b) support MOF and the Regions/Raions in support of local level financial planning and the effective distribution and monitoring of de-centralised operational budgets for ICTs in schools, and specifically in CLSs; (c) monitoring in association with the MOF, Oblasts and Raions the use of funding by schools and determine practical replacement and operational budget requirements for ICTs wider financial planning purposes both centrally and at raion/oblast level; (d) undertaking research into parental contributions to basic education generally and to ICTs specifically; (e) provision of funding to support research and pilot projects into income generation opportunities (e.g. establishing rural tele-centres for the use of the community and local businesses), de-centralised school financing via CLSs and cost reduction by comparing the operational possibilities of Fat and Thin Client options; (f) the development in association with the GOU of a national publicity campaign to ensure that all schools, teachers, parents, students and the wider community are fully informed about GOU/MOPE plans for ICT developments in Basic Education. Details on these activities are provided in Appendix 9.

112. This Component will also be primarily responsible with MOPE for the development of effective working relationships with other ADB-funded basic education projects (ESDP and STDP) to ensure maximum coordination and benefit for the GOU/MOPE and the basic education system, and with other projects operating in the basic education sub-sector (e.g. WB BEP and Chinese, Korean, US initiatives in ICT hardware supply)

113. The E-Resources Development Fund will be managed by this component in close association with the MOPE. The fund will be competitive and will be available to all with good e-learning ideas from RITTIs, LRCs, CLSs, schools, government departments and private sector companies and private individuals

114. The Management Support Component will be responsible for developing and implementing the Monitoring and Evaluation component, which will aim to visit and evaluate approximately 250-300 school clusters per year, plus the effectiveness of the training and support provided by LRCs and RITTIs. Key indicators to be monitored and evaluated are provided in Appendix 25

115. Finally, this component will continue to work closely with MOPE/MOF/COM on the national ICT Strategy as the basis for further investment in ICTs in Basic Education as part of the 2nd Phase.

C. Special Features

116. **School Clusters.** The creation of a national system of school clusters has many advantages, not just for the introduction of ICT into the Basic Education curriculum, but also for a much wider range of educational development issues. The cluster system enables an initial concentration of resources and training into a limited number of schools, each of which will have responsibility for supporting and assisting other schools in the cluster. The clusters will also enable a rapid de-centralisation of in-service teacher training down to local levels and will provide professional development opportunities for all teachers at local level. It will stimulate collaborative working among small groups of schools and among small groups of subject teachers and will create the basis for national school-to-school and teacher-to-teacher collaboration and ideas sharing through the Internet links that will be provided to each CLS. This will provide opportunities to pilot aspects of Internet connectivity without making major investments at a time when facilities are still widely sub-standard. The school clusters will also represent a focus for Monitoring and Evaluation and will provide a convenient test bed for piloting and experimentation. The project links into the activities and work of other ADB projects and other donor funded interventions. Thus, the school cluster approach draws from the LRCs, which will be funded by the ESDP and the WB BEP. The cluster leader schools will also incorporate the school libraries to be developed by the STDP. The Software Development Fund in the STDP will be mirrored by, and could even merge with, the E-Materials Development Fund included in this project. The Internet connections in the Cluster Leader Schools will support Internet connectivity in the STDP's school library project and will support computerised, school-based textbook ordering, which is a central part of the STDP. The project itself will strongly influence, and will be influenced by, the curriculum and assessment reviews, which are a part of STDP, and on the reforms in teacher training and management capacity development, which are objectives of ESDP

117. **ICT Across the Curriculum.** The National ICT Strategy for Basic Education clearly envisages that ICT should be fully integrated within State Educational Standards and the school curriculum and that it should become as soon as possible an integral part of teaching and learning in all subjects at all grade levels. ICT will not be provided simply to support the teaching of informatics as a separate subject. In the medium term the computer:student ratios financed by GOU/MOPE will not be sufficient to extend regular access and usage to all students for all subjects and thus the MOPE will have to prioritise specified grade levels and subjects (all grades from grade 5 and above and Languages, Maths, Science subjects and one social science subject). Nevertheless, the mid-term objective is full integration and this is exemplified by the priority given to the early training of subject specialists in the CLSs to ensure that working groups of subject teachers will be able to meet, exchange ideas on the effective use of ICT and develop subject based portals in communication with other clusters across the country

118. **Financial Sustainability.** A major objective of the National ICT Strategy and an objective of the project is to achieve financial sustainability in the provision of ICT to all basic education schools. The project design has attempted to identify all of the costs associated with ICT supply, replacement and operations. The School Development Fund will cover the majority of the initial investment costs, but it is of great importance that there should be

operational budgets available to every school with ICT facilities in order to ensure that the hardware provided can actually be used to its potential. School visits have revealed that at present this is not happening in many cases. The project will fund the necessary operational budgets for the CLSs because of their pivotal role in the launch of the National ICT Strategy, but it will be absolutely necessary for GOU/MOF to underpin the capital investment costs with sensible and adequate operational costs on an ongoing basis for all other schools with ICT installations. Eventually GOU/MOPE will have to accept responsibility for all operational budget requirements. The project will create a Monitoring and Evaluation system that will investigate and accurately identify true costs of operation as the basis for further investments and stages of development. The project will also continue to pilot and experiment with income generation, cost reduction and even cost recovery, so long as adequate provision is made for the poor and vulnerable groups who could easily be excluded by cost recovery and parental contribution requirements.

119. **Achieving Equity across the System.** The introduction of decentralised financing to the education system, despite the use of central government funds as a safety net, has led to increasing regional variations in the financing of education between oblasts, raions and even within raions. In these circumstances there is a real risk that well-funded schools in urban areas will be better able to afford ICT than poorly funded schools in rural and remote areas[29]. Information from IREX, for example, indicates huge cost differentials in the provision of Internet connectivity in different parts of the country with a particular division between rural and urban areas. If schools were required to fund Internet costs out of their current operational budgets it is clear that poor rural schools would be less able to do so than richer urban schools. However, the project will carry the Internet costs and the operational costs of all CLSs for the period of the project thus ensuring that all CLSs will be able to work effectively in both rural and urban areas. Because the CLSs will create a national network of school clusters where 95% of schools will be within 20-25 kilometres of the CLS the project will create a situation where every school in the country will have easy access to CLSs, Internet connectivity, the loan of peripheral equipment and teacher training and CPD. If the unpredictable power supply situation in many rural areas can be resolved by granting schools priority access to power supplies during the school day, this will further improve the equity of educational provision in the country. All schools will also have equal access to the development of e-Learning Resources in Uzbek and in local minority languages

120. **Uzbek and Minority Language E-materials Development.** The project will create an e-Learning Materials Development Fund to support and encourage the rapid development of e-Learning Materials in Uzbek and other local minority languages as the basis for the full integration of ICT in the SES and the curriculum. It is obvious that ICT can never be a central part of the learning and teaching process in Uzbekistan until there is a rich resource of educational software and e-Materials for teachers and students to use in subjects across the curriculum. The collaborative activities of the cluster groups and the encouragement for cluster groups to interact with each other via Internet connections in the CLSs should also stimulate materials development activities in local languages. The project will provide specialist training in e-Materials localisation, translation and development techniques for RITTIs, LRCs, MOPE Departments, private individuals and interested private sector companies and will focus, at

[29] For example, Schools #50 and #110 in Tashkent City are considered to have very low ICT recurrent budget requirements. However, in one school the costs of servicing and network management are provided free of charge by an old student who now runs an Internet Café and in the other school parental contributions pay for the servicing. In both schools parents pay for consumables and the schools do not know the costs of electricity and telecommunications charges because these are paid by the raion. Both of these schools have relatively rich catchment areas and parents can afford to cover most of the costs. This situation would not apply to the overwhelming majority of schools in rural areas where parental contributions represent a real hardship.

least initially, on adaptation, localisation and translation techniques in order to achieve a rapid build-up in the availability of suitable e-Learning Materials in local languages. Because It is faster, cheaper and easier to translate and adapt electronic materials for use in other languages than it is to translate and adapt print materials, the introduction of ICTs into all schools, including other language schools, will do much to improve the provision of learning materials in local minority languages.

121. **Improved School Management Capacity and Governance.** The project will fund free-standing computers for school administration and management in CLSs plus basic software programmes and training in school management for trainers in RITTIs and for all schools who will be provided with computer suites. The re-establishment of a Performance Management system and CPD in all schools, led by the CLSs, will improve school management capacity and self governance.

D. Cost Estimates

122. The total cost of the project is provisionally calculated at US$43.5 million including GOU/MOPE contributions. The foreign exchange cost is estimated at US$18.46 million and the local currency cost at US$25.07 million. A summary of the costs is provided in Table 1 below and more detailed estimates are provided in Appendix 6.

Table 1: Project Cost Estimates by Component

Project Component (in '000 USD)	ADB Financing			GOU Financing		
	Foreign currency	Local currency	Total cost	Foreign currency	Local currency	To co
A. Base Cost						
Component 1: Formation of Cluster Leader Schools	15645	10094	25739	0	9728	9
Component 2: Development of De-centralized INSETT Capacity	120	432	552	0	3570	3
Component 3: E-Materials Development	1000	0	1000	0	0	
Component 4: Management Support	1680	1242	2922	0	0	
Total Base Cost	18445	11768	30213	0	13298	13
%	61%	39%	100%	0%	100%	1
Project Component (in % Total Base Cost)	**ADB Financing**			**GOU Financing**		
	Foreign currency	Local currency	Total cost	Foreign currency	Local currency	To co
A. Base Cost						
Component 1: Formation of Cluster Leader Schools	85%	86%	85%	0%	73%	
Component 2: Development of De-centralized INSETT	1%	4%	2%	0%	27%	
Component 3: E-Materials Development	5%	0%	3%	0%	0%	
Component 4: Management Support	9%	11%	10%	0%	0%	
Total Base Cost	100%	100%	100%	0%	100%	1
B. Contingencies	**ADB Financing**			**GOU Financing**		
	Foreign currency	Local currency	Total cost	Foreign currency	Local currency	To co
1. Price Contingency (a)	443	1177	1620	0	1246	
2. Physical Contingency (b)	922	588	1511	0	623	

Subtotal	1365	1765	3130	0	1869	
C. Interest and Commitment Charges (c)	861	0	861	0	0	
Total Project Cost	20671	13534	34205	0	14326	14
Percentage	60%	40%	100%	0%	100%	1

E. Financing Plan

123. It is proposed that ADB should provide a loan of US$34.2 million to finance 70% of the total project cost of US$48.50 million. ADB should fund 100% of the foreign exchange costs of US$20.67 million (43.0% of the estimated total project cost) and US$13.53 million of the local currency costs or 48.5% of total local currency costs. The ADB loan will have a term of 35 years, including a grace period of 10 years with an interest rate of 1.5% per annum during the grace period. The remaining US$14.30 million representing 30% of total project cost and 51.5% of total local currency costs will be counterpart funding to be provided by the Government. It represents on-going INSETT costs, the salaries of teachers in the CLSs who will be required to take the lead in teacher training, continuous professional development and collaborative working within the clusters and the cost of classroom refurbishment. The Financing Plan is summarised in Table 2 with more detail in Appendix 6

Table 2: Financing Plan (US$ million)

Uzbekistan ICT in Basic Education Project
Financing Plan ($ million)

Source of Financing	Foreign Currency	Local Currency	Total Cost	%
ADB	20.7	13,5	34.2	70%
GOU	0,0	14,3	14.3	30%
Total	20.7	27.9	48.5	100%
%	43%	57%	100%	

Note:

(a) Physical contingencies are assumed at 5% of total base cost;
(b) Foreign and local price contingencies are estimated at 2.4% and 10% respectively;
(c) 1% interest

F. Implementation Arrangement

1. Project Management

124. The Project Executing Agency will be the MOPE in Tashkent. A Project Steering Committee (PSC) will be appointed by the Cabinet of Ministers as the decision-making body responsible for overall project coordination. The membership of the Committee will be drawn from the COM, MOPE, MOF, MOPS and UZAgCI. The chair will be a high level official nominated by the COM. The Project Steering Committee will meet quarterly to review project implementation status, discuss implementation issues, provide broad guidance, ensure coordination among different agencies, resolve issues and review and advise on the annual implementation plan..

125. MOPE will appoint a Project Director, who will be a senior MOPE official responsible for supervising MOPE departments likely to be most affected by project implementation. The Project Director will provide general guidance to the PIU on policy issues, will arrange the quarterly meetings of, and be present at, the PSC, will present quarterly reports to PSC and ensure coordination of project implementation within MOPE. The Project Director will be responsible for MOPE policy inputs into the project.

126. A Project Manager will be recruited to report to the Project Director and will be responsible for coordinating and supervising the overall work of the PIU. The PIU, which will consist of the Project Manager and xxxxx staff, will be responsible for the day to day project implementation, including financial management and accountability. The PIU is responsible for preparing the detailed project implementation plan and will provide annual reports and quaterly progress reports to the PSC, the Project Director and the ADB. The PIU will be responsible for managing and implementing all 4 components, although some of the components may be sub-contracted to specialist agencies within MOPE. The PIU will maintain a Procurement Section, a Financial and Accounting Section and a Monitoring and Evaluation Section. A Project Management Chart is included as Appendix 4

2. Implementation Period

127. The project will be implemented over 5 years starting in January 2006 and will complete in December 2010. A Project Implementation Schedule is include as Appendix 5

3. Procurement

a) Civil Works

128. All civil works required to prepare classrooms for the installation of ICT suites will be the responsibility of the GoU/MOPE and will be financed and undertaken as part of the school rehabilitation and upgrading funded by the SDF as part of the National Programme for Basic Education Development (NPBED). Classrooms must be in a suitable condition for hardware installation, which will require safe and adequate wiring up to specifications, a dust free atmosphere and some form of climate control (ie acceptable heating in winter and cooling in summer to avoid maintenance problems and less than desirable replacement cycles as a result of temperature extremes)[30]. The extent and nature of the civil works in each school will depend on the condition of each school and its level of development with respect to baseline requirements. Appendix 17 provides the minimum criteria that must be met by a school prior to the installation of ICT hardware.

129. The Project Implementation Unit (PIU) working through nominated officers in Oblasts and Raions will be responsible for ensuring that minimum criteria for hardware installation have been met. The quality control and costs of school and classroom rehabilitation suitable for ICT installation will be the responsibility of the Raion and Oblast under the terms of the exiting NPBED programme. A MOPE system of supervision of hardware installation needs to be established in order to ensure that companies responsible for hardware installation have performed their tasks adequately[31].

b) Equipment and Materials

130. All ADB financed goods will be procured in accordance with ADB's *Guidelines for Procurement*. The PIU will be responsible for all hardware procurement. The indicative procurement packages are specified in Appendix 10. Supply contracts for goods estimated at $500,000 equivalent or more will be awarded on the basis of

[30] IREX reports maintenance problems with PC cooling systems in summer when they are used in high temperatures without air conditioning.
[31] Field visits to schools have already revealed instances of sub-standard ICT installation (see Appendix 16)

International Competitive Bidding (ICB). Supply contracts for goods worth less than $500,000 but more than $100,000 will follow International Shopping procedures (IS). Supply contracts for E-Learning materials will follow Local Competitive Bidding (LCB) procedures. Minor items costing less than $100,000 equivalent may be procured by Direct Purchase (DP). ~~Details of procurement packages and technical specifications will be submitted for ADB approval before procurement~~.

131. The project will finance the procurement of standard packages of ICT hardware and peripherals for between 650 and 700 Cluster Leader Schools (CLS). These will be installed by the suppliers and the length of warranty offered by suppliers and the ability to meet project deadlines and packaging requirements will be part of the evaluation criteria. All software supplied by the project will be legally licensed versions.

4. Consulting Services

132. The project will provide 171 person months of consulting services (56 international and 115 domestic). International consultants will be needed for (i) training RITTI trainers in school network management and technical support, including the design of the initial training course and course materials; (ii) assisting with the initial training of CLS school network managers; (iii) designing training courses for RITTI trainers in ICT use in priority subjects and grade levels. This will include course design and the preparation of course materials and will extend to initial support in the delivery of the training courses to teachers; (iv) design of a performance management system suitable for the needs and context of Uzbekistan basic education; (v) course design and preparation of training materials for the training of trainers in RITTIs on the performance management system and initial assistance in the delivery of these courses to teachers; (vi) design of a basic school administration system comprising existing school-based EMIS, school timetabling software, financial management software, computerised textbook ordering, etc; (vii) design of an RITTI course to train trainers in basic school administration using ICT and the development of all associated course materials. Assistance with the initial delivery of training courses should also be provided; (viii) design and development of training courses in E-Learning materials origination, the preparation of course materials and the training of trainers in RITTIs and in LRCs. The development of E-Learning materials should involve spiral training courses at increasing levels of difficulty and sophistication and should also include provision for the development of materials for special educational needs and translation and adaptation of materials from established ICT systems and into local minority languages; (ix) the design of the operation, management and procurement systems for the E-Learning materials development fund; (x) the design of a comprehensive monitoring and evaluation system that will provide regular feedback on progress toward the objectives of Phase 1 of the ICT in Basic Education strategy and which will provide the data on which future phases of the ICT strategy will be based and designed; (xi) the design of small-scale pilot projects (see Appendix 9); (xii) Study Tours (see Appendix 9); and (xiii) support to project management. A schedule of required consulting services is provided in Appendix 7 and outline Terms of Reference for international and domestic consultants are provided in Appendix 8

133. Domestic consultants will be needed in order to (i) assist international consultants in the design of training courses, in the preparation of training materials and in the delivery of training workshops and seminars; (ii) develop local capacity within the PIU and MOPE for the management and development of ICT in Basic Education; and (iii) undertake the detailed monitoring and evaluation according to the specifications of the monitoring and evaluation design.

134. Almost all of the consultancy services are based on training the trainers and are thus intended to provide rapid local development of skills, knowledge and capacity in the implementation of an ICT in Basic Education national strategy. Detailed descriptions of the basic consulting services requirements and ToRs for both international and domestic consultants are provided in Annexes 7 and 8. Details of proposed research studies and pilot projects are provided in Appendix 9. Details of study tours are provided in Appendix XXX.

5. Disbursement Arrangements

135. The proposed ADB loan will be disbursed in accordance with ADB's *Loan Disbursement Handbook*. If government funds are first used for eligible expenditure, ADB's reimbursement procedure will be applied. The government may request the establishment of an imprest account to expedite loan disbursement. The ceiling of the imprest account should be based on the next six months of estimated expenditure or 10% of the loan amount, whichever is lower.

6. Accounting and Auditing

136. MOPE will maintain separate accounts for project components financed by the ADB and the government, and will prepare financial statements according to international accounting standards. MOPE will have the project accounts and related financial statements audited annually by independent auditors with adequate qualifications, knowledge and experience of international accounting practices acceptable to ADB. Certified copies of the audited project accounts and financial statements, as well as the auditors reports, will be submitted to ADB within 6 months of the end of each financial year. In the event of non-compliance with the above requirements the ADB can decide to suspend disbursements.

137. MOPE will prepare and submit to ADB quarterly reports in English and in a format acceptable to ADB on progress made and problems encountered during the period under review, the steps taken or proposed to remedy problems encountered during the quarter, and the proposed activities and expected progress during the following period. Within three months of physical completion of the project MOPE will submit a project completion report to ADB to facilitate post evaluation of the project. The project completion report will provide details on implementation, costs, benefits and other information requested by ADB.

7. Reporting

138. The PIU will prepare quarterly progress reports in English on the implementation of the project in a format acceptable to ADB. The reports will indicate, among other things, progress made against established targets, problems encountered during the quarter, steps taken and steps proposed to resolve problems, compliance with loan covenants and proposed project activities to be undertaken during the following quarter. A project completion report must be prepared and provided by the PIU within 3 months of project completion

8. Project Performance Monitoring and Evaluation

139. A statement of performance targets by individual component and the specific monitoring mechanisms for each one is provided in the Project Framework attached as Appendix 1

140. In addition to the targets specified in the project framework (see Appendix 1), systematic monitoring and evaluation will be specifically developed and undertaken during the implementation of the project. For this purpose a set of indicators for monitoring and evaluating the performance of the project in relation to its goals, purposes and outputs will be agreed upon with MOPE prior to loan negotiations (see Appendix 13). The establishment of the baseline values of the indicators will be one of the first activities after implementation and the establishment of the PIU (see the Implementation Schedule in Appendix 5). The Implementation Schedule indicates that the first CLSs are unlikely to come on stream until the third quarter of 2006, which will allow sufficient time to design and conduct the baseline study and establish definitive indicators Monitoring indicators will be measured and reported on annually during implementation. Comments and findings on these indicators will be incorporated in every quarterly report to ADB. In addition to indicators for implementation monitoring, indicators for project evaluation will be measured at project completion and three years after completion. Where feasible and appropriate these data should be disaggregated by gender, by language of instruction and by rural/urban location. Close coordination between the PIU and the COM Monitoring Unit is essential. At project inception and completion and three years after completion MOPE will submit to ADB reports that summarise key findings of the monitoring and evaluation studies in order to specify and quantify critical changes that have occurred as a result of the project.

141. The PIU will be responsible for monitoring project activities using data and consistent feedback from RITTIs, LRCs, Oblast and Raion education offices, Oblast financial departments, Cluster Leader Schools (including teachers, students and parents) and domestic and international consultants reports.

9. Project Reviews

142. In addition to regular twice-annual reviews of the Project, comprehensive reviews of project performance will be conducted at the end of the first and third years of implementation, given that much of the research and advisory work will be carried out during the first years of implementation. The first comprehensive review will focus on the success of implementation arrangements. . A comprehensive midterm review of the project will be undertaken by GOU/ADB in the second half of the third year of its implementation. The midterm review will (a) review the scope, design and implementation arrangements of the project; (b) identify any changes required since the time of project appraisal; (c) assess progress of project implementation against performance indicators; (d) establish compliance with loan covenants; and (e) if necessary, recommend changes in the design or implementation arrangements

10. Anti-Corruption Measures

143. The government will agree to include the relevant sections of ADB's anti-corruption policy in all documents and contracts used during bidding for and implementation of the project.

III PROJECT BENEFIT, IMPACTS AND RISKS

III. PROJECT BENEFIT, IMPACTS AND RISKS

A. Benefits and Impacts:

144. **Direct beneficiaries:** the project will benefit directly the 700 CLSs who will receive furniture, ICT hardware, key teaching and learning peripherals and Internet connections. The average size of a basic education school in Uzbekistan is 630 students so the 700 CLSs will have a direct beneficiary population of approximately 441,000 students. In addition, because of the strategic location of the Cluster Leader Schools and their role in providing support and assistance to all the other schools in the clusters, all 9,700 schools in the basic education system in Uzbekistan will feel the benefit of the project. If ICT access is restricted to grades 5-9 the current grade 5-9 enrollment of 3.135 million students will receive direct benefit in terms of access to ICT and new methodologies in priority subjects. In addition, each year for the duration of the project, grade 4 students will progress into grade 5 and during the period of the project from 2006 to 2010 it is estimated that an additional 2.9[32] million students will benefit in this way through normal grade promotion. Thus, the total beneficiary population will be close to 6.04 million students for the 5-year period of the project. In addition, 6.300 teachers in CLS schools and 81,000 teachers in other schools will receive training in network management, ICT coordination, subject specialist skills in ICT and Continuous Professional Development and 1400 CLS school management staff and 18,000 management staff in other schools will receive training in the use of ICT in school administration and management. 240 RITTI lecturers will receive intensive training on different aspects of ICT in schools and at least 10 new teacher training course modules to support ICT investments in schools will be designed and made available in Uzbek. 200 individuals will receive intensive instruction in the techniques of localising and developing software and e-Learning Materials. Finally, there are many households, particularly in the poorer rural areas who are eager to get community access to some of the benefits of ICT. The project will consciously seek to extend ICT facilities in schools to the wider community and will run a pilot project on this issue. If only one quarter of the rural schools make their ICT facilities available to their local communities, this will benefit over 1 million households in rural and therefore mostly poor areas.

145. The **educational benefits** from access to ICT facilities and the use of ICT by teachers and students in subjects across the curriculum will be typically relatively slow to develop if the experience of other countries is taken into account. However, the national strategy proposes an integrated approach to ICT in the curriculum, supported by teacher training at both RITTI and cluster levels, continuous professional development in schools, e-Learning Materials development focused on the Uzbek and other languages and enhanced management and technical support. This approach has been demonstrated to be the most effective approach to successful ICT introduction into schools and school systems. With growing familiarity, confidence and increased usage there is evidence from other countries that ICT has a beneficial impact on student performance and on the working relationship between teachers and students.

146. The educational benefits from the introduction of ICT into basic education relate to (i) the link between integrated ICT usage in the school curriculum and increased student performance in a number of key subjects such as language, mathematics, science, etc; (ii) the impact of ICT usage across the curriculum on the development of skills and competencies (as opposed to the accumulation of factual knowledge) and the development of higher order thinking skills; (iii) the introduction

[32] This is based on the current grade 1-4 roll numbers and the fact that drop-outs are low throughout the system and very low indeed in grades 1-4. Thus the current grade 1-4 enrolment plus an additional grade year can be expected to progress through to grade 5 during the period of the project

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III PROJECT BENEFIT, IMPACTS AND RISKS

warehousing costs; (ii) the re-introduction of collaborative working at the level of individual school clusters will re-establish the tradition of continuous, school-based professional development, which is included within the salary structure of every teacher, but which hasn't been properly utilised for many years as a result of financial constraints. The re-introduction of school level CPD as a result of the project will ensure the proper use of the 20% of teachers' salaries already allocated for this purpose; (iii) computer rooms in schools are currently poorly managed and under-used and thus do not provide a full economic return for the investment made. The project, by extending computer usage across the curriculum, introducing effective management of the ICT facilities and fully utilising the hardware thus increasing the economic return on the investment; (iv) the adaptation and translation of materials into other languages is much cheaper and easier in electronic than in print format. The development of e-Learning Materials in other languages will reduce the extent of textbooks in other languages (because some of the required material will be available in electronic form) and thus reduce the costs of minority language materials provision to the GOU/MOPE; and (v) the introduction of computers into school management will reduce the requirement for paper-based transactions and will remove/reduce many of the labour intensive manual tasks (e.g. maintaining students' rating marks, annual timetabling, maintaining school records etc). The total annual quantifiable financial benefit resulting from the project is estimated at US$41 (see Appendix 11)

152. There is also research evidence that ICT has an impact on economic growth. The accumulation of ICT capital stock is a determinant of output growth across economies. ICT is considered to be superior to non-ICT situations in the enhancement of output growth. Given levels of growth and labour and capital inputs, a higher level of ICT capital stock per capita allows a typical economy to achieve a higher output growth rate. The research evidence demonstrates a positive ICT impact on economic growth in Australia, Canada, Korea, the UK, Finland and the Netherlands among many other countries. ICT has an impact on productivity, income and labour productivity at the national level. The creation of school leavers with familiarity and confidence in ICT, a good grasp of the basic generic software applications and a problem solving approach to work, will have a beneficial impact on labour productivity.

153. In order to achieve these economic benefits national curricula and syllabuses will need to be adjusted to take account of the available technology in order to use it to best effect in basic education classrooms. There is also a perceived need to extend the use of facilities provided to schools by making them available to the wider community. This provides access to information and to basic facilities of use to the community (e.g. word processing for writing letters, spreadsheets for doing accounts, printing and photocopying etc are all valuable and useable assets particularly for isolated rural communities. Offering basic skills training in the use of computers and basic generic software applications also provides a useful community service).

154. **Poverty Impact:** In recent years there have been increasing differentials in the financing of basic education between Oblasts, Raions and between individual schools. In the majority of cases parents have been required to make additional contributions in cash and in kind to support the day-by-day operational costs of the schools. This has had an impact on the affordability of basic education to poor parents. The intention of the project is to ensure that ICT facilities are not only made available, but are also actively used in support of new approaches to learning by every school in the country, irrespective of urban or rural location or relative wealth or poverty. In this context, the role of the CLSs in supporting all schools in their cluster by ensuring that the hardware and systems are always operational and that priority subject teachers in all schools are assisted in delivering new teaching and learning

strategies, is obviously of critical importance. There is also an objective to provide Internet connectivity to all Cluster Leader Schools thus bringing Internet access close to every school in the country[34], once again without reference to rural or urban location or relative wealth or poverty. Cluster Leader Schools will be supplied for the period of the project with operational budgets to ensure that they will have the ability to work consistently with their Cluster Schools. Thus, every part of the country should have equal access to the benefits that should accrue from investment in ICT facilities at basic school level. It is also the intention of the project to ensure that all schools (and not just CLSs) receive an ICT operational budget to cover the costs of consumables, electricity and servicing maintenance costs. This will be a major departure, which should ensure that ICT is equally accessible to students everywhere. Project monitoring and evaluation will pay specific attention to ICT usage and to ensure that parental contributions do not become barriers to usage and access in rural and poor areas. There is evidence from other countries that access to ICT facilities and the Internet has a particularly beneficial impact on rural communities. The project will attempt to experiment in the establishment of rural telecentres based on school facilities in order to provide enhanced community access and this also will be a positive benefit to the poor.

155. **Environmental and Social Safeguards:** the project will not involve any major construction apart from the rehabilitation of existing school buildings and facilities. Thus there should be no negative environmental impact. The project will, however, enhance access to learning materials for ethnic minorities because adaptation and translation into minority languages is far easier with electronic materials than it is with printed materials. Thus, access to ICT in every school, including minority language schools, should serve to improve the equity of provision of learning materials to schools including those with minority languages of instruction.

156. **Gender Mainstreaming:** in the basic education system there is virtual parity of attendance between boys and girls. The project will do nothing to disturb the existing favourable gender balance in the basic school system in Uzbekistan.

157. **Participatory Process:** the overall project and all individual components of the project were designed with the full participation of all stakeholder groups. 7 workshops including representatives from MOPE, MOHSSA, COM, MOF, MOE, UZAgCI, Uzbektelecom and Ubekenergo were held during research and project planning phases in order to discuss and resolve issues arising. Research visits were undertaken to all 14 regions (research data was provided by the Oblast Finance and Education Departments in every oblast and in Karakalpakstan), to over 40 Raions and Makhallas and to 60 schools where focus group discussions were held with teachers, parents and students. More detail on the participatory process is provided in Appendix 32.

B. Risks

158. **School Readiness**: there is a risk that if the pace of ICT installation into schools proceeds too quickly many schools may not be fully ready to receive ICT hardware and thus will be unable to manage it and use it effectively

159. Although there are problems of school readiness many of these (e.g. wiring problems and the need for re-furbished classrooms) should be resolved by the major

[34] Focus group discussions with parents, particularly in rural areas where computers and Internet gfacilities have hardly existed up to now, were mostly keen to gain evening access to school computers and, if possible to use school facilities as a rural telecentre and Internet cafe

school rehabilition programme currently underway as part of the NPBED. Careful planning, intensive training and the fast start up of the Cluster Leader Schools, which will provide support, guidance and advice for other schools in the clusters, should be able to mitigate or resolve these problems. Adherence to the minimum criteria for the initial installation of hardware should be established and rigorously adhered to as a pre-condition for investment.

160.. **Financial risks:** ICT investments in schools are expensive. As a proportion of total educational budget ICT will be relatively more expensive in Uzbekistan than in developed countries. The initial investment cost is only part of the problem. Hardware, once installed and used within the educational system, will need to be replaced so that there will be an ongoing annual hardware replacement cost which needs to be planned for and factored in to MOF/MOPE forward budget projections.

161. ICT operational costs are also significant. For this reason, it is essential that MOF/MOPE make adequate provision in their education financing plans for adequate school operational budgets in order to support the substantial investment in ICT hardware. These budgets must be made available to schools. This issue has been raised and discussed and MOF are preparing basic operational budgets to support ICT investments, although more work is needed on the actual level of budget support

162. **Sustainability:** ICT provision in Uzbekistan must be based on a sustainable financial profile, which includes not only the initial investment costs but also replacement costs (based upon sensible replacement cycle assumptions and sensible policies on the relative educational, technical and cost benefits of thin, tubby and Fat Client options). The first phase of planned ICT development from 2006 to 2010 will provide valuable information and data on the real costs of providing ICT to basic schools. In the short to mid term MOF and MOPE have both accepted the need for supportive operational budgets and an operational budget line will become available from the next financial year. Discussions are currently underway on the exact size of the budget needed to provide adequate support to the initial investments.

163. **Servicing and Maintenance:** Efficient servicing and maintenance facilities are essential if schools are to be able to use their computer facilities regularly and with confidence. The IREX connectivity project has already demonstrated the need for such servicing and has also developed background data on costs. MOF and MOPE have accepted that schools must have adequate budgets in order to ensure access to reliable servicing so that the investment in hardware and systems is used productively.

164. **Educational Risks:** there are risks that the existing educational infrastructure will not be able to adjust with sufficient flexibility to create the changes needed to enable ICT to be fully integrated within the curriculum and delivered effectively in target subjects and grades in the classroom. The present school curriculum is overloaded with subject and content requirements and many subject teachers will find difficulties in making time to use ICT creatively within the framework of current syllabuses. Similarly the current assessment system will need to be reviewed in order to place more emphasis on the acquisition and use of skills and competencies and the exercise of problem solving and higher order thinking skills.

165. All previous experience in other countries demonstrates that teacher training and teacher experience and enthusiasm are key factors in determining the success of ICT in the classroom. Because so few teachers in Uzbekistan have prior experience of ICT there is an obvious need for a major in-service training program to

ensure that teachers have a firm foundation of skills and knowledge and the necessary confidence to introduce ICT into their classroom work. Teachers cannot be expected to guide students in the use of ICT without proper training.

166. Associated with the problem of a lack of teacher experience is the lack of relevant software and e-Learning resources currently available in the Uzbek language and in the minority languages used in Uzbekistan. If the impact of investment in ICT hardware is to be maximised then there is a requirement for a major programme of software and e-Learning resources development in Uzbek. Only a part of this resource development needs to be locally originated. There is a wealth of educational software in all subjects currently available in English and, to a lesser extent, in Russian. Existing materials could be licensed, adapted and translated into Uzbek very quickly and at relatively little cost.

167. The proposed project will address all of the issues listed above. The immediate training needs for school network managers, curriculum coordinators in schools, priority subject and grade level teachers, school administrators and those involved in developing CPD are all included within the proposed project. Thus, a strong foundation of trained staff will be available quickly to support the use of the hardware. The project also intends to stimulate the rapid growth of e-learning resources and software in Uzbek and other minority languages via the mechanism of the e-Materials Development Fund and intensive training in the techniques of localising, translating and originating e-Learning Materials. Adjustments to curriculum and assessment are already programmed as part of STDP. Ongoing teacher training will be supported by the ESDP and there is great potential in the use of distance education (also a part of the ESDP) as a delivery mechanism for INSETT. The cluster schools concept will ensure support, assistance and ongoing professional development for all teachers in all schools in the country.

168. **Infrastructure risks:** all Oblasts, apart from Tashkent City, confirm that there is regular and unpredictable power load-shedding that affects schools in most parts of the country. The severity of the power outages varies from a loss of power from 1 to 2 hours per day to no power at all during most school days. Self-evidently, there is little point in providing ICT hardware unless power supplies can be regularised. Closely associated with the problem of unpredictable power supplies are the power spikes and surges, which can damage ICT equipment unless it is well protected by adequate UPS equipment.

169. The solution to the power supply problem does not lie in the provision of generators or accumulators. A two-pronged approach is necessary. Firstly, no school should be equipped with ICT hardware unless there is a realistic probability of regular power supplies for most of the school day on most days. This would be one of the most important of the minimum criteria for hardware installation. Secondly, basic schools with computer equipment should be moved from category 3 institutions to category 2 institutions. This shift, which in many parts of the country might be achieved relatively easily, would ensure that schools would receive continuous power except in emergency situations.

170. The second major infrastructural problem is the under developed condition of the telecommunications network. The quality of the telecommunications network is improving and the number of fibre optic lines continues to develop. Uzbektelecom has recently proposed wireless terminals for Navoi, Bukhara, Khorezm and Karakalpakstan – all regions/oblasts with numbers of remote schools that cannot easily be reached by landline connections. However, much of the country, and most of the rural areas, are still served by poor quality, low capacity lines, which

remainrelatively unsuitable for Internet connections. In addition, telecommunications are still relatively expensive in Uzbekistan. As a result of both of these factors the project is not proposing large scale Internet connectivity. Instead, the project will focus on strategic access to the Internet for the Cluster Leader Schools only. It is assumed that the requirement for access to the Internet will be relatively limited because of the lack of Uzbek and other minority language materials. However, attention should be given to the development of lower cost connections on a local intranet using spare capacity on local lines as the basis for the development of an Uzbek educational portal and a national system for delivering relevant educational software and learning materials to Cluster Leader Schools and onward by disk transfer to the servers of individual cluster schools.

171. The technical infrastructure for ICT in Uzbekistan remains under developed and there will obviously be problems for some years to come with reliable power supply and access to low cost, high quality telecommunications. For this reason the project will not advocate significant investments in Internet connectivity and will not invest in hardware installations in schools without reliable power supplies.

172. Over the five-year period of the project it can be expected that hardware costs will fall, that radio and V-SAT developments will support easier telecommunications access to rural and remote areas at lower cost and with much wider bandwidth. This will support a wider and more effective use of the Internet. It can also be expected that power problems will be ameliorated and that many rural areas will have more reliable access to satisfactory power.

173. **Overall Assessment:** in the 21st Century every country needs to develop a national strategy for the development of ICT capacity and skills. The draft National ICT Strategy for Basic Education (see Appendix 2) has proposed a phased approach which recognises that within the context of existing constraints and opportunities the full development and integration of ICT in basic education will be a long term task. During the first phase of this strategy from 2006-2010 the benefits have been deliberately established on a limited and achievable scale so that ICT will be affordable and sustainable on the basis of reasonable financial projections and thus ICT access will be available only to priority grades and subjects. It is anticipated that individual student access to the hardware also will be relatively limited (see Appendix 27). Similarly Internet connections will be restricted only to a number of strategically important schools and will not be general throughout the system. Nevertheless, despite these initial limitations, the main benefits in terms of the integration of ICT into the total curriculum and the provision of basic skills in information and communications technology to every basic education student and thus the creation of a foundation of universal ICT literacy, will still be substantial. In addition, the initial stage of development will allow time for the country and the education system to develop experience and knowledge and to improve the conditions necessary for larger scale and more ambitious use of ICT in schools in succeeding phases of development. At present Uzbekistan has only limited financial capability, weak educational preparedness and is still in the process of developing a reliable nationalpower and telecommunications infrastructure. By the end of the first phase of development in 2010 there should be strengthened financial sustainability, improved educational readiness and a more developed power and telecommunications infrastructure.

174. It is reasonable to assume that the following assumptions would form the basis for the 2nd Phase of ICT development from 2011-2015: (i) reduced hardware costs will enable higher computer:student ratios to be achieved and thus the use of ICTs across the curriculum should be extendable to additional grades and additional

subjects; (ii) improvements in telecoms capacity and reduced costs will enable more schools to be Internet connected and at cheaper and more affordable rates; (iii) sustained economic growth on the basis of reasonable assumptions will enhance the fiscal and financial situation of the country to support better provision of ICT. Similarly, improved financial and fiscal management, such as the per-capita school funding experiment, will enhance school budgeting and financial management for improved ICT provision and usage in classrooms; (iv) Library Resource Centre usage will be extended beyond the existing 1,000 pilot schools of STDP and will be a feature of all basic schools, providing opportunities for a larger number of students to work and research independently in an information rich environment; (v) the threshold level of e-Learning Materials in Uzbek and local minority languages should have been reached so that there will be a good stock of appropriate e-learning resources available in Uzbek and other languages to support the use of ICT across the curriculum; (vi) teacher cadres will develop much further and will ensure that teachers are well trained and practiced in modern teaching methodologies, supported by well-developed decentralized in-service teacher training and collaborative, self-help support systems, and a system of incentives based on performance. This will enable the full potential of ICTs to be developed; (vii) reliable servicing and maintenance will be available everywhere on a national basis

IV ASSURANCES

A. Government Assurances

175. In addition to the standard assurances the should provide the following assurances, which will be incorporated in the legal documents

176. **Annual Operational Budgets to Support ICT:** The GOU will ensure that adequate annual budget allocations will be provided to all schools provided with ICT suites to cover the costs of consumables, servicing and maintenance and electricity;

177. **In-Service Teacher Training:** The GOU will undertake to provide adequate financial provision in order to continue an intensive teacher training programme through the RITTIs throughout the project period to ensure that all schools provided with ICT suites have at least one trained school network manager, one trained ICT co-ordinator, five trained subject teachers with knowledge on how to use ICT across curriculum subjects, one staff member trained in the principles and practices of continuous professional development and one member of the school management staff trained in school administration and management using computers;

178. **Minimum Criteria for ICT Installation:** GOU/MOPE will ensure that Oblast and Raion staff will rigorously apply an agreed set of minimum criteria prior to ICT installation in order to ensure that all schools are ready to receive ICT installations. In particular, no school should be supplied with an ICT installation unless there is a suitable room, reliable power supply and at least one staff member with training in the management of hardware and the school network;

179 **Sustainable Financing Plan:** GOU should demonstrate that it has made adequate provision for sustainable financing of the initial hardware investments including on-going adequate provision of recurrent budgets to cover expected operational costs and the costs of equipment replacement;

180. **Selection of Cluster Leader Schools:**GOU/MOPE will confirm the criteria for the selection of Cluster Leader Schools;

181. **Identification of School Clusters:** GOU/MOPE will ensure that the process of dividing schools into school clusters should be completed on a national basis by December 2005. Within this national clustering plan Cluster Leaders Schools should be indicated which meet the agreed criteria for selection. ADB and GOU will consult and agree on the final list of Cluster Leader Schools;

182. **CLS Priority for School Rehabilitation:** GOU undertakes to give priority in school rehabilitation and the refurbishment of computer rooms and the re-wiring of premises to those schools designated as Cluster Leader Schools so that at least 85% of Cluster Leader Schools can be equipped and operational by the end of 2006; GOU/MOPE will undertake to ensure that wherever possible the school libraries to be equipped under STDP will be located in CLSs;

183. **Devolved Financing Experiments for Cluster Leader Schools:** GOU/MOPE/MOF undertakes to extend per capita financing and devolved funding to schools so that CLSs can be used as experimental schools in new methods of school financing for ICT operational funds to be provided under the project;

184. **Publicity:** GOU/MOPE undertakes to launch a major national publicity campaign on the agreed national ICT strategy to coincide with the National Conference on ICT Strategy in Basic Education, provisionally planned for November 2004.

APPENDIX 1: PROJECT DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
Impact Improve the quality, relevance and efficiency of basic school education in Uzbekistan and launch the process of creating an information and computer literate society which can participate on equal terms in the global economy of the 21st century	80,000+ teachers in Basic Schools will have been trained in using ICT across a range of priority curriculum subjects. A high % of Basic Schools should be using ICT regularly as a teaching and learning tool in a range of priority subjects Learning objectives and assessment regimes will start to emphasise skills, competencies, problem solving and higher order thinking skills and the importance of factual recall should be diminished Computers in schools will be used to the maximum extent and every school will create open access systems All grade 9 completers should have basic computer literacy in terms of knowing how to access, manage and use information and should be familiar with the basic generic software applications (word processing, spreadsheets, databases, presentations. School leavers should have more work relevant skills and should be more employable	Monitoring & Evaluation visits to schools MOLSC statistics Outcome of 2006/07 Curriculum and Assessment Reviews Annual student performance assessments PISA results MLA results	
Outcome Establish a high quality and relevant system of education for all Uzbek students, which has ICT fully integrated into the teaching and learning processes of all targeted subjects in order to achieve curriculum reforms, new learning objectives and new learning and teaching methodologies, which focus on the development of skills and higher order thinking rather than on the accumulation and memorisation of factual knowledge	Cluster system operational and working on a national basis with CLSs taking a leading strategic role in ICT development Infrastructure and facilities of all basic schools improved up to acceptable standards A reformed curriculum with fewer subjects, less content and a greater concentration on skills and higher order thinking and which supports and encourages ICT usage across the curriculum	Annual reports of School Development Fund Monitoring & Evaluation visits to schools Annual survey of contents of Uzbek and other language e-resources portal Content of 2006/2007 curriculum	**Assumptions** GOU remains committed to basic educ SDF generates expected cash income GOU can complete its National Plan fo Rehabilitation and Equipment on sche Current constraints e.g. erratic power s resolved

review

A new Information and Computer Literacy subject for all students from Grades 5-9 based on hands-on practical access to the hardware and software. Current informatics syllabus becomes specialist option only

Annual student performance assessments

PISA results

An operational decentralised INSETT system in place based on School Clusters in support of existing RITTI system

MLA results

Teachers regularly using ICT and modern teaching and learning methodologies in target subjects and grades

The availability of an effective and rapidly expanding range of e-learning materials for targeted subjects and grade levels in local languages

Improved teacher and student motivation and interest

An operational and sustainable decentralised INSETT system in place based on CLSs

Pre-installation training for school netw managers can be completed on sched

Risks

School rehabilitation & re-equipping wi

E-learning resources for schools will b

There will be insufficient teachers train ICT

Curriculum inertia will limit opportunitie ICT in school subjects across the curri

Assessment inertia will continue to em factual recall as the dominant learning

Outputs

1. Cluster Leader Schools

1.1 National List of School Clusters and Cluster Leader Schools (by mid 05)
1.2 85% of Cluster Leader Schools equipped with ICT, including testing of alternative hardware configurations (by end 06) and 100% by end 2007
1.3 85% of Cluster Leader Schools Internet connected by end 06 and 100% by end 2007
1.4 CLSs operational
1.5 1400 CLS School Network Managers Trained (by end 2006) and in place in CLSs
1.6 3500 CLS teachers trained in use of ICT in priority curriculum subjects
1.7 At least 9500 School Network Managers trained by (end 2010)
1.8 Adequate Servicing/Maintenance facilities in place for CLS by end 2006
1.9 Adequate Servicing/Maintenance facilities in place for other schools as they are equipped with ICT
1.8 Adequate operational budgets to support ICT available to CLSs
1.9 Adequate operational budgets to support ICT in non-CLS schools made available by MOF/Hokkimyats

Cluster Leader Schools equipped and operational

Annual M&E Reports

At least 2 trained School Network Managers in each CLS by end 2006

School Development Fund Reports

At least 2 trained School Network Managers in place in every school prior to installation of computer suites

MOF. Oblast and Raion educational budgets and disbursements

Adequate and affordable servicing/maintenance arrangements

School budgets

Operational budgets available to schools

2. Decentralised INSETT

Assumptions

SDF generates expected cash income

GOU can complete its National Plan fc Rehabilitation and Equipment on sche

Current constraints e.g. erratic power s resolved

Pre-installation training for school netw managers can be completed

MOF provides operational budgets suf purpose

RITTI ICT training delivered on schedu

Risks

School rehabilitation & re-equipping wi

E-learning resources for schools will b

There will be insufficient teachers train ICT

2.1 280 LRC staff identified and trained in use of ICT across curriculum subjects (by end 06) 2.2 Staff of Cluster Leader Schools trained by LRCs (by mid 07) comprising School Network Managers, Subject specialist teachers, CPD specialists and school admin staff 2.3 CPD system designed, approved and operational (end 06) 2.4 Collaborative decentralised training in Clusters established and sustainable by end of project) 2.5 School admin system operational and effective 2.6 Minimum criteria for installation of all ICT suites approved and applied (by Jan 06)	LRCs and CLSs trained in new teaching/learning methodologies and in ICT use across the curriculum Decentralised INSETT working from CLSs	RITTI training programmes and annual reports	Schools will be provided with ICT suite are ready to receive them Power supply problems remain unresc
3. E-Materials Development 3.1 e-materials developers trained (from early 06 up to end of project) 3.2 e-materials portal for Uzbek and local language e-Materials established and operational (from early 06) 3.4 e-Materials Development Fund designed, approved and launched (by mid 06) 3.5 Caching system for non-Internet schools designed, tested and operational (early 07)	Adequate supply of quality e-materials available for school use Caching system for non-Internet schools operational	Monthly e-catalogue of e-materials Regular review of contents and usage of Uzbek language portal Rate of disbursement of e-Materials Development Fund	Operational budgets not provided or in
4 Management Support 4.1 M&E methodology and instruments designed and approved 4.2Data collectors trained 4.3 Baseline Study completed 4.4 Annual M&E Reviews 4.5 Pilot Project in Telecentres operational 4.6 Pilot Project operational in Thin and Fat Client Options 4.7 Pilot Project operational for de-centralised school financing	M&E system designed and base line study completed Pilot projects designed, approved and in process	PIU and Consultants Project Supervision & Quarterly reports Pilot project progress reports	

Activities with Milestones

1. Cluster Leader Schools

1.1 Identify School Clusters and Cluster Leader Schools (mid 06)
1.2 Equip all Cluster Leader Schools (end 06)
1.3 Establish connectivity (end 06)
1.4 School Network Managers operational (by end 06)
1.5 Trained subject teachers in ICT across the curriculum operational (by end 06)
1.6 Trained CPD staff in place and operational (by end 06)
1.7 Trained CPD staff in place and operational (by end 06)
1.8 CLS based CPD, collaborative working and cluster support operational (by end 06)

M&E Reports

SDF Reports

MOF budget information
Hokkimyat budget information

PIU and Consultants reports

1.9 Establish minimum criteria for installation of ICT Suites
1.10 Establish minimum criteria and cost envelope for Servicing and Maintenance arrangements
1.11 Agree de-centralised school financing arrangements for project operational budgets
1.12 Calculate and agree minimum school operational budget with MOPE and MOF for non CLS schools

2. Decentralised INSETT

2.1 Form Working and Reporting procedures between LRCs, Cluster Leader Schools and Cluster Schools (early 06)
2.2. Specify and agree other working relationships with raion methodologists, RITTIs (early 06)
2.3 TOT for RITTI staff for high priority ICT support training courses (by mid 06)
2.4 Train Cluster Leader Schools and Staff (by end 06)
2.5 Initiate training programme for non CLS schools (by end 06)

3. E-Materials Development

3.1. Design and agree operations of e-Materials Development Fund (early 2006)
3,2 Establish criteria for submission and awards (early 2006)
3.3. Establish a portal of e-resources for reference by e-materials developers (mid 2006)
3.4 Establish the Uzbek language portal (and other minority language portals) (by end 2006)
3.5 Design e-Materials Training courses (early 2006)
3.6 identify trainees (early 2006)
3.7 Start e-Materials Training Courses (in RiTTIs?) (mid 2006)
3.8 Annual programme of courses run by selected RITTIs (annual)
3.9 regular Monitoring of Course Quality and Effectiveness (annual)

4 Management Support

4.1 Recruit, equip and operationale PIU
4.2 Design M&E methodology and instruments (by mid 2006)
4.3 Conduct Baseline study (By end 2006)
4.4 Work with MOPE/MOF on cost identification and reduction issues (From the beginning of the project onwards)
4.5 Identify and design cost reduction pilot projects (from early 2006)
4.6 Identify and design Thin and Fat Client Pilot Project (early 2006)
4.7 Identify and design income generation projects (e.g. rural telecenters) (from early 2006)
4.8 Identify and Design decentralised school operational budget delivery to CLS schools

COM Monitoring Reports

RITTI annual work programmes

RITTI annual reports

E-Learning Materials Catalogues

Charter and Regulations of Fund

Fund Reports and Accounts

M&E Methodology and Instruments

Pilot project approved designs

Pilot project monitoring reports

APPENDIX 2: A DRAFT NATIONAL STRATEGY FOR ICT IN BASIC EDUCATION

1. The Background

The Government has a national strategy in place for long-term ICT development in Uzbekistan. Within this broad framework, ADB is assisting the Government to develop a national strategy for integrating ICT in basic education, consistent with the National Program for Basic Education Development 2004-2009.

2. Rationale

The rationale for investing in ICT in basic education is based on long term strategic, human and economic development and educational considerations.

From the national strategic viewpoint, no country can afford to be left behind in a world where mastery of ICT is increasingly becoming the key to success to any country in the family of nations.

The 21st century will be the information and knowledge-based century and therefore requires a country's workforce to have increasingly sophisticated skills in information access, management, processing and usage and a general population that is computer literate and capable of working with and utilising information technology.

Educationally, there is increasingly evidence that appropriate use of ICT in education brings about positive impact on students analytical ability, problem-solving skills, and motivation to study. This improves student performance.

In sum, ICTs are here to stay and they are already a major factor in spurring global economic activity, promoting development and creating prosperity. Every country must have a policy and a strategy to guide its educational investments in ICTs. In this context, the key issue is "balance". How much can Uzbekistan afford to invest in ICT now and in the future? How is the best value for money to be achieved? How can sustainable provision be assured?

3. The Vision

To improve the quality of learning and teaching and thus educational outputs in basic schools by ensuring effective and sustainable access to ICT to all teachers and students within the next 10-15 years.

This requires:

(i) that every teacher and student has the hardware and connectivity to routinely use ICT in their work and their studies;
(ii) that there is a wide range of electronic teaching and learning resources in all curriculum subjects at all levels; and
(iii) that there is a transformation of teaching and learning styles and methodology as a result of the introduction of ICT into basic schools

Uzbekistan's pace and effectiveness in achieving this vision will depend on its ability to overcome a set of constraints now and as they evolve in the future, as well as its capacity to exploit present and future opportunities.

4. The Constraints

There are three sets of constraints: financial, educational and infrastructure constraints.

4.1 Financial Constraints

- ICT investments and replacement are expensive[35]. At current unit costs and assuming the current "Fat Client" approach with a computer:student ratio of between 1:40 and 1:50[36] it will cost around US$100+ million to equip every basic education school. The annual replacement costs of this investment are around US$20+ million assuming a 5-year replacement cycle and current costs.

- Operational costs (consumables, maintenance and servicing) are expensive, at a minimum US$10 million a year, not including the costs of software licensing, teacher training, or Internet connectivity

- Internet connectivity is expensive in Uzbekistan. Perhaps *an average* of US$1,000 per school per year in 2005[37];

Not counting Internet connectivity, these costs together could amount to around US$35 million per year at current costs. This is equivalent to 4.9% of the 2005 total basic education budget, including the contributions from the School Development Fund. It is equivalent to 6.2% of the basic education budget, not including the SDF contributions. If the fixed components of teachers' salaries and social charges (86.3% of recurrent budget in 2005) and utilities (3.5% of recurrent budget in 2005) are removed from the recurrent budget, then the ICT related recurrent and replacement costs amount to 60% of the remaining education budget. In addition, costs for training teachers, localising and developing e-learning materials, providing technical and managerial support must still be added on. In summary, the additional recurrent costs of ICT provision in the basic education budget, even at this moderate level of supply will be substantial.

4.2 Educational Constraints

- *Curriculum & Assessment*

The present school curriculum is overloaded with subjects and content requirements. There is little room or time to use ICT effectively and the pedagogic implications of ICT across the curriculum have still to be absorbed into State Education Standards. The current ICT syllabus is not appropriate for use with all students. A more general, hands-on, syllabus based on information and computer literacy is recommended for use as a general introduction to ICT.

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[35] All financial estimates in this draft strategy document are approximate only until detailed cost estimates have been completed

[36] A more accurate assessment of likely computer:student ratios in 2010 will be provided when all supply and enrolment data is finally available

[37] This estimate is based upon cost information supplied by IREX. IREX operates connectivity services in a wide range o urban and rural environments and thus the figure quoted is likely to represent a reasonable average. However, because 80% of school are located in rural areas the average figure quoted here might need further adjustment, probably upwards.

❖ *Teachers' Readiness and Development*

Teachers' experience and enthusiasm are key factors in determining the success of ICT integration into classroom activities. At present, a majority of teachers have never used a computer for any purpose. They cannot be expected to guide students in the use of ICT without proper training. The current in-service teaching training system needs to be made more responsive to system needs and priorities, more de-centralised and more flexible in order to provide training and professional development that is regular and frequent, close to the school, comprehensive in coverage and on-going. The provision of this kind of capacity building on a large scale is a substantial additional recurrent cost.

❖ *School's* e-Readiness

In addition to the lack of e-Readiness of teachers, a majority of schools are not ready to use ICT at present. Many schools need renovation, proper wiring[38] and safety measures, appropriate classroom layouts, dust and climate control etc. Affordable and effective maintenance and servicing must be in place at school, raion and oblast levels to ensure hardware availability and proper usage all schools with ICT need reliable and adequate operational budgets

❖ *E-Learning Resources*

At present, there are few e-Learning resources available in the Uzbek language, or in any other minority language (except possibly Russian), in any school in the country[39]. The use of the potential created by the investment in hardware will require the rapid localisation of existing educational software and the development of information rich environments in Uzbek (and in other minority languages).

4.3 Infrastructure Constraints

❖ *Power Supplies*

Lack of reliable and predictable power supplies during the school day is a major obstacle to computer usage in some oblasts and rural areas. Frequent and large-scale power surges are typical of all regions and load-shedding in many areas can range from 2-3 hours to the whole of the school day. There is obviously little point in supplying hardware and if there is no reliable power supply available

❖ *Telecommunications*

The current preponderance of low quality, expensive analogue phone lines will inhibit/prevent Internet connectivity to most rural areas of the country and thus to the majority of the poor for some years to come.

5. The Opportunities

Hardware costs are coming down, with the real possibility of the $100 computer in the next few years. Significant hardware cost reductions will make higher levels of

[38] The introduction of Fat Client computer suites into schools will require (depending on the number of work stations) between 7.5 to 10 kilowatts per hour of power usage. A majority of schools currently use very little electricity and the sudden increase in power requirement will significantly increase the cost of utilities bills but will also bring pressure to bear on outdated wiring systems

[39] This statement is derived from the responses to the PPTA Raion and School Surveys

computer provision possible in the future and will make replacement costs more affordable, thus enhancing the sustainability of ICT provision in Uzbekistan. Given existing technology, "Thin" or "Tubby" client options in hardware/network configurations will make significantly lower hardware investment and replacement costs possible.

Telecommunications developments are rapid: telephone lines in Uzbekistan are improving, offering the hope of much wider and more reliable connectivity in the medium term. Increased fibre-optic lines and the use of radio and V-SAT to reach rural and remote areas more cost effectively are all in a developmental stage. More broadly, developments in wireless technology may offer a new generation of access, connectivity and price that could revolutionize what we know today.

It is cheaper and easier to develop translations and adaptations of electronic materials than to develop translations and adaptations in standard print format. Thus, the advent of ICT in schools could assist in the solution of materials supply problems to minority language schools and special needs schools.

Private sector support for ICT in education is common elsewhere in the world. It is also a real possibility to establish private public partnerships (PPP) in providing services to ICT in schools in Uzbekistan. Discussions are currently underway between the GOU and a number of major international ICT companies

6. A Strategic Approach

Given the constraints and opportunities discussed above, achieving the vision of ICT development in basic education is a long-term task. Therefore a phased approach over the next 10-15 years is proposed, with clearly defined objectives and activities for each phase.

The key idea of a phased approach is that all schools will benefit from ICT during the initial stage. This benefit will be on a limited scale (grades, subjects and time of access) because the country faces limited financial capability, weak educational preparedness, and is still in the process of developing a reliable national infrastructure over the medium term. But this initial stage is crucial because, in addition to immediate benefit to teachers and students, it allows time for the country and the education system to improve the conditions necessary for larger scale and more integrated use of ICT in schools in future stages, that is, strengthening financial sustainability, educational readiness, and infrastructure development.

7. The First Phase: 2005-2010

7.1 Objectives of the 1st Phase

The objective of the 1st phase of development of ICT in Basic Education is:

- To improve learning and teaching across a priority number of curriculum subjects in grades 6-9 in all schools through the use of ICT.

This requires:

(i) Provision of access to computers and ICT to every school in Uzbekistan, with Internet availability limited largely to schools of strategic importance i.e. Cluster Leader Schools (CLSs);

(ii) at least one, and preferably two, staff in every school who have been trained to manage a school network; plus a sufficient number of teachers in priority grades and subjects trained in using ICT as learning and teaching tools;

(iii) adjustments in present SES and syllabi to encourage the full integration of ICT; the development and wide availability of e-teaching and learning materials;

(iv) the establishment of an effective monitoring and evaluation system as the basis for future planning and decision making on ICT development in schools.

Central to achieving the objectives of the 1st phase are two key strategic pillars. The first is the establishment of school clusters. Each cluster will have a Cluster Leader School (CLS) whose central role will be to lead and assist all cluster schools in all activities relating to e-Readiness and the integration of ICT into all aspects of school teaching and learning. Each cluster will contain on average 15 schools[40], each within a radius of no more than 20-25 kilometres from the Cluster Leader School, so that 650-700 clusters will cover every school in Uzbekistan. The school cluster concept is strategic – instead of spreading the limited financial and human resources evenly but thinly across all schools, the country should prioritise the allocation of its resources strategically in order to build up cluster leader schools as champions and mentors for the use of ICT as a central part of the educational process. Every school will get basic resources, but CLSs should get additional resources and priority training so that they can become sources of timely support to other schools, and bases for future expansion.

The second pillar is the adoption of the "Thin Client" option for all schools in a cluster - except for the cluster leader. The cluster leader will be equipped with a "Fat Client" network configuration and Internet connection to enable it to provide full technical and pedagogic support to other schools in the cluster. The Thin Client solution will support cluster member schools who will be provided with more limited but more affordable ICT networks. This is reasonable bearing in mind how little prepared most schools are to receive ICT facilities. The clear advantage of this approach however is the guaranteeing of direct benefit from ICT and Internet to every school in the country, be it rural or urban, central or remote, during the initial phase of ICT development when Uzbekistan faces quite substantial financial, educational and technical constraints. The Thin Client option appears to have the possibility of significant financial advantages (although not necessarily the Thin Client options currently under consideration)[41]. The alternative would be either to spread the limited resources evenly to all schools, or focus resources on restricted geographical areas or limited the number of schools. Either way, it would not be consistent with the country's goal of bridging the internal digital divide. CLSs should become strategic strongholds for future accelerated ICT development in future developmental phases.

[40] In remote areas, clusters may comprise only 3 or 4 schools, whereas in urban areas clusters may comprise 20+ schools. The key factor in the composition of school clusters will be ease of access

[41] The financial advantages of Thin Client options lie in the reduced replacement costs rather than in reduced initial investment cost, although it would be possible to specify a Thin Client option that would be cheaper to procure than the current Fat Client options. The basic problem is that no Thin Client system has yet been in operation in schools long enough to determine whether the extended replacement cycle claimed by the proponents of the system can actually be delivered.

7.2 Key Components and Activities of the 1st Phase

Key components and activities of the 1st phase of ICT development in Basic Education are proposed below. A set of detailed recommendations for GOU consideration is provided in Annex 4.

a) School Clustering Component

- 650-700 school clusters will be established with each cluster containing on average 15 schools within a radius of 20-25 kilometers. One school will be selected as the cluster leader school.
- Cluster leader schools will be provided with "Fat Client" ICT option consistent with the basic requirements of MOPE, but with additional equipment such as data projectors, scanners, digital cameras, colour printers etc as sources of pedagogic support to other schools. All cluster leader schools should have Internet connection.
- Other cluster member schools could be provided with a "Thin Client" ICT solution and no Internet connection.
- Cluster leader schools will operate with clear plans for organizing and supporting e-readiness and activities for developing and integrating ICT in education in other schools.

b) Curriculum and e-Resources Component

- Extend school opening hours and introduce innovative timetabling to ensure that ICT hardware is used to the maximum effect
- Adjust SES and syllabi to encourage prioritized grade level and subject access to ICT hardware during the 1st phase: grade 6 - grade 9 in Languages (Uzbek and local minority languages, Russian, English/French/German), Maths and Science subjects and one social science subject e.g. History or Economics etc.
- Develop and adopt a more general *Information and Computer Literacy syllabus and making the present informatics* course optional for those who want to specialize in ICT. This will release time for using ICT for other subjects.
- Establish an effective program of e-Learning materials localisation of existing software and the development in the Uzbek language of a translation programme to support electronic materials development in ethnic minority languages

c) E-Readiness Component

- Create conditions and environment in classrooms and schools (classrooms, layouts, wiring, security, climate control etc) for receiving the computer suites;
- Give schools priority access to electricity during school days to ensure power supply;
- Train at least one staff member in every school (preferably two) to manage a school network prior to hardware installation;

- ❖ Provide adequate technical maintenance and servicing facilities on a national regional and zonal basis.

d) Teacher Professional Development Component

- ❖ Improve existing program for continuous professional development of teachers – with cluster leader schools (and learning resource centers presently being established) at the core, this program will be (a) close to schools; (b) closely targeted to school, teacher and student needs; (c) frequent – not 24 days every 5 years but weekly or monthly training and upgrading; (d) closely supervised and quality controlled; (e) the basis for remuneration incentives;

- ❖ Equip and train RITTIs as a high priority in order to train the schools and teachers who will receive computer suites.

e) Financial Sustainability Component

- ❖ Establish sustainable financing planning to ensure that the full investment, replacement and recurrent cost implications of ICT are appreciated;

- ❖ Provide budgetary allocations to cover fully these costs including the recurrent costs;

- ❖ Research and pilot cost reduction, income generation, cost recovery and pro-poor financing policies.

f) M&E Component

- ❖ Establish effective Monitoring and Evaluation system at the school, raion/oblast and central government level to provide evidence of progress, areas for further improvement, which serve as the basis for decision making for 2nd phase of ICT development.

8. The 2nd Phase: 2010-2015

8.1 Critical Issues

Looking into the future, the critical issues that will need to be assessed in the planning and specification of the 2nd Phase of Development include:

a) Degrees of success of the 1st phase implementation, including:

- ❖ enhanced educational preparedness - a conducive curriculum, increasingly available e-resources, a core of well-trained and practiced teachers in ICT, trainers in place at national, regional and zonal level and successive cohorts of students who have developed enthusiasms and skills in learning aided by ICT;

- ❖ proper financial management developed at central government (MOF, MOPE), other levels of government, down to school level management to cope with substantial tasks in financing ICT in schools;

- a tested support system, including technical and managerial support, that is built wherever possible on a firm partnership between the public and private sector; and much improved power supplies, telecommunications and market structures

b) Financial constraints – economic growth itself may offer the best hope of relaxing the financial constraint. Apart from its fiscal impact, robust economic growth will also (i) create higher demand for more skilled workers, particularly those well trained in ICT; and (ii) generate more enthusiasm on the part of teachers and students as the relevance of education is greatly enhanced.

c) New technology developments – rapid technological advancement on a global scale will offer new possibilities of access and connectivity that may not even be foreseen today. Such progress will drive down costs and prices for telecom equipment and Internet connectivity in open market conditions. Technological changes often lead to structural changes to the market, which in turn will benefit consumers, and in this case, Basic Education in Uzbekistan.

8.2 A Possible Outline of the 2nd Phase: 2010-2015.

It is reasonable to assume that the following trends would be part of a 2nd Phase development:

- Reduced costs will enable higher computer:student ratios to be achieved in the 2nd Phase and thus the use of ICTs across the curriculum should be extendable to additional grades and additional subjects

- Improvements in telecoms capacity and reduced costs will enable more schools to be Internet connected and at cheaper rates

- Sustainable economic growth under reasonable assumptions will enhance the fiscal and financial situation of the country in order to support better provision of ICT; similarly, improved financial and fiscal management, such as the per-capita school funding experiment, will enhance school budgeting and management for improved ICT provision and usage in classrooms.

- Library Resource Centre usage will be extended beyond the existing 1,000 pilot schools of STDP and will be a feature of all basic schools, providing opportunities for a larger number of students to work and research independently

- The threshold level of e-Learning Materials in Uzbek and local minority languages should have been reached so that there will be a good stock of appropriate e-learning resources available in Uzbek to support the use of ICT across the curriculum

- Teacher cadres will develop much further and will ensure that teachers are well trained and practiced in modern teaching methodologies, supported by (i) well-developed decentralized in-service teacher training and collaborative, self-help support systems, and (ii) a system of incentives based on performance. This will enable the full potential of ICTs to be developed

- Reliable servicing and maintenance will be a standard part of the system

8.3 Economic Growth and Cost Projections for a 2nd Phase Project

We are preparing scenarios based on different assumptions on (i) economic growth, increases in budget allocations for basic education; and (iii) cost trajectories. These scenarios will allow us to project further expansion of ICT in basic education for the 2nd phase from 2010-2015, including a higher ratio of students/computer, more sophisticated technical specification of ICT equipment, and wider Internet connectivity.

This strategy document is supported by Annexes as follows:
Annex 1: Financial Data and Implications
Annex 2: Summary Checklist of Strategic Activities
Annex 3: Proposed 1st Phase Strategy Recommendations

ANNEX 1: FINANCIAL DATA AND IMPLICATIONS

Item	Value
No of Basic schools	9,700
Students enrolled in Basic Education	6,100,000
Av Number of Students per School	629
Av Number of Student Work Station per school	15
Av PC: Student Ratio (Total Roll Nos divided by Number of PCs)	1:42
No of PCs required for Basic Education	145,500
Assume 10% Loss, Damage, Replacement Rate	160,050
Unit Cost per Work Station (Fat Client Profile)	$705
TOTAL INVESTMENT REQUIRED	**$112,835,250**
Annual Replacement Cost at current costs (Assuming 5 yr cycle)	***$22,567,050 per year***
Per PC monthly costs of servicing and maintenance	$3/month (IREX) $6/month (Ozautomatika)
Per PC costs of consumables and utilities	$5/month (IREX)
Annual Recurrent Budget Requirement ($8-11/month x 10 months x 145,500 PCs	**$11,640,000 to $16,005,000**
Annual Replacement + Recurrent Costs Requirement at current costs	**$34.21 million to $38.57 million per year**
Potential Reduction in Investment Costs using Thin Client options	20-30%
Potential Reduction in Replacement Costs using Thin Client Options	Up to 60% assuming a 10 yr terminal life and a 7 year appliance server life

ANNEX 2: SUMMARY CHECK LIST OF ACTIVITIES SPECIFIED BY THE NATIONAL ICT STRATEGY FOR BASIC EDUCATION

No	Activity	Term			Priority			Deadline	Comments	
		Short-term (2005-2006)	Medium-term (2005-2010)	Long-term (beyond 2010)	Low	Medium	High		Donor supported	Country supported
1	**Provide ICTs to every basic school in Uzbekistan**									
1.1	Organize national system of school clusters and identify Cluster Leader Schools (CLSs)	■					■	By end 2005		■
1.2	Establish system of minimum school criteria for the installation of ICTs into schools and ensure that it is rigorously applied	■					■	By end 2005		■
1.3	Develop annual plan to identify schools for ICT installations based on the minimum criteria and provide priority for CLSs.	■					■	By end 2005		■
1.4	Agree and specify national hardware standards for CLSs and other schools	■					■	By end 2005		■
1.5	Ensure integration of planning for school rehabilitation, teacher training, maintenance etc	■					■	By end 2005		■
1.6	Develop and implement policies to ensure reliable power supply to schools with ICT, particularly for rural areas	■					■	By end 2006		■
1.7	Develop and implement policies and activities to ensure continued improvements in the quality of Internet connectivity (e.g. digital telephone lines, radio, V-SAT etc) particularly for rural areas		■			■		By end 2010		■
1.8	Renovate/refurbish school computer classrooms		■				■	By end 2010		■
1.9	Renovate/refurbish school classrooms for CLS	■					■	By end 2006		■
1.10	Install ICTs in LRCs (ESDP) CLSs and RITTIs	■					■	By end 2006	■	
1.11	Install ICTs in all BE schools		■			■		By end 2010		■
1.12	Establish LRCs (ESDP) and CLSs with Internet connections throughout the country	■					■	By end 2006	■	
1.13	Establish national service network for ICT at affordable prices	■	■				■	By end 2010	■	
1.14	Identify, implement and evaluate pilot projects for testing new technology or new hardware		■			■		By end 2010	■	

No	Activity	Term			Priority			Deadline	Comments	
		Short-term (2005-2006)	Medium-term (2005-2010)	Long-term (post 2010)	Low	Medium	High		Need donor assistance	Country support
2	**Develop Sustainable Financing for ICT in Basic Education**									
2.1	Accurately identify all costs associated with ICT provision – investment, replacement & recurrent – as basis for forward financial planning	■					■	By end 2005		■
2.2	Ensure all schools have adequate operational budgets for ICT		■				■	By end 2010		■
2.3	Develop with the GOU/MOF sustainable financing plan for ICT in BE Program		■				■	By end 2010		■
2.4	Identify, implement, evaluate pilot projects for income generation, cost reduction, cost recovery, pro poor and efficient fund delivery for future benefit		■			■		By end 2010	■	
3	**Create A Supportive Learning Environment for ICT Usage**									
3.1	Make adjustments to the State Education Standards and syllabuses to support the use of ICT across the curriculum		■				■	By end 2007	■	
3.2	Design a New Information and Computer Literacy Syllabus for Grades 5-9 suitable for general use by all students (see STDP)		■			■		By end 2007	■	
3.3	Encourage extended school opening hours and flexible use of resources to achieve optimum use of facilities provided		■			■		By end 2010		■
3.4	Prioritise ICT use to specified subjects/grades		■			■		By end 2010		■
3.4	Develop and run TOT programs in RITTIs in (a) School Network Management; (b) Use of ICT in School Admin; (c) Information & Computer Literacy; (d) ICT across the Curriculum	■					■	By end 2006	■	
3.5	Run in-service training in RITTIs for LRCs/CLSs	■	■				■	By end 2006	■	
3.6	Extend INSETT activities in RITTIs to cover all schools on a national basis		■				■	By end 2010	■	
3.7	LRCs/CLSs to develop de-centralized teacher training, CPD, collaborative working and self help within/between school clusters	■					■	By end 2006	■	
3.8	Create incentives for teachers to become ICT literate and familiar with ICT		■			■		By end 2010		■

No	Activity	Term			Priority			Deadline	Comments	
		Short-term (2005-2006)	Medium-term (2005-2010)	Long-term (beyond 2010)	Low	Medium	High		Donor supported	Country supported
4	**Develop e- resources**									
4.1	Localising selected international educational software and obtaining national licences	■	■				■	By end 2010	■	
4.2	Establish an e-Learning Materials Development Fund to encourage rapid development of e-learning materials for schools		■				■	By end 2006	■	
4.3	Train LRCs, RITTIs, MOPE Departments, Oblasts and Private Sector in the techniques of e-Materials Development	■					■	By end 2006	■	
4.4	Develop e-learning materials in Uzbek and local minority languages		■				■	By end 2010	■	
4.5	Develop a MOPE e-Materials portal to access and retrieve necessary data, pedagogical materials and other e-resources for schools		■				■	By end 2010	■	
4.6	Establish e-libraries in schools based on STDP School Libraries		■				■	By end 2010	■	
4.7	Encourage school clusters to develop materials, share ideas etc		■			■		By end 2010		■
5	**Monitoring and Evaluation System**									
5.1	Establish key performance indicators for ICT in Basic Education	■					■	By end 2005		
5.2	Design, test and implement a monitoring and evaluation system on the use of ICT in Basic Education	■					■	By end 2006		■
5.3	Establish monitoring and evaluation system annually for life of project		■				■	By end 2010		■
5.4	Produce annual M&E reports and adjust strategies in the light of developing experience		■			■		By end 2010	■	
5.5	Design 2nd Phase of ICT in Basic Education on the basis of experience from 1st Phase derived from M&E		■				■	By end 2009	■	
6	**Increase Parental & Community Involvement in Schools**									
6.1	Raise public awareness among community and parents on benefits of use ICT in schools.		■			■		By end 2010		■
6.2	Pilot test community tele-centres in rural and remote areas		■			■		By end 2010	■	

No	Activity	Term			Priority			Deadline	Comments	
		Short-term (2005-2006)	Medium-term (2005-2010)	Long-term (beyond 2010)	Low	Medium	High		Donor supported	Country supported
7	**Use ICT in Schools to Improve School Management**									
7.1	Ensure that every school has one free-standing PC for admin and management purposes		■				■	By end 2010		■
7.2	Agree standard software packages for school management and admin PC and provide to every school – including EMIS	■					■	By end 2006		■
7.3	Develop INSETT program on use of EMIS for School Managers based on standard software provision to schools (see 7.2, above)		■				■	By end 2010	■	
7.4	Train school management, RED, OED and MOPE specialists on use of EMIS		■				■	By end 2010	■	

ANNEX 3: 1ST PHASE STRATEGY RECOMMENDATIONS

Issue	Recommendation	Implications	Rationale
School Clustering Strategies			
School Clusters	• Adopt national school cluster network as basic ICT strategy	• Create 650-700 school clusters • Av number of schools/cluster = 15 • All schools in cluster should be within 20-25 kms • Small clusters for remote schools	• Proven strategy • Fast implementing support to all schools • National system • Rural and urban equity • Focus for school level training • Internet connections provide convenient delivery method for e-learning materials • Internet will enable schools, clusters and subject groups to work collaboratively • Vehicle for school textbook ordering (STDP)
Libraries	• Ensure all Cluster Leader Schools (CLSs) should have an STDP library	• CLSs can work to integrate computer suites and school libraries as the basis for student centred learning and individual student working	• Contribution to full integration of ICT in the school curriculum and in classroom methodologies
Installation Priority	• All CLSs to have installation priority	• Urgent need to identify clusters and cluster leader schools • Priority to CLSs for all minimum required criteria	• Early installation = maximum support to schools and support to make schools e-ready.
Curriculum & E-Materials Strategies			
Purpose	• To support the integrated use of ICT as a teaching and learning tool across the curriculum	• ICT must be used for purposes much wider than just the learning of informatics • Eventually, this will require investment in e-materials development, teacher training, curriculum reform and assessment reform across all curriculum subjects	• Informatics is too limited an objective to warrant the scale of investment envisaged by the GOU
Curriculum & Assessment	• Review Curriculum & Assessment requirements for ICT across the curriculum	• This is already part of the STDP and should be specifically added to the TORs of the Curriculum and Assessment Groups	• The integration of ICT into the curriculum requires a re-assessment of SES, curriculum and assessment policies and strategies
Prioritise Grade Levels	• 6-9	• Use of ICT across the curriculum restricted to Grades 6-9	• Provides sufficient access hours for efficient use
Prioritise Subjects	• Maths, Sciences, Languages	• Use of ICT across the curriculum restricted to these subjects	• Provides sufficient access hours for efficient use

Extend Computer Access Hours	• Maintain computer suites open 12 hours/ school day, and on Saturdays and Sundays	• Increases student access to ICT • Allows more ICT time in target subjects and grade levels	• More efficient use of investment • Maximum exposure of hardware to students
E-Materials Development	• Software localisation and acquisition • Software evaluation tecbniques • Positive encouragement for the development of e-learning resources in Uzbek and other minority languages	• Training for e-materials authors, financial support to encourage and support development, web portals to encourage collaborative materials development among	• There is little point in supplying the hardware if there are no relevant e-Learning materials in Uzbek and minority languages to use
E-Readiness Strategies			
Restrict school installations to e-Ready schools	• Develop minimum criteria for installation • Apply minimum criteria rigorously	• ICT suites only supplied to schools that are ready to receive them • Single shot supply to very small schools or schools not ready to receive ICT suites	• Avoids damage to or improper use of ICT facilities • Avoids possibility of wasted investment
Teacher Development Strategies			
Teacher Preparation	• High priority for RITTI training for School Network Managers, Subject Teachers, School Administrators, E-Materials Developers	• Investment needed in Crash Programme of Training in RITTIs	• Provision of ICT without training will undermine investment
Continuous Professional Development	• CLSs should get priority access to RITTI training	• CLSs will be able to support other cluster schools until they also get access to RITTI	• There is a need for *fast* provision of teacher training to support all schools with new ICT installations
Financial Sustainability Strategies			
Computer:Student Ratio	• 1:50	• 110,000 Work Stations by 2010 • Total Cost = $78 milllion	• 1:50 is at limit of sustainable affordability
Client Configuration	• Thin Client	• 25% Investment cost reduction • 50% Replacement Cost reduction • 50% operational cost reduction • Some operational disadvantages	• Contributes to sustainability
Replacement assumptions	• 5 years for Fat Client • 7-10 years for Thin Client	• Lower replacement costs for Thin Client	• Thin client cheaper to sustain
Internet Connectivity	• Strategic connections to CLSs only	• Limited investment in Internet connectivity	• ISP costs still too high • Telecoms quality not yet ready

Monitoring & Evaluation Strategies			
Research Projects	• Establish research projects as basis for evidence-based policy making and planning for the next Phase of development	• None	• There is a need to experiment with a range of technical configurations, cost reduction possibilities, budget delivery options, income generation and parental contribution scenarios as the basis for future planning
M&E	• Create a system of M&E, which will monitor progress on ICT development across the school curriculum	• None	• Accurate feed-back is essential for policy making, planning and the design of the next phase of development

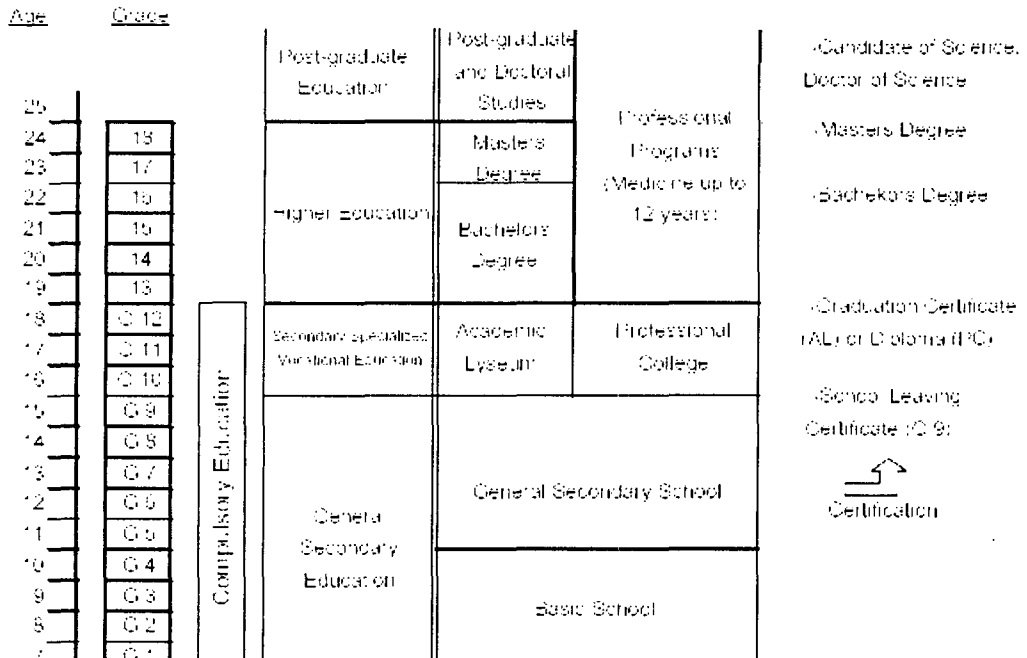
APPENDIX 3: GENERAL SECONDARY EDUCATION SUB-SECTOR ANALYSIS

1. Overview of the Uzbekistan Education System

The Uzbekistan education system comprises four sub-sectors: (a) pre-school education; (b) general secondary education; (c) senior secondary and secondary specialised education; and (d) higher education.

Prior to 1991 virtually every child had access to a nursery or kindergarten for up to three years prior to entry into basic school. Pre-school education was largely financed by state farms and other state enterprises. The economic and financial problems of transition from the Soviet Union into an independent state after 1991 caused considerable financial problems with many of the state farms and enterprises and as a result a large number of pre-schools and nursery facilities were closed down. In 2005 it is estimated that there are approximately six hundred children in pre-schools representing, perhaps, 20-25% of the demand.

Figure 1: Structure of the Uzbek Education System



Source MHSSE CSSVE MPE

General secondary education comprises primary or basic school for four years followed by general secondary school for five years. Until the announcement of the National Programme for Personnel Training (NPPT) Uzbekistan operated an 11 year system of general secondary education so that the five grades of general secondary school would be followed by two grades of senior secondary school. The NPPT

introduced a 12 year education system with all students having to choose between an academic lyceum, frequently associated with or even attached to, a higher education institution or a professional college, which provided specialised vocational education. The secondary education system is currently in the process of transition from the 11 year to the 12 year system. This was originally supposed to have been completed in 2004 but has been extended to 2010.

Higher education is now divided into a four-year Bachelor degree, a two-year Masters degree followed by Post-graduate and Doctoral studies. Some specialised higher education e.g. medicine can take 10-12 years to complete.

There is a school-leaving certificate taken at the end of Grade 9. Academic lyceums offer graduation to students at the end of the 3-year course and professional colleges offer specialist diplomas. Increasingly, higher education institutions are now setting their own entrance examinations, partly it is reported because they no longer have trust in the objectivity and/or accuracy of school leaving examinations.

In 2003/4 MOPE/CSSE reported 594,984 pre-school students, 6,093,277 students enrolled in general secondary education and 650.483 enrolled in specialised secondary education (see Table 7, below)

2. Enrolments in General Secondary Education

Uzbekistan has the largest population among Central Asian countries. In 2005 the population was estimated at 25.9 million. The rate of population growth is approximately 1.2% per annum. Table 1 shows an urban population in 2005 of 36.3 percent and a rural population 63.7 percent.

Table 1: Analysis of Population ('000s)

Year	Entire Population		Urban			Rural		
	No.	% Change	No.	% Change	Share	No.	% Change	Share
2000	24,487,7		9,165,5		37,4%	15,322,2		62,6%
2001	24,813,1	1,3%	9,225,3	0,7%	37,2%	15,587,8	1,7%	62,8%
2002	25,115,8	1,2%	9,286,9	0,7%	37,0%	15,828,9	1,5%	63,0%
2003	25,427,9	1,2%	9,340,7	0,6%	36,7%	16,087,2	1,6%	63,3%
2004	25,707,4	1,1%	9,381,3	0,4%	36,5%	16,326,1	1,5%	63,5%
2005	26,006,8	1,2%	9,430,3	0,5%	36,3%	16,576,5	1,5%	63,7%
	Average	**1,2%**		**0,6%**	**36,7%**		**1,6%**	**63,3%**

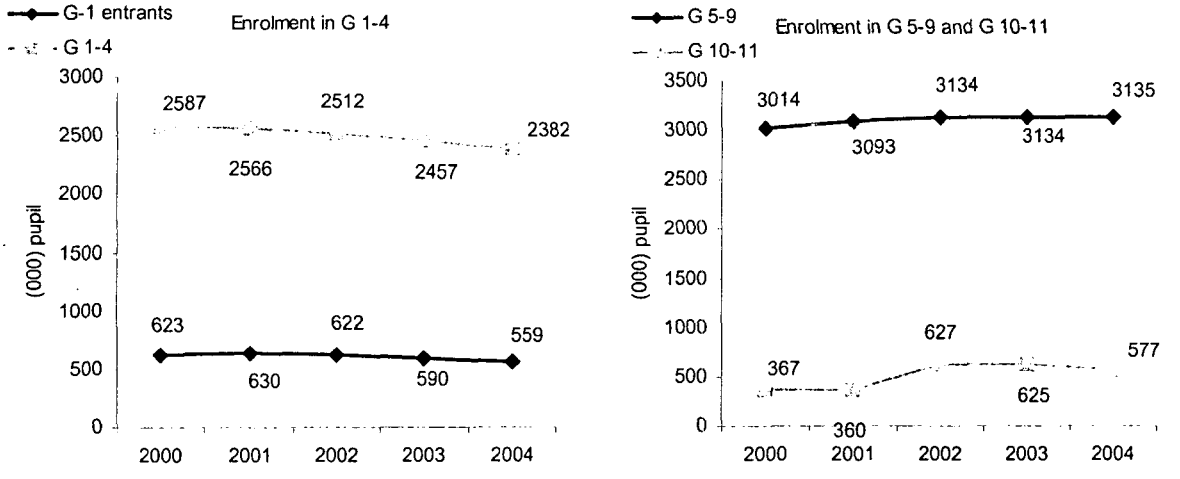
Uzbekistan offers general secondary education in 7 languages – Uzbek, Karakalpak, Russian, Kazakh, Tajik, Krygyz and Turkmen. Education is provided in all of these languages generally from Grade 1 through to Grade 9 and even to Grade 11. Minority language groups are well dispersed throughout the country and although there are many schools with a single language of instruction it is also common for schools to maintain two or even three languages of instruction on the same premises. The enrolment statistics, disaggregated by language of instruction and grade level are provided in Table 8, below. The latest available figure for the number of general secondary schools is 9,757 (2004) so that the average school size is around 625. This mean figure, however, conceals great variations from schools of 2,000+ students in major urban areas to schools of 100 or less in remote rural or mountain areas. The school clustering exercise illustrated in Appendix 34 provides an indication of the variation in school size in one Raion of 53 schools in Tashkent

Oblast. In this one Raion there are five languages of instruction (Uzbek, Kazakh, Russian, Tajik and Kyrgyz) there are eight schools with over a thousand students and four schools with less than one hundred of which the smallest is an Uzbek language school of only 59 students in the mountains. Three schools are only reachable on horseback and one school is 30 kms from the nearest paved highway. This single example illustrates the diversity and the complexity of general secondary education in Uzbekistan.

Amongst the 14 Oblast/regions the largest student populations are in Samarkand, Ferghana and Kashkadarya. The smallest school populations are in Navoi (despite having the second largest area) and Syrdarya. 89% of the general secondary enrolment attends Uzbek language schools, 4.5% attend Russian language schools, 2.2% attend Karakalpak language schools, 3.1% attend Kazakh language schools, 1.7% attend Tajik language schools. These five language groups account for more than 99.5% of the school population. Kyrgyz and Turkmen between them account for less than 0.5%. Table 3 illustrates the location of the various minority languages according to Oblast/region. Uzbek tends to have larger schools than the other languages. Some of the smaller language groups often have very small enrolments

Over the past 10 years there have been significant changes in the structure of the school population. Declining birth rates and an aging population have reduced the population between 0-15 years of age by 13%, while the age cohort 16-19 has increased by 27%. Demographic projections suggest that the school population (5-19 years) will decline quite sharply until 2010 but will then start to increase again. Table 2 demonstrates clearly the impact of decreasing enrolments. Each year for the past six years there has been a steady decline in Grade 1 entry levels and the Grade 1 cohort in 2004 is 15% less than the Grade 1 cohort in 1999 – an average decrease of 3% per year over a five-year period.

Figure 2: Enrolment in Grades 1-4, 5-9 and 10-11



By 2010 approximately 600,000 students currently enrolled in Grades 10 and 11 of general secondary education will be transferred to senior secondary specialised education and will attend either academic lyceums or professional colleges. This transfer, combined with the continuing projected decline in Grade 1 entry up to 2010 suggests that the general secondary population will decrease from the current level of approximately 6.1 million to around 5.3 million by the end of the decade. These

demographics and restructuring changes obviously need to be taken into account in the forward planning for the provision of ICT to basic and general secondary education.

The number of teachers is provided in Table 2, below.

Table 2: Number of Teachers in Basic Education (2000-2005)

	2000	2001	2002	2003	2004
Number of teachers	440762	445474	449795	451852	447129

Source: MOPE, May 2005

Despite falling enrolments in General Secondary and Basic Education teacher numbers have remained very stable and have in fact increased slightly over the past 5 years by around 1.5%. The general teacher:pupil ratio for general secondary education is 1:13.6 . 75% of teachers in Basic and General Secondary schools are women.

3. Financing Basic and General Secondary Education

Education is a high government priority and the GOU has maintained investment in education as a percentage of GDP of over 8.5% since at least 1999 compared with an average for all OECD countries of 5.1% (see Table 3, below). Education expenditure as a percentage of the total GOU budget has increased from 19.2% in 2001 to 23.3% in 2005. The real growth rate in educational expenditure after adjustments for inflation has averaged approximately 9% per year between 2001 and 2004.

Table 3: Public Expenditures of Education Sub-sectors as a share of GDP*

	1999	2000	2001	2002	2003	2004	2005**
Pre-school	1.18%	1.03%	1.12%	1.18%	1.07%	0.98%	0.98%
Basic Education	4.24%	3.58%	3.81%	3.74%	3.73%	3.65%	4.86%
SSVE	3.40%	3.93%	2.81%	2.60%	2.54%	2.28%	2.44%
Higher Education	0.50%	0.48%	0.48%	0.45%	0.42%	0.39%	0.41%
Total Education	9.32%	9.02%	8.22%	7.97%	7.76%	7.30%	8.69%

Source: Calculated based on MOF data, May 2005. * Does not include foreign assistance **Estimate.

Table 4: Real Public Expenditure Growth in Education Sub-sectors

	2000	2001	2002	2003	2004	2005
CPI*	28,00%	27,40%	21,60%	3,80%	10,00%	10,00%
Pre-school	5,29%	37,60%	38,36%	13,76%	5,28%	10,95%
Basic education	0,92%	33,57%	27,29%	25,15%	13,45%	51,22%
SSVE	48,83%	19,16%	18,70%	22,33%	3,64%	19,07%
Higher education	19,36%	22,85%	23,04%	16,69%	5,56%	18,98%

Source: Calculated based on MOF data, May 2005; ADB Outlook (Update), 2004.

Although general secondary education enrolment represents almost 84% of total enrolment from pre-primary through to senior secondary in 2005 it only receives

50.3% of the total education budget. Specialised senior secondary education, with only 8% of enrolment numbers receive 31.6% and pre-school 12.7%. However, over the past five years there has been a reallocation of budget back toward general

Table 5: Distribution of Education Expenditure by Sub-sector (%)

Year	Preschool	Basic Education	Senior Secondary	Higher Education	Total
1999	12.6	45.5	36.5	5.4	100.0
2000	11.4	43.6	39.7	5.3	100.0
2001	13.6	46.4	34.2	5.8	100.0
2002	14.8	46.9	32.6	5.7	100.0
2003	13.8	48.0	32.7	5.5	100.0
2004	13.4	49.9	31.4	5.3	100.0
2005	12.7	50.3	31.6	5.4	100.0

Source: Ministry of Finance, Government of Uzbekistan, April 2005

secondary education with year on year average increases of 0.8% over a six-year period. The overwhelming majority of the secondary education budget is recurrent budget expenditure and this has risen from 96% in 2000 to 100% in 2005. The advent of the School Development Fund, an extra budgetary fund created by a 1% tax on enterprise profits has been created to fund the rehabilitation and re-equipment of general secondary buildings, computer rooms, laboratories, libraries and sports halls as part of the National Plan for Basic Education Development (NPBED). Within the general secondary budget more than 80% of the recurrent budgets have traditionally been allocated to teachers' salaries. With the recent increases in teachers' salaries by bonuses and incentive payments it is estimated that teachers' salaries plus associated social charges could well reach 90% of basic education budgets in the near future.

Table 6: Basic Education Budget (2003, 2005)

	2003	%	2005	%
Capital Investments (mil. UZS)*	6148	1.7%	147196	21%
Recurrent budget (mil. UZS)	338569	98.3%	569 345	79%
Including Salaries and social charges in recurrent budget	268857	79.4%	491006	86.2%

Source: MOF, 2005 Note: *Financed through the SFD

Despite the government's efforts to maintain high levels of expenditure in education generally and its attempts over the past five years to reallocate funding back toward general secondary education, there is a lack of government funding to support operational budgets in schools. Survey work undertaken by the PPTA team as part of the research for the feasibility study received almost unanimous confirmation from schools, teachers, parents and students that financial allocations for consumable costs were inadequate and that schools either had to do without or raise parental contributions. Parents complained of the increase in pressure to provide both formal and informal payments to maintain basic school activities. In 1998 GOU/MOPE terminated free textbook supply to schools, except for 1st year students plus an allocation of 15% of required textbooks for school libraries, which were intended to be borrowed by the poor. The introduction of a successful Textbook Rental Scheme in 2001 was widely welcomed by parents because it reduced textbook costs and increased textbook availability, but the scheme itself nevertheless shifted the burden of financing for textbooks from the government to the parents. This is an example of a formal contribution. However, it is clear that parents are required to make contributions for a range of other items of school expenditure as well.

In some parts of the country, in particular in rural and mountainous areas, there is a concentration of poor families and these families have great difficulty in affording the parental contributions which are required to ensure that schools continue to run and provide basic services. For example, one of the most consistent complaints from schools was that they did not have the funding to undertake regular servicing and maintenance for their computer rooms. If anything went wrong with a computer or a school network, which couldn't be repaired by amateur enthusiasts, then the computers tended to stay out of commission and were not used. Clearly, major investments in ICT hardware and computer room facilities must be matched by realistic operating budgets simply to ensure that the investment is effective.

However, there are other issues arising from the shortage of operational budgets. Perhaps the most significant is that educational equity is affected. Obviously the quality of education offered in rural and poor areas where parents cannot afford to make adequate contributions must be less than in more affluent urban areas where it is possible to afford to make contributions. In addition, there is a suspicion that some children do not attend school because their parents cannot afford the costs of attendance. These costs cover uniform, notebooks and pencils, school bags and contributions to the running and effective operation of the school.

Since 2000 the GOU/MOF has started to decentralise educational financing. In 2005 approximately 65% of education sector expenditures are provided by Raion and City budgets, 22% by Oblast budgets and 13% by the Central Republican Budget. Because education is now largely financed through decentralised Raion and City budgets, which in turn depend upon the ability to collect local taxes, there is a potential for regional funding disparities which again could have an impact on the quality of education offered by different Raions and Oblasts. The Republican Budget is supposed to be used as a safety net to equalise under-financing in those Raions where their likely income is less than their budget of expenditure. Nevertheless the current available evidence from Oblast Finance Departments and Oblast and Raion Education Departments is that there is evidence of disparity on educational financing between Oblasts, between Raions within an Oblast, and between schools within a Raion. These are obviously issues of concern.

Schools have little control over operational finance. Salaries, which account for a very high percentage of general secondary recurrent budget, are paid direct by the Raion and city governments. Utilities (electricity, water and telephone) are also paid direct by Raion and city governments. The level of discretionary cash available to a school is tiny. Most of the available discretionary cash is generated from direct parental contributions or from income generating activities such as school farms, crafts and simple manufacturing and other broadly entrepreneurial activities. Even these are normally required to be either paid to the Raion or at least to be shared with the Raion although there are plenty of cases where the Raion allows the schools to keep most of the income generated. Again, the ability to raise parental contribution and to generate income will vary geographically and socially within Uzbekistan and this is another issue, which creates inequitable funding differentials. Some schools from wealthy parts of Tashkent may have very large discretionary budgets entirely funded by parental contributions. Poor schools in rural areas may not have enough money to pay for basic consumable supplies

Current GOU/MOPE policy, as expressed through NPBED, is to provide every school in the country with rehabilitated premises, new science labs and equipment and sports facilities. In addition every school will be provided with a refurbished computer

Table 7: Total Enrolments in General Secondary Education by Grade Level and Oblast (2003/2004)

Oblasts/Region	1	2	3	4	Gr1-4	5	6	7	8	9	Gr5-9	10	11	Gr10-11	Totals
Karakalpakstan	29942	31027	30899	31697	123565	34452	36426	40618	41327	37857	190680	13137	14605	27742	341987
Andijan	49407	52681	56702	58008	216798	59331	58018	60368	57665	50988	286370	25051	26077	51128	554296
Bukhara	31088	31674	33300	30944	127006	30998	32816	32783	35760	34080	170937	18317	17825	36142	334085
Jizzak	25109	26419	27339	26499	105366	26308	27308	38474	27319	24933	134342	10580	11208	21788	261496
Kashkadarya	57326	59769	63575	62984	243654	61445	63252	65301	62119	57842	309868	30935	33868	64803	618325
Navoi	15241	17254	18491	19971	70957	19868	20223	21057	20184	18790	100122	9459	12450	21909	192988
Namangan	46058	51232	51289	53216	201795	53285	53757	53787	52424	47572	260825	21827	21984	43811	506431
Samarkand	64567	70648	73540	75312	284067	73380	73651	76565	75409	69936	368941	37722	38453	76175	729183
Sukhandarya	47574	49877	52783	52138	202372	50620	49920	53763	51713	47080	253096	31257	30369	61626	517094
Syrdarya	14254	14676	14945	15182	59057	14839	15580	16950	17285	15651	80315	5877	6261	12138	151510
Khorezm	30691	30971	31819	33411	126892	34599	34177	35931	36392	32900	173999	14425	18188	32613	333504
Tashkent Oblast	48909	49279	52577	53120	203885	51815	53884	56269	55480	53096	270544	22279	18453	40732	515161
Ferghana	63514	64395	69389	70562	267860	71358	70962	74994	72021	61626	350961	33034	31649	64683	683504
Tashkent City	35726	36520	38636	37844	148726	37005	35532	37362	33860	39947	183706	9834	11447	21281	353713
Totals	559406	586422	615284	620888	2382000	619303	625506	658631	638968	592298	3134706	283734	292837	576571	6093277

Table 8: Enrolments by Oblast/Region and Language of Instruction

Oblasts/Region	Uzbek		Karakalpak		Russian		Kazakh		Tajik		Kirghyz		Turkmen	
	Gr1-4	Total	Gr1-4	Total	Gr1-4	Total	Gr1-4	Total	Gr1-4	Total	Gr1-4	Total	Gr1-4	Total
Karakalpakstan	52047	137079	44928	133671	6535	11282	16094	47387	0	0	0	0	3961	12568
Andijan	203310	527012	0	0	11392	20450	0	0	0	0	2096	6834	0	0
Bukhara	122749	322700	0	0	33868	8074	745	2023	126	1288	0	0	0	0
Jizzak	96897	240106	0	0	1912	4345	4611	11596	479	1213	1467	4236	0	0
Kashkadarya	237376	602600	0	0	2444	4931	0	0	3252	9322	0	0	582	1472
Navoi	59604	161547	164	527	4855	12678	5807	16966	334	823	0	0	193	447
Namangan	189861	479007	0	0	8102	15299	0	0	4360	11036	372	1089	0	0
Samarkand	269087	688038	0	0	8521	19088	66	180	6393	21877	0	0	0	0
Sukhandarya	190339	483911	0	0	1569	3714	0	0	10453	29412	0	0	11	57
Syrdarya	54825	140132	0	0	2808	7299	882	2384	542	1695	0	0	0	0
Khorezm	121556	322147	0	0	4427	8458	739	2433	0	0	0	0	170	466
Tashkent Oblast	166113	415395	0	0	17410	43267	16004	44214	3891	11072	467	1213	0	0
Ferghana	254289	651471	0	0	8154	16913	0	0	5079	14110	338	1010	0	0
Tashkent City	105139	254230	0	0	43523	99307	64	176	0	0	0	0	0	0
Totals	21231920	5425375	45092	134198	125038	275105	45012	127359	34009	101848	4740	14382	4917	15010

Table 9: ICT Provision To Basic Schools In 2004

No.	Regions	No. of basic schools	In the beginning of 2004				No. of suites installed In 2004				At the end of 2004			
			Total computer suites		Modern (IBM Pentium) Computers						Total suites		Modern (IBM Pentium) Computers	
			No.	%	No.	%	GOU Funded	From 2003	Sponsors	Total	No.	%	No.	%
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*
1	Karakalpakstan	763	336	44.0	91	11.9	18	-	2	20	356	46.7	111	14.5
2	Andijan	744	413	55.5	111	14.9	28	1	-	29	442	59.4	140	18.8
3	Bukhara	538	312	58.0	88	16.4	17	6	1	24	336	62.5	112	20.8
4	Jizzah	542	299	55.2	81	14.9	13	5	-	18	317	58.5	99	18.3
5	Kashkadarya	1088	352	32.4	86	7.9	26	5	-	31	383	35.2	117	10.8
6	Navoi	377	226	59.9	87	23.1	10	-	-	10	236	62.6	97	25.7
7	Namangan	673	359	53.3	137	20.4	26	-	1	27	386	57.4	164	24.4
8	Samarkand	1195	432	36.3	134	11.2	37	-	3	40	472	39.5	174	14.6
9	Surhandarya	824	251	30.5	75	9.1	100	-	3	103	354	43.0	178	21.6
10	Syrdarya	308	201	65.3	62	20.1	7	-	-	7	208	67.5	69	22.4
11	Khorezm	897	724	80.7	82	9.1	26	-	1	27	751	83.7	109	12.2
12	Tashkent	910	732	80.4	140	15.4	34	-	4	38	770	84.6	178	19.6
13	Ferghana	536	283	52.8	87	16.2	16	-	-	16	299	55.8	103	19.2
14	Tashkent City	332	459	99.1	81	24.4	18	-	9	27	486	146.4	108	32.5
	TOTALS	**9727**	**5379**	**55.0**	**1342**	**14.0**	**376**	**17**	**24**	**417**	**5796**	**59.0**	**1759**	**18.0**

room and with up-to-date hardware, school networks and teaching/learning peripherals (data projectors, scanners, webcams, digital cameras, etc). The scale of provision is still under debate but from the various specifications being discussed from the Ministry it appears that at its most optimistic there will be one computer for each 35 enrolled students. At the other end of the scale there may be only one computer for 50-55 enrolled students. The cost implications of this policy spread are considerable. At present, only 18% of basic schools have access to modern computers (see Table 9, above). The initial investment cost of equipping the remaining 82% of schools could vary between $100,000,000 and $170,000,000, depending upon the target computer:student ration. The ongoing pressure on the recurrent budgets to cover hardware replacement costs and basic operational costs such as consumables, electricity and servicing and maintenance are equally large. Annual cost implications could range from $30,000,000 to $60,000,000 per year (or more), depending on the exact policy decisions taken on the computer:student ratio, fat and Thin Client options and the achieved hardware replacement cycle. The cost of investing in ICT in basic education in Uzbekistan is unlikely to be significantly lower in real terms than in developed countries. In fact, the percentage of recurrent budget that might have to be allocated to ICT related costs is almost certain to be significantly larger in developing and transitional economies than in developed economies. For this reason it is very important that GOU/MOPE takes the right strategy decisions at this critical time in the development of a National ICT Strategy for Basic Education. The wrong decisions could lead to an inability to use the computer hardware effectively through widespread lack of adequate operational budgets, which would be a major waste of scarce resources in the hardware investments. Further down the line there is the problem of replacement funding as hardware begins to wear out or require replacement with newer and more exciting technologies. The ability to sustain the initial investment is a crucial issue, which many countries in the FSU are facing.

On the plus side, hardware costs are decreasing and telecommunications and power supply are improving in quality so that in 5 years time there could be the possibility of a significantly different situation. Nevertheless, careful consideration of the financial issues and implications behind ICT policies is extremely important

4. Access to, and Participation in, Basic & General Secondary Education

Entry into Grade 1 normally takes place at age 7. The Ministry of Education believes that 99% of the cohort enrols in school. Gender differentials hardly exist in primary and seem to be minor at junior secondary. However, the gender differentials start to increase with progress through the system. Thus, in professional colleges, current enrolments suggest 55% enrolment is boys and only 45% is girls. Gender differentials also are reflected by different subject choices with girls far more likely to opt for careers in social services or in clerical, secretarial and office based occupations while boys show more interest in science, engineering, etc.

There is considerable debate on the issue of absenteeism. Some studies that took place between 2000 and 2002 have suggested that average national daily attendance could be as low as 70-78%. In some of the poorer areas (e.g. Kashkadarya and Sukhandarya) attendance levels were estimated at less than 40%. Ministry of Public Education statistics indicate very much higher levels of attendance at school and very high levels of progression beyond Grade 9 into senior secondary, academic lyceums and professional colleges. Interviews with makhallas confirm that

there is absenteeism, although the scale is difficult to determine. The causes are widely perceived to be economic with students staying at home to help on the farm or with the family or taking casual work to enhance family income.

In the interviews carried out in schools and the student, teacher, and parent focus group discussions the majority of students were highly motivated to stay on at school. There is widespread agreement amongst parents and students that there is little future and few life choices for a poorly educated student in Uzbekistan. No matter how imperfect, education is very widely perceived as the only obvious way out of the poverty trap and the only lifeline available for most students, particularly in poor and rural areas. The advent of cost recovery, particularly for higher education, where higher education entry now depends upon students contracting to pay Uzs 500,000 as a condition of entry has caused considerable disillusionment among students and parents because it has effectively removed the possibility of higher education from many. Many students, perhaps a majority, feel that financial resources are now a more important determinant of access to higher education than academic performance in school. Under these circumstances it is easy to understand how students can become demotivated. Nevertheless, there was a clear sense from the focus group discussions with students that senior specialised secondary education either in academic lyceums or in professional colleges was considered to be better than leaving school at Grade 9 even though it may not lead onto university or tertiary level education. An analysis of school records showed high levels of progression beyond Grade 9 and an apparent preference by students to follow the 11-year route by staying on into senior secondary in their own schools rather than taking the three year route which would require transfer to academic lyceums or professional colleges. This may well be purely for financial reasons.

Overall, access to education seems good. There is a wide network of general education schools and even in remote areas schooling is made available. Students can opt for education in their own language, even though the school may be very small and may not be able to provide the facilities available in other, larger schools. The inhibiting factor in access to education is now financial. Education costs to parents have increased as a larger burden of educational financing now has to be covered by parents rather than by the state. Most parents and most students seem prepared to accept this, at least at the current levels of contribution required. However, there is evidence to suggest that in rural and poor areas many parents reach the limit of their capacity to contribute and in some cases the contributions to school, plus the costs incurred in sending their children to school, may have an impact on school attendance. Most makhallas report that they routinely follow-up on persistent non-attenders and that where reasons for non-attendance are economic, they try to offer financial assistance, or assistance with textbook rental fees, other educational materials or winter clothes. While most makhallas report that non-attendance is a minor problem, one makhalla interviewed estimated that up to 15% of school roll numbers had difficulty in maintaining regular attendance.

The school visits and focus group discussions suggest that for most students there is a strong motivation in school attendance and a strong demand for education as a route out of poverty. However, school attendance may well not be as high as suggested by recent MOPE data. Schools are responsible for high levels of school attendance and there is possibly a subconscious motivation in school reporting to make the picture as bright as possible

5. Government Policies towards Basic and General Secondary Education

Educational policy is framed by the social complex of the Cabinet of Ministers and the office of the President. MOPE and MOHSSE are responsible for the implementation of national policies. In addition there are a number of semi-autonomous institutions responsible for particular aspects in the delivery of education such as the Republican Education Centre (curriculum and textbooks) and the Republican Testing Centre (examinations and standard setting).

With the launch of the National Programme for Personal Development the government announced a decisive shift towards vocational, professional and specialised senior secondary education at the expense of general education. The costs of the NPPT were very large and in the late 90s and throughout the early years of the new millennium funding was diverted away from basic education in favour of senior specialised secondary education. Thus, Table 3, above, demonstrates that in 2000 there was a real public expenditure growth in senior secondary and vocational education of 48.83% compared with the growth in basic education funding for the same year of only 0.82%. The diversion of funds away from basic education toward senior secondary has had a damaging impact on the fabric of basic education schools. The presidential decree announcing the National Programme for Basic Education Development in 2004 stated:

"*...out of 9,727 schools 684 are in emergency condition: many do not have heating, drinking water or natural gas; over 28% of students study in 2-3 shift schools; basic laboratory equipment exists in only 29% of schools and modern computers in only 15% of schools.*"

In recent years the deteriorating quality of basic and general secondary education has become increasingly apparent and there has been a noticeable, although modest, shift back to increased funding for basic education. However, the announcement in May 2004 of the NPBED and the announcement a month later of the establishment of the extra budgetary School Development Fund marks a decisive shift in government policy back toward support for basic education. The new policy requires that by 2010 every basic school will have been rehabilitated and refurbished, will have newly equipped science labs, will have computer rooms with modern IBM compatible computers and will have upgraded sports facilities.

The government impetus for ICT development was launched by a presidential speech in parliament in May 2001 in which the president urged the government to formulate a general ICT development strategy. COM Decree No. 200 of 6 June 2002 announced the Programme of **Further Development of Computerisation and the Introduction of Information and Communication Technologies for the period 2002-2010**. This formed the blueprint for the policies now being adopted in moving swiftly to provide every school with access to ICT equipment.

Another strand of government policy is its desire to continue to provide support for the poorest in society. As a result it maintains free textbook distribution to all Grade 1 students and provides 15% of total textbook requirement to all schools to keep in their libraries to loan to the poor. There are also allowances for schools to provide winter clothing support to poor students.

The government also uses the Makhalla network to target social welfare support and to become partners with schools in school development activities. Unfortunately the use of a flat 15% poverty allocation to every school means that government poverty support is poorly targeted. A recent survey of economically vulnerable families in 30

Makhallas revealed that local Makhallas had identified levels of poverty ranging from 2% in one Makhalla to 97% in another. The poverty thresholds used by the Makhallas to determine social welfare allocations varied from 12,000 UZS to 1,000 UZS per month average per capita income. Faced with these substantial variations it is clear there is a need for better targeted poverty support through the education system.

6. Factors Effecting Quality of Education

6.1 The Curriculum

The current curriculum states that it is intended to develop pupils' knowledge, skills and values. However, the subject curriculum and syllabuses are traditional, subject based and almost exclusively knowledge oriented. They lack an emphasis on the development of skills and competencies and emphasise factual recall and the passive receipt of information by pupils rather than the application of knowledge and the development of higher order thinking skills.

Current curriculum objectives are oriented towards elite students and many teachers and students believe that the Maths and Science parts of the curriculum, in particular, overloaded and too difficult. There are no mechanisms within State Educational Standards or the curriculum to cater to differing abilities and, as a result, students can be left behind and underperform.

There are too many subjects to fit into the school day and the school year. The result is that many subjects are taught only once or twice a week, which is insufficient to achieve any depth of learning. In 2004, only four subjects out of 20 were taught for more than two lessons a week in Grades 5 to 9. This trend continues. The new Informatics syllabus for Grades 5 to 7, which will be introduced in September 2005 provides for only one period per week (30 minutes) in Grade 5 and 1 hour per fortnight in Grade 6. In Grades 7 and 8 Informatics will be taught for one hour a week and only in Grade 9 does the intensity rise to two hours per week. This low intensity approach means that it will be very difficult for students to develop hands-on practical skills with computers because they simply do not have sufficient time allocated. The ability to use ICT hardware and techniques in other curriculum subjects is severely constrained by the heavily overloaded curriculum which allows little time for the kind of activities normally associated with ICT usage. In addition, few teachers in the country, even Informatics teachers, have first hand experience of computer use and there is very little understanding of how computers should be used in education.

The most fundamental problems associated with the current SES and syllabuses are appreciated by GOU/MOPE and the NPBED clearly specifies curriculum and assessment reform as one its major objectives. A major curriculum review is part of STDP and is scheduled to implement during 2005. It is expected that the review will take two years to complete and implement. The GOU /MOPE has recognised the problem of curriculum overload and has made curriculum reform a priority objectives of the NPBED

6.2 Assessment

The current reform programmes of the GOU/MOPE emphasise the need to transform teaching and learning methodologies to encourage the development of a more interactive classroom climate and thus to develop students own learning skills. There is, of course, a minimum body of knowledge without which no student could function.

However, this core knowledge is now widely accepted to be far less than was previously supposed and the prime function of an increasing number of education systems is to provide students with the capacity to develop their own learning skills and to assist them to gain the knowledge that they require. Thus, they must be able to assess the value of new knowledge and be able to apply it in their lives and in their work. A successful education system should therefore provide new knowledge to the students but it should also enable students to develop a range of skills and an understanding of how to apply knowledge and the capacity to find things out for themselves.

An essential part of the operation of the education system is to establish an effective way of checking and verifying students' knowledge, skills and understanding in the range of subject areas in the national curriculum. This verification can take place in a number of different ways. In most education systems it is usually in the form of a summative assessment or tests at key stages in the education process. Other experts feel that continuous assessment, which relies more upon a students regular and steady achievement rather than a specially prepared performance on a designated day, is a better method of assessment. However, whichever system is used it should be meaningful to parents, to students, to local and national authorities as well as to educational professionals. Ideally it should be valued and respected by all of these constituencies. Any assessment system, moreover, should not be onerous. It should be manageable and it should not dominate the learning process.

Within Uzbekistan the current rating system for assessing students performance in basic schools does not appear to fulfil any of these criteria. It is onerous, extremely time consuming, difficult for parents to understand and, most importantly, the outcomes do not discriminate sufficiently between students' individual performance. Teachers are required to complete a rating score on every subject on a weekly basis. The rating is arrived at as the result of weekly repetitive summative assessments. The students can re-take tests to improve their rating but this merely demonstrates that they have learnt to answer a question and it doesn't represent any wider knowledge or understanding. The pass mark for these ratings, which is set centrally by the school, often is artificially low. Additionally the teacher can enter marks on the basis of their own assessments but there is seldom any variance between teachers assessments and the output from the national assessment tests. The majority of students may complete a year having exceeded the pass mark in all assessments. Achieving the pass mark is represented by a rating of 100%. This means that all but a handful of students complete the school year with performance in many subjects in excess of 100%.

Teachers are given specially printed ratings books with dedicated pages for each subjects and grids into which they must enter by hand the marks which the student achieves. Most teachers complete the ratings on a separate piece of paper and transcribe the results into the official ratings book as a fair copy, thus undertaking the same work twice.

For any student there could be up to 20 marks per subject per year to be aggregated, calculated and inserted into the official ratings book or the equivalent of perhaps 400 marks per year per student. Assessments are so frequent that teachers can often spend 30-50% of the available lesson time completing the ratings. Because the curriculum is already overloaded this significantly reduces the teachers' time on task.

The outcomes of the assessments are not understood by parents and the whole process is so time consuming that it is universally hated by all teachers. During the focus group discussions the single topic most raised by students, teachers and

parents was their objection to the current rating system. This was repeated in every focus group in every school.

It is difficult to see how major progress can be made on introducing ICT across the school curriculum while a rating system which demands so much time from teachers continues to operate. Fortunately, the NPBED has also identified assessment reform as a high priority objective.

6.3 Teachers

Teacher morale and motivation declined as salaries decreased in comparison with salaries elsewhere in government service. In 2004, teachers salaries were estimated to represent only two thirds of the average public sector salary. However, in recent years a determined effort has been made to increase teachers salaries by providing school bonus and incentives. Teachers can now get bonus or premium payments for working in special needs schools, for working in rural areas, for undertaking to be a class teacher as well as a subject teacher, for being adjudged as being a good teacher by their colleagues and for completing in-service training courses on Informatics. While the service conditions for teachers have been improving so has the percentage of recurrent budget represented by teachers remuneration plus social charges. At the end of the 1990s teacher remuneration salary charges represented between 55% and 65% of the basic education recurrent budget. Table 6, above, indicates that in 2003 teachers salaries and social charges represented 76.4% of total recurrent budget. In 2005 they represented 86.2% and it is estimated that they could reach 90% in 2006. Thus, while teachers motivation and conditions of service have improved, and this is an important issue, the disposable part of the recurrent budget has declined and the increase in salaries and social charges will be paralleled by a reduction in operational budgets for schools. This in turn will place greater strains on parents who will be pressured by schools to provide increasing levels of contribution to make up for the lack of operational budgets.

Although teachers can expect significantly higher pay in rural and remote areas the disbenefits of working in these areas are considerable with poor teaching environments, multi-grade classes, longer working hours and a lack of materials, equipment and teaching aids. It is reported that the recruitment to schools in rural and remote areas is still a problem.

Current teaching loads are still low (although they have improved) and class sizes are still relatively small in most parts of the country (although they are in some urban areas increasing to 30 to 25 students per class).

The vast majority of teachers are women. Many of the women find residential in-service teacher training difficult to attend because of the difficulties they face in leaving families. As a result, their access to in-service teacher training, further education and promotion within the education service is constrained. This is a major problem when intensive teacher training will be required to launch ICT across curriculum subjects. Thus, the development of the cluster system which emphasises in-service teacher training close to the school and on a regular week by week basis as opposed to a four week residential course once every five years is both more suitable for women, who represent the majority of teachers, and thus more likely to produce classroom changes.

6.4. Software and e-Learning Materials

The advent of modern ICT hardware in every school in the country and the government policy intention to encourage ICT as a basic teaching and learning tool in subjects across the curriculum will require rapid development of e-Learning resources. At present, MOPE has commissioned six e-books. In common with developments elsewhere in the world where ICT has been successfully introduced, the basic requirement will be for a wide range of software and e-Learning materials which provide opportunities for research and self-learning by both students and teachers. These materials must be in the Uzbek language and in other languages used in the schools. At present very little is available and there is an urgent need to create conditions to encourage the development of local software.

One of the simplest and fastest ways to do this is to adapt, localise and translate successful software already designed and successfully used for other systems. There is no reason why local software should not be originated as a result of participation in the process of learning the techniques of software and e-materials development through adapting and translating other successful software from other languages with more experience of using e-Learning Materials in a wide range of curriculum subjects. Encouragement to the rapid development of e-Learning Materials in Uzbek and other local languages is a key component of the proposed project

The school library development component of STDP has a software development budget, which is aimed to encourage the development of supplementary materials in a range of different media formats.

7. Infrastructural Issues

The problem of deteriorated school buildings and facilities and the urgent need for rehabilitation has been mentioned above. However, one of the major problems in launching an ICT development project is the unreliability of power supplies throughout the country. During the research phase for the sector work and feasibility study visits were made to schools in 40 Raions spread across all 14 Oblasts/regions of Uzbekistan. With the exception of Tashkent City, every Raion experienced power difficulties. The IREX Connectivity Project reports that every one of it's 60 schools, again widely spread across the country, suffers from more or less severe power problems. These power problems range from unpredictable 2-3 hour power cuts to several days without power to lack of power throughout the school day. When power is available it is subject to volatile power surges which require well specified UPS to protect the hardware. Investment in ICT and the installation of ICT into schools requires power. A 12 workstation computer room will probably use something in the region of 7.5kw/hour which will be rather more than the power requirements of the rest of the school for most of the year. Access to reliable power is an absolute requirement for ICT development and this is an issue that needs to be resolved before expensive hardware installations are made in areas where there is no current access to power. This is by no means a unique situation. Reports on ICT developments in Mongolia, for example, (see Appendix 31) also provide examples of ICT hardware provided to schools with no power whatsoever.

The solution to the problem doesn't lie with generators and accumulators. At present most schools are classified as Category 3 power users and are therefore subject to load shedding and power cuts along with all the non-priority users. A reclassification of schools to Category 2 users would give them priority access to reliable power supplies except in times of emergencies. There has not been time to date to discuss this issue with UzbekEnergo but in many parts of the country reclassification is reported not to be a major technical problem.

Telecommunications also represent an infrastructural problem. Although telecommunications are improving with the growth of fibre optic lines and the introduction of wireless and V-SAT connections in rural and remote areas the majority of the country still only has access through analogue telephone lines, which are not suitable for Internet connections. ISP and telecommunications prices are coming down but they are still expensive. Thus, at present, the large scale investment in Internet connectivity would not seem to be sensible. In five years time with significant improvements in the network, the introduction of new technologies which will make wireless connections in rural areas cheaper, higher quality and more secure and continuing with reductions in prices, Internet connections could be a more realistic possibility.

However, Uzbektelecom reports that is has considerable spare capacity on internal lines and that the development of a national intranet for all Uzbek language materials could be achieved relatively cheaply. This is a possibility worth exploring.

8. e-Readiness

School visits have demonstrated a number of problems with computer suites already installed in schools. In some cases the installation has not been performed properly, in other cases the school wiring has not been refurbished and is either unsuitable and/or unsafe and in other cases the physical condition of computer rooms means that hardware can be exposed to extremes of weather and to dust, which will have an impact on equipment longevity and thus on replacement costs. At the beginning of 2005 only 59% of schools in Uzbekistan had received old Soviet style computers and only 18% had received modern computers. Thus, a significant proportion of Uzbek schools have been teaching Informatics entirely as a theoretical subject and with no access to modern computers. In these circumstances there is an urgent need for the training of teachers as network managers, ICT co-ordinators and in the use of ICT in teaching subjects across the curriculum. It is clear that even in good schools in Tashkent basic concepts and principles of school network management are not known and that as a result computer usage either on a stand alone or on a school network basis is often chaotic. In some cases students have passworded computers so that teachers and other students can no longer use them. In other cases inappropriate websites have been downloaded. This is an extremely urgent issue and one that GOU/MOPE must take on board before pushing ahead with the rapid expansion of computer facilities into schools. MOPE needs to establish a clear set of minimum criteria which are then rigidly applied before installation can take place. At present, individual Raions are asked to nominate schools for ICT installation and these schools are often self selected on the basis of parental willingness to pick up at least part of the costs of classroom refurbishment. This is self-evidently a substantial problem for the equitable supply of hardware to schools because only parents of richer communities will be able to afford to provide the support needed to ensure that classrooms are made ready. In the event, a number of examples have been seen where classrooms were self-evidently not ready for computer installation.

9. Demand for ICT

Focus group interviews with students, teachers and parent groups provided virtually unanimous support for ICT in education. Students felt that it was an essential part of their education and one that would make their learning more relevant and would increase their chances of employment after school. Students felt that existing computer labs were not used to maximum capacity, that they were closed when they should have been open and accessible. In many schools expensive computer

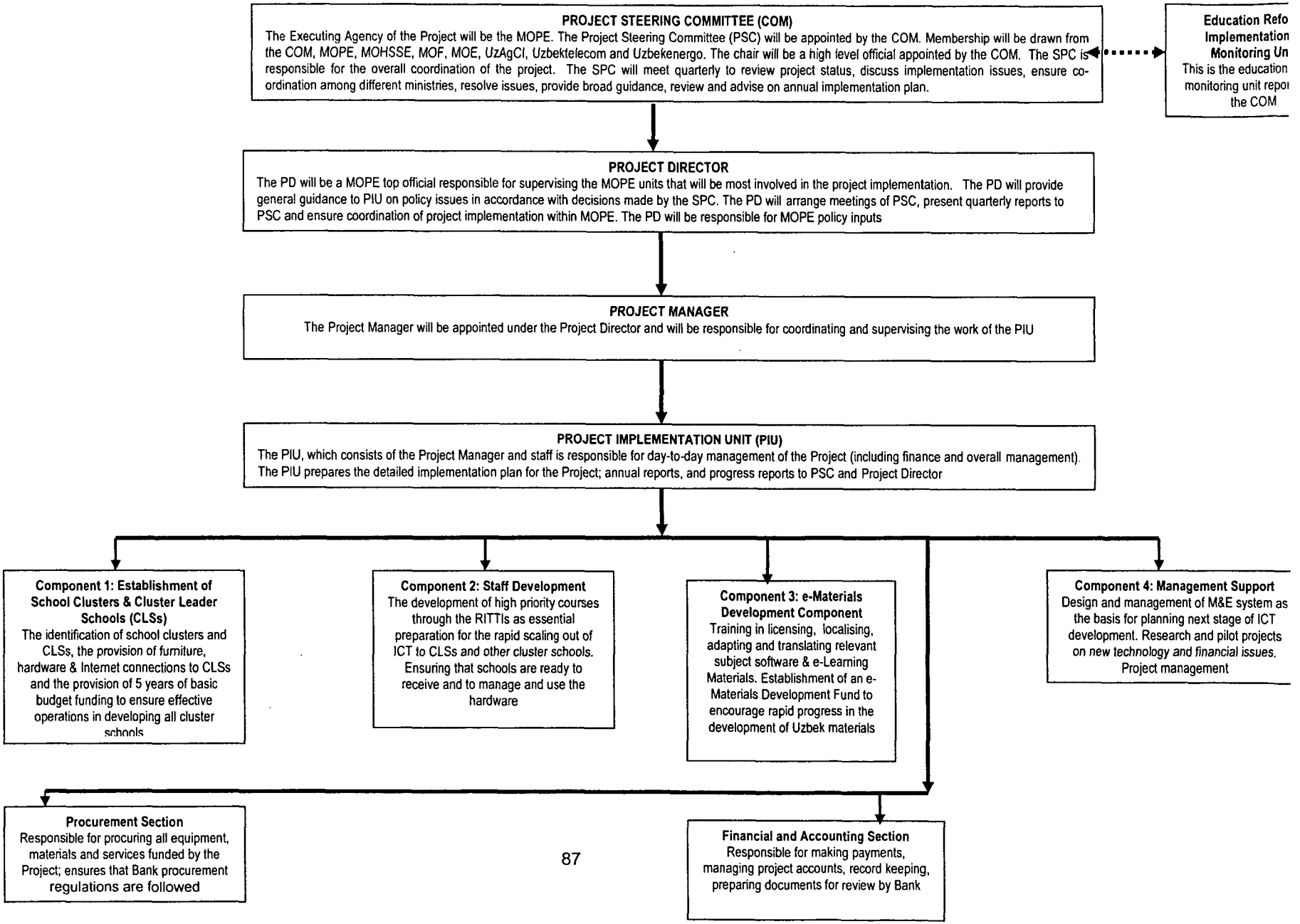
facilities are used for only 8-10 hours per week, which is not achieving a reasonable return on investment nor is it beneficiary to students. Students were also critical about teachers ICT knowledge, confidence and commitment. They wanted to see ICT operate far more widely than Informatics and wanted to see it as an integral part of their learning across the curriculum.

Teachers were also keen to use ICT but many believed that it was only to be used in the teaching of Informatics. In fact, in most schools visited there had been very little use of ICT outside Informatics classes and even in Informatics classes much of the time was spent in theoretical work rather than with hands-on practical experience. Teachers were excited by the possibility of using ICT as a new teaching and learning tool which would bring interest, excitement and more relevance to their normal classroom teaching. Their main reservations were: (a) they needed training to give them the skills and the confidence to operate ICT as part of their normal subject teaching; (b) they needed access to materials which they could use; and (c) they needed regular access to the computers to practice their own skills. There was strong support for suggestions that the Informatics Teachers should run computer literary courses for other school staff.

If anything, parents were the strongest group in favour of ICT in schools. They saw it as essential to the education of their children and as a skill which would assist their children in getting jobs after they left school. They were prepared to contribute (although the contributions were generally modest averaging only 200 Soum per month) and they wanted, if possible, to have personal access to computers and to computer skills. Thus, in many of the focus group interviews with the parents there was strong interest in the concept of the development of rural telecentres. The want in urban areas may well be less because of the existence already of Internet cafes.

The demand for ICT in basic education in Uzbekistan is strong at all levels. Schools, teachers, students and parents are anxious to get access to the hardware but they recognise, perhaps more keenly than Tashkent based administrative staff, that there needs to be careful system preparation. Teachers were very conscious of their need for training and very cautious of the possibilities of using ICT without training, help and support. Informatics teachers were worried that they did not have the skills to manage the system, students were often dismissive of teacher competence and were themselves unlikely to be organised enough to run systems themselves. There is an urgent need, perhaps an overwhelming need, to develop strong management of the system of ICT development within Uzbekistan. A national strategy has been developed and proposed and key challenges have been outlined but the development policy still seems to be dominantly hardware and technology led rather than school, student and teacher led.

APPENDIX 4: PROJECT MANAGEMENT CHART



APPENDIX 5: IMPLEMENTATION SCHEDULE

PROJECT ACTIVITIES	2005		2006				2007				2008				2009				2010			
	3¼	4¼	1¼	2¼	3¼	4¼	1¼	2¼	3¼	4¼	1¼	2¼	3¼	4¼	1¼	2¼	3¼	4¼	1¼	2¼	3¼	4¼
Component 1																						
Rehabilitation of CLSs (by GOU)																						
Identification of Clusters																						
Identification of CLSs																						
Confirmation of Minimum Criteria																						
Finalisation of Procurement Specs																						
Finalisation & Approval of Bid Docs																						
Bid Announcements for Hardware																						
Bid Announcement for Furniture																						
Bid Announcement for Installation																						
Bid Submission Deadlines																						
Bid Evaluation & Contract Award																						
Final Check on CLS Conformity to Criteria																						
Confirmation of Final CLS List																						
Install Hardware/Furniture in CLSs																						
Supervise & Sign-off installations																						
Release Recurrent Budget Support to CLSs																						
Component 2																						
TOT for Network Managers/ICT Coordinators																						
TOT for ICT in Priority Subjects																						
TOT for School Admin																						
TOT for CPD																						
2nd ICT Study Tour																						
CLS Training for Network Managers & ICT Coordintors																						
CLS Training for ICT in Priority Subjects																						
CLS Training for School Admin																						
CLS Training for CPD																						
Non-CLS Training for Network Managers/ICT Coordinators																						
CLS Training for ICT in Priority Subjects																						
CLS Training for School Admin																						

PROJECT ACTIVITIES	2005		2006				2007				2008				2009				2010			
	3¼	4¼	1¼	2¼	3¼	4¼	1¼	2¼	3¼	4¼	1¼	2¼	3¼	4¼	1¼	2¼	3¼	4¼	1¼	2¼	3¼	4¼
CLS Training for CPD																						
Component 3																						
Software Development Training																						
1st ICT Study Tour																						
3rd ICT Study Tout																						
Design & Establish e-Learning Fund																						
Establishment of e-Learning Fund																						
e-Learning Fund Operational																						
e-Learning Fund Monitoring/Review																						
Component 4																						
Establish PIU																						
Procure PIU Vehicle																						
Appoint Local M&E Consultants																						
Design M&E system																						
Train Local M&E consultants																						
Local Consultants do Base Line Study																						
Base Line Study Data Analysis & Report																						
Local Consultants do Annual M&E																						
Annual M&E Report																						
Preparation for 2nd Phase ICT																						
2nd Phase ICT Proposals																						
Finalisation of 2nd Phase ICT Plan																						
Appoint Pilot Project Consultants																						
Design 3 Pilot Projects																						
Implementation of 3 Pilot Projects																						
Pilot Project Monitoring reports																						
Appoint Pilot Project Consultants																						
Design 2 Pilot Projects																						
Implementation of 2 Pilot Projects																						
Pilot Project Monitoring reports																						
Consultant team leader Support Visits																						
Project Completion																						

APPENDIX 6: COST ESTIMATES AND FINANCING PLAN

Cost Estimates by Component

Project Component (in '000 USD)	ADB Financing			GOU Financing			Total Cost		
	Foreign currency	Local currency	Total cost	Foreign currency	Local currency	Total cost	Foreign currency	Local currency	Total cost
A. Base Cost									
Component 1: Formation of Cluster Leader Schools	15645	10094	25739	0	9728	9728	15645	19822	35467
Component 2: Development of De-centralized INSETT Capacity	120	432	552	0	3570	3570	120	4002	4122
Component 3: E-Materials Development	1000	0	1000	0	0	0	1000	0	1000
Component 4: Management Support	1680	1242	2922	0	0	0	1680	1242	2922
Total Base Cost	18445	11768	30213	0	13298	13298	18445	25066	43511
%	61%	39%	100%	0%	100%	100%	42%	58%	100%

Project Component (in % Total Base Cost)	ADB Financing			GOU Financing			Total Cost		
	Foreign currency	Local currency	Total cost	Foreign currency	Local currency	Total cost	Foreign currency	Local currency	Total cost
A. Base Cost									
Component 1: Formation of Cluster Leader Schools	85%	86%	85%	0%	73%	73%	85%	79%	82%
Component 2: Development of De-centralized INSETT Capacity	1%	4%	2%	0%	27%	27%	1%	16%	9%
Component 3: E-Materials Development	5%	0%	3%	0%	0%	0%	5%	0%	2%
Component 4: Management Support	9%	11%	10%	0%	0%	0%	9%	5%	7%
Total Base Cost	100%	100%	100%	0%	100%	100%	100%	100%	100%

B. Contingencies	ADB Financing			GOU Financing			Total Cost		
	Foreign currency	Local currency	Total cost	Foreign currency	Local currency	Total cost	Foreign currency	Local currency	Total cost
1. Price Contingency (a)	443	1177	1620	0	1330	1330	443	2507	2949
2. Physical Contingency (b)	922	588	1511	0	665	665	922	1253	2176
Subtotal	1365	1765	3130	0	1995	1995	1365	3760	5125
C. Interest and Commitment Charges (c)	3127	0	3127	0	0	0	3127	0	3127
Total Project Cost	22937	13534	36471	0	15292	15292	22937	28826	51763
Percentage	63%	37%	100%	0%	100%	100%	44%	56%	100%

Uzbekistan ICT in Basic Education Project

Project Cost Estimates and Financing Plan by Item of Expenditure

(In '000 USD)

Component	ADB Financing			GOU Financing			Total Cost		
	Foreign currency	Local currency	Total cost	Foreign currency	Local currency	Total cost	Foreign currency	Local currency	Total cost
A. Investment Cost									
1. Civil Works			**0**		**2800**	**2800**	**0**	**2800**	**2800**
2. Equipment, Vehicles & Furniture	**15260**	**936**	**16196**	**0**	**0**	**0**	**15260**	**936**	**16196**
a. Equipment	15260		15260				15260	0	15260
b. Vehicles		12	12				0	12	12
c. Furniture		924	924				0	924	924
3. Staff Development & Training	**120**	**432**	**552**	**0**	**3570**	**3570**	**120**	**4002**	**4122**
a. External Training	120		120				120	0	120
b. In-country Training		432	432		3570	3570	0	4002	4002
4. Consulting Services	**1680**	**230**	**1910**	**0**	**0**	**0**	**1680**	**230**	**1910**
a. International	1680		1680				1680	0	1680
b. Domestic		230	230				0	230	230
5. Learning Materials	**1000**		**1000**				**1000**	**0**	**1000**
6. Pilot Projects		**200**	**200**				**0**	**200**	**200**
7. Taxes and Duties	**0**		**0**		**208**	**208**	**0**	**208**	**208**
Total Investment cost	**18060**	**1798**	**19858**	**0**	**6578**	**6578**	**18060**	**8376**	**26436**
B. Recurrent Cost (O&M costs)	**385**	**9970**	**10355**	**0**	**5880**	**5580**	**385**	**15850**	**16235**
C. Total Base Cost	**18445**	**11768**	**30213**	**0**	**12458**	**12458**	**18445**	**24226**	**42671**
D. Contingencies	**1365**	**1765**	**3130**	**0**	**1869**	**1869**	**1365**	**3634**	**4999**
a. Physical contingencies (a)	922	588	1511	0	623	623	922	1211	2134
b. Price contingencies (b)	443	1177	1620	0	1246	1246	443	2423	2865
E. Interest and commitment charges (c)	**861**		**3127**				**861**	**0**	**861**
Total Cost	**20671**	**13534**	**36471**	**0**	**14326**	**14326**	**20671**	**27860**	**48531**

(a) Physical contingencies are assumed at 5% of total base cost;

(b) Foreign and local price contingencies are estimated at 2.4% and 10% respectively;

(c) 1% interest

APPENDIX 7.1: CONSULTANCY SERVICES REQUIREMENTS – INTERNATIONAL CONSULTANTS

Activity No	Proposed Date	Description of Activities	No of Consultants Required	No of Months in Uzbekistan	No of Home Months	Air Fares Required
COMPONENT 1						
1.1	Jan 06	• Finalisation of Detailed Specifications for CLS Furniture and Hardware Procurement	1	1.00		1
1.2	Jan 06	• Finalisation of School Clusters, Identification of CLSs and Checks on Conformity with Selection Criteria	1	1.50		1
COMPONENT 2						
2.1	Feb 06	• Course Design & Preparation of Course Materials for Training of RITTI Trainers in School Network Management & School ICT Coordination (2 weeks) • Delivery of Course to RITTI Trainers (6 weeks) • Design of Course and Preparation of Course Materials with RITTI Trainers for School Network Managers and School ICT Coordinators (3 weeks) • Support to 1st Course for CLSs (3 weeks)	1	3.00	0.5	1
2.2	March 06	• Course Design & Preparation of Course Materials for Training of RITTI Trainers in ICT in Priority School Subjects of Maths, Physics, Chemistry, Biology and English/Other Languages (2 weeks for @ subject) • Delivery of Courses to RITTI Trainers (4 weeks for @ of 5 subjects) • Design of Course and Preparation of Course Materials with RITTI Trainers for School Subject Specialists (weeks for @ of 5 subjects) • Support to 1st Course for CLSs (2 weeks)	5	10.00	2.50	5
2.3	April 06	• Course Design & Preparation of Course Materials for Training of RITTI Trainers in Computerised School Administration (1 week) • Delivery of Course to RITTI Trainers (2 weeks) • Design of Course and Preparation of Course Materials with RITTI Trainers for Computerised School Administration (2 weeks) • Support to 1st Course for CLSs in Computerised School	1	1.25	0.25	1

		Administration (1 week)				
2.4	April 06	• Course Design & Preparation of Course Materials for Training of RITTI Trainers in School-Based CPD (1 week) • Delivery of Course to RITTI Trainers (2 weeks) • Design of Course and Preparation of Course Materials with RITTI Trainers for School–Based CPD (1 weeks) • Support to 1st Course for CLSs in School-Based CPD (1 weeks)	1	1.00	0.25	1
COMPONENT 3						
3.1	June 06	• Course Design & Preparation of Course Materials for Training of Software & E-Materials Developers in Language, Maths & Science (1 weeks for @ subject) • Delivery of Course to RITTI Trainers (4 weeks for @ subject)	4	4.00	1,00	3
3.2	April 07	• Course Design & Preparation of Course Materials for Training of Software & E-Materials Developers in Language, Maths & Science (1 week for @ subject) • Delivery of Course to RITTI Trainers (4 weeks for @ subject)	4	4.00	1.00	3
3.3	April 08	• Course Design & Preparation of Course Materials for Training of Software & E-Materials Developers in Language, Maths & Science (1 week for @ subject) • Delivery of Course to RITTI Trainers (4 weeks for @ subject)	4	4.00	1.00	3
3.4	June 06	• Design and Establishment of e-Materials & Software Development Fund and Training of PIU/MOPE in Fund Operation	1	1.00	0.25	1
3.5	On-Going	• On-line support and problem-solving during period of Fund-Establishment	1		0.50	-
3.6	April 07	• Monitoring and Problem Solving on e-Materials & Software Development Fund	1	0.75		1
3.7	April 08	• Monitoring and Problem Solving on e-Materials & Software Development Fund	1	0.75		1
COMPONENT 4						
4.1	April 06	• Design of Monitoring and Evaluation System & Instruments (3 weeks) • Training of Local Consultants in Monitoring and Evaluation (1 week)	1	1.00	0.25	1

4.2	Oct 06	• Support for M&E Data Analysis and Report Writing for Base Line Study (4 weeks)	1	1.00		1
4.3	Oct 07	• Support for M&E Data Analysis and Report Writing for Base Line Study (4 weeks)	1	1.00		1
4.4	Oct 08	• Support for M&E Data Analysis and Report Writing for Base Line Study (4 weeks)	1	1.00		1
4.5	May 06	• Design of 3 x Pilot Projects & Training of PIU/MOPE & local consultants (see Appendix 9)	3	4.00		3
4.6	Oct 07	• Follow-up and support for evaluation of Pilot Projects (see 4.5 above)	3	1.5		3
4.7	May 07	• Design of 2 x Pilot Projects & Training of PIU/MOPE & local consultants (see Appendix 9)	3	3.00		3
4.8	Oct 08	• Follow-up and support for evaluation of Pilot Projects (see 4.5 above)	3	1.5		3
4.9	Feb 06 and Oct 06	• Team Leader Support to PIU	1	1.0	0.5	2
4.10	Feb 07 and Oct 07	• Team Leader Support to PIU	1	1.0	0.5	2
4.11	Feb 07 and Oct 07	• Team Leader Support to PIU	1	1.0	0.5	2
		TOTALS		**48.75**	**7.25**	**44**

APPENDIX 7.2: CONSULTANCY SERVICES REQUIREMENTS – DOMESTIC CONSULTANTS

Activity No	Proposed Date	Description of Activities	No of Consultants Required	No of Months in Uzbekistan	No of Home Months	Air Fares Required
COMPONENT 1						
1.1	Jan 06	• Finalisation of Detailed Specifications for CLS Furniture and Hardware Procurement				
1.2	Jan 06	• Finalisation of School Clusters, Identification of CLSs and Checks on Conformity with Selection Criteria	5	2 @ = 10		
COMPONENT 2						
2.1	Feb 06	• Course Design & Preparation of Course Materials for Training of RITTI Trainers in School Network Management & School ICT Coordination (2 weeks) • Delivery of Course to RITTI Trainers (6 weeks) • Design of Course and Preparation of Course Materials with RITTI Trainers for School Network Managers and School ICT Coordinators (2 weeks) • Support to 1st Course for CLSs (2 weeks)				
2.2	March 06	• Course Design & Preparation of Course Materials for Training of RITTI Trainers in ICT in Priority School Subjects of Maths, Physics, Chemistry, Biology and English/Other Languages (2 weeks for @ subject) • Delivery of Courses to RITTI Trainers (3 weeks for @ of 5 subjects) • Design of Course and Preparation of Course Materials with RITTI Trainers for School Subject Specialists (2 weeks for @ of 5 subjects)				
2.3	April 06	• Course Design & Preparation of Course Materials for Training of RITTI Trainers in Computerised School Administration (1 week) • Delivery of Course to RITTI Trainers (2 weeks) • Design of Course and Preparation of Course Materials with RITTI Trainers for Computerised School Administration (1 week) • Support to 1st Course for CLSs in Computerised School Administration (1 week)				

2.4	April 06	• Course Design & Preparation of Course Materials for Training of RITTI Trainers in School-Based CPD (1 week) • Delivery of Course to RITTI Trainers (2 weeks) • Design of Course and Preparation of Course Materials with RITTI Trainers for School–Based CPD (1 weeks) • Support to 1st Course for CLSs in School-Based CPD (1 weeks)				
COMPONENT 3						
3.1	June 06	• Course Design & Preparation of Course Materials for Training of Software & E-Materials Developers in Language, Maths & Science (1 week for @ subject) • Delivery of Course to RITTI Trainers (3 weeks for @ subject)				
3.2	April 07	• Course Design & Preparation of Course Materials for Training of Software & E-Materials Developers in Language, Maths & Science (1 week for @ subject) • Delivery of Course to RITTI Trainers (3 weeks for @ subject)				
3.3	April 08	• Course Design & Preparation of Course Materials for Training of Software & E-Materials Developers in Language, Maths & Science (1 week for @ subject) • Delivery of Course to RITTI Trainers (3 weeks for @ subject)				
3.4	June 06	• Design and Establishment of e-Materials & Software Development Fund and Training of PIU/MOPE in Fund Operation				
3.5	On-Going	• On-line support and problem-solving during period of Fund-Establishment				
3.6	April 07	• Monitoring and Problem Solving on e-Materials & Software Development Fund				
3.7	April 08	• Monitoring and Problem Solving on e-Materials & Software Development Fund				
COMPONENT 4						
4.1	April 06	• Design of Monitoring and Evaluation System & Instruments (3 weeks) • Training of Local Consultants in Monitoring and Evaluation (1 week)	5	3.00 @ = 15		

4.2	Oct 06	• Support for M&E Data Analysis and Report Writing for Base Line Study (812 weeks)	5	3.00 @ = 15		
4.3	Oct 07	• Support for M&E Data Analysis and Report Writing for Base Line Study (812 weeks)	5	3.00 @ = 15		
4.4	Oct 08	• Support for M&E Data Analysis and Report Writing for Base Line Study (812 weeks)	5	3.00 @ = 15		
4.5	May 06	• Design of 3 x Pilot Projects & Training of PIU/MOPE & local consultants (see Appendix 9)	3	3.00 @ = 9		
4.6	Oct 07	• Follow-up and support for evaluation of Pilot Projects (see 4.5 above)				
4.7	May 07	• Design of 2 x Pilot Projects & Training of PIU/MOPE & local consultants (see Appendix 9)	2	3.00 @ = 6		
4.8	Oct 08	• Follow-up and support for evaluation of Pilot Projects (see 4.5 above)				
4.9	Feb 06 and Oct 06	• Team Leader Support to PIU				
4.10	Feb 07 and Oct 07	• Team Leader Support to PIU				
4.11	Feb 07 and Oct 07	• Team Leader Support to PIU				
4.12	Oct 09	• Support for M&E Data Analysis and Report Writing for Base Line Study (12 weeks)	5	3.00 @ = 15		
4.13	Oct 10	• Support for M&E Data Analysis and Report Writing for Base Line Study (12 weeks)	5	3.00 @ = 15		
		TOTALS		**115.00**		

APPENDIX 8: TORS FOR CONSULTING SERVICES

8.1 ToRs for International Consultants

1.1 Finalisation of detailed specifications for CLS furniture and hardware procurement (January 06 – 1 month in Uzbekistan).

The consultant will:

- work closely with the PIU and the ICT Department in MOPE and any other agency designated by MOPE to review the draft specifications for furniture, computer hardware and peripherals;
- take into account latest developments and appropriate technology;
- take into account latest cost structures;
- assess suitability for the purpose;
- make recommendations to MOPE on the final recommended specifications;
- review and comment on procurement documentation and evaluation methodology and criteria;
- produce a draft report within two weeks of completion of assignment.

1.2 Finalisation of school clusters, identification of CLSs and random checks on conformity with selection criteria (January 06 – 1 month in Uzbekistan).

The consultant will:

- work closely with the PIU, and the nominated departments of MOPE and with Oblast and Raion staff in the field and with local consultants to review school cluster designs;
- assess the appropriateness of the selection of CRSs and comment as required;
- in association with the PIU, MOPE and local consultants, carry out random checks on CLSs to ensure that they have been selected in accordance with the agreed minimum selection criteria;
- ensure that pro-poor criteria have been taken into account and that at least 40% of the CLSs are located in schools designated as "poor";
- ensure that CLSs are located in a representative number of all minority language schools.
- produce a draft report within two weeks of completion of assignment.

2.1 Course design and preparation of course materials for TOT in school network management and school ICT coordination (February 06 – 3.0 months in Uzbekistan and 0.5 home based months).

The consultant will:

- design a course and prepare all required course materials and supply them to the PIU at least three weeks prior to the agreed start date for the course, so that materials can be translated into Uzbek/Russian;
- work with local consultants, interpreters and RITTI trainers in the delivery of the TOT course;
- design the course to be practical and hands-on wherever possible;
- at the completion of the course recommend course participants to work on the detailed design and development of an abbreviated course for proposed CLS school network managers and CLS school ICT coordinators;

- provide support to RITTI trainers in their presentation and delivery of the first school network management and school ICT coordination courses to CLS attenders;
- submit a full report on the conduct of the assignment and the course including copies of all course materials and representative feedback from all attenders;

2.2 Course design and preparation of course materials for training of RITTI trainers in ICT in maths, physics, chemistry, biology and languages (March 06 – 2.0 months in Uzbekistan and 0.5 weeks at home for each of five subject specialists)

The consultant will:

- design a course and prepare all required course materials and supply them to the PIU at least three weeks prior to the agreed start date for the course, so that materials can be translated into Uzbek/Russian;
- work with local consultants, interpreters and RITTI trainers in the delivery of the relevant course;
- design the course to be practical and hands-on wherever possible;
- at the completion of the course recommend course participants to work on the detailed design and development of an abbreviated course for proposed CLS school network managers and CLS school ICT coordinators;
- provide support to RITTI trainers in their presentation and delivery of the subject course to CLS attenders;
- submit a full report on the conduct of the assignment and the course including copies of all course materials and representative feedback from all attenders;

2.3 Course design and preparation of course materials for TOT in computerised school administration (April 06 – 5 weeks in Uzbekistan and 0.25 months at home)

The consultant will:

- design a course and prepare all required course materials and supply them to the PIU at least three weeks prior to the agreed start date for the course, so that materials can be translated into Uzbek/Russian;
- work with local consultants, interpreters and RITTI trainers in the delivery of the TOT course;
- design the course to be practical and hands-on wherever possible;
- at the completion of the course recommend course participants to work on the detailed design and development of an abbreviated course for proposed CLS school network managers and CLS school ICT coordinators;
- provide support to RITTI trainers in their presentation and delivery of the computerised school administration course to CLS attenders;
- submit a full report on the conduct of the assignment and the course including copies of all course materials and representative feedback from all attenders;

2.4 Course design and preparation of course materials for TOT in school based CPD (April 06 – 1 month in Uzbekistan and 0.25 months at home).

The consultant will:

- design a course and prepare all required course materials and supply them to the PIU at least three weeks prior to the agreed start date for the course, so that materials can be translated into Uzbek/Russian;
- work with local consultants, interpreters and RITTI trainers in the delivery of the TOT course;
- design the course to be practical and hands-on wherever possible;
- at the completion of the course recommend course participants to work on the detailed design and development of an abbreviated course for proposed CLS school network managers and CLS school ICT coordinators;
- provide support to RITTI trainers in their presentation and delivery of the school based CPD course to CLS attenders;
- submit a full report on the conduct of the assignment and the course including copies of all course materials and representative feedback from all attenders;

3.1 Course design and preparation of course materials for training of software and new materials developers in language, maths and science (June 06 – 1 month in Uzbekistan and 0.25 months at home for each of three specialist consultants).

Each specialist consultant will:

- identify typical software in use in school systems elsewhere in the world in the specialist subjects and at the grade levels for which they will be preparing the course;
- select the software to illustrate a variety of different types of ICT usage in the target subjects and grade levels;
- explain how software can be licensed, versioned, localised, adapted and translated for use in Uzbek and other minority languages in use in Uzbekistan;
- explain typical licensing procedures and costs;
- explain and demonstrate the techniques for adaptation, localisation and translation;
- provide practical sessions wherever possible through and particularly on adaptation, localisation and translation;
- assist the attenders in the development of one or two original ideas;
- within two weeks of completion of the assignment produce a report identifying strengths and weaknesses in the presentation, software of interest to local subject specialists and issues arising with recommendations.

3.2 Course design and preparation of course materials for training of software and new materials developers in language, maths and science (April 07 – 1 month in Uzbekistan and 0.25 months at home for each of three specialist consultants).

Each specialist will:

- identify typical software in use in school systems elsewhere in the world in the specialist subjects and at the grade levels for which they will be preparing the course;
- select the software to illustrate a variety of different types of ICT usage in the target subjects and grade levels;
- explain how software can be licensed, versioned, localised, adapted and translated for use in Uzbek and other minority languages in use in Uzbekistan;
- explain typical licensing procedures and costs;
- explain and demonstrate and the techniques for adaptation and localisation;

- provide practical sessions on adaptation, localisation and translation;
- assist the attenders in the development of one or two original ideas;

- within two weeks of completion of the assignment produce a report identifying strengths and weaknesses in the presentation, software of interest to local subject specialists and issues arising with recommendations.

3.3 Course design and preparation of course materials for training of software and new materials developers in language, maths and science (April 08 – 1 month in Uzbekistan and 0.25 months at home for each of three specialist consultants).

Each specialist will:

- identify typical software in use in school systems elsewhere in the world in the specialist subjects and at the grade levels for which they will be preparing the course;
- select the software to illustrate a variety of different types of ICT usage in the target subjects and grade levels;
- explain how software can be licensed, versioned, localised, adapted and translated for use in Uzbek and other minority languages in use in Uzbekistan;
- explain typical licensing procedures and costs;
- explain and demonstrate the techniques for adaptation and localisation;
- provide practical sessions on adaptation, localisation and translation;
- assist the attenders in the development of one or two original ideas;
- within two weeks of completion of the assignment produce a report identifying strengths and weaknesses in the presentation, software of interest to local subject specialists and issues arising with recommendations

3.4 Design the establishment of e-materials and software development fund (June 06 – 1 month in Uzbekistan and 0.25 months at home)

The consultant will:

- liaise closely with the PIU and nominated staff and departments from MOPE and MOF;
- agree an outline approach to the provision of financial support for rapid software development in priority subjects and grades according to MOPE specifications;
- design a competitive format for the operation of the fund;
- propose the evaluation methodology and criteria;
- establish clear and transparent accounting and disbursement procedures;
- propose reporting proformas;
- provide all necessary documentation and a management handout as the basis for fund establishment;
- within two weeks of completion of assignment, produce a report containing full details of all proformas and agreements achieved on the operation of the fund.

3.5 Provide online support and problem solving during the period of fund establishment (ongoing – 2 weeks at home allocated for online support).

The consultant will:

- be available to provide online support, advice and problem solving to the PIU on any issue arising out of the establishment, operation, assessment, evaluation, award and accounting of the fund.

3.6 Monitoring and problem solving of key materials and software development fund (April 07 – 0.75 months in Uzbekistan).

The consultant will:

- review, in close association with PIU, MOPE and MOF, the operations of the fund in the previous nine months;
- identify any problem areas and propose solutions as appropriate;
- assess the quality of the software output funded through the fund and make proposals to improve quality in the future;
- within two weeks of completion of the assignment to produce a report on the key issues arising from the review, the proposed solutions and any alternative options or pros and cons.

3.7 Monitoring and problem solving of key materials and software development fund (April 08 – 0.75 months in Uzbekistan).

The consultant will:

- review, in close association with PIU, MOPE and MOF, the operations of the fund in the previous nine months;
- identify any problem areas and propose solutions as appropriate;
- assess the quality of the software output funded through the fund and make proposals to improve quality in the future;
- within two weeks of completion of the assignment to produce a report on the key issues arising from the review, the proposed solutions and any alternative options or pros and cons.

4.1 Design a monitoring and evaluation system and monitoring instruments (April 06 – 1 month in Uzbekistan and 0.25 months at home).

The consultant will:

- review in association with the PIU, MOPE and MOF the agreed key performance indicators;
- on the basis of these indicators design a monitoring and evaluation system which will provide annual feedback or project progress with particular relevance to the key performance indicators;
- take into account both the performance of the CLSs and the performance of ICT in basic education for the whole system, covering as well those schools which are not being funded by the project;
- provide a detailed handbook on the conduct of the monitoring and evaluation exercise;
- train local consultants in the required monitoring and evaluation techniques;
- design the data analysis systems;
- establish the parameters for an initial baseline study against which future progress can be measured;
- provide detailed guidance to the PIU, MOPE, MOF and local consultants on the initial baseline data collection exercise;

- within two weeks of completion of the assignment produce a detailed report on the monitoring and evaluation system and identify and propose possible solutions for any significant issue or problem likely to occur.

4.2 Support for MOE data analysis and report writing for baseline study (October 06 – 1 month in Uzbekistan).

The consultant will:

- support the PIU and the local consultants responsible for monitoring and evaluation to review the data achieved for the initial baseline study;
- work closely with local consultants in the PIU in the analysis of the data;
- assist PIU and local consultants in the preparation of the baseline study report.

4.3 Support for MOE data analysis and report writing for baseline study (Oct 07 – 1 month in Uzbekistan).

The consultant will:

- support the PIU and the local consultants responsible for monitoring and evaluation to review the data achieved for the initial baseline study;
- work closely with local consultants in the PIU in the analysis of the data;
- assist PIU and local consultants in the preparation of the baseline study report.

4.4 Support for MOE data analysis and report writing for baseline study (..... – 1 month in Uzbekistan).

The consultant will:

- support the PIU and the local consultants responsible for monitoring and evaluation to review the data achieved for the initial baseline study;
- work closely with local consultants in the PIU in the analysis of the data;
- assist PIU and local consultants in the preparation of the baseline study report.

4.5 Design of three pilot projects and training of PIU/MOPE and local consultants (May 06 – 1.25 months in Uzbekistan for each of three specialist consultants).

The pilot projects are specified in Appendix 9. Specialist consultants will have to be appointed for each pilot project. Each consultant will:

- work closely with PIU/MOPE/MOF and any other nominated department to clearly establish the objectives and purpose of the pilot projects and the required data and feedback;
- prepare a draft pilot project design for detailed discussion and agreement with concerned departments;
- prepare, discuss and agree pilot project evaluation schedules;
- prepare a pilot project handbook to guide PIU, MOPE, MOF and any associated local consultants;
- provide training to local consultants, PIU, MOPE, MOF as appropriate and required in the establishment and conduct of the pilot projects.

4.6 Follow-up and support for the evaluation of the pilot project (October 07 – 0.5 months in Uzbekistan).

The consultant will:

- support the PIU and the local consultants responsible for monitoring and evaluation to review the data achieved for the initial baseline study;
- work closely with local consultants in the PIU in the analysis of the data;
- assist PIU and local consultants in the preparation of the baseline study report.

4.7 Design of three pilot projects and training of PIU/MOPE and local consultants (February 07 - 1 month in Uzbekistan for each of three specialist consultants).

The pilot projects are specified in Appendix 9. Specialist consultants will have to be appointed for each pilot project. Each consultant will:

- work closely with PIU/MOPE/MOF and any other nominated department to clearly establish the objectives and purposes of the pilot projects and the required data and feedback;
- prepare a draft pilot project design for detailed discussion and agreement with concerned departments;
- prepare, discuss and agree pilot project evaluation schedules;
- prepare a pilot project handbook to guide PIU, MOPE, MOF and any associated local consultants;
- provide training to local consultants, PIU, MOPE, MOF as appropriate and required in the establishment and conduct of the pilot projects.

4.8 Support for MOE data analysis and report writing for baseline study (April 08 – 1 month in Uzbekistan).

The consultant will:

- support the PIU and the local consultants responsible for monitoring and evaluation to review the data achieved for the initial baseline study;
- work closely with local consultants in the PIU in the analysis of the data;
- assist PIU and local consultants in the preparation of the baseline study report.

4.9 Team leader support to the PIU (February 06 and October 06 – 2 weeks in Uzbekistan and 1 week at home for each visit).

The team leader will:

- work closely with the PIU, MOPE, MOF and any other designated department as required in order to review overall progress on the project according to specified deadlines and required performance indicators;
- identify problems and/or potential problems and proposed a range of possible solutions with the pros and cons and implications of each option;
- review progress and agree any necessary adjustments to the overall project programme;
- review procurement arrangements, identify any problem areas and propose solutions as required;
- Undertake any other task required by PIU/MOPE;
- within two weeks of completion of assignment produce a report detailing all the major issues arising from the visit, recommended actions, options, pros cons and implications as appropriate.

4.10 Team leader support to the PIU (February 07 and October 07 – 2 weeks in Uzbekistan and 1 week at home for each visit).

The team leader will:

- work closely with the PIU, MOPE, MOF and any other designated department as required in order to review overall progress on the project according to specified deadlines and required performance indicators;
- identify problems and/or potential problems and proposed a range of possible solutions with the pros and cons and implications of each option;
- review progress and agree any necessary adjustments to the overall project programme;
- review procurement arrangements, identify any problem areas and propose solutions as required;
- undertake any other task required by PIU/MOPE;
- within two weeks of completion of assignment produce a report detailing all the major issues arising from the visit, recommended actions, options, pros cons and implications as appropriate.

4.11 Team leader support to the PIU (February 08 and October 08 – 2 weeks in Uzbekistan and 1 week at home for each visit).

The team leader will:

- work closely with the PIU, MOPE, MOF and any other designated department as required in order to review overall progress on the project according to specified deadlines and required performance indicators;
- identify problems and/or potential problems and proposed a range of possible solutions with the pros and cons and implications of each option;
- review progress and agree any necessary adjustments to the overall project programme;
- review procurement arrangements, identify any problem areas and propose solutions as required;
- undertake any other tasks as required by PIU/MOPE;
- within two weeks of completion of assignment produce a report detailing all the major issues arising from the visit, recommended actions, options, pros cons and implications as appropriate.

8.2 ToRs for Domestic Consultants

There is no requirement for domestic consultants on the staff development training courses because the intention is to develop capacity knowledge and skills in the permanent staff of the RITTIs.

There are two areas where local consultants will be required. These are for monitoring and evaluation (5 consultants for approximately 3 months each per year) and the establishment, supervision and evaluation of the pilot projects (5 consultants for approximately 4 months for 2 years). The Terms of Reference of these two types of domestic consultancy are provided below.

1 Monitoring and evaluation consultants

The consultants will:

- visit approximately 50 Cluster Leader Schools per year;
- administer the monitoring and evaluation instruments according to the monitoring and evaluation design and guidelines;
- where required to do so by the monitoring and evaluation handbook, provide training to local Cluster Leader Schools so that they can apply monitoring and evaluation instruments to the individual schools in their own cluster;
- be responsible for ensuring data collection on time;
- be responsible for ensuring the accurate input of data into the data analysis software programs;
- work with the other domestic consultants on the analysis of data and writing of the baseline and annual monitoring and evaluation reports.

2 Pilot project support consultants

The consultant will:

- work closely with the PIU and other government departments as specified and with the international consultants on the detailed design of individual pilot projects;
- be responsible for maintaining regular contact and supervision with the pilot project under the overall management of the PIU;
- be responsible for applying monitoring and evaluation instruments and collecting data on the progress and outcomes of the pilot project and work with the PIU on the analysis of data returns, on the preparation of reports and on recommendations to the PIU and to government on future policy and strategy resulting from the outcomes of the pilot project.

APPENDIX 9: RESEARCH STUDIES, PILOT PROJECTS AND STUDY TOURS

The following research activities and pilot projects are included within the project.

Name of research study/Pilot project	Duration	To be undertaken by	Brief description	Expected outputs
Pilot Project in the Development of Community Telecentres	September 2006 to June 2008	PIU using an external specialist to assist in the design of the pilot project and local consultants for supervision, monitoring and evaluation.	This study will support a number of schools in both urban and rural areas in the development of telecentre facilities serving the local community. A range of cost structures will be experimented with from simple cost recovery (i.e. no income surplus for schools) to different levels of income surplus. The facilities to be offered will include access to Internet (in CLSs), evening classes in basic computer literacy and generic software applications, use of computers for personal or commercial purposes (e.g. maintaining accounts on spreadsheets, writing business or personal letters on wordprocessing software, designing posters or fliers for local events, designing invitations to weddings, etc, designing presentations using Powerpoint, etc). The pilot project schools (approximately 10 are envisaged) will receive support in the form of training, basic accounting, additional network management (individual secure files for each community member, etc, a simple course design in computer literacy and generic software skills and training in record keeping and basic monitoring and evaluation) There will also be support in the form of local publicity and the organisation of open meetings to explain what is available to the local community in terms of options (e.g. a membership scheme in which a monthly membership fee entitles you to all facilities without additional charges, or a services fee in which the community only pays for the specific service used).	The objective of the pilot project is to explore the potential for community involvement in the use of school-based ICT in both urban and rural communities and to quantify the impact that such involvement is likely to have on the community, the school and on student access. Thus, the pilot project will seek to establish a level of potential usage from the community, the amount of time required for community usage, the impact on staffing and school management (e.g. the need to open the school in the evenings to give access to the community), the associated revenue implications (i.e. the costs of operating telecentres against the potential income and the level of profitability generated for the school and its potential contribution toward the running costs of ICT in the school), impact on maintenance and servicing (i.e. does extended usage lead to additional servicing and maintenance costs and if so, can they be quantified), the impact of access to ICT facilities on local community economic and social life, the impact on the community in terms of school added value, etc. The two dominant considerations would be: (a) is access to ICT a high priority for the community and will the use of school facilities by the community provide significant benefit? (b) can community use provide financial support to the school to assist in sustaining the operational costs of ICT? One of the major factors to be taken into account would be the impact of proximity, i.e. to what extent is the viability of a telecentre affected by proximity to alternative resources elsewhere. Thus, would telecentres be of less interest in urban areas because there are already operational Internet cafes. The main output will be a strategy guideline for the development of

				community access to school ICT facilities.
Research Study on Thin and Fat Client options	September 06 to end of project	The PIU with the assistance of a specialist external consultant to design the research study and local consultants to undertake supervision, monitoring and evaluation	The Thin Client option in education has not yet been established for long enough to determine the likely replacement cycles which are claimed to have a significant impact on replacement costs. Replacement cycles are, in any case, also going to be dependent on local environmental factors. For example, schools in western Europe do not suffer from the climatic extremes which are common in Uzbekistan, nor do they have to put up with dust to the same extent. The physical facilities are also likely to be better and all of these features will have an impact on longevity. There are also important pedagogic considerations. Thin Client options are considered to be less flexible and to perform relatively poorly with multi-media and video (although some of the current hardware on offer claims that these drawbacks can be mitigated or overcome). The research study would purchase and install three sets of Thin Client hardware in schools close to selected CLSs. Two of the schools would be rural and one would be urban. The pilot project would provide training in the operation and management of a Thin Client option and would also ensure that the pilot schools were in areas where qualified servicing and maintenance was available to support the Thin Client servers.	The objectives of the pilot project would be: (a) to test the potential longevity of the Thin Client option in Uzbekistan conditions and to compare it with longevity in Fat Client options in similar circumstances and locations. Although the current project will not last long enough to fully test the Thin Client claims for longevity it should be possible to develop an idea from the condition of the hardware at the end of the current project; in addition there is no reason why a successor project should not continue with the monitoring and evaluation of thin and Fat Client options; (b) to determine differences in operational costs and in particular differences in the electricity usage, use of consumables and servicing and maintenance costs; (c) to determine the extent of any limitations on pedagogic effectiveness imposed by the constraints of the Thin Client network. The main output will be data and operational experience which can be used as the basis for the planning of the second phase of ICT development from 2011 to 2016.
A pilot project on Decentralised Cash Financing for ICT operational budgets in CLSs	September 2006 to June 2008	PIU in close association with MOF, local Oblast finance departments, Hokimmyat finance departments and the Raion Education Department	The pilot project would be designed by the PIU working closely with the MOF and a specialist foreign expert. The pilot project would be monitored by local consultants contracted by the PIU for the purpose and by staff from the Oblast Finance Department, the Hokimmyat Finance Department and the MOF.	At present most schools handle little or no cash and have very little discretionary spending capacity, apart from funds contributed by parents or, on occasion, generated through income earning activities. As a result, school visits revealed that no school had any idea about the actual costs involved in running ICT in their schools. Electricity bills, telephone bills and in some cases maintenance and servicing bills were paid by the Raion and neither Raions nor schools could determine what proportion of each bill was ICT related and what was part of general school operations. Because there was no information on cost against available finance there was no attempt at cost control by schools in

				order to make the available budget go further. Thus, examples were found of Raions and schools paying for quarterly servicing charges where no servicing was delivered. It is not untypical that systems where schools are divorced from financial decision making have no interest in cost control or cost reduction. As a result, systems often operate at significantly higher costs than they need to. All CLSs will be provided with operational budgets for the full five-year period of the project because the role of the CLSs in supporting and developing ICT in other schools is so fundamental that they need to be guaranteed adequate annual funding in order to deliver the expected benefits. The objective of the pilot project would be to identify in association with the MOF a number of CLSs in who would then be provided with cash budgets to run their ICT systems. These cash budgets would be calculated to cover consumables, maintenance and servicing and electricity and telephone bills and arrangements would be made to disaggregate the costs of electricity and telecommunications allocated to ICT rooms and to general school usage. Schools will also be encouraged to select their own services suppliers in order to get better service and lower cost operations while maintaining facilities in full operational order. The objective of the pilot project would be to determine whether or not decentralised, school-based cash financing for ICT has a beneficial impact on (a) annual operational costs; (b) the operational condition of ICT hardware (i.e. can the school maintain hardware better and cheaper by using its own finances than by having the Hokimmyat pay the bills directly; (c) can the school maintain proper financial records so the use of funds can be properly accounted and audited? (d) the relative pros and cons of decentralised school-based cash budgeting should be identified. The pilot decentralising financing project could be link to existing decentralised per capita financing pilots. The output will be direct experience of the financial and managerial implications of school-based, cash financing.

The three research study/pilot projects listed above are proposed for launching in the first year of the project. Sufficient funding will be maintained to design and launch other pilot projects and research studies in subsequent years that spring out of the practical experiences of working on the development of ICT in basic education.

STUDY TOURS

Study Tour 1

Number of participants: 10

Duration: 13 days assuming departure from Uzbekistan on Sunday and return to Uzbekistan 13 days later on the Saturday.

Objective: To study ICT policies, strategies and usage in other relevant countries

Destination: Singapore and Malaysia

Description: The study tour would meet ICT policy makers in both countries to discuss past and current policies and strategies toward ICT development, the lessons learned from past experience and to identify key issues of relevance to Uzbekistan in the development of ICT in basic education.

Visits to schools would enable the study tourists to observe ICT in use as a subject as well as the use of ICT in a range of other curriculum subjects. Schools will also provide opportunities to observe and inspect relevant software packages and to examine operational cost situations, financial management systems, etc.

The study tourists will also visit in-service and pre-service teacher training institutes to discuss and observe teacher training support for ICT in schools.

Other areas of interest to cover during the study tour would be the level of school operational budgets for consumables, maintenance and servicing, electricity and telecommunications charges and the necessary levels of technician support for servicing and maintenance. Study tourists could also discuss thin, tubby and Fat Client options and establish the pros and cons of each from actual users.

Timing: second quarter of 2006.

Study Tour No. 2

Number of participants: 10

Duration: 13 days, as above

Objective: To study ICT policies, strategies usage in other relevant countries.

Destination: Finland and the UK

Description: Finland is currently rated as the highest performing education system in the world and has invested very large sums in ICT based education over the past 10 years. The UK has the highest level of ICT investment of all European countries and has undertaken a great deal of research on ICT attainment targets, total costs of operation, teacher training requirements, technical requirements, etc. The

programme structure proposed for Singapore and Malaysia should also form the basis for the programmes in Finland and the UK. Thus, the programme would cover senior policy makers and strategists, primary and secondary schools, pre-service and in-service teacher training institutes, assessment and examinations, curricula, maintenance and servicing organisations, financial departments, software developers and teachers centres where teachers work collaboratively.

Timing: fourth quarter of 2006.

Study Tour No. 3

Number of participants: 10

Duration: 13 days, as above

Objective: To study ICT policies, strategies and usage in other relevant countries.

Destination: Russia and Ukraine

Description: Russia and Ukraine are countries where the educational systems have recognisable similarities to those of Uzbekistan. Both countries have ambitious strategies for ICT development and both countries have to develop those strategies within financial constraints which will be familiar to Uzbekistan. The value of seeing how other countries, both with donor support, are planning and developing their ICT approaches is important and likely to be beneficial in the development of strategy in Uzbekistan. The same broad programme as for the first two study tours would apply.

Timing: second quarter 2007.

APPENDIX 10: PROCUREMENT PACKAGES AND ARRANGEMENTS

The procurement comprises

a) ICT Hardware for CLSs
b) Furniture for ICT Rooms
c) Thin Client Configuration for 3-4 schools as part of the piloting of Thin Client options in Uzbekistan
d) One vehicle and office equipment for the PIU

In addition the e-Learning Materials Fund will run regular small competitions as the basis for funding interesting software applications in support of ICT across the curriculum

Based on the experience of ESDP the following basic procurement principles for the project are proposed:

a) Hardware should not be procured as one large package for all CLSs but should be broken down into regional packages. The following regional packages are suggested:
   - Ferghana, Andijan and Namangan
   - Tashkent City and Tashkent Oblast
   - Syrdarya, Jizzak and Samarkand
   - Sukandarya, Kashkadarya. Navoi
   - Karakalpakstan, Khorezm and Bukhara
b) Procurement packages should include all Hardware for ICT installations i.e. workstations, servers, data projectors, scanners, digital cameras, printers, UPS, cabling, hubs etc
c) Procurement packages should include installation
d) All supplies should be pre-packaged for each named school and should be identified by Oblast, Raion and School Number
e) Furniture should be procured separately from ICT hardware but should be procured in advance of the hardware

PROVISIONAL PROCUREMENT PACKAGES

Description	Number of Contracts	Est. Value ($ million)	Procurement Method
A. Equipment			
1. Vehicle for PIU	1	0.012	DP
2. Office Equipment for PIU	1	0.012	DP
3. Thin Client Hardware for 3-4 Pilot Schools	1	0.040	DP
4. Furniture (Computer Tables and Chairs etc) for approx 140 schools	5	0.200	LCB
5. ICT Hardware for approx 140 schools	5	3.052	ICB
B. Software and e-Learning Materials			
1. Anual	Multiple	Variable	LCB/DP

LCB= local competitive bidding
ICB= international competitive bidding
DP= direct purchase
PIU= Project Implementation Unit

APPENDIX 11: ECONOMIC AND FINANCIAL ANALYSIS

1. MACRO-ECONOMIC AND SECTOR CONTEXT

1.1 Macroeconomic Performance, Demographics and Employment

Macroeconomic Performance. The Republic of Uzbekistan was founded on 31 August 1991 following independence from the Soviet Union. After independence, the Government sought to prop up its Soviet-style command economy with subsidies and tight controls on production and prices. Faced with high rates of inflation, the Government began to reform in mid-1994 by introducing tighter monetary policies, expanding privatization, slightly reducing the role of the state in the economy, and improving the environment for foreign investors. Uzbekistan initially responded to the negative external conditions generated by the Asian and Russian financial crises by tightening exports and currency controls within its already largely closed economy.

While Uzbekistan's gross domestic product (GDP) fell by about 20 percent during 1991-1995, the economic contraction was not as severe as that of other Central Asian republics of the former Soviet Union (FSU). Uzbekistan resumed moderate growth in 1996 averaging 4.8 percent annually in the two years that followed. Growth has since slowed and this is attributed to persisting needs for additional structural transformation, including large-scale privatization, agricultural liberalization, and capital market development. The average annual growth rate for the period from 1995 to 2003 was 3.5%, achieving over 4% per annum since 1997. The growth rate for 2004 was 7.7 percent (Table 1, Annex 1).

Of the 7.7% GDP growth in 2003, industry contributed 0.9% of the growth, agriculture 2.9%, construction 0.2%, services 2.7%, trade and public catering 1.2%, other branches and services 0.8%, and net taxes accounted for 1.02%[42]. As compared to 2003 performance, industry's contribution to GDP growth increased by 2.3 times, agriculture by 1.4 times, and services – 2.3 times. Industry and the services sector are gradually becoming dominant contributors to GDP growth in the country.

The production structure of the GDP shows a significant contribution from the services sector accounting for 37.6% of production output. Agriculture has the second largest share with 26.8% of GDP in 2004. The agriculture sector has been declining over the past four years (Table 2, Annex 1).

Employment. During the 1990s, the rate of population growth was significantly reduced, from 2.1 per cent per year in 1991 to 1.4 per cent in 2000 and 1.2 per cent on average during the past three years. This decline in population growth rate will obviously reduce the pressure to provide jobs for new entrants into the labor force. However, the rate of population growth of people of working age is still high because it is the lagged effect of higher population growth in the mid-1980s of the Soviet Union. Therefore, the share of the population of employable age in the total population increased from 49.5 per cent in 1995 to 52.5 per cent in 2000 and will continue to increase for the next few years[43]. For this reason, the Uzbek economy will need to generate employment for an additional 254,000 workers every year until 2008[44].

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[42] Source: Center for Effective Economic Policy, 2005.

[43] Employment Promotion and Poverty Reduction by Terry McKinley, G. Saidova, Z. Nasritdinkhodjaev, Y. Abduganieva and A. Tukhtarov, Growth and Poverty Reduction in the Next Decade: *a Report to the Government of Uzbekistan, 2004*

[44] Ibid.

In 2003, the employment structure by sectors shows that the majority of the labor force is in the Agriculture and Forestry sector. Education, Culture, Art and Science is the second largest employment category. The latest information (2004) demonstrates that the greatest increase in the number of employees (by 63,600 or by 5.1%) took place in this sector, which accounted for 19.8% of the total employment growth for the year[45].

The GOU's Interim Welfare Strategy for 2005-2010, identified the following employment issues:

- high proportion (29%) of employed are in the informal sector;
- high level of hidden unemployment;
- low motivation of unemployed and employed in the informal sector of the economy due to low salaries;
- mismatch between the qualifications and skills of the unemployed,
- mismatch between supply and demand for labor skills is caused by the lack of flexibility in the education and training system.

The 2004 JBIC Education sector study noted the issues concerning industry-education linkages such as inconsistency between the contents of education/training and labor market needs; lack of information of industries in the locality where schools are located; and training contents responding only to the short-term needs of employment.

1.2 Government Expenditures on Education

Since independence in 1991, Uzbekistan has struggled to maintain its previous educational standards. It has tried to maintain high levels of expenditure on education and simultaneously has attempted to introduce reforms intended to reflect its status as a newly independent, multi-ethnic state moving towards a market oriented economy.

Although the nominal growth rate has slowed down during the past 3 years falling to 22.6% in 2004, the real growth rate has been increasing by an average 9% per year (Table 4, Annex 1). In 2004, the real growth rate was 13.8% as compared to a 2003 real growth rate of 10%. Consequently, education sector expenditures have been increasing in both real and nominal terms. In nominal terms, for the past two years, the Government managed to increase spending on average by 23% each year. Under the current financial conditions, the education spending growth rate is likely to remain at around 23-24% per year.

The trend in the proportion of GDP allocated to education has declined during the last five years; however, it is expected that it will reach 9.2 per cent in 2005. The expenditure level as a proportion of GDP is above the average for all OECD countries (5.1%)[46] (Table 5, Annex 1). The high level of investment in the sector reflects the continuing commitment of the government to education as one of the highest of state policy priorities. As GDP is unlikely to rise dramatically in the short to medium term, it will be difficult to increase state education budgets substantially above their current levels. This implies that the existing financing for education must be used more efficiently in future in pursuit of clearly defined and prioritized educational objectives. Failure to achieve more efficient use of existing resources could lead to deterioration in the quality of education or a reduction in the number and scale of institutions and/or staff.

[45] Ibid.
[46] World Bank Public Expenditure Review, 2004.

In 2003 the share of the sub-sectors in total education expenditure was 16.2% for pre-school education, 54.7% for general secondary education, 12.3% for the secondary specialized vocational education, 6.4% for higher education[47]. Salaries and social charges accounted for 62.3% of the total education budget. Approximately 65% of education sector expenditures are covered through the raion and city local budgets, 22% by Oblast budgets and only 13% by the central republican budget[48]. Since the education sector is now mostly financed through decentralized raion and city budgets, which in turn depend upon the ability to collect local taxes[49], there is a potential issue of regional funding disparities, which in turn could have a significant impact on the quality of education on offer in different raions and oblasts.

Over the past 15 years the problems of transition and the impact of economic difficulties has caused resource allocations to many parts of the education sector to fall substantially in real terms, and the intra-sectoral composition of spending has experienced major structural transformations, including: (a) a decline in public spending on physical capital investment in education; (b) a decline in the overall real value of recurrent public expenditure on education up to 2001, which has only just started to recover to previous levels in the past 5 years; (c) the share of recurrent budget represented by the salary bill for teachers and support staff has increased and has remained high (although the wage rates are still low); (d) GOU expenditure on learning and teaching materials and consumable supplies has declined and remains low[50]; (e) operational expenditures, including maintenance budgets have declined significantly; and (f) spending on staff training has been badly affected[51]. The country's present major challenges related to education public expenditures include: (i) inefficiencies in the use of resources (e.g. low student/teacher ratios, small (but growing) average class size, low actual teaching load, excessive numbers of non-teaching support staff, extensive use of outdated infrastructures and equipment etc); (ii) increasing regional inequities in access to education, with particular impact on the rural poor; (iii) deterioration of the quality of education services, particularly in the basic education sub-sector; and (iv) an inappropriate education output mix for an emerging market economy.

1.5 Government Expenditures on Basic Education

The Basic Education sub-sector receives the highest cash budget allocation of the education sub-sectors but it also receives consistently the lowest per capita allocations. The sub-sector received 45.5 per cent of the total education budget in 1999, but allocations have continued to rise and in 2005 are estimated at 50.3 per cent of total GOU expenditure on education, a year on year average increase of 0.8% per year over a six-year period. There has also been a change in the resources allocated to the basic education investment budget. Table 6, below, presents the composition of the sub-sector budget, which shows that the amount allocated to the recurrent budget has been more than 95 per cent of the total budget for the sub-sector since at least 1999 (Table 6, Annex 1). For the last few years more than 80

[47] MOF, 2003.
[48] MOF, 2002.
[49] "Uzbekistan's fiscal performance has, as one of its underpinnings, an ability to effectively collect taxes that is shared by few other former Soviet Republics." Cornia G A and McKinley T 2004 Growth and Poverty Reduction in Uzbekistan in the Next Decade UNDP – page 13
[50] Although the introduction of the Textbook Rental Scheme has greatly reduced textbook costs to parents and is widely welcomed as a much more cost effective alternative to parent purchase of textbooks, it still transfers much of the cost of textbooks and teachers' guide provision from government to parents. Also, data collection from schools indicates that most parents as well now have to contribute to the costs of other consumable supplies that were previously government funded.
[51] See World Bank Public Expenditure Review, 2004.

per cent of the recurrent budget has been allocated to teachers' salaries. However, there has been a steady decline in capital investment allocations, down from 4.4% of total expenditures in 1999 to only 1.3% in 2004. For 2005 there is no capital investment budget for basic education and 100 percent of the sub-sector budget has been allocated to the recurrent budget. However, it is expected that all capital investment items in the sub-sector will be financed out of the School Development Fund (SDF) at least until 2009.

The issue of the sustainability of basic education financing via the mechanism of the SDF beyond 2009 (when the NPSED will be fully implemented) is a critical issue for future education financing policy. The current education financing system does not provide sufficient resources to maintain the incremental costs incurred as a result of the New Program to cover both replacement and recurrent costs of equipment (particularly for the ambitious ICT program for basic schools) as well as the need for continued and on-going maintenance and further rehabilitation of schools.

Over the past three years the GOU has introduced a number of different measures to improve teachers' salaries. Although there is no doubt that these increases will greatly improve teacher morale, it will simultaneously erode the already inadequate school operational budgets. It seems inevitable that increased parental contributions will be required to maintain basic operations, particularly in basic schools, but there is a risk that some services and facilities will remain unused for lack of support budgets. For example, for the past 4 years catering and food expenditures have accounted for 7-10%, utilities for 2-2.5% and textbooks for around 1% of basic education budgets. Financing for other recurrent expenditure items such as maintenance of buildings and equipment, the provision of electricity, water, latrines and telephone services and the provision of consumables were often inadequate. The allocation of investment funds for equipment and furniture became rare. As a result, many basic education schools are now in a critical condition.

The preliminary findings of the PPTA School Survey show that some rural basic schools receive less than half the per capita funding allocations provided to some urban basic schools in the same oblast, the average expenditure per pre-school pupil was 3.4 times higher than for a basic school student and senior secondary allocations were 2.2 times higher. Per student expenditure varies considerably among oblasts, with even greater variations between raions within oblasts. In the basic education sub-sector rural schools generally receive significantly lower levels of per capita funding than urban schools. The significant regional differences show that these oblasts and rayons are less able to benefit from public education expenditures.

The results of recent focus group discussions demonstrate teacher and parent concern with falling standards of provision and rising parental costs and the impact that this is perceived to have on standards. Declining quality results mainly from cumulative budgetary neglect, resulting in depleted stocks of equipment and educational materials, in an underpaid and demoralized teaching force, and in the physical deterioration of schools. The increasing reliance on formal and informal parental contributions to meet essential school needs also results in a more unequal distribution of education quality and places an unfair burden on the poor.

The current education financing system does not place specific priorities for allocating resources by type of school or by items of expenditure other than those centrally determined. A small degree of flexibility exists at the school level where school directors have some discretion to allocate more than minimum levels of workloads to teachers. Some schools in richer areas have parental funds on which they can exercise decisions on spending priorities.

The current education financing system does not meet the current demand for the provision of quality education over the next few years. Tough decisions are required to ensure the financial sustainability of the education sector and its sub-sectors. In most cases government decisions on education do not seem to take into account the medium and longer-term financial implications of policy initiatives. The absence of a systematic approach to financing policy and the lack of proper coordination and sector management could lead to a continued decrease in quality and equity in the education sector, despite the plans for major capital investments in school refurbishment and equipment. There are already signs, for example, that expensive computer suites are not being properly utilized in schools (in some cases even utilized at all) because of a lack of adequate preparation, management, training, servicing, maintenance and basic operational budgets. There are indications that expensive investment decisions can be made on a short-term basis and that there is a priority need for gradual, systematic, effective and efficient mechanisms that could ensure longer-term sustainability.

2. ECONOMIC RATIONALE, DEMAND ANALYSIS, AND PROJECT ALTERNATIVES

2.1 Economic Rationale for ICT

Many countries have put the "deployment" of ICT as a priority in their strategic development. Most countries see ICT as a tool to overcome poverty and further improve living standards. The ADB, which has set poverty reduction as a major priority, has developed three main strategic directions in promoting ICT in DMCs[52]:

- Create an enabling environment by fostering (i) the development of innovative sector policies, (ii) the strengthening of public institutions; and (iii) the development of ICT facilities and related infrastructure, and networks.
- Build human resources to improve knowledge and skills, and to promote ICT-literacy and lifelong learning of citizens through e-Learning and awareness programs.
- Develop ICT applications and information content for ADB supported projects/activities, e.g. poverty reduction and good governance.

These strategies are aimed towards accelerating social and economic development, improving governance, and supporting the fight against poverty. ADB have assisted many countries such as Thailand, Philippines, Pakistan, Lao People's Democratic Republic, Nepal, Indonesia and Bangladesh in building capacity and developing ICT related infrastructure. An example of a successful ICT project is the ADB supported Grameenphone Telecommunications Project in Bangladesh, which demonstrates that connectivity results in increased productivity[53].

There are many reasons why countries are eager to make large investments in ICT. An OECD study[54] demonstrates that from 1995 to 2001, ICT capital contributed on average about 0.5 percentage points to GDP growth in OECD countries. Large contributions were observed in the United States, Canada, the Netherlands and Australia, accounting for about one fourth of GDP growth from 1995-2001. As illustrated in the Figure below, the contribution of ICT capital to GDP growth increased from about 16% of total GDP growth to about 20% from the first to the

[52] "Toward e-Development in Asia and the Pacific," ADB Publication, November 2003
[53] Ibid.
[54] The Economic Impact of ICT, OECD 2004

second half of the 1990s. Although in recent years, the contribution of ICT capital to economic growth has declined somewhat as ICT investment has lessened during the economic slowdown, the share of ICT investment in total capital formation remained high even in 2001 and 2002. It shows that ICT investment has not been affected more than the average by the slowdown.

The ICT contribution to growth in most economies dramatically increased from the period 1990-1995 to the period 1995-2000, while its variance was also strikingly widened. Many studies confirm that ICT has a significant impact on economic growth. World ICT expenditure nearly doubled, from $1,300 billion in 1993 to $2,400 in 2002[55] at a compound annual growth rate of 8 percent, which far exceeded the growth rates in the same period of global gross product and international trade, which are about 3% and 5%, respectively. The ICT intensity, measured as a percentage of ICT spending in GDP, increased on average for 50 researched developed and developing countries from 4.4 percent in 1992 to 7.0 percent in 2000, and the key determinants of the variance in ICT contribution to growth across economies were education, institutional quality and openness[56].

In OECD countries, three major impacts of ICT on economic growth between 1990 and 2002 were identified and the following conclusions are made[57]:

- Investment in ICT adds to the capital stock that is available for workers and thus helps raise labour productivity;
- The ICT-producing sector plays an important role in some OECD countries, although it is small in most;
- The use of ICT throughout the value chain contributes to improved firm performance. The smart use of ICT can help firms increase their overall efficiency in combining labor and capital, or multi-factor productivity (MFP). ICT use can also contribute to network effects, such as lower transaction costs and more rapid innovation, which can improve MFP.

For instance, in OECD countries ICT investment accounted for between 0.3 and 0.8 percentage point of growth in GDP per capita over the 1995-2001 period[58]. The United States, Canada, the Netherlands and Australia received the largest impact while Japan and the United Kingdom a more modest one, and Germany, France and Italy a much smaller one. It is interesting to note that investment in software accounted for up to a third of the contribution of ICT capital[59]. The contribution of ICT to growth was also significant in Australia[60], Canada[61], Korea[62], United Kingdom[63], Finland[64], and the Netherlands[65].

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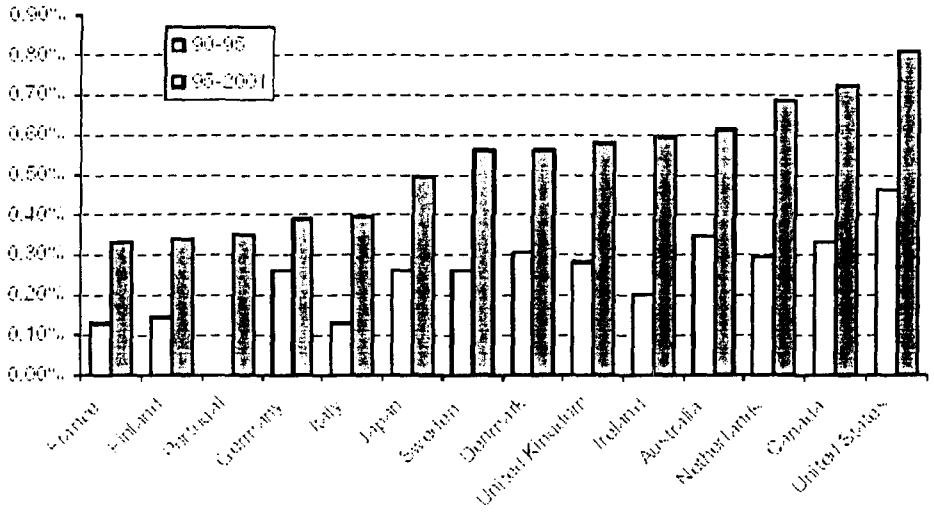
[55] WITSA. 1998, 2000, 2002. *Digital Planet,* World Information Technology and Services, 1998, 2000, 2002.
[56] ICT and Global Economic Growth by Khuong Vu, Novermber 2004.
[57] ICT and Economic Growth: Evidence from OECD Countries, Industries and Firms, OECD Publication, 2003.

[58] ICT and Economic Growth: Evidence from OECD Countries, Industries and Firms, OECD Publication, 2003.
[59] Ibid.
[60] Parham, D., P. Roberts, and H. Sun. 2001. "Information Technology and Australia's Productivity Surge", Staff Research paper, Productivity Commission, AusInfo, Canberra.
[61] Armstrong, P., T.M. Harchaoui, C. Jackson, and F Tarkhani. 2002. " A Comparison of Canada-US Economic Growth in the Information Age, 1981-2000: The Important of Investment in Information and Communication Technologies", Economic Research Paper Series No. 70, February, Zurich.
[62] Kim, S.J. 2002. The Digital Economy and the Role of Government: Information Technology and Economic Performance in Korea, Program on Information Resources Policy, Harvard University, January.
[63] Oulton, Nick (2002), 'ICT and productivity growth in the UK', *Oxford Review of Economic Policy*, Vol. 18, pp. 363-379.
[64] Jalava, J., and M. Pohjola. 2001. "Economic Growth in the New Economy". WIDER Discussion Paper 2001/5. Helsinki: UNU/WIDER.
[65] Van der Wiel, H. 2001. "Does ICT Boost Dutch Productivity Growth", CPB Document No. 016, CPB Netherlands Bureau of Economic Policy Analysis, December.

The overall impact of ICT to the economy via the ICT-manufacturing sector has become important in OECD countries. In Finland, Ireland and Korea, close to 1 percentage point of aggregate labor productivity growth in the 1995-2001 period was due to ICT manufacturing. In the United States, Japan and Sweden, the ICT producing sector also contributed significantly to productivity growth[66].

Figure 1: The contribution of growth in ICT capital assets to GDP growth
(1990-1995 and 1995-20011, in percentage points)



Source: The Economic Impact of ICT OECD 2004; OECD Productivity Database, OECD Capital Services Database, 2003.

Ireland had great success in attracting large FDI to its ICT sector in the 1990s and that small country has quickly become the eighth largest exporter of computer equipment and the fifth largest producer of software in the world. India reached significant growth in the software industry with its software exports increasing from $105 million in 1990 to $6.2 billion in 2000 and $9.2 billion in 2002. Most importantly, India's software industry has surpassed major traditional industries, such as steel and cars, to become the country's largest value-added industry[67].

Firm-level studies also show that the use of ICT enables firms to gain market share at the cost of less productive firms, raising overall productivity. The use of ICT may also provide opportunities for firms to expand their product range, differentiate the services offered, or react better to demand. In addition, ICT at operating level may help reduce inventories or integrate information flow among companies along with a supply-chain.

In Uzbekistan, ICT development was launched by a Presidential speech in Parliament in May 2001, in which the President urged the Government to formulate a general ICT development strategy in support of the country's social, cultural and economic future. A Presidential Degree - ***On Further Development of Computerization and Introduction of Information and Communication Technologies*** of May 30, 2002 outlined the national ICT priorities. The ICT

[66] Ibid.
[67] ICT and Global Economic Growth by Khuong Vu, November 2004.

investment in Uzbekistan including the basic education sub-sector may bring great potential to the country as:

- The production structure of the GDP in Uzbekistan shows a significant contribution from the services sector accounting for 37.6% of production output. Investment in ICT will increase the efficiency of both service and manufacturing sectors of economy. The dominant agriculture sector will be declining as a result of increased efficiency and incremental added value of ICT deployment;
- The rate of population growth of people of working age is still high the Uzbek economy. More employment opportunities need to be created. Since the main reason for high unemployment is a mismatch between the qualifications and skills of the unemployed, ICT will boost the skills of students in basic schools to satisfy the demand for higher skills and qualifications in the labor market upon completion of their schooling;
- Labor productivity in Uzbekistan will increase output levels in the economy. It is expected that Uzbekistan will benefit at least from 0.3 percent of growth in per capita GDP during the next 5-10 years;
- As the case of Ireland has shown, Uzbekistan has a chance to attract large FDI to its ICT sector by finding a niche either in software, hardware or any other ICT solutions.

2.2 Demand for ICT in Basic Education

The results of recent focus group discussions with students, parents and teachers organized in 60 basic schools in Uzbekistan clearly demonstrate that:

- Almost 100% of students consider ICT as an important tool in their education. However, a majority of students think that their teachers are not well informed about ICT and the use of computers as a part of education. Almost 100% of students specifically stated that ICT and computers are insufficient in numbers and not sufficiently used in their schools. A majority of students in schools with modern ICT hardware complained that the computer rooms were kept locked when they should have been open for teacher and student use. Over 85% of students hoped to be able to use computers more often in the future than it is possible under the current curriculum. 100% of the student focus groups wanted Internet access in order to provide them with unlimited access to information about school subjects and to build bridges with other students in Uzbekistan as well as overseas. Almost 100% of student focus groups wanted computers to be used in all subjects across the curriculum and not just in Informatics. Most students wanted computer labs to be open beyond school hours to increase access after lessons.
- Almost 100% of parents wanted their children to learn how to use computers and felt that there were insufficient computers in schools now. Parent focus groups also wanted their children to have access to the Internet as an important tool in education of their children. Parents were surprisingly well informed about the Internet and some parent groups (around 30%) expressed concern about content and wanted safeguards to prevent students accessing inappropriate websites[68]. A majority of parents, even in poor rural areas were prepared to make some kind of contribution to the cost of ICT and Internet but the level of potential contribution varied from 1-2,000 UZS per month in richer urban areas to 50-100 UZS per month in poorer rural areas. The most commonly quoted possible contribution was around 200 UZS per month. This

[68] Adequate protection from inappropriate websites will require protective software and good school network management. The latter was hardly found in any school visited that had modern computers. More than one school had inappropriate sites already downloaded on to PCs.

was an unexpected but clear indication of the importance attached by parents, even in poor communities, to ICT access for their children. However, most parent focus groups noted in the discussions that any contribution would have to be based on the actual financial condition of families. 100% of parent focus groups expressed their interest to get access to school computers in the evenings for their own use;

- 100% of teacher focus groups believed that ICT was important as a teaching and learning tool. Almost 100% wanted computers to be used across the curriculum and not just for informatics. Most teachers wanted to learn how to use computers for both personal use and in their classes. Access to the Internet was also required by a majority of teachers as a source of information and for independent study via distance learning, and, most importantly a communication tool to contact students and teachers in other schools. Teachers complained about lack of computers (or very old computers) and lack of training in the use of computers in education. They also complained about the lack of e-Learning Materials to use on the computers.

The analysis of teachers', students' and parents' responses shows that there is an absolute demand for ICT use in basic education at all levels. Teachers in all subjects want to master ICT applications and use new skills in their subject teaching. Students are impatient with poor facilities or inadequate usage of the facilities that are available and feel that their teachers lack the skills to be able to use ICT in their classes. Parents are eager to support these initiatives by contributing to the running costs of ICT in education, but there is a danger that user charges could negatively affect socially vulnerable families.

As the ADB's Long-Term Strategic Framework recognizes, the importance of supporting ICT is to promote development and close the gap between the information-rich and information-poor[69]. The main focus is to create an opportunity for "increased access to information and allow the less privileged in society, and the less-developed parts of the region to have wider options and a greater role in determining their future."

2.3 Alternative Project Analysis

The alternatives projects considered for this Project are the following:

A. ICT in Basic Education Project without a CLS concept;
B. Absence of the ICT in Basic Education Project.

2.3.1 ICT in Basic Education Project without a CLS concept

The Project without a CLS concept would be easier and cheaper to implement but would have many disadvantages:

- Under this approach 700 schools would be funded on the basis of a geographic area such as a group of raions or one or two oblasts. Thus, the schools could have a beneficial impact on a limited area but would not have a strategic impact on the whole basic education system. The CLS concept ensures a high level of support and guidance to all schools in the country. Without the clusters it would not have been possible to concentrate and focus support.

[69] ADB. 2001. Moving the Poverty Reduction Agenda Forward in Asia and the Pacific: The Long-Term Strategic Framework of the Asian Development Bank (2001–2015). Manila.

- The Project would not have been able to achieve equity of access to support for all schools in the country and would therefore not have been able to provide a comprehensive national pro poor focus.
- Without CLSs it would be much more difficult to ensure that all schools scheduled for hardware installations would be e-Ready because there would be no CLS to work with schools to ensure that they fulfilled minimum criteria for installation
- The CLS concept also ensures the re-establishment of CPD for all basic schools through the collaborative working of schools and teachers within a cluster. Without CLSs the possibility of re-developing self-help and regular training and staff upgrading at a local level would have been very much more difficult if not actually impossible
- Without CLSs, the LRCs would have less penetration and impact on the basic education system because CLSs provide a mechanism for LRCs to extend their influence down to every school
- Without CLSs it would not have been easy to create a national network of Internet access, which would bring Internet experience close to almost every school without making large investments at a time when neither the telecommunications infrastructure nor the pricing profile is conducive to widespread Internet connectivity.
- Without the Internet links in CLSs it would have been much more difficult to start the process of creating a national e-Delivery system for software and e-Learning Materials.
- A project with no CLSs would have made it much more difficult to generate a national Monitoring and Evaluation system, which covered ICT developments on a national basis down to cluster levels and even down to developments and problems in individual schools
- No CLSs would have made it much more difficult to launch STDPs computerized textbook ordering system
- This Project will not have a synergy effect from combining ADB, GOU and other donor funded projects in ICT. All activities in this project are likely to be more polarized, inefficient and lacking in overall coordination;
- This alternative project does not solve the issue of poor hardware and software installations. CLS can act as quality assurance centers with trained staff offering first port of call advice and support..

2.3.2 Absence of the ICT in Basic Education Project

If the Project is not introduced at all into current basic education system, it has only one advantage: GOU will not need to allocate funds as a part of its commitments for this Project and released funds can be used for other purposes. This alternative option assumes the continuation of the GOU Program for ICT in basic education. Non-existence of the project has the following list of issues and possible detrimental outcomes in the basic education system:

- The lack of a national ICT strategy and phased ICT development plan
- Problems with achieving e-Readiness prior to hardware installations and quality assurance after installations of hardware and software would lead to less efficient usage of the GOU's large ICT investment
- Teachers would not have access to re-established systems of continuous professional development
- Schools throughout the system would lack the collaborative working with each other and the active practical support, which would have been provided by the CLSs

- Intensive in-service teacher training and technician support for ICT would not have been provided to ensure efficient lift-off and effective management and use of computers in schools
- The current "Informatics" only approach to ICT would have been perpetuated and ICT across the curriculum would have been more difficult to achieve.
- The methodological benefits of ICT across the curriculum would have been much slower to develop, which would have an impact on student attainment, skills, competencies and higher order thinking skills. Students would be less well-prepared for work in the 21st century
- There would be reduced emphasis on a coherent program of e-Materials development in support of teaching and learning across the curriculum.
- Lack of adequate operational budgets would create growing inequities based on variable parental contributions to support ICT in schools
- Progress towards financial sustainability in ICT provision would have been affected
- Positive pro-poor policies in ICT development would be impaired
- There would be no comprehensive M&E system to provide feedback on current strategies and thus to provide the foundation for future project planning.

3. ECONOMIC COST AND BENEFIT ANALYSIS

This section provides an economic cost and benefit analysis of the proposed ICT in Basic Education Project. The project will generate both quantifiable and non-quantifiable economic benefits. The total quantifiable benefit will derive from four project components: (a) Component 1: Formation of Cluster Leader Schools; (b) Component 2: Development of De-centralized INSETT Capacity; (c) Component 3: E-Materials Development; and (d) Component 4: Management Support. All four components will reduce the costs or will increase the efficiency of current expenditure.Table 1, below, provides a summary of the Economic (quantifiable) Benefits of the Project.

Under Component 3, the Project will encourage the development e-Learning Materials and this activity will be supported by the curriculum review component of the ADB-funded STDP. The introduction of ICT usage across curriculum subjects will require a reconsideration of many aspects of the current State Educational Standards and syllabuses. In particular, the current curriculum overload, with too many subjects and too much factual content will have to be reduced in order to allow constructive use of the hardware and facilities provided to schools. If the result of the curriculum review provides a modest subject reduction of 20% and a modest content reduction of 20% there will be a clear economic benefit. Cumulatively, such a revision would save approximately 36% of the current costs of textbook provision within the system (estimated $3.38 mil. of benefit per year). The reduction in textbook production costs would also be paralleled by reductions in distribution costs and warehousing costs.

Another key aspect of economic benefit is the potential reduction in textbook production costs resulting from the development of e-Learning Materials for minority languages. E-Learning materials do not carry the same low quantity unit cost penalties as printed materials. E-Learning materials will not remove the need for minority language textbooks but could well reduce the extent of the textbooks by significantly increasing the amount of supplementary materials availability in minority languages in electronic forms. On the assumption that e-Learning Materials could reduce the extent of minority language textbooks by 20% and that the annual cost of

minority language textbooks provision is around US$1 million per year, the potential saving is around $0.2 million per year or $1 million over the period of the project.

The biggest economic benefit resulting from the Project comes from the full utilization of the 20% of teacher time currently allocated for professional development. At present, in-service training in Uxbekistan consists of residential INSETT courses run through RITTIs and personal professional development in schools where every teacher is expected to dedicate the equivalent of one full working day to self-development. This self-development day is currently fully paid for by the GOU but is rarely fully (or even partially) utilized for this purpose because of the lack of financial and material resources needed to support Continuous Professional Development. The collaborative working between cluster schools proposed as part of the project should fully restore this CPD day to its original purpose. Thus GOU/MOPE will benefit from the proper utilization of a previously lost 20% of teachers' time and salaries, which is estimated at $32.2 million per year.

Table 1: Summary of Economic (quantifiable) Benefits of the Project

	Activities	Outcomes	Annual Economic Benefit ($mil.)
1	Curriculum revision by introducing ICT	20% reduction of subjects	
		20% reduction of content	
		36% reduction in textbook provision	3.38
		Related savings in distribution at 10% of production cost saving	0.338
		Related savings in warehousing costs at 1% of production cost	0.034
2	Providing e-Materials for Minority languages	reduction in textbook printing costs	0.2
3	Professional development Training	utilization of 20% of teacher time	32.2
4	Increase in effective use of PCs in schools	Increased use of hardware and premises	4.64
5	Introducing EMIS	reduction in paper based correspondence, substitution with e-based one	0.11
		Total	**40.902**

Because current computer classrooms are used only for informatics they are operating at only 20% of their potential capacity. 80% of depreciation cost is a lost opportunity for the education system to fully utilize the computer hardware and classrooms. The Project, by integrating ICT across curriculum subjects, will increase the effective use of computers to 100% by introducing computer-literacy classes for students in grades 5-9 and ICT use in priority subjects and grades. With extended opening hours and access to the Computer Rooms, the notional benefit could be greater than 100% in many schools. The Project assumes that classrooms will be used extensively, including the provision of access to local communities to use computers after regular working hours at schools. The IREX project has already demonstrated the potential impact on full usage, where computer access has been extended from the normal 10-12 periods per week to 12 hours per day plus openings on weekends as well. These activities under the Project will allow the system to gain an estimated $4.64 million/year in lost usage of the capital investment.

The provision of a computer to schools for administration purposes will result in a functioning EMIS system providing school, raion and oblast data electronically to replace the current manual and labour intensive paper-based systems. Substitution of paper with electronic documents for communication among schools, RED, OED and MOPE will provide savings of more than $110,000 per year on the assumption that each school on average sends and receives 20-30 pages of hard copy correspondence per month to raions, oblasts and MOPE. There is an additional labour benefit from the reduction in time consuming manual tasks and their replacement by more efficient electronic working methods (e.g. school timetabling)

The total quantifiable economic benefit of the Project is therefore estimated at $40.902 million per year. Further calculations of all net benefits, taking into account capital investment, replacement and recurrent costs demonstrate that over the 5-year period (2006-2010) the Net Present Value (12%) of the Project impact is $1.44 million with IRR of 16%. However, if project years in terms of impact are considered up to 10 years (2006-2015) as the GOU can continue benefiting from the Project, the NPV will be $47.9 million with 52% IRR. The quantifiable economic benefits already show a major impact of the Project.

Table 2: Net Economic Benefits

	Capital investment	Replacement costs (depreciation)	recurring costs	Total costs	Utilization of economic benefits	Economic benefits	Net benefit
2006	11,6	2,3	4,4	18,3	15%	6,1	-8,7
2007	11,6	3,5	6,7	21,8	35%	14,3	-4,0
2008	11,6	4,6	9,0	25,2	55%	22,5	0,7
2009	11,6	5,8	11,3	28,7	80%	32,7	7,5
2010		5,8	12,4	18,2	100%	40,9	12,2
2011		5,8	13,6	19,4	100%	40,9	22,7
2012		5,8	15,0	20,8	100%	40,9	21,5
2013		5,8	16,5	22,3	100%	40,9	20,1
2014		5,8	18,2	24,0	100%	40,9	18,6
2015		5,8	20,0	25,8	100%	40,9	16,9
2006-2015	NPV (12%)	47,9	mil. USD	**2006-2010**	NPV (12%)	1,44	mil. USD
	IRR	52%			IRR	16%	

There will be close to 8 million direct beneficiaries of the Project as illustrated below. The beneficiaries list includes almost 80,000 teachers, 6.04 million students (grades 5-9), and 1 million households in urban and rural communities (Mahallas).

Table 3: Direct Beneficiaries of the Project

Beneficiaries/activities	No.	
Teachers		
TOT for School Network Management	64	RITTI trainees
Training CLS Network Managers	1400	CLS trainees
Training non-CLS Network Managers	9000	Teacher trainees
TOT in ICT in priority subjects and grades	16	RITTI trainees
Subject/grade training in ICT for CLSs	700	CLS trainees
Training non-CLS schools in ICT across curriculum	45000	School trainees
School Admin training for CLS	700	CLS trainees
School Admin training for non-CLS schools	9000	School trainees
TOT for CPD Training	48	RITTI trainees

CPD Training for CLSs	700	CLS trainees
CPD Training for non-CLS schools	9000	School trainees
Software & e-Materials Development Training	1000	RED/MOPE/private firms
Total number of teachers	**76628**	**Trainees**
Students		
Computer literacy courses for students in G 5-9	6.04	mil. Students
Students attending Math in G 5-9	6.04	mil. Students
Students attending Science in G 5-9	6.04	mil. Students
Students attending Languages in G 5-9	6.04	mil. Students
Total number of students	**5,5**	**mil. Students**
Rural and Urban Communities		
Households using ICT facilities in schools	1	million households
Total number of direct beneficiaries	**4**	**million people**

In addition to quantifiable economic benefits there are many qualitative benefits. The following matrix shows all benefits of ICT use in education. The major beneficiaries under this matrix are students, teachers, school management, parents and communities, RITTIs, MOPE, REDs and OED.

Table 4: Matrix of Project Beneficiaries and Related Qualitative[70] Benefits

⇒ Impact on students	⇒ Impact on teachers
• Students develop an appropriate level of capability, become more engaged with their own learning, and achieve learning outcomes across the curriculum at a higher level • Improve computer literacy skills • Gain higher order of thinking skills • Positive impact on attainment, motivation • Improved learner engagement • Access to Internet offers unlimited sources • e-Learning packages allow students to work at their own pace, repeat sections if they don't understand • Students develop information content about their school activities, hobbies, interests on intranet portals • Increased quality of education for girls • Facilities available for students with disabilities • e-Learning materials developed in Uzbek and local minority languages • Differentiated learning experience will give better learning outcomes • Students benefit from extended school opening hours and flexible use of resources to achieve optimum use of facilities provided • e-Materials portal to access and retrieve necessary data, pedagogical materials and other e-resources for schools • Access to e-Libraries in schools based on STDP School Libraries • ICT tools (word processing, spreadsheets, PowerPoint and other applications) to increase student productivity especially with repetitive, low-level tasks involving writing, drawing and computation. • ICT results in new learning experiences requiring higher levels of thinking and problem-solving	• ICT is used to support pedagogic practices that provide learning environments that are more Learner-centered, Knowledge-centered, Assessment-centered, and Community-centered • The teacher exploits the characteristics of ICT to support the learning of students by, effectively integrating their use, wherever appropriate, into constructivist learning environments, and contributing to relevant learning communities • Benefits of distance learning facilities (less costly, effective) • Links to other schools or businesses (international cooperation is feasible) • Optimized number of teachers (ICT will remove redundant teachers) • Interactive teaching packages available on CDs • Information and skills sharing during teacher visits to CLS as a part of professional development self-training (1 day per week) • Benefits from revisions of overloaded curriculum based on ICT applications • Teachers benefit from extended school opening hours and flexible use of resources to achieve optimum use of facilities provided • Created incentives (certification, bonuses) motivate teachers to become ICT literate and familiar with ICT • Access to e-Libraries in schools based on STDP School Libraries • The use of ICT encourages teachers to use more cooperative work and less teacher lecturing • Teachers are provided with adequate support to select appropriate applications of ICT to address the requirements of the intended curriculum

[70] Developed based on research evidence, experiences of developed and developing countries in using ICT in Basic Education

• Increase learner independence • ICT tools can be used to create records of thoughts and support reflection and assessment of progress • ICT allows students to investigate more thoroughly the real world using up-to-date information and tools to build a broader and deeper knowledge base • ICT makes learning more student-centered, to encourage cooperative learning, and to stimulate increased teacher/student interaction • Software tools can be used to support the development of higher level thinking skills such as application, analysis and synthesis • Graduates are prepared to work in service and manufacturing industries where ICT skills are becoming a necessity	
⇒ **Impact on school management**	⇒ **Impact on parents and communities**
• School environment is supportive of teachers and students use of ICT built on a shared, community-based vision that prepares students to learn, work and live successfully in a knowledge-based society • Improved computer literacy skills • Higher order of thinking skills of school management • Higher efficiency in school management • Improved school infrastructure (reliable (predictable) power supply, better facilities, reliable connectivity) • Larger operating budgets to cover maintenance and servicing costs, utilities and other consumables • All costs associated with ICT provision are identified– investment, replacement & recurrent – as basis for forward financial planning. Sustainable financing plan is developed and implemented • Newly developed Monitoring and Evaluation System for ICT (key performance indicators for ICT in Basic Education) will help school management to fine tune the ICT use in schools • Agreed standard software packages for school management and provision of administration PC will enable school management be consistent in use of EMIS • INSETT program on use of EMIS for School Managers based on standard software provision to schools will raise efficiency of ICT use in schools • The school provides leadership and planning structures based on clear goals that encourage and support teachers and students in their use of ICT • The intended curriculum is organized in a manner that is conducive to the use of ICT to support learning and teaching processes. • The school recognizes local and global communities as critical partners and stakeholders in the learning and teaching process • The school has adequate systems to ensure accountability in the use of ICT	• Increased public awareness of ICT use in schools • Voluntary contributions of those parents who can afford to pay for keeping ICT project sustainable in schools • Improved computer literacy skills (if parents are allowed to attend special courses organized by school management) • Benefits from pilot tests for community tele-centres in rural and remote areas by establishing both income generation potential & community benefit

⇒ Impact on RITTIs for LRCs/CLSs	⇒ Impact on MOPE/OED/RED
• TOTs are trained based on new teaching methodologies and subjects • Increased number of qualified TOTs • Training equipment is provided • RITTS and LRCs/CLSs receive experience in running decentralized trainings • LRCs, RITTIs, MOPE Departments, Oblasts and Private Sector in the techniques of e-Materials Development • M&E allows RITTs, LRCS/CLSs to revise, fine tune training programs in ICT	• MOPE (REC) benefits from e-materials portal to regulate the nature of content of information • M&E (key performance indicators for ICT in Basic Education) help to revise, amend or introduce new teaching and learning approaches into the educational system, it ensures better governance • Train school management, RED, OED and MOPE specialists on use of EMIS • The Project will improve overall governance with introduction of EMIS • Improve efficiency of textbook ordering system
⇒ Impact on service and telecommunication industry	
• Service companies will be given equal chances to bid for servicing and maintenance contracts which will lead to improved quality of servicing and maintenance, and expected higher profits (gradual building capacity of IT servicing and maintenance industry)	

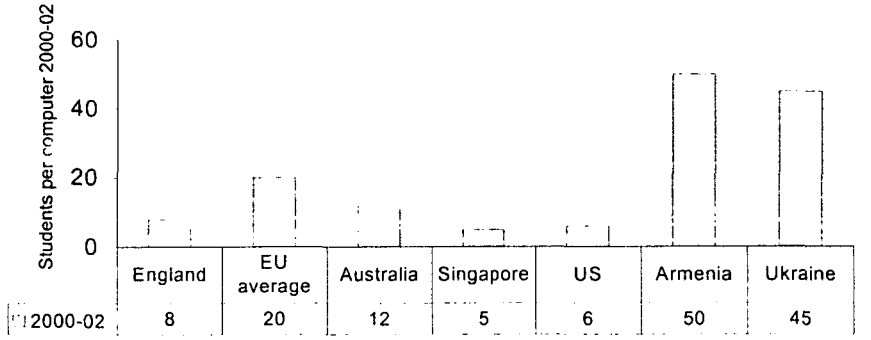
4. FINANCIAL IMPLICATIONS OF ICT IN BASIC EDUCATION

4.1 Sustainability of GOU's Program for ICT in Basic Education

The ***Programme of Further Development of Computerisation and Introduction of Information and Communication Technologies for the Period 2002-2010*** confirmed the policy directions and the priority given to national ICT development in Uzbekistan. The COM No. 200 sets a target of PC/student ratio in Basic Education to reach 1:20 by 2010. Currently, the GOU is in the process of approving a Chinese Loan for $20 mil. to equip basic schools with hardware but the GOU/MOPE is still unclear about the cost benefit implications of specific indicators of PC/student ratios.

The international comparisons show that developed countries have already reached a significantly lower ratio than the Uzbek target. For instance, in England the ratio is 1:8, while EU average is 1:20. The CIS transitional economies such as Armenia and Ukraine are targeting ratios of 1:50 and 1:45 respectively.

Figure 1: International comparisons of students per computer



Source: English and EU data from Eurydice report 2004 (original data from OECD PISA database, Australian, Singaporean, US dta from OrbIT UNESCO G8 report 2000; *Consultants report for Armenia and Ukraine*

The fiscal impact analysis on the Basic Education budget of different options and scenarios clearly shows that 1:50 option with Thin Client hardware configuration will be optimal for the GOU to consider for the first phase of the ICT deployment in Basic Education within the context of the National ICT Strategy for Basic Education (for more details refer to Appendix 2 of the Project Feasibility Study).

Table 5: Fiscal Impact (%) on Basic Education Budget with Different Options[71]

PC/ student ratio	High case scenario[72]								Low case scenario							
	Fat client				Thin client				Fat client				Thin Client			
	1:50	1:40	1:30	1:20	1:50	1:40	1:30	1:20	1:50	1:40	1:30	1:20	1:50	1:40	1:30	1:20
2006	1,1	1,3	1,7	2,3	1,1	1,2	1,3	1,7	1,1	1,3	1,7	2,3	1,1	1,2	1,3	1,7
2007	1,7	2,0	2,5	3,5	1,6	1,8	2,0	2,5	1,7	2,0	2,5	3,5	1,6	1,8	2,0	2,5
2008	2,3	2,7	3,3	4,7	2,1	2,3	2,7	3,3	2,3	2,7	3,3	4,7	2,1	2,3	2,7	3,3
2009	2,8	3,3	4,2	5,8	2,7	2,9	3,4	4,2	2,8	3,3	4,2	5,8	2,7	2,9	3,4	4,2
2010	2,9	3,4	4,3	5,9	2,9	3,1	3,5	4,4	2,9	3,4	4,3	5,9	2,9	3,1	3,5	4,4
2015	3,6	4,1	5,0	6,8	4,1	4,3	4,8	5,6	3,6	4,1	5,0	6,8	4,1	4,3	4,8	5,6
2020	4,7	5,3	6,2	8,1	6,0	6,3	6,7	7,7	4,7	5,3	6,2	8,1	6,0	6,3	6,7	7,7

The overall impact on the Basic Education budget and how it will specifically affect capital investment and recurrent budgets of the Basic Education sub-sector is illustrated in Annex 2: Strategic Options and Financial Implications. The preliminary calculations show that the Fat Client option on the basis of a "10+1" provision per school (student and teacher work stations) with a 1:50 PC/student ratio will require $15.6 million of annual capital investment for 5 years. This option will result in an annual deficit in this budget of US$7.1 million and will exceed the Thin Client option requiring only $11.7 million of investment with a lower annual capital investment budget of $3.2 million. It means that the GOU will need to reallocate a considerable amount of funding to meet the target of PC/student ratio. On the other hand, the GOU target of 1:20 PC/student ratio (Fat Client option) requires nearly $31 million of annual capital investments over the next five years.

A proposed MOPE specification of "18+1" would require considerable capital investments as well as recurring costs. For instance, the GOU will need $17.7 million of annual investments to reach the target of 1:30 PC/student ratio, which corresponds to the "18+1" specification. The Chinese project loan is based on an "18+1" specification. It raises the issue of sustainability and current MOPE policy needs to be considered in the context of realistic financial constraints.

Replacement costs under Thin Client "10+1" option require the lowest annual investment budget of $5.8 million. All other options have significant financial implications for the budget system and the Fat Client option seems to apply much larger replacement budgets.

Another important aspect of the financial constraints is availability of recurrent budget for keeping the GOU's ICT Program in Basic Education operational. The preliminary estimates show that an adoption of the 1:20 option with a Fat Client hardware configuration would result in an $18 million deficit in the recurrent budget of the sub-

[71] These financial implications are calculated on current prices and assumptions provided by Hewlett Packard, which have not yet been demonstrated anywhere in schools. The basic assumptions are that Fat Client hardware will need to be replaced every 5 years, whereas in Thin Client configurations the dumb terminals will have a life of 10 years and the applications servers will have a life of 7 years.

[72] Calculated based on projections in Annex 1: Projections of Education Expenditure.

sector. From the point of view of affordability the minimum impact on the recurrent budget occurs through the Thin Client "10+1" option with a target PC/student ratio of 1:50.

4.2 Fiscal Impact Analysis

The Government's share in the Project is estimated at $15.2 million (30% of the total project) over five years and will consist mainly of the civil works for refurbishing of 700 CLS, salaries and social charges of those dedicated staff in CLS who will manage all assigned responsibilities under the Project, and costs associated with running trainings in RITTIs for non CLS schools. Three scenarios are presented to analyze the sensitivity of the fiscal impact of the project on GOU's budget: (i) a "high case" scenario where the GDP growth is 17% per year expressed in local currency; and a (ii) "mid case" scenario where the annual GDP growth is 15% in UZS, a "low case" scenario with 13% GDP growth (see Basic Assumptions table below).

Table 6: Basic Assumptions for 2006-2010

Indicators	High case scenario	Mid case scenario	Low case scenario
Annual GDP growth, UZS	17%	15%	13%
Annual CPI	10%	10%	10%
Annual devaluation of the national currency against USD	10%	10%	10%
Budget allocations to the Education sector as a share of GDP			
Recurrent Budget	6.7%	6.7%	6.7%
Capital Inv. Budget	2.4%	2.4%	2.4%
Total	9.1%	9.1%	9.1%
Budget allocations to the Basic Education Sub-sector			
Recurrent Budget	3.9%	3.9%	3.9%
Capital Inv. Budget	1%	1%	1%
Total	4.9%	4.9%	4.9%

The annual share of the Government in the Project cost, together with commitments in other ADB funded projects (the Education Sector Development Project (ESDP) and the Senior Secondary Education Project (SSEP) as well as the loan project financed by the government of Peoples Republic of China (PRC), were compared to the annual education budget ("high case" scenario) for the years 2005 to 2010. The Government's annual commitment as a percentage of the education budget for capital investments ranges from 3.3 % to 1.8%, averaging 2% over the five-year life of the Project. The impact on the basic education sub-sector capital investment budget ranges from 3.8% to 1.7% and the recurrent sub-sector budget will be impacted in the range of 0.38% to 0.12%.

Table 7: Fiscal Impact Analysis: High Case Scenario (US$ '000)

	Capital Investments	2005	2006	2007	2008	2009	2010	Total
1	Gov't. Share in STDP	12 460	9 053	2 747	2 810	2 898	0	29 968
2	Gov't. Share in ESDP	11 720	11 720	11 720	11 720	11 720	0	58 600
3	Gov't. Share in SSEP	15 040	15 040	15 040	15 040	15 040	0	75 200
4	Gov't. Share in ICTBEP		595	105	0	0	0	700
5	Gov't Share in ESCC (PRC Loan)	0	2 171	0	0	0	0	2 171
	Total Gov't. Commitments	**39 220**	**38 579**	**29 612**	**29 570**	**29 658**	**0**	**166 639**
6	% Impact on Ed. Budget	3,3%	3,0%	2,1%	2,0%	1,8%	0,0%	

7	% Impact on BE Budget	3,8%	3,5%	2,0%	1,8%	1,7%	0,0%	
8	% Impact on BE Cap.Inv. Budget	18,7%	17,1%	9,7%	8,9%	8,2%	0,0%	
	Recurrent costs							
9	Gov't. Share in STDP	41	63	106	153	200	0	563
10	Gov't. Share in ESDP	807	807	807	807	807	0	4 037
11	Gov't. Share in SSEP	25	25	25	25	25	0	126
12	Gov't. Share in ICTBEP	0	924	924	924	924	924	4 620
13	Gov't Share in ESCC (Chinese Loan)	0	271	0	0	0	0	271
	Total Gov't. Commitments	**874**	**2 091**	**1 863**	**1 910**	**1 957**	**924**	**9 617**
14	% Impact on Ed. Budget	0,07%	0,16%	0,13%	0,13%	0,12%	0,05%	
15	% Impact on BE Budget	0,13%	0,31%	0,25%	0,23%	0,22%	0,10%	
16	% Impact on BE Recur. Budget	0,17%	0,38%	0,31%	0,29%	0,28%	0,12%	

In the "mid case" scenario, the Government's annual commitment as a percentage of the education budget ranges from 3.3% to 2.19% over the five-year life of the project. The GOU commitments impact the basic education sub-sector (capital investments) budget in the range from 18.7% to 9.7% in 2009. By 2010 all current donor-assisted projects will end and, therefore, the commitment level for capital investments will reach 0%. The GOU commitments to cover recurrent costs will not significantly affect either Education sector or the Basic Education sub-sector budgets. The fiscal impact on recurrent budgets ranges from 0.17% to 0.06% for the Education sector, and 0.32% to 0.12% for Basic Education sub-sector. The Basic education sub-sector recurrent budget also will not be affected significantly by GOU commitments.

Table 8: Fiscal Impact Analysis: Mid Case Scenario (US$ '000)

	Capital Investments	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
1	Gov't. Share in STDP	12 460	9 053	2 747	2 810	2 898	0	29 968
2	Gov't. Share in ESDP	11 720	11 720	11 720	11 720	11 720	0	58 600
3	Gov't. Share in SSEP	15 040	15 040	15 040	15 040	15 040	0	75 200
4	Gov't. Share in ICTBEP	0	595	105	0	0	0	700
5	Gov't Share in ESCC (PRC Loan)	0	2 171	0	0	0	0	2 171
	Total Gov't. Commitments	**39 220**	**38 579**	**29 612**	**29 570**	**29 658**	**0**	**166 639**
6	% Impact on Ed. Budget	3,3%	3,2%	2,3%	2,2%	2,1%	0,0%	
7	% Impact on BE Budget	3,8%	3,6%	2,2%	2,1%	2,0%	0,0%	
8	% Impact on BE Cap.Inv. Budget	18,7%	17,9%	10,6%	10,1%	9,7%	0,0%	
	Recurrent costs							
9	Gov't. Share in STDP	41	63	106	153	200	0	563
10	Gov't. Share in ESDP	807	807	807	807	807	0	4 037
11	Gov't. Share in SSEP	25	25	25	25	25	0	126
12	Gov't. Share in ICTBEP	0	924	924	924	924	924	4 620
13	Gov't Share in ESCC (Chinese Loan)	0	271	0	0	0	0	271
	Total Gov't. Commitments	**874**	**2 091**	**1 863**	**1 910**	**1 957**	**924**	**9 617**
14	% Impact on Ed. Budget	0,07%	0,17%	0,15%	0,14%	0,14%	0,06%	
15	% Impact on BE Budget	0,13%	0,32%	0,27%	0,27%	0,26%	0,12%	
16	% Impact on BE Recur. Budget	0,17%	0,40%	0,34%	0,34%	0,33%	0,15%	

In the third "low case" scenario, the GOU annual commitment for the STDP, PRC loan project, and other ADB funded projects is deemed sustainable due to low fiscal impacts both to Education sector as well as to the Basic Education sub-sector. Similar conclusions can be made based on the indicators illustrated below. Both capital and recurrent budgets will not significantly be affected by GOU commitments under the low case scenario.

Table 9: Fiscal Impact Analysis: Low Case Scenario (US$ '000)

	Capital Investments	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**Total**
1	Gov't. Share in STDP	12 460	9 053	2 747	2 810	2 898	0	29 968
2	Gov't. Share in ESDP	11 720	11 720	11 720	11 720	11 720	0	58 600
3	Gov't. Share in SSEP	15 040	15 040	15 040	15 040	15 040	0	75 200
4	Gov't. Share in ICTBEP	0	595	105	0	0	0	700
5	Gov't Share in ESCC (PRC Loan)	0	2 171	0	0	0	0	2 171
	Total Gov't. Commitments	**39 220**	**38 579**	**29 612**	**29 570**	**29 658**	**0**	**166 639**
6	% Impact on Ed. Budget	3,3%	3,2%	2,4%	2,3%	2,3%	0,0%	
7	% Impact on BE Budget	3,8%	3,7%	2,2%	2,2%	2,1%	0,0%	
8	% Impact on BE Cap.Inv. Budget	18,7%	18,2%	11,0%	10,6%	10,4%	0,0%	
	Recurrent costs							
9	Gov't. Share in STDP	41	63	106	153	200	0	563
10	Gov't. Share in ESDP	807	807	807	807	807	0	4 037
11	Gov't. Share in SSEP	25	25	25	25	25	0	126
12	Gov't. Share in ICTBEP	0	924	924	924	924	924	4 620
13	Gov't Share in ESCC (Chinese Loan)	0	271	0	0	0	0	271
	Total Gov't. Commitments	**874**	**2 091**	**1 863**	**1 910**	**1 957**	**924**	**9 617**
14	% Impact on Ed. Budget	0,07%	0,17%	0,15%	0,15%	0,15%	0,07%	
15	% Impact on BE Budget	0,13%	0,33%	0,28%	0,28%	0,28%	0,13%	
16	% Impact on BE Recur. Budget	0,17%	0,41%	0,35%	0,35%	0,35%	0,16%	

In all three scenarios, the estimated GOU commitments over 2005-2010 Project years under the several projects will not considerably affect both Education sector and Basic Education sub-sector budgets. The only exception is the Basic Education sub-sector capital investment budgets, which can be affected as nearly 10.4% annually ranging from 18.7% to 10.4% (low-case scenario for 2009).

In all three scenarios, the Government's annual commitments both in terms of capital and recurrent budgets for the ICT in Basic Education Project and other ADB as well as other donor funded projects are deemed affordable and therefore sustainable.

Annex 1: Macroeconomic Performance, Demographics and Employment

Table 1: GDP Growth, Inflation and Unemployment

Indicator	2000	2001	2002	2003	2004
GDP	103.8	104.2	104.0	104.4	107.7
Inflation	128.2	126.6	121.6	103.8	103.7
Unemployment (end of period, in %)	0.4	0.4	0.4	0.3	0.4

Source: State Committee of Statistics, 2004

Table 2: Production Structure of GDP (%)

Year	Production Structure of GDP %				
	Industry	Agriculture	Construction	Services	Net taxes
2000	14.2	30.1	6.0	37.2	12.5
2001	14.2	30.2	5.8	28.2	11.9
2002	14.5	30.1	4.9	37.9	12.6
2003	15.8	28.6	4.5	37.4	13.7
2004	17.1	26.8	4.5	37.6	14

Source: State Committee of Statistics, 2004

Table 3: Analysis of Population

Year	Entire Population		Urban			Rural		
	No.	% Change	No.	% Change	Share	No.	% Change	Share
2000	24487,7		9165,5		37,4%	15322,2		62,6%
2001	24813,1	1,3%	9225,3	0,7%	37,2%	15587,8	1,7%	62,8%
2002	25115,8	1,2%	9286,9	0,7%	37,0%	15828,9	1,5%	63,0%
2003	25427,9	1,2%	9340,7	0,6%	36,7%	16087,2	1,6%	63,3%
2004	25707,4	1,1%	9381,3	0,4%	36,5%	16326,1	1,5%	63,5%
2005	26006,8	1,2%	9430,3	0,5%	36,3%	16576,5	1,5%	63,7%
	Average	**1,2%**		**0,6%**	**36,7%**		**1,6%**	**63,3%**

Table 4: Real Education Sector Expenditures after Adjustment for Inflation

	2002	2003	2004	2005 est.	2006 est.
Education exp. in mil. UZS*	500,922.5	625,342.7	766,458.3	991,502.9	1,520,965
Growth rate (%)	49.36%	24.84%	22.57%	29.36%	53.40%
Inflation rate**	44.30%	14.80%	8.80%	14.50%	13.00%
Real growth rate (%)	5.06%	10.04%	13.77%	14.86%	40.40%

Source: * MOF, MOE 2005; ** IMF. World Economic Outlook, April 2005

Table 5: Analysis of Government Expenditures on Education

	GDP		EDUCATION EXPENDITURES										
			Recurrent			Capital			Total***				
Year	Actual GDP*	% Change	Actual	% Change	%GDP	Actual	% Change	%GDP	TOTAL	% Change	% GDP	% Recur.	% Capital
1998	1 416		108		7,6	4		0,3	112		7,9	96,2	3,8
1999	2 129	50,4	160	48,4	7,5	38	802,1	1,8	198	77,0	9,3	80,6	19,4
2000	3 256	52,9	218	36,6	6,7	81	112,4	2,5	300	51,3	9,2	72,8	27,2
2001	4 925	51,3	335	53,7	6,8	49	-39,5	1,0	385	28,4	7,8	87,2	12,8
2002	7 469	51,7	501	49,4	6,7	142	188,1	1,9	643	67,1	8,6	77,9	22,1
2003	9 664	29,4	625	24,8	6,5	174	22,6	1,8	799	24,3	8,3	78,2	21,8
2004	12 190	26,1	766	22,6	6,3	180	3,5	1,5	947	18,4	7,8	81,0	19,0
2005**	14 737	20,9	992	29,4	6,7	360	99,7	2,4	1 351	42,8	9,2	73,4	26,6
Ave.		**40,4**		**37,8**	**6,9**		**169,9**	**1,8**		**44,2**	**8,5**	**80,9**	**19,1**

Notes: * at current prices; **2005 expenditures are preliminary; capital investment budget includes 146 billion UZS which is financed through the School Development Fund; *** Excludes Foreign financed expenditures

Table 6: Analysis of Basic Education Expenditure

	GDP		BASIC EDUCATION EXPENDITURES										
			Recurrent			Capital			Total***				
Year	Actual GDP*	% Change	Actual	% Change	%GDP	Actual	% Change	%GDP	TOTAL	% Change	% GDP	% Recurrent	% Capital
1999	2 129		86		4,1	4,0		0,2	90		4,2	95,6	4,4
2000	3 256	52,9	115	33,2	3,5	1,5	-62,5	0,0	116	28,9	3,6	98,7	1,3
2001	4 925	51,3	180	56,4	3,7	7,7	413,3	0,2	188	61,0	3,8	95,9	4,1
2002	7 469	51,7	271	50,8	3,6	8,1	5,3	0,1	279	48,9	3,7	97,1	2,9
2003	9 664	29,4	354	30,5	3,7	6,1	-24,2	0,1	360	29,0	3,7	98,3	1,7
2004	12 190	26,1	439	24,0	3,6	5,8	-6,4	0,0	444	23,5	3,6	98,7	1,3
2005**	14 737	20,9	571	30,1	3,9	146,0	2437,4	1,0	717	61,2	4,9	79,6	20,4
Ave.				**37,5**	**3,7**		**460,5**	**0,2**		**42,1**	**3,9**	**94,8**	**5,2**

Notes: * at current prices; **2005 expenditures are preliminary; capital investment budget includes 146 billion UZS Which is financed through the School Development Fund; *** Excludes Foreign financed expenditures

Source: Compiled from data received from the Ministry of Finance of Uzbekistan

Annex 2: Projections of Education Expenditure

Table A-1: GDP Growth

Year	GDP					
	High case scenario		Mid case scenario		Low case scenario	
	Bil. UZS	%Change	Bil. UZS	%Change	Bil. UZS	%Change
2005	14 737	20,9	14 737	20,9	14 737	20,9
2006	17 724	17,0	16 948	15,0	16 653	13,0
2007	20 737	17,0	19 490	15,0	18 818	13,0
2008	24 262	17,0	22 413	15,0	21 264	13,0
2009	28 386	17,0	25 775	15,0	24 028	13,0
2010	33 212	17,0	29 641	15,0	27 152	13,0

Table A-2: Projected Education Budget in million USD

Year	High case scenario			Mid case scenario			Low case scenario			Average
	Recurrent	Capital	**Total**	Recurrent	Capital	**Total**	Recurrent	Capital	**Total**	Ex. Rate
2005	878,5	318,7	**1 197,2**	878,5	318,7	**1 197,2**	878,5	318,7	**1 197,2**	1128,6
2006	935,0	339,2	**1 274,2**	894,1	324,3	**1 218,4**	878,5	318,7	**1 197,2**	1275,3
2007	994,5	360,8	**1 355,3**	934,7	339,1	**1 273,8**	902,5	327,4	**1 229,9**	1402,8
2008	1 057,8	383,7	**1 441,5**	977,2	354,5	**1 331,7**	927,1	336,3	**1 263,4**	1543,1
2009	1 125,1	408,1	**1 533,3**	1 021,6	370,6	**1 392,2**	952,4	345,5	**1 297,9**	1697,4
2010	1 196,7	434,1	**1 630,8**	1 068,1	387,4	**1 455,5**	978,4	354,9	**1 333,3**	1867,2

Table A-3: Projected Basic Education Budget in billion UZS

Year	High case scenario			Mid case scenario			Low case scenario			Average
	Recurrent	Capital	**Total**	Recurrent	Capital	**Total**	Recurrent	Capital	**Total**	Ex. Rate
2005	570,5	146,0	**716,5**	570,5	146,0	**716,5**	570,5	146,0	**716,5**	1128,6
2006	686,2	175,6	**861,7**	656,1	167,9	**824,0**	644,7	165,0	**809,7**	1275,3
2007	802,8	205,4	**1 008,2**	754,5	193,1	**947,6**	728,5	186,4	**914,9**	1402,8
2008	939,3	240,4	**1 179,6**	867,7	222,0	**1 089,8**	823,2	210,7	**1 033,9**	1543,1
2009	1 099,0	281,2	**1 380,2**	997,9	255,4	**1 253,2**	930,2	238,0	**1 168,3**	1697,4
2010	1 285,8	329,0	**1 614,8**	1 147,5	293,7	**1 441,2**	1 051,2	269,0	**1 320,2**	1867,2

Table A-4: Projected Basic Education Budget in million USD

Year	High case scenario			Mid case scenario			Low case scenario			Average
	Recurrent	Capital	**Total**	Recurrent	Capital	**Total**	Recurrent	Capital	**Total**	Ex. Rate
2005	505,5	129,4	**634,9**	505,5	129,4	**634,9**	505,5	129,4	**634,9**	1128,6
2006	538,0	137,7	**675,7**	514,5	131,7	**646,1**	505,5	129,4	**634,9**	1275,3
2007	572,3	146,4	**718,7**	537,9	137,6	**675,5**	519,3	132,9	**652,2**	1402,8
2008	608,7	155,8	**764,4**	562,3	143,9	**706,2**	533,5	136,5	**670,0**	1543,1
2009	647,4	165,7	**813,1**	587,9	150,4	**738,3**	548,0	140,2	**688,3**	1697,4
2010	688,6	176,2	**864,8**	614,6	157,3	**771,9**	563,0	144,1	**707,0**	1867,2

Annex 3: Strategic Options and Financial Implications

Main Parameters

Number of "student and teacher stations"	"10+1"		"18+1"
PC/student ratio (G 1-9)	1:50	1:20 COM No.200	1:30
PC/student ratio (G 6-9)	1:23	1:09	1:14
Number of computers needed by 2010	110328	275819	185573
Number of computers per year	22066	55164	37115

Indicators	"Fat Client"	"Thin Client"
Approximate price per PC	$705	$529
Useful economic life	Work station for students and teacher): 5 years	Server (for teacher): 7 yrs; work station: 10 yrs
Servicing and maintenance cost per PC (10 months)	$30	$15
Consumables (cartridge, toner, paper, electricity) per PC (10 months)	$50	$25
Incremental annual training cost ($ mil.)	$2	$2

Capital investments

Indicator/expenditure	"Fat Client"		"Thin Client"		"Fat Client"
Number of "student and teacher stations"	"10+1"		"10+1"		"18+1"
PC/student ratio (G 1-9)	1:50	1:20 COM No.200	1:50	1:20 COM No.200	1:30
Annual investments ($ mil.)	$15,6	$38,9	$11,7	$29,2	$26,2
Total capital investments (2005-2009) ($ mil.)	$77,8	$194	$58,3	$145,8	$130,8
Financing through the SDF (2005-2009) ($ mil.)	$42,1	$42,1	$42,1	$42,1	$42,1
Deficit of the capital investment budget (2005-2009) ($ mil.)	**$35,7**	**$152,4**	**$16,2**	**$103,7**	**$88,7**
Annual deficit of the capital investment budget ($ mil.)	**$7,1**	**$30,5**	**$3,2**	**$20,7**	**$17,7**

Recurrent expenditures

Indicator/expenditure	"Fat Client"		"Thin Client"		"Fat Client"
Number of "student and teacher stations"	"10+1"		"10+1"		"18+1"
PC/student ratio (G 1-9)	1:50	1:20 COM No.200	1:50	1:20 COM No.200	1:30
Servicing and maintenance cost per PC (10 months) by 2010 ($mil.)	$3,3	$8,3	$1,7	$4,1	$5,6
Consumables (cartridge, toner, paper, electricity) per year ($ mil)	$5,5	$14	$2,8	$6,9	$9,3
Incremental annual training cost ($ mil.)	$2,0	$2,0	$2,0	$2,0	$2,0
Total annual recurrent costs per year by 2010 ($ mil.)	**$10,8**	**$24,1**	**$6,4**	**$13,0**	**$16,8**

Replacement costs by 2010

Indicator/expenditure	"Fat Client"		"Thin Client"		"Fat Client"
Number of "student and teacher stations"	"10+1"		"10+1"		"18+1"
PC/student ratio (G 1-9)	1:50	1:20 COM No.200	1:50	1:20 COM No.200	1:30
Annual replacement cost ($ mil.)*	**$15,6**	**$38,9**	**$5,8**	**$14,6**	**$26,2**

Note: *Replacement costs are financed through the capital investment budget and will add deficit to this budget

Recurrent budget deficit

Total annual recurrent costs per year by 2010 ($ mil.)	**$10,8**	**$24,1**	**$6,4**	**$13,0**	**$16,8**
Available annual budget for recurrent costs ($ mil.)	$6,1	$6,1	$6,1	$6,1	$6,1
Annual deficit of the recurrent budget ($ mil.)	**$4,7**	**$18,0**	**$0,3**	**$6,9**	**$10,7**

APPENDIX 12: POVERTY AND SOCIAL ANALYSIS

1. Background

The ICT in Basic Education Project aims to improve the quality, relevance and efficiency of basic school education in Uzbekistan and to create an information and computer literate society, which can participate on equal terms in the global economy of the 21st Century. The project will contribute substantially to the establishment to a high quality and relevant system of education for all Uzbek students, with ICT fully integrated into the teaching and learning processes of all designated priority subjects and priority grades. This process will require curriculum reforms, new learning objectives and new learning and teaching methodologies, which focus on the development of skills and higher order thinking rather than on the accumulation of memorisation of factual knowledge.

The government has committed itself to a policy of rapid ICT development since the publication of COM No. 200 in June 2002. In May 2004 the government announced the National Program for Basic Education Development, which aimed at the complete rehabilitation of all basic education schools by 2010 including the refurbishment and re-equipment of basic school facilities such as science labs, computer rooms and sports facilities. It is also intended to ensure adequate water, power and telecommunications links to all schools. In June 2004 the School Development Fund was established to provide the cash resources to finance this program. The SDF is an extra budgetary fund based on the collection of a tax of 1% on enterprises, which is scheduled to raise US$145 million in 2005. Of this, 6.9% will be spent on the purchase of computers for installation into schools. Negotations are actively underway with the Chinese government for a US$20 million credit to purchase 2,000 computer rooms for the basic school system and other negotiations are in hand with US hardware manufacturers and Korea.

There is considerable pressure to move ahead as quickly as possible with the installation of computers into schools. Unfortunately, there are many practical obstacles in the way of effective installation and usage including (a) lack of reliable power supplies in many parts of the country; (b) many basic education schools have not yet been rehabilitated via the NPBED and thus do not necessarily have suitable classrooms or secure wiring for a substantial computer installation; (c) 82% of schools in Uzbekistan have never seen or used a modern IBM compatible computer. 41% have never had access even to the old Soviet era computers. The current Informatics syllabus was designed to be dominantly a theoretical syllabus simply because so few schools had access to computers. As a result, there are very few teachers, even Informatics teachers, who are familiar with the skills and confident in the use of computers. Even in the best schools in Tashkent it is clear that very few Informatics teachers know how to run and manage a school network efficiently. Under these circumstances there are considerable risks that over hasty installation of computers could lead to misuse, which in turn could cause damage to the facilities; (d) school operational budgets have declined and in 2005 teachers' salaries and social charges represent 86.5% of recurrent budgets allocated to schools. ICT is expensive in investment, in equipment replacement and also in daily operating costs. Electricity usage is high, consumables are expensive and computers in schools require effective, fast responding servicing and maintenance systems. Without adequate operational budgets computers in schools could either fall rapidly out of use or parents would be forced to make cash contributions to ensure that the ICT facilities are efficiently maintained. The demand for parental contributions for ICT is already evident in the schools and while this doesn't necessarily pose a problem for relatively affluent families in Tashkent it can be a very severe problem for poor

families in rural areas. Thus, high costs of operating computers combined with low school operational budgets could serve to penalise the poor by making it relatively unlikely that ICT facilities would be effectively used in poor rural areas while making it relatively more likely that they would be used in more relevant urban areas.

The project will not, in itself, invest significantly in the provision of hardware to basic education schools throughout Uzbekistan, out of 9,757 schools in 2004 it is planned that the project will provide furniture and hardware to no more than 700 schools. These schools however will be strategically selected and located at the heart of a national network of school clusters, each of which will contain an average of 15 schools. In urban areas it is quite possible that clusters will be significantly larger than 15 schools because accessibility is the key factor in determining the size and nature of each cluster. Thus, in rural and remote areas where schools are more distant from each other clusters will be smaller and in some cases it is possible that the clusters may comprise only 3 or 4 schools. A principle which is being adopted in the determination of the clusters is that all schools should be within 25km of the Cluster Leader School on normal roads.

A sample clustering exercise was undertaken in Bustonlik Raion in Tashkent Oblast. This is the Raion that incorporates the mountainous areas around Chimgan and Charvak. There are 53 schools in the Raion including two boarding schools. There are five languages of instruction, eight schools have student populations of over 1,000 and four schools have student populations of under 100. It was nevertheless possible to organise five clusters which enabled all schools to be within 25km of the various Cluster Leader Schools except for three remote mountains schools which were only accessible on horse back. Thus, in this very difficult Raion, clustering achieved coverage of 52 out of 55 schools.

The intention behind the clustering is to concentrate ADB investment, hardware, training and support and Internet facilities into 700 Cluster Leader Schools. On this basis almost every school in the country will be no further than 25km away from an Internet connection. This will bring Internet closer to rural poor schools than ever before. Cluster Leader Schools will also ensure that all schools, rich and poor, urban and rural, have support close at hand. It will also bring training, collaborative working and teacher professional development down to a local level. This is particularly important for female teachers who represent 75% of the teaching force. Typically, relatively few female teachers have been able to take advantage of residential in-service training opportunities run in the RITTIs because of their unwillingness to leave their families. As a result, relatively few women occupy senior positions in education and many female teachers do not have any access to practical professional development activities. Thus, the cluster schools will not only bring training close to rural poor schools it will also bring it within reach of female teachers.

The project will also support intensive teacher training at the RITTI level for school network managers and school ICT co-ordinators, for subject specialist teachers in languages, Science and Maths in the use of ICT in these subjects, for continuous professional development training and the training of school administrators in the use of ICT. The aim is that every school equipped with an ICT suite will have teachers trained to manage the school network and to undertake first call maintenance but there will also be teachers who are trained to use ICT across the curriculum and not just in Informatics.

The project will also support the rapid development of e-Learning materials in the Uzbek language and in other languages used as the medium of instruction in Uzbek schools. Finally the project will establish an intensive monitoring and evaluation

system to provide the feedback and data on which further phases of ICT development can be planned.

One of the most significant pro-poor features of the project is that the project will pick up the operational budget costs for all CLSs for the whole period of the project to ensure that they are capable of providing the support, assistance and training to all schools in their cluster. Each CLS will also have a budget to support other schools to attend meetings and training opportunities in the CLSs. In addition, the project will seek assurances from governemtn that adequate operational budgets will be made available to all schools in the country to avoid a waste of investment and expensive hardware and to ensure that all schools, including the poorest, are able to utilise ICT.

2. Poverty Analysis

In 2005 Uzbekistan had an estimated population of 25.9 million. The population is aging and has a declining birth rate and as a result primary enrolments are already beginning to decline. It is projected that enrolments in the basic education system will continue to decline until 2010 when there should be a gradual recovery.

The World Bank Living Standards Assessment (2003) shows that an estimated 27.5% of the population or 6.8 million people live at or below the poverty line. Of these, approximately one third or 2.3 million people are classified as extremely poor[73]. Poverty is significantly higher in rural than in urban areas and 69% of the poor and 72% of the extreme poor are to be found in rural Uzbekistan[74]. Poverty is also associated with specific regions. Thus poverty is relatively low in the Tashkent region and relatively very high in Kashkadarya, Sukhandarya and in Karakalpakstan. This is partly the result of environmental factors but also to a bias in public policy that has allocated far more public investment, credit, foreign exchange and subsidies and other scarce resources to the urban areas while broadly neglecting the rural areas[75].

A high proportion of the poor in Uzbekistan tend to be rich in human capital. Thus most of them have at least 9 years of education, 98% of them own the house where they live, 86% have land plots and 12% own a car. Most of these assets were accumulated during the Soviet era and it's quite possible these assets will either be sold or will fall into disrepair and past educational achievements may become less relevant. In this way the temporary poor could become the permanent poor[76].

The stark contrasts in average levels of income are demonstrated in Table 1, below.

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[73] IMF/World Bank 2002 *Poverty Reduction, Growth and Debt Sustainability in the Low Income CIS Countries*

[74] Corniaga et al 2003 Transient Poverty, Inequality and Human Deprivation in Uzbekistan *Growth and Poverty Reduction in the Next Decade* UNDP for the GOU

[75] Corniaga 2003 *An Overall Strategy for Pro-Poor Growth* in *Growth and Poverty Reduction in the Next Decade* UNDP for the GOU

[76] Ibid

Table 1: Average incomes per head per year (2004) by Oblast

	Oblasts	Income/head/yr UZS'000	Population. Thousand people 01.01.2005
1	Tashkent City	904.1	2135.9
2	Navoi Oblast	450.7	810.6
3	Tashkent Oblast	311.6	2451.5
4	Andijan Oblast	282.4	2345.1
5	Fergana Oblast	271.6	2838.9
6	Bukhara Oblast	259.3	1505.8
7	Kashkadarya Oblast	229.8	2378.2
8	Sukhandarya Oblast	217.2	1892.9
9	Sirdarya Oblast	215.1	671.6
10	Samarkand Oblast	202.8	2865.3
11	Khorezm oblast	196.5	1430.7
12	Jizzak Oblast	187.9	1042.4
13	Namangan Oblast	182.6	2070.2
14	Republic of Karakalpakstan	158.4	1567.7
	Total population of the Republic of Uzbekistan		**26006.8**

Source:

Tashkent City has an average per capita income of UZS904,000 per year or approximately US$900 (US$75 per month). At the other end of the scale the average income per head per year in Karakalpakstan is only UZS158,400 or approximately US$13 per head per month. After Tashkent City the next richest Oblast in terms of average per capita income is Navoi Oblast with just slightly less than half the Tashkent figure at UZS450,700 per head per year (approximately US$37.50 per month). Table 1 indicates that the poorest Oblasts in terms of income are Karakalpakstan, Namangan, Jizzak and Khorezm. The traditional poor Oblasts of the South, Sukhandarya and Kashkadarya are both in the second band where average per capita incomes are between US$200-300 per head per year which also includes Samarkhand, Sidarya, Bukhara, Fergana and Andijan. The population of these Oblasts total 20.3 million people. Thus 78% of the total population are living in Oblasts with an average per capita income of less than US$300 per year.

The incidence of poverty also has remarkable regional contrasts within Oblasts. In a recent survey of 30 Makhallas[77] the incidence of economically vulnerable families varied from 97% in one Makhalla is Yozobon Raion in Fergana Oblast to 2% in Shaykhantokhur Raion in Tashkent City. Within Fergana Oblast two Raions recorded the incidence of economically vulnerable families at 7% while the third estimated 97%. In Namangan Oblast a Makhalla in Mingbulak Raion recorded 76% economically vulnerable families whereas in Namangan City a Makhalla recorded only 4%. The contrasts can be stark even within Tashkent Oblast. Thus a Makhalla in Pskent Raion recorded 77% economically vulnerable families whereas a Makhalla in Bustonlik recorded only 9% economically vulnerable families. It is also interesting to note that the threshold poverty level was set at UZS12,000 per capita per month in a Makhalla in Kungrad Raion in Karakalpakstan whereas a Makhalla in Muzrobod Raion in Sukhandarya Oblast put the threshold level at only UZS1,000 per head per month. The threshold levels are used by the Makhallas to determine the point at which a family becomes economically vulnerable and thus able to claim social welfare support from the Makhalla. Thus, in Kungrad Raion there was a Makhalla who was prepared to provide social welfare to any family with an average per capita income of less than UZS12,000 per month. In Muzrobod Raion the Makhalla would only supply support if the family was earning less than UZS1,000 per capita per month. These are not arbitrary figures but probably represent different policies in

[77] PPTA School Survey, May 2005

different Makhallas in terms of support for the poor. Thus a Makhalla with a high threshold figure will probably spread the available social welfare benefits thinly over a larger populations whereas a Makhalla with a very low threshold will concentrate available social welfare benefits on the very poorest.

Table 2 suggests, contrary to Table 1, that Kashkadarya is the poorest Oblast with 62.6% of the population classified as poor and 41.6% as extremely poor. Sukhandarya and Khorezm, both which were in the lowest average per capita income band in Table 1 have the lowest levels of poverty and extreme poverty in Table 2. This demonstrates some of the problems involved in unravelling the poverty issue in Uzbekistan and achieving the data and the statistical basis to achieve improved targeting of current government and Makhalla support for the poor.

Table 2: Geographic Distribution of Poverty (Percentage)

Characteristics	Incidence of Poverty	Incidence of extreme poverty	Share of population	Share of poor	Share of extreme poor
National	27.5	9.7	100.0	100.0	100.0
Area					
• Urban	22.5	7.1	37.4	30.6	27.4
• Rural	30.5	11.2	62.6	69.4	72.3
Economic Regions					
• Tashkent	13.3	3.4	18.2	8.8	6.5
• Mirzachul	21.3	5.2	6.6	5.1	3.5
• Fergana	28.6	8.0	27.6	28.7	22.8
• Northern	33.5	8.0	11.6	14.4	9.6
• Central	21.4	6.0	19.9	15.5	12.3
• Southern	47.4	27.4	16.1	27.8	45.5
Oblasts					
• Karakalpakstan	36.4	7.7	6.2	8.2	4.9
• Andijan	31.8	9.1	8.9	10.3	8.3
• Bukhara	13.4	1.9	5.8	2.8	1.1
• Djizzak	29.7	7.2	4.0	4.3	3.0
• Kashkadarya	62.6	41.6	8.9	20.3	38.2
• Navoi	18.7	5.6	3.2	2.2	1.8
• Namangan	39.7	12.2	7.8	11.3	9.8
• Samarkand	26.4	6.4	10.9	10.5	9.4
• Sukhandarya	28.4	9.7	7.2	7.4	7.2
• Syrdarya	8.4	2.0	2.6	0.8	0.5
• Tashkent	16.9	3.8	9.6	5.9	3.8
• Fergana	18.1	4.0	10.9	7.2	4.5
• Khorezm	30.1	8.3	5.4	5.9	4.6
• Tashkent City	9.2	2.9	8.7	2.9	2.6

3. Poverty and Employment

The registered unemployment rate in Uzbekistan is very low at 0.4-0.5%. Even when alternative definitions are used (e.g. the ILO Definition) the employment rate still only rises to 4%, which is still low by international standards. The issue in Uzbekistan is not therefore unemployment but under employment and under payment. Under employment takes the form of part time or full time work with low intensity, low productivity and low levels of reward. Much of the under employment results from lack of applicable skills but much of it is also closely associated with agriculture and rural life. There are low wages in the agricultural sector because farm prices are often controlled and are typically low. Other areas of under employment and low remuneration are contract work in the informal economy.

There is a direct link between education, qualifications and unemployment. Unemployment tends to be highest for those who left school at Grade 9 and lowest for those with higher education.

4. Poverty Risk

Cornia[78] notes that poor households are distinguished by the following features: (a) high unemployment or under employment; (b) those receiving low pay often paid in arrears; (c) those with minimum educational qualifications; (d) those with more than 3 children per family; (e) reduced access to land of good quality; (f) those who are less integrated into the market economy.

These factors suggest that much of rural poverty comprises people with poor education, low quality and low paying jobs owning small amounts of land which are not fully exploited.

5. Education

There has been steady reduction in direct recurrent budget support to schools. Thus, in 1998 free textbooks were abandoned in favour of a policy of parental purchase. This policy was eventually replaced by a Textbook Rental Scheme, which significantly reduced costs to parents and was therefore popular, but nevertheless shifted the burden of textbook financing away from government and onto parents. Since 2000, attempts to reward teachers with performance related bonuses, have been relatively successful because teachers' salaries and social charges as a percentage of recurrent budgets have increased from 55-65% in 2000 to 79% in 2003, to 86% in 2005 and it is projected that it could reach 90% in 2006. While this is good news for teachers it is bad news for schools operational budgets. The two highest priorities for Hokimmyat Finance Departments is to ensure payments of teachers' salaries and the payment of basic utilities such as electricity, water and telephones. These two categories make up a very high proportion of school annual operational budgets. This means that a wide range of other consumables and activities that were previously paid for by the state are now having to be funded by parental contributions. In a recent World Bank Living Assessment Survey 93% of all parents indicated that they were required to make financial contributions for their children's education in basic schools. Self-evidently, this situation favours the rich at the expense of the poor. Richer and more affluent areas can afford to make contributions for the sake of their children's education but it is much more difficult for parents in poor rural areas. This situation has been made worse by the decentralisation of educational budgets. In 2005 65% of basic education budgets are financed by Raions, 20% by Oblasts and only 15% by central government. Only 5 out of 14 Oblasts are self sufficient in taxation (i.e. revenue income is sufficient to cover their expenditure budgets) and the Republican budget is used as a safety net to provide support for those Oblasts that cannot balance the books. Nevertheless, there is clear evidence from Oblast and Raion budgets that there are growing differentials beginning to emerge in financial allocations by Oblasts, by Raions and even to individual schools within Raions. There is evidence, for example, that rural schools receive less money in the annual recurrent budgets than urban schools. Once again, such a situation brings particular pressure to bare on poor families.

[78] IBID

In addition, poor families have opportunity costs that have to be taken into account. During the Makhalla survey[79] virtually all Makhallas suggested that the single most important reason for student non attendance was the economic circumstances of the family which required students either to stay at home and provide labour or to go out to work as contract labour to earn additional family income. Only a minority of Makhallas suggested that persistent non attendance resulted from non-economic factors (broken homes, psychological problems, etc).

The lack of operational budgets has a knock on effect in poor rural areas in other ways. Thus, many parents and teachers complain about the lack of heating in schools during winter. A significant percentage of children are kept at home by their parents in severe weather because they are concerned about possible illness as a result of the poor conditions in classrooms. Because schools are more distant in rural areas it is common for students to walk quite long distances to school. In bad weather in winter this is not an option and some schools comment that lack of rural transport and the costs of rural transport are reasons for lower levels of attendance in bad weather and winter. These are also factors which have a particular impact on poor families.

6. Poverty and Gender

Gender differences between boys and girls in basic schools are negligible but they do start to become more pronounced in senior secondary and in higher education. Women tend to take a higher share of voluntary unemployment largely as a result of their restricted mobility because of children. The majority of unemployed women are between the ages of 20 and 30 and most have a young family which ties them to home. Women also earn less than men, tend to have lower pensions because they have had to take time off work to raise families and thus have lower pension rights.

75% of teachers in schools are women but relatively few achieve senior positions in education, again largely because of their restricted mobility and the need to have career breaks for family reasons.

7. Social Protection for the Poor and Vulnerable

In the education sector free textbooks are provided to all Grade 1 students. In addition 15% of all textbook requirements are provided free to school libraries so that poorer students can borrow the books rather than having to pay rental fees. Schools also receive allowances to provide winter clothing for poor students. Makhallas also provide social welfare support. They provide allowances for children under the age of 18 who stay on at school and allowances for children under the age of 2. They provide cash benefits, which vary according to the Makhalla, to families who have been categorised as economically vulnerable. In some cases they provide support in the form of educational materials (this can range from notebooks and pencils to school bags). Some Makhallas also buy clothing to support poor children. There are also indications that the Hokimmyat sometimes provides direct support to the poorest, often in the form of parties and presents on national holidays. The basic problem with support provided by the schools is that government financial allocations assume a straightforward allocation to cover 15% of each school's enrolment. This is on the assumption that the level of extreme poverty is around 15% and that it is equally distributed to every school. In reality, the incidence of poverty is extremely variable (see the Makhalla survey) and to be properly targeted there is a need to

[79] PPTA Survey for ICTBE Project May 2005 Feasibility Study for ICT in Basic Education ADB for GOU

develop poverty data at least on a Raion basis so that financial support from government can be targeted efficiently on the poorest. The Makhalla system clearly maintains excellent and comprehensive records of the economic and socially vulnerable in their own Makhallas. There are 9,500 Makhallas in the country and 9,757 schools so that most Makhallas have one basic school in their area of responsibility. Makhallas can often assist schools in deciding who poor families are but quite a number of schools report that they prefer to do this exercise by themselves.

While it is clear that the government is concerned to provide support for the poor it is equally clear that the current methodologies are not well targeted and could be improved.

C SOCIAL ANALYSIS

1. The Demand for ICT in Basic Education

The PPTA research for the ICTBE Feasibility Study performed a focus group interviews with students, teachers and parents in 60 schools. Overall, almost 180 focus group interviews took place. All attenders at the focus group discussions were randomly selected on the day of school visits and parents, teachers and students had no pre-warning that they were to take part in a focus group discussion. No parents or teachers or school staff of any kind were permitted in the student focus groups and no teachers were permitted in the parent focus groups nor were parents permitted in the teacher and student focus groups. The school director and school management staff were not permitted to take part in any focus group discussion. Nobody was forced to take part in the focus group discussion and it was carefully explained that participation was voluntary and that all information would be completely confidential and that not even the names of the schools would be revealed. On this basis discussions on a wide range of issues (not just ICT) were remarkably frank in all three groups. The overwhelming conclusion so far as ICT is concerned was that it represents a very high priority for all three groups, although the rationale is somewhat different for each group.

Students feel very strongly that ICT should be a fundamental part of their education, that it will make their education more relevant and that it will increase their chances of getting a good job when they leave school. They complained that the existing computer equipment is under used and that it is very difficult for students to gain access to it. They would like schools to stay open longer and provide pre-school and post-school access to ICT hardware. They believe that the current Informatics syllabus is too theoretical and that there is a need for much more hands-on work on computers. They would like to see ICT skills used as a learning tool in a wide range of curriculum subjects and not just Informatics. While being generally supportive of their teachers most students in focus groups were not impressed by the ICT skills of the school staff and felt that there was an urgent need for school staff to be trained so they could guide students on the use of ICT in the schools. There was a strong demand for Internet access.

Teachers were also keen to see a wider use of ICT in the schools. Many teachers commented that they had assumed that computers should only be used for Informatics and that although they would have liked to have learnt more about computers they felt that there was no point in doing so if the use of computers was restricted to Informatics. The idea that computers could be used as a basic learning tool in a much wider range of subjects and grades was warmly and widely welcomed by teachers. However, teachers made three very basic caveats. These were (a) that

they should receive training before they were required to use ICT in subject learning situations; (b) that they should have educational software easily available which they have been trained to use; and (c) they needed access time on the computers in their own school to develop skills and competence and familiarity before they were expected to use ICT in the classroom. All of these were sensible and mature viewpoints.

Parent viewpoints were more basic. They felt that computers were part of the modern world and that as such their students needed to have access to them. They felt that their education would be made more relevant by access to computers and that their job prospects would be enhanced if they had developed computer skills. They were generally prepared to make financial contributions to support the use of computers in schools although the level of support offered varied from several thousand UZS in affluent Tashkent neighbourhoods to one or two hundred UZS per student per month in poorer rural communities. One rural school felt that UZS50 per student per month was the maximum that local parents could afford to pay. Nevertheless, the fact that parents were prepared to pay anything to support computer use in the school was a significant indicator of the strong demand for ICT in the educational system. This situation is even more striking when it is noted that at most parent focus group discussions all parents, except for those in richer Tashkent schools complained strongly about the rising costs of education and the increasing contributions that parents were required to make to maintain schools as operational entities. Most parents do not appear to have problems with the textbook rental fee which they perceive as good value and far better than buying the books on the open market. They also do not appear to have problems with the concept of financial support for ICT although there is a much wider variation in the level of support that can be afforded.

Strong regional variations in levels of poverty combined with significant regional variations in budget support to basic schools suggests that there will be problems in assuming that parental contributions can be used to support ICT operational costs. There will certainly be cases where schools will be able to afford to do this. Equally, there will be many schools who simply cannot afford the costs or who can only afford nominal contributions.

2. Project Benefits and Beneficiaries

International experience suggests that the benefits of ICT in education take a little time to emerge. This will certainly be an issue in Uzbekistan where a great deal of teacher training will be needed before the available hardware can be properly utilised. However, with increasing skills and confidence and the development of relevant e-Learning materials in local languages there are a number of positive benefits that are suggested by international experience. These are: (a) when ICT is properly integrated into the curriculum there is statistical evidence to demonstrate a positive association between ICT usage and improved student achievement in languages, Maths and Science and some other subjects; (b) ICT across the curriculum changes the nature of the working relationship between student and teacher. The teacher ceases to be the sole purveyor of knowledge for the student and becomes instead a guide and mentor assisting children to learn and managing their learning process. In this scenario the children become more independent learners and take more responsibility for their own learning; (c) ICT has a positive benefit in assisting children to use their knowledge. ICT across the curriculum pays less attention to what you know and far more attention to how do you find out and how do you use what you know? Thus ICT across the curriculum encourages problem solving and the use and development of higher order thinking skills; (d) there

is some evidence to indicate that regular access to ICT increases student motivation. Thus the IREX connectivity project suggests that the active use of ICT in many of its schools significantly reduced absenteeism, although no quantitative data has been provided to demonstrate this; (e) there can be little doubt that access to computers increases the relevance of education. The fastest growing employment sector in the Uzbek economy and the sector that provides the fastest growing contribution to GDP is the services sector which has a higher usage of ICT than any other sector. Thus familiarity with computers, the Internet, the concepts of information and the major generic software applications are excellent preparation for the world of work.

The major beneficiaries of the project are the approximately 3.13 million students in Grades 5 to 9 who will benefit first from using ICT computer suites in high priority curriculum subjects. During the period of the project approximately 2.9 million children will be promoted from primary into junior secondary grades and this will also have direct benefit from important direct contact with the use of ICT across the curriculum. Thus the total number of student beneficiaries will be over 6 million. In addition, 6,300 teachers in CLS schools and 81,000 teachers in other schools will receive training in network management, ICT co-ordination, subject specialist skills in ICT and continuous professional development. 1,400 CLS management staff and 18,000 management staff in other schools will receive training in the use of ICT in school administration and management. 240 RITTI lecturers will receive intensive training on different aspects of ICT in schools and at least 10 new teacher training course modules to support ICT investments in schools will be designed and made available in local languages. 200 individuals will receive intensive instruction in the techniques of localising and developing software and e-Learning materials. Finally it is estimated that up to 1 million households may be provided with access to ICT via community access schemes such as telecentres or school based Internet cafes. The project will consciously seek to extend ICT facilities in schools out to the wider community. It needs to be stressed that all the beneficiaries listed above will be drawn from every basic education school in Uzbekistan. Because almost 70% of students attend basic education schools in rural areas and because rural areas are widely associated with poverty there should be disproportionate benefits both to rural schools and thus to poor schools.

The project will also benefit school and system management by improved school management and administrative performance as a result of using ICT for basic management tasks. In addition, the monitoring and evaluation component of the project will ensure that there is detailed feedback on which to design a future intervention in ICT development.

The need for curriculum and assessment reform to accommodate ICT within the State Educational Standard should provide further pressure to reduce the number of subjects and to reduce the amount of content in the existing curriculum and thus reduce the number of textbooks and the extent of the textbooks. This in turn will reduce textbook rental costs to parents which will be of direct benefit to the poor.

There is evidence from other countries that access to ICT facilities and the Internet has a particularly beneficial impact on rural communities.

3. Affordability

It is clear that ICT is expensive and if it had to be paid for from parental contributions it would hardly exist in poor and rural communities. The CLS schools will be provided with five year budgets to ensure that the full range of ICT services can be provided for the full period of the project without the requirement for parental

contributions. The project components will require government to provide adequate operational budgets for all schools with ICT installations. The clustering concept will ensure that the necessary support services are made available to almost every school in the country.

4. Ethnic Minorities

Ethnic minorities have suffered in the past from lower levels of textbook supply. This is partly caused by the fact that it is relatively expensive to make small print run adaptations and translations. However, with electronic media it is faster, cheaper and easier to make minority language versions of software and e-Learning materials. The advent of additional e-Learning materials in local languages will not solve the current textbook problem for minority languages but it will ensure that the same situation should not arise with software supply in local languages.

5. Project Performance and Monitoring

Because ICT in Basic Education is largely a new field for MOPE there is little existing baseline data. Thus a high intensity monitoring and evaluation system will be designed to ensure a regular and reliable flow of data on progress. Appendix 13 provides a list of the current key performance indicators. The data derived from PPMS will be used (a) to assess overall project progress, to identify constraints and propose strategies for resolving issues; (b) it will provide a platform of information on which future interventions in the sector can be planned.

APPENDIX 13.1: KEY PERFORMANCE INDICATORS FOR MONITORING AND EVALUATION

Indicator No.	Indicator	Baseline	Year 2	Mid-Term	End of Project
1. ICT BASED POLICY AND STRATEGY INDICATORS					
1.1	National ICT Strategy accepted by GOU	Date	-	-	-
1.2	GOU policy decision on average number of work stations per school	Date Computer/student ratio			
1.3	GOU agreement to provide adequate recurrent budget for ICT	Date Allocated recurrent budget/school	Availability of budget Amount of budget	Availability of budget Amount of budget	Availability of budget Amount of budget
1.4	GOU policy position on Thin Client versus Fat Client option	Date of decision Nature of decision			
1.5	Sustainable budget financing projections from MOF (see Appendix 13.2 for detailed indicators on financial sustainability)	Available Yes/No	Available Yes/No	Available Yes/No	Available Yes/No
2. ESTABLISHMENT OF CLS INDICATORS					
2.1	Completion of clustering in all Raions	Date			
2.2	Identification of Cluster Leader Schools	Date			
2.3	Confirmation that CLSs adhere to minimum specifications	Date	-	-	-
2.4	Approval of Cluster Leader Schools	Date	Date		
2.5	Announcement of furniture and hardware bid for CLSs	Date	-	-	-
2.6	Announcement of awards for furniture and hardware bids	Date	-	-	-
2.7	Completion of installation of 85% of CLSs	By end of 2006 Number completed	-	-	-
2.8	Completion of remaining 15% of CLSs		By June 2007 Number completed	-	-
2.9	Supervision and confirmation of correct installation and adherence to minimum criteria	85% by end 2006 Number completed	15% by June 2007 Number completed	-	-

2.10	Number of CLS with Internet connections	0	Number	Number	Number
3. TEACHER TRAINING INDICATORS					
3.1	Completion of TOT for school network managers and ITC Co-ordinators	Dates	-	-	-
3.2	Completion of school network management and ICT co-ordinator training for CLS schools	85% of CLSs by end 2006 Number trained	Remaining 15% by June 2007 Number trained	-	-
3.3	Launch of school network management and ICT co-ordinator training for non CLS schools	Date	Number of schools with trained network managers Number of school network managers trained Number of school ICT co-ordinators trained	Number of schools with trained network managers Number of school network managers trained Number of school ICT co-ordinators trained	Number of schools with trained network managers Number of school network managers trained Number of school ICT co-ordinators trained
3.4	Completion of TOT training for ICT in priority subjects and grades	Date	Number of schools with ICT in priority subjects and grades	Number of schools with ICT in priority subjects and grades	Number of schools with ICT in priority subjects and grades
3.5	Progress of CLS training for ICT in priority subjects and grades	85% of CLSs receive training by end 2006 Number trained	Remaining 15% of CLSs receive training by June 2007 Number trained	-	-
3.6	Progress of CLS training for ICT	85% of CLSs receive training by end 2006	Remaining 15% of CLSs receive training by June 2007		
3.7	Completion of TOT for school administration training	Date	-	-	-
3.8	Completion of school administration training for CLS schools	85% of CLSs by end 2006	Remaining 15% by June 2007		
3.9	Launch of school administration training for non CLS schools	Date Number trained	Number of schools with trained school administrators Number trained	Number of schools with trained school administrators Number trained	Number of schools with trained school administrators Number trained
3.10	Completion of TOT training in CPD	Date	-	-	-
4. LEARNING MATERIALS DEVELOPMENT INDICATORS					
4.1	Completion of training in localisation, adaptation and development techniques for	Date	Date	Date	Date

	software	Number of trainees	Number of trainees	Number of trainees	Number of trainees
4.2	Establishment of e-Learning Materials Fund	Date			
4.3	Funds disbursed	Amount	Amount	Amount	Amount
4.4	e-Learning materials titles developed	Number	Number	Number	Number
4.5	Number of schools supplied with e-Learning materials	Number	Number	Number	Number
4.6	Number of titles supplied to schools	Number	Number	Number	Number
5. PILOT PROJECT INDICATORS					
5.1	Telecentre Pilot Project designed and approved	Date	-	-	-
5.2	Telecentre Pilot Project launched	Date	-	-	-
5.3	First evaluation report for telecentre pilot project	Date	-	-	-
5.4	Final telecentre pilot project evaluation report		Date		
5.5	Thin client/Fat Client research project design approved	Date	-	-	-
5.6	Thin client/Fat Client research project launched	Date	-	-	-
5.7	Thin client/Fat Client first evaluation report	-	Date	-	-
5.8	Thin client/Fat Client mid-term evaluation report	-	-	Date	-
5/9	Thin client/Fat Client research project end of project report	-	-	-	Date
5.10	Thin client/Fat Client evaluation recommendations accepted	-	-	-	Date
5.11	Decentralised school financing pilot project design approved	Date	-	-	-
5.12	Decentralised school financing pilot project launched	Date	-	-	-
5.13	Final school decentralised financing pilot project evaluation report	-	Date	-	-
5.14	Decentralised school financing mid-term evaluation report	-	-	Date	-
5.15	Decentralised school financing research project end of project report	-	-	-	Date
5.16	Decentralised school financing evaluation recommendations accepted	-	-	-	Date
5.17	Other research projects identified	-	Date	Date	-
5.18	Other research projects designed and approved	-	Date	Date	-
5.19	Other research projects launched	-	Date	Date	-

5.20	Other research projects evaluated	-		Date	Date
5.21	Monitoring and evaluation system designed	Date			
5.22	Monitoring and evaluation system launched	Date			
5.23	Baseline Study and Report Completed	Date	-	-	-
5.24	First monitoring and evaluation report		Date		
5.25	Second monitoring and evaluation report			Date	
5.26	Final monitoring and evaluation report				Date
5.27	Monitoring and evaluation report recommendations accepted as the basis for the second phase of development				Date
6. ICT INFRASTRUCTURE AND ACCESS INDICATORS					
6.1	Number and percentage of CLSs with power problems	Number %	Number %	Number %	Number %
6.2	Number and percentage of non-CLS schools with power problems	Number %	Number %	Number %	Number %
6.3	Number and percentage of CLSs with access to Internet	Number %	Number %	Number %	Number %
6.4	Number and percentage of non-CLS schools with access to national intranet	Number %	Number %	Number %	Number %
6.5	Number of computers per 100 students in CLS schools	Ratio	Ratio	Ratio	Ratio
6.6	Number of computers per 100 students in non-CLS schools	Ratio	Ratio	Ratio	Ratio
6.7	Average number of computer hours per week for informatics in CLSs	Number	Number	Number	Number
6.8	Average number of hours per week for non-CLSs	Number	Number	Number	Number
6.9	Average number of hours per week for ICT across the curriculum in CLS schools	Number	Number	Number	Number
6.10	Average number of hours per week for ICT across the curriculum in non-CLS schools	Number	Number	Number	Number
6.11	Average number of hours of computer access outside school hours in CLS schools	Number	Number	Number	Number
6.12	Average number of hours of computer access outside school hours in non-CLS schools	Number	Number	Number	Number
6.13	Number and percentage of CLS schools offering community ICT facilities	Number %	Number %	Number %	Number %
6.14	Number and percentage of non-CLS schools offering community ICT facilities	Number %	Number %	Number %	Number %
6.15	Number and percentage of operational	Number	Number	Number	Number

	computers in CLS schools	%	%	%	%
6.16	Number and percentage of operational computers in non-CLS schools	Number %	Number %	Number %	Number %
6.17	Percentage of CLS schools with maintenance and servicing contracts	Number %	Number %	Number %	Number %
6.18	Percentage of non-CLS schools with maintenance and servicing contracts	%	%	%	%
6.19	Percentage of CLS schools satisfied with maintenance and servicing arrangements	%	%	%	%
6.20	Percentage of non-CLS schools satisfied with maintenance and servicing arrangements	%	%	%	%
7. ICT BASED CURRICULUM INDICATORS					
7.1	Number of CLS schools regularly using ICT across the curriculum	Number	Number	Number	Number
7.2	Number of non-CLS schools regularly using ICT across the curriculum	Number	Number	Number	Number
7.3	Average number of ICT access hours per student per week in priority subjects in grades in CLS schools	Number	Number	Number	Number
7.4	Average number of ICT access hours per student per week in priority subjects in grades in non-CLS schools	Number	Number	Number	Number
7.5	Number of students with access to ICT outside school	Number	Number	Number	Number
7.6	Number of students with access to Internet for ICT across the curriculum	Number	Number	Number	Number
8. IMPACT OF SCHOOL CLUSTERING INDICATORS					
8.1	Number of CLSs with active school clusters	Number %	Number %	Number %	Number %
8.2	Frequency of meetings in CLSs	Frequency	Frequency	Frequency	Frequency
8.3	Average attendance at CLSs for training and collaborative working	Actual/Possible	Actual/Possible	Actual/Possible	Actual/Possible
8.4	Number of non-CLSs who are e-ready for computer installations	Number	Number	Number	Number
8.5	Number of non-CLSs who were not e-ready when computers were installed	Number %	Number %	Number %	Number %
8.6	Percentage of schools in the cluster who are active members of the cluster group	%	%	%	%
8.7	Percentage of schools who do not attend cluster meetings	%	%	%	%

9. FINANCIAL INDICATORS					
9.1	Average costs of consumables in CLSs	UZS	UZS	UZS	UZS
9.2	Average costs of consumables in non-CLSs	UZS	UZS	UZS	UZS
9.3	Average costs of servicing in CLSs	UZS	UZS	UZS	UZS
9.4	Average costs of servicing in non-CLSs	UZS	UZS	UZS	UZS
9.5	Average costs of electricity in CLSs	UZS	UZS	UZS	UZS
9.6	Average costs of electricity in non-CLSs	UZS	UZS	UZS	UZS
9.7	Average costs of telecoms in CLSs	UZS	UZS	UZS	UZS
9.8	Average costs of telecoms in non-CLSs	UZS	UZS	UZS	UZS
9.9	Average parental contributions for ICT	UZS	UZS	UZS	UZS
9.10	Average telecentre income	UZS	UZS	UZS	UZS
9.11	Average income from other income generation	UZS	UZS	UZS	UZS

APPENDIX 13.1: PERFORMANCE INDICATORS: FINANCIAL SUSTAINABILITY

Objectives	Inputs	Outputs	Risks And Critical Assumptions	Outcomes And Impacts
Adopt financially sustainable educational target of ICT use in BE (PC/Pupils ratio: 1:50)	-SDF resources ($42 mil/year): 2005-2009 -ADB's ICT in BEP ($30-35 mil) 2006-2009; -PRC's Loan ($20 mil): 2005-2006	-110 thousand computers (10+1, Thin Client) are operating in schools	-GOU accepts the National ICT Strategy in BE	-increased number of students, teachers, parents and community benefiting from ICT use
Adopt a systematic approach in assessing opportunities of acquiring hardware and software	-Component 4 of the ADB's ICT in BE -MOPE's resources	-optimal configuration profile is identified and necessary corrections are made to the preciously adopted specifications	-a uniform standard use of ICT is adopted	- fast and effective deployment of available ICT in schools
Improve recurrent budget allocation for adequate use of ICT equipment	GOU Basic education recurrent budget	-sufficient allocation of funds to schools to finance maintenance, servicing and consumables.	-reallocation of funds from other Education sub-sectors; -efficient use of available financial resources; -removing redundant teachers from schools; -savings from curriculum revision.	-sufficient servicing and maintenance budget for ICT is budgeted; -reliable, affordable servicing and maintenance of computers is ensured;
Raise public awareness among community and parents on benefits of use ICT in schools	-Component 4 of the ADB's ICT in BE -MOPE's resources	-trained school management run meetings/activities with parents and community on use of ICT in schools	-Schools have minimum funds to run public awareness campaign	At least 2 million of households are aware of the ICT program in schools
Pilot test community tele-centres in schools located in rural and remote areas in order to establish both income generation potential & community benefit	-Component 4 of the ADB's ICT in BE -MOPE's resources	-2-3 community centers in schools are established and commercially operated	GOU/MOPE accept the synergy of communities and schools for this project	-reduction in level of poverty in communities as a result of income generation benefits as well as benefit for the community in total
Increase computer use efficiency	-Component 3 of the Project	-Develop or adapt a software allowing to record number of users/access time/purpose	-curriculum revision allows for extended use of ICT; -computer suites open 12 hours/ school day, and on Saturdays and	-increased student, teacher, parent and community access

			Sundays; -parents and community are permitted to use school ICT facilities	
Curriculum revision by introducing ICT	ESDP, ICTBP, MOPE	-36% reduction in textbook provision; -20% reduction of subjects; -20% reduction of content; - Related savings in distribution at 10% of production cost saving; Related savings in warehousing costs at 1% of production cost	GOU/MOPE support the curriculum revision	-students and teachers benefit from computer literacy courses, and ICT use in priority subjects; -less overloaded curriculum takes off pressure from teachers and increases student attainment, motivation.
Professional development training	CLS/library resource rooms set under the Project and STDP	-20% of teachers' time is utilized	-teachers have sufficient budgets to travel to CLS	-teachers are well trained, they use gained information from CLS for teaching

APPENDIX 14: BASIC EDUCATION STATISTICS

Table 1: Enrolment by Grades ('000 pupils)

	2000	2001	2002	2003	2004
G 1-4	2587	2566	2512	2457	2382
G 5-9	3014	3093	3134	3134	3135
G 10-11	367	360	627	625	577
Total	5969	6019	6273	6216	6093

Source: MOPE, May 2005

Table 1a: Enrolment by language of instruction

	2000	2001	2002	2003	2004
Number of pupils	5971511	6014850	6266371	6211932	6093277
Pupils in schools with Uzbek language of instruction	5168631	5227452	5449201	5489012	5425375
Pupils in schools with minority language of instruction	802880	787398	817170	722920	667902
Russian	315249	312528	341821	287216	275105
Tadjik	135434	129166	127977	117343	101848
Turkmen	15481	14780	14243	13826	15010
Kazakh	163629	157863	157721	140585	127359
Kyrgyz	17084	21022	22238	19065	14382
Karakalpak	156003	151825	152957	144885	134198
Korean		214	213		

Source: MOPE, May 2005

Table 2: Number of basic schools

	2000	2001	2002	2003	2004
Number of basic schools	9672	9679	9702	9737	9751

Source: MOPE, May 2005

Table 3: Teachers in Basic Education

	2000	2001	2002	2003	2004
Number of teachers	440762	445474	449795	451852	447129

Source: MOPE, May 2005

Table 4: Distribution of Education Expenditure by Sub-sector (%)

Year	Preschool	Basic Education	Senior Secondary	Higher Education	Total
1999	12.6	45.5	36.5	5.4	100.0
2000	11.4	43.6	39.7	5.3	100.0
2001	13.6	46.4	34.2	5.8	100.0
2002	14.8	46.9	32.6	5.7	100.0
2003	13.8	48.0	32.7	5.5	100.0
2004	13.4	49.9	31.4	5.3	100.0
2005	12.7	50.3	31.6	5.4	100.0

Source: Ministry of Finance, Government of Uzbekistan, April 2005

Table 5: Basic Education Budget (2003, 2005)

	2003	%	2005	%
Capital Investments (mil. UZS)*	6148	1.7%	147196	79%
Recurrent budget (mil. UZS)	338569	98.3%	569 345	21%
Including Salaries and social charges in recurrent budget	268857	79.4%	491006	86.2%

Source: MOF, 2005 Note: *Financed through the SFD

Table 6: Public Expenditures of Education Sub-sectors as a share of GDP*

	1999	2000	2001	2002	2003	2004	2005**
Pre-school	1.18%	1.03%	1.12%	1.18%	1.07%	0.98%	0.98%
Basic Education	4.24%	3.58%	3.81%	3.74%	3.73%	3.65%	4.86%
SSVE	3.40%	3.93%	2.81%	2.60%	2.54%	2.28%	2.44%
Higher Education	0.50%	0.48%	0.48%	0.45%	0.42%	0.39%	0.41%
Total Education	9.32%	9.02%	8.22%	7.97%	7.76%	7.30%	8.69%

Source: Calculated based on MOF data, May 2005. * Does not include foreign assistance **Estimate.

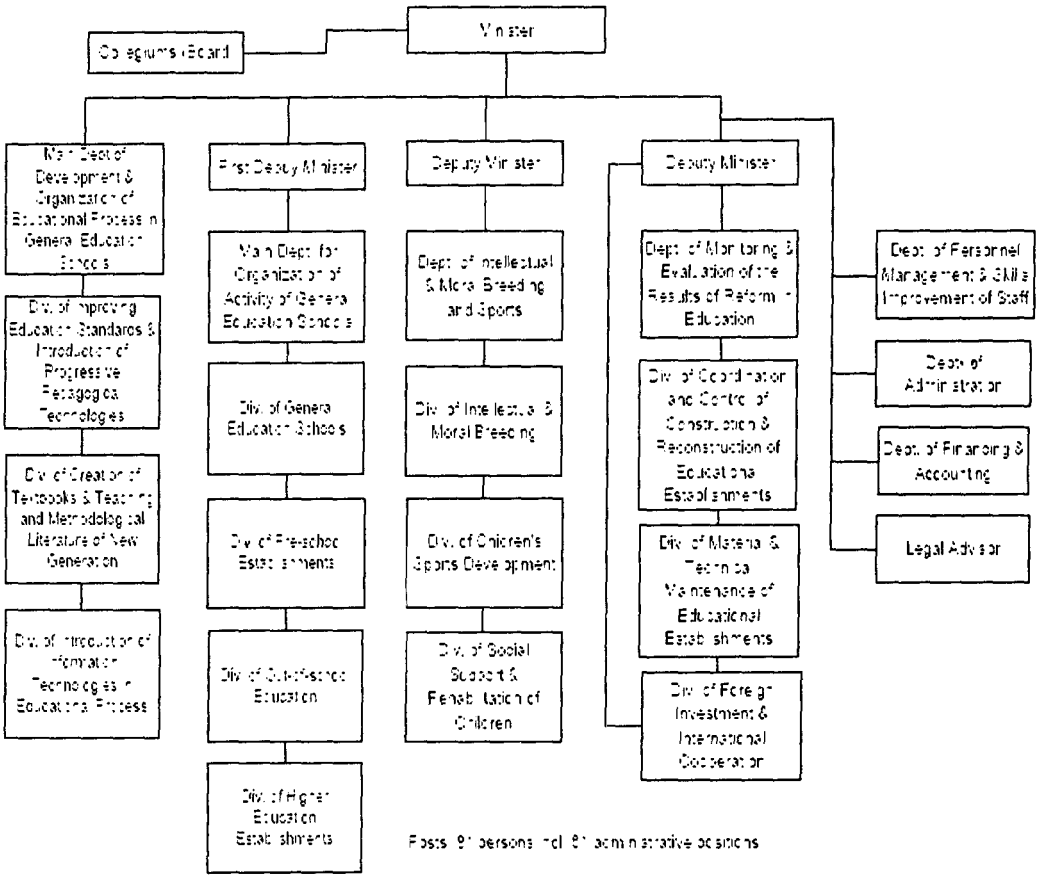
Table 7: Real Public Expenditure Growth in Education Sub-sectors

	2000	2001	2002	2003	2004	2005
CPI*	28,00%	27,40%	21,60%	3,80%	10,00%	10,00%
Pre-school	5,29%	37,60%	38,36%	13,76%	5,28%	10,95%
Basic education	0,92%	33,57%	27,29%	25,15%	13,45%	51,22%
SSVE	48,83%	19,16%	18,70%	22,33%	3,64%	19,07%
Higher education	19,36%	22,85%	23,04%	16,69%	5,56%	18,98%

Source: Calculated based on MOF data, May 2005; ADB Outlook (Update), 2004.

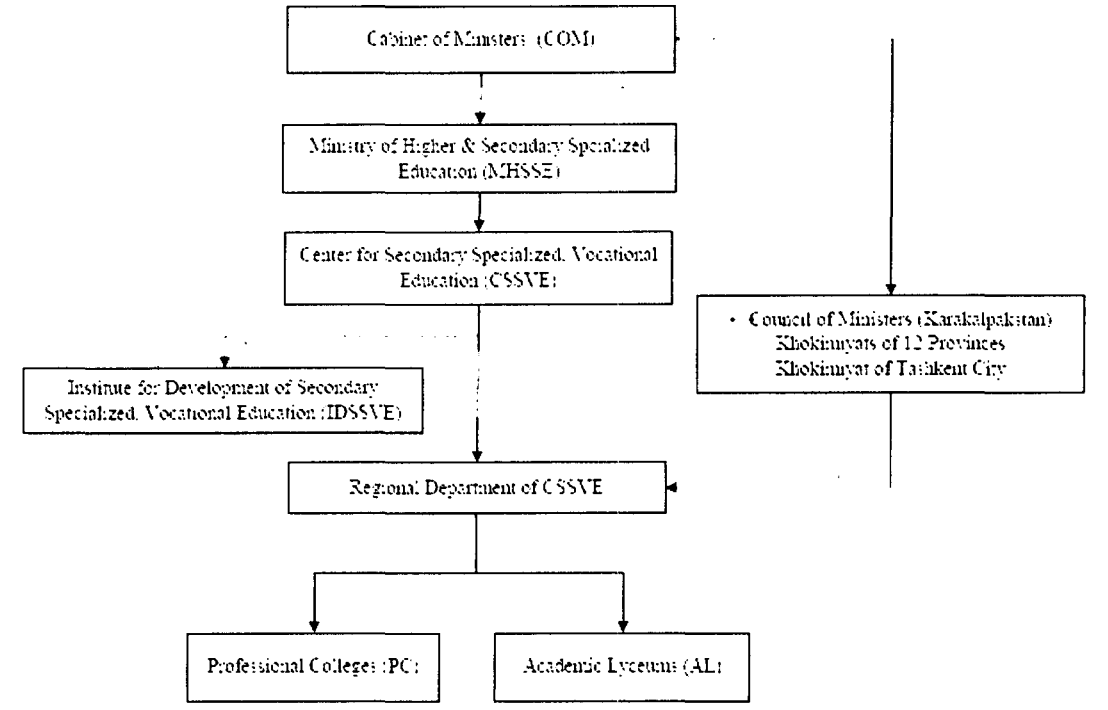
APPENDIX 15: MOPE AND MOHSSE ORGANOGRAMS

15.1 Ministry of Public Education

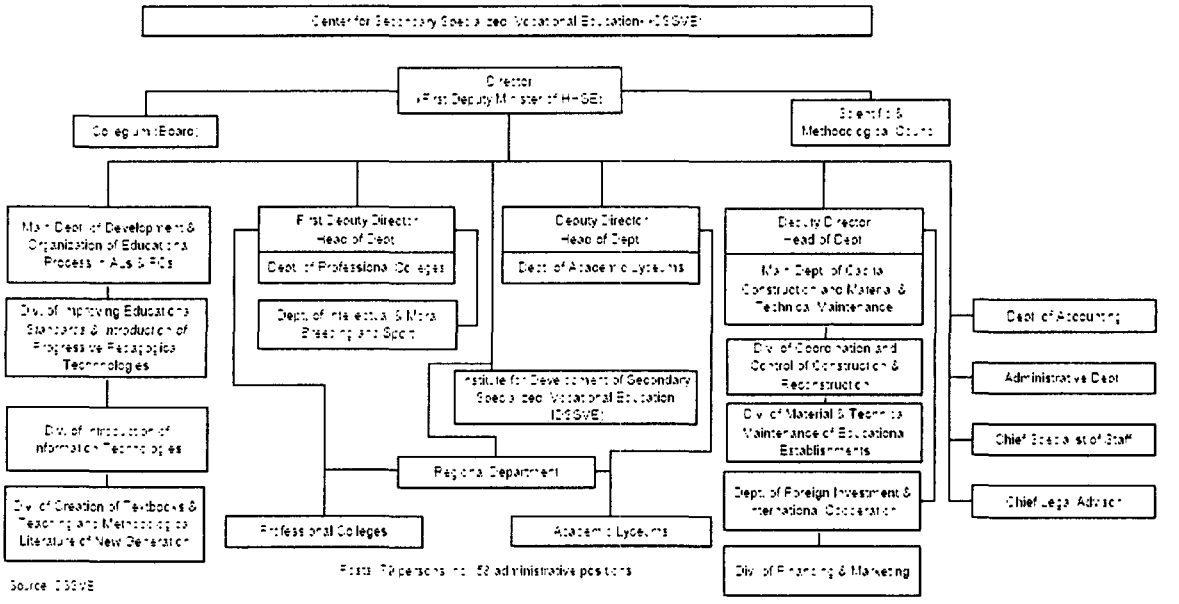


Source: Ministry of Public Education

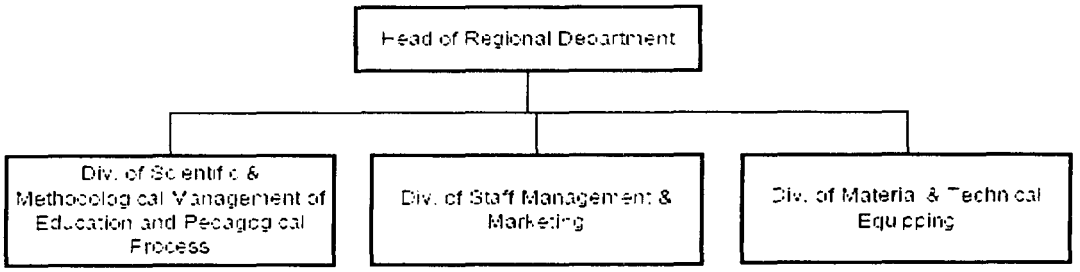
15.2 Center for Secondary Specialized Vocational Education (CSSVE)



Source: CSSVE

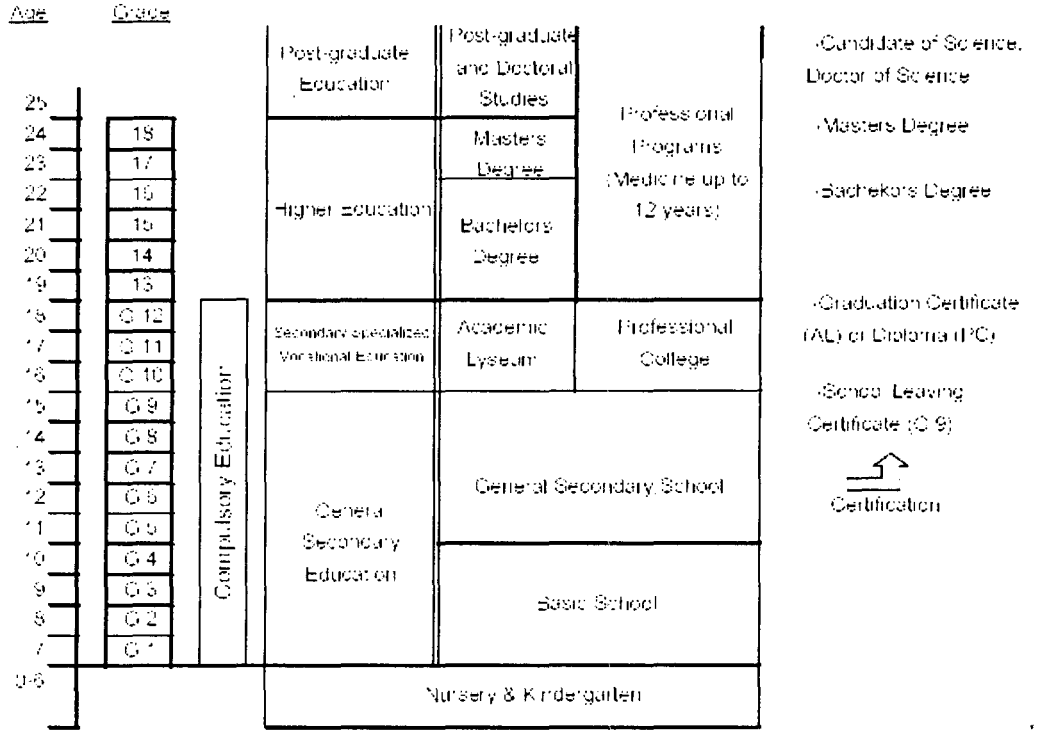


Source: CSSVE



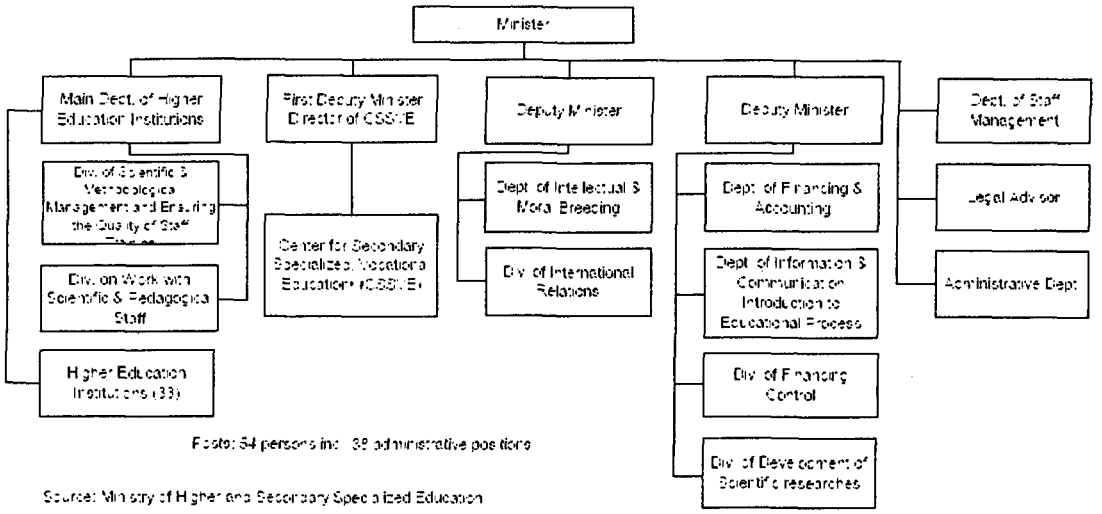
Source: OSSVE

15.3 Education Structure of Uzbekistan



Source: MHSSE OSSVE MPE

15.4 Ministry of Higher and Secondary Specialized Education



Note: 54 persons incl. 39 administrative positions

Source: Ministry of Higher and Secondary Specialized Education

APPENDIX 16: DONOR FUNDED PROJECTS IN THE EDUCATION SECTOR

Название на русском языке	Donor	Education activity	Contact	Contact Address and Details
Азиатский банк Развития Постоянное представительство в Узбекистане	Asian Development Bank Uzbekistan Resident Mission	**Basic Education Staff Development (Teacher Education Reform), (23 April 1999 – 30 November 1999), PPTA** **Basic Education Textbook Development Project (18 March 2003 - ?), PPTA** **Senior Secondary Education Project (Approved on 8 February 2000) Loan** **Education Sector Development Program (Approved on 6 December 2002) Loan** **Education Sector Development Project (Approved on 6 December 2002) Loan** **Second Textbook Development Project (Approved on 29 September 2004) Loan** **ICT in Basic Education (Approved in October, 2004), PPTA**	O'Sullivan, Sean, Country Director Zulfiya Karimova Portfolio Manager and Project Management Specialist	Узбекистан, Ташкент 700027 Ул. Ходжаева, 1 Тел: (998 71) 120 79 21, 120 79 22, 120 79 24 Факс: (998 71) 120 79 23 www.adb.org/urm

Безвозмездная помощь Центральной Азии	Central Asian Free Exchange Inc. (café)	Language courses in English, Spanish and German for public and school students Established computer centres for MS Office and other software training, use of the Internet/ Организовало компьютерные центры, где обучают офисным и другим прикладным программам, а также предоставляют доступ в Интернет. CAFE set up English resource centres with various printed and electronic materials (A/V, DVD etc.) in Andijan, Ferghana, Kokand, Samarkand and Tashkent cities which can now be used by students for TOEFL, GRE and GMAT preparation. Resource centres provide language debate hours for language hands- on training	Jefry Liverman President	Ташкент 700021 Проспект Навои, 48 (глав. офис – ул. Минглар, 10) О: г. Grand Mir, магазин Гранд 120-67-57, 152-61-93, 55-91-77 Т/ф 152-10-87, 144-48-37 Андижан: (742) 24-35-97 Карши: (75) 221-1494 Наманган: (6922) 6-17-41 Самарканд: (662) 33-68-89 Мазар-и-Шариф: (7622) 2-9250 Фергана: (732) 26-5579 Коканд: (7355) 2-6917 Нукус: (61) 223-9037 Cafe@cafengo.org
Американская ассоциация юристов	American Bar Association (ABA)	Legal Education and Law Student Development Through its efforts in legal education and law student development in Uzbekistan, CEELI seeks to improve the legal education system and professionalism of law students in order to provide them with the skills and progressive orientation necessary to promote and protect civil society and the rule of law. □ CEELI's dynamic Street Law program aims to educate young people about law, human rights and democracy. Law students learn techniques for teaching primary and secondary school students their rights and responsibilities under Uzbek law, in order to encourage them to use the law to solve critical social, political and familial challenges. The success and popularity of the Street Law program in Tashkent has led to the expansion of its activities into other cities in Uzbekistan. In the past several months, CEELI's Ferghana office has orchestrated five trainings in Namangan, two in Ferghana and one in Andijan for between eight and fifteen students each. □ In September of 2003, in connection with the Tashkent Student Bar Association's National Advocacy Competition, CEELI conducted two trainings for law students. The first was a two-day course designed to help students develop a clear understanding of trafficking in persons. The participants learned about national anti-trafficking legislation and were given practical advice on	Richard Paton, Директор	Ташкент, 700003 ул. Расулова, д. 47 О: Обувная фабрика Тел. 152-65/47-48/49/50 152-13-71 152-65-50 ф152-74-77 dilnoza@abaceeli.uz www.abanet.org/ceeli

		possible prosecution strategies. Post-training surveys indicated a nearly universal improved capacity among participants to define and qualify the crime. □ CEELI works with the Tashkent Student Bar Associations (SBA) to improve member services and sustainability. In addition to providing the SBA with training on proposal writing and management skills, CEELI has worked with the SBA and its Namangan affiliate to cultivate domestic, sustainable sources of funding and in September assisted in a massive recruitment campaign at the Tashkent State Law Institute, increasing the size of the association by 47%. In July, CEELI also supported the Ferghana Valley Moot Court Competition for students from the region and the National Advocacy Competition. The National Advocacy Competition served both to improve the students' substantive knowledge and practical skills in domestic law and to identify crucial needs for future CEELI practical skills trainings on topics such as evidence law and advocates ethics.		
				Ташкент, 700015 ул. Конституция д. 68 О: г. Россия, магазины Океан, Аквариум 152-12-81 152-12-86 факс: 120-70-03 general@actr.bcc.com.uz
Американское Агентство международного развития	USAID - United States Agency for International Development	**PEAKS** initiated in 2003 and focuses on 5 aspects of the system: in-service teacher training, learning materials development, increasing community involvement in education, management capacity strengthening at all levels and infrastructure rehabilitation. Also has a pilot initiative in the area of education finance decentralization. Starting from 2004 7 pilot schools started to act as training resource centres working closely with schools in their clusters **Computers for Schools in Uzbekistan Project**	ДЖОЕН ХЕЙЛ	Ташкент, 700000 Ул. Буюк Турон 41, 4 этаж 120-63-09 azhuravko@usaid.gov

		The project focuses on development of skills and knowledge in modern ICT usage and provides access to the Internet (where possible) to over 100 basic schools around the country. This project will be linked to other education projects in Uzbekistan in particular with Basic Education Sector Strengthening in Uzbekistan Project 10.000 shall have access to PCs as a result of this project. IREX is the IA for this project. **Business skills and information project:** This project aims to provide training in the area of business skills and economical education for higher education students. The education network of the Agency provides learning materials, training, research grants and scholarships. Over 25.000 Uzbek students have been already introduced to modern approaches in business ands economic learning and 52 universities have benefited from improved curriculum for business and economics courses. 320 local professors have been trained. **Education and Exchange Programme** In 2003 the Agency has trained 1.400 citizens of Uzbekistan 44% of which are females. The training programme emphasized the development of small business skills, independent mass media development, international accounting implementation, democratic development and improvements in health sector Implemented by AED		
Ассоциация Abt.	Abt. Association, Inc. Health Reform Project	ZdravPlus in 2001-2003 has developed a teachers' guide for grades 1-8 on health awareness for basic schools. Further it has conducted relevant training in pilot schools	**Директор проекта: АЛАНА ШАЙХ**	Ташкент Ул. Бозбозор д. 16 О: Дагестанская 169-22-11 169-22-12 1691490/91 169-14-92ф Фергана Ул. Касымова, 29-а (3732) 24-76-56 abt@zdravplus.uz abt@fer.zdravplus.uz www.zplus.kz

IREX /АЙРЕКС Совет по Международным Исследованиям и Обменам	IREX, International Research and Exchanges Board		Mumtoz Abdurazzakov Director	**Офис представительства:** **Адрес:** ул. Абдуллы Каххора, 4 Проезд, дом 8, Ташкент, Узбекистан 700100 **Тел.:** (998-71) 115-28-49/51/54/56, 115-2728, 115-2995; **Факс:** (998-71) 152-5147, 115-2664 **Эл. почта:** irextash@irex.ogr.uz **Веб сайт:** www.irex.uz **Офис проекта Поддержки гражданского общества:** Ташкент, 700031, ул. Миракилова, 22 152-23-02, 152-34-56 152-63-79 152-67-23 ф: 54-47-53 www.irex.uz cssi@irex.uz
Уорлд Консерн	World Concern USA	A Project based in Yakkasaray Khokimiyat of the city of Tashkent has launched an ICT and English Language Literacy Centre	Mr. Dan Rutz, 1) Country manager	Ташкент Ул. Катта Миробод, 96 152-72-67 120-55-54 120-55-53 www.worldconcern.org
ЮНИСЕФ (Детский фонд ООН)	UNICEF-United Nations Children's Fund		Ms. Brenda Vigo Assistant Resident Representative	Ташкент ул. Академика Сулейманова, 43 133-95-12 133-97-35 133-77-09 Ф: 120-65-08 bvigo@unicef.org

Институт Азиатской Культуры и Развития	Asia Culture and Development Institute	Small scale education projects	Канг Сун Хан	Ташкент, ул. Банокатий, 18 191-95-44 191-95-40 1) iacduz@hotmail.com
Корейская международная организация по поддержке бедных людей	KIADECHEK (International Korean Organization for support to poor people)	Small scale education projects	Господин Чонг Сонг Хюн	Ташкент, Ул. Кичик Бешягач, 27 120-52-75 93-34-73 ф.54-06-30 vthai@fhi.net
Адвентистское Агентство Помощи и Развития	ADRA Uzbekistan (Adventist Development and Relief Agency)	Dessemination of new education materials in English in different regions of Uzbekistan. Anti-smoking campaign for younger generation and Anti-Drug project for infants and up	Natalia Y. Ivaschenko, Acting Country Director; Nodir I. Gafurov, Projects Director (Наталия Е. Иващенко, Директор; Нодир И. Гафуров, Директор по проектам)	15 Khoshimov Street, Tashkent, Uzbekistan 700077. 68-88-54; 186-94-98 adrauzb@sarkor.uz www.adra.org
Всемирная организация здравоохранения (ВОЗ)	World Health Organization	Integration of the mother and child mortality reduction strategies in the curriculum of the health higher education institutions and vocational schools as well as healthy life awareness initiatives	Mr. Arun Nanda Представитель ВОЗ в Узбекистане	Ташкент, 700029, ул. Тараса Шевченко, 4 Тел: 1206167, 139 85 41, 152 35 48 www.who.dk , www.who.int office@who.uz

			Marica Olsen Госпожа Халида Анарбаева	Ташкент, 700070 Ул. К. Джалилова, 31 О. Яккасарайский хокимият 120-79-09 office@internews.uz
16. Корпус мира	Peace Corps USA	Volunteers provide language training for Higher Education and Schools	Edward Willett Country Director	Ташкент, 700015 ул. 2-я Саперная, 63/65 (ул. Кунаева) О: маг. Океан, гост. Орзу 120-73-90 Ф:120-73-92 receptionist@uz.peacecorps.gov www.peacecorp.gov

Embassies and attached organisations

Name of Donor	Миссия / Направления деятельности	Projects and Activities	Contact	Contact Details
The British Council	Содействие изучению английского языка, распространению информации о Великобритании и британских организациях, а также поддержка проектов в различных сферах искусства и культуры. Главная цель – укрепление репутации Великобритании, как значимого партнера на международной арене, способствующего экономическому и социальному развитию тех стран, с которыми сотрудничает Британский Совет. Содействие важным экономическим, образовательным и политическим реформам, развивая партнерство (Мин-во образования, Ассоциация преподавателей англ. Языка и др.), усиливая потенциал партнеров, улучшая используемые английские стандарты	Within 2002 – 2004 BC has: - implemented BETDP - assisted in the opening of Westminster University in Tashkent - provided study tours for senior policy makers and college directors to the UK - carried out with MOPE a water conservation project involving 1000 schools arounf Uzbekistan - carried out VI Language and Development Conference for over 3000 participants from more than 30 countries - sent 70 student to the UK universities	Mr. Neville McBain Director	**Ташкент, ул. Кунаева, 11, в здании Ин-та мировых языков** 120-67-52/53 120-67-62 Fax: 120-63-71 Neville.mcbain@britishcouncil.uz

Korea International Cooperation Agency (KOICA)	Администрирует ряд программ сотрудничества, включая безвозмездные поставки оборудования, обучение в Корее по различным специальностям, направление корейских добровольцев, врачей и др. специалистов в РУ, содействие корейским ННО	Volunteers for schools	Mr. KIM Dong Ho, Director of KOICA office in Uzbekistan	Ташкент, ул. Афросиаб, 7, (Корейское Посольство) О: м Ойбек 152 63 78, 152 31 51/ /52/53 ф120 64 84 inna@korea.anet.uz
		Stipends	Мартин Хеккер Посол Германии	Ташкент 700017 ул. Рашидова, 15 О: Монумент Мужества 120-84-40 fax: 120-84-50 gerembuz@rol.uz
		Stipends, training and research projects and small grants	Жак Андре Кости, посол	**Ташкент** Ахунбабаева, 25 коммутатор 133-53-82; 133-54-84 133-82-44 Факс: 133-62-10 e-mail – N/A
		Provides grants to NGOs	Mr. Hayashi Tomoynki 3 rd secretary, head section of economic cooperation	Ташкент Ул. Садыка Азимова, 52/1 120-80-60\ 61\62\63 ф. 120-80-75

APPENDIX 17: SCHOOL e-READINESS

The processes relating to the provision of hardware to schools have to be well managed so that students and teachers can use ICT resources effectively. Unfortunately, the current system for the selection of schools for ICT resources and the methods of installation and school preparation appear to lack rigour and there is evidence from the school visits that some schools that have received ICT equipment are not using it or managing it efficiently.

It is important that a school should be deemed 'e-ready' according to rigorous agreed criteria. If so desired, these criteria could be used to determine the level of ICT resources to be provided. Oblasts, raions and schools should be made aware of the criteria so that schools can progress as fast as possible through the 'e-readiness' scale with local support until full e-readiness is achieved.

The following are examples of current ICT problems in schools discovered during recent school visits

School #32, Gazli – Romaton Raion (150Km NW of Bukhara)

New school opened in Sept 2004 – buildings paid for by local gas/oil company at a cost of US$5M). Most specialist classrooms have no, or very poor resources (e.g.Science labs, PE etc). Textbooks mostly OK through operation of textbook rental scheme.

There are 2 dedicated ICT rooms, each with 11+1 new Pentium IV PCs loaded with Windows 98 operating system. There is no evidence of licensing of Operating Systems – and this may be pirated software because most new PCs now come ready loaded with XP. The hardware was supplied and installed by O'zbeko'quvavtomatika.

The machines all have network cards and, for a very small investment in a hub and Cat5 cabling (less than US$50), they could have been networked together. However, they have not been networked and all are operating as stand-alone machines. All have MS Office as a standard and Winamp as a media player. Apart from this there is no standardisation across the machines.

Checking six machines at random there was no evidence of any student work using word-processing, spreadsheets or presentation software. One maths teacher had produced some worksheets in Word. A few students had been playing with PowerPoint and had produced some very rudimentary slide shows. Some students had installed music and music videos on the machines. The only consistent feature of all the machines was that there was evidence that the students had been writing some simple programs in Basic (in accordance with the informatics curriculum).

The Informatics teacher had very little knowledge of PC configuration or first-line maintenance so the machines could easily be damaged or sabotaged by students by accident or malice. A few teachers were self-teaching themselves ICT literacy. Some open access to students available outside regular class hours – but little on the machines to interest them (unless they brought in their own CD/ DVD music videos).

Other than their use for informatics for less than 10 hours a week these rooms would be standing empty and idle. No Internet access; no bank of software resources; no systematic use of ICT across the curriculum. Staff skills in ICT either absent or very weak.

School 29 – Romaton Raion

Computer suite with 11+1 Pentium IV PCs. Networked; but little evidence of student work on the PCs except for writing a few BASIC programs. No use of ICT in other curriculum suibjects; no technical support (servicing and maintenance); No Internet access; Low level staff skills in ICT to make best use of hardware.

School 8 Bukhara City

2 computer suites supported by UNESCO/IREX. One is an "old" IBM 286 suite with 9 machines only and only BASIC programming is possible. The "new" suite had 5 x standalone PCs, and provides access to community use via the Makhalla but during the visit us used only by students. Only 3 out of the 5 machines were useable because a power extension cable had been removed and had not been replaced. Internet was operational through a modem on a parallel school 'phone line – but the link could not be established to demonstrate. Once again, a serious under-use of the facilities with no school staff trained to use the equipment in a productive way. School Director claimed that grant from Japan will soon be provided to train local ladies on the use of computers.

School 98 – Boarding School; Taskent City

A new computer suite of 9+1 PCs running MS XP donated by local businessman. Some machines already inoperable because a student has password protected them and no one knows how to get access. There are no effective network management skills in the school, no standard software platform, no trained staff who know how to use the hardware effectively. Most use is music and low-level games playing.

School had Internet access last year, but benefactor's subscription has run out and they can't afford to renew it! School Director claims that 25% of teachers are ICT literate and Informatics teacher does all staff INSET.

The most basic e-Readiness problems discovered by the school visits were:

- Lack of regular and predictable power availability during the school day
- Classrooms not rehabilitated and made suitable for computer use in terms of size, layout, wiring, security and climate control (NB the major climate problems are dust and extreme temperature ranges from 50 degrees in summer to –20 degrees in winter)
- Incorrect or careless installation
- Lack of proper supervision and checking of installation (schools are generally not competent to determine whether installation has been properly performed
- Lack of adequate servicing and maintenance facilities
- Lack of school staff trained to manage a school network
- Lack of school staff trained to use ICT across curriculum subjects
- Insufficiently trained informatics staff
- No guidelines from MOPE on how it expects ICT to be used in schools
- Inadequate operating budgets, which severely limit use or even prevent use completely (e.g. as a PC becomes inoperable and there are no funds for servicing)

It is clear that schools are being provided with ICT facilities without basic e-Readiness criteria being established or even considered

Network Managers and Teacher Training

Many IT teachers in schools have had no experiences with modern computers; a significant number have had no experiences with any computers – but just teach the theory from a textbook. The following existing training modules could be used as the basis for the essential training of schools and teachers

- MS Modules 2 and 4 are appropriate for School Network Managers

- MS Modules 1, 3, 6 and 8 (6 could be used as basic level) could be used as the basis for the development of teacher competence
- European Computer Driving Licence (ECDL) for Educators
- International Computer Driving Licence (ICDL) - The ICDL syllabus is designed to cover the key concepts of computing, its practical applications and their use in the workplace and society. It allows everyone to document their acquired knowledge and skills through a series of performance-based tests administered at a growing network of training and test centres around the world. No prior knowledge of IT or computer skills is needed to study for the ICDL.

The commissioning and payment for classroom wiring and power supply to classrooms and any minor works required before computers are delivered also need to be clarified.

APPENDIX 18: CRITERIA FOR SELECTING SCHOOLS FOR ICT INSTALLATION

Factors determining E-Readiness

The following list of factors will determine the e-Readiness of the school. Schools in rural/remote and vulnerable communities may need somewhat different criteria.

- Availability of reliable power supplies throughout most school days
- Availability of suitable classroom of acceptable size with adequate climate control, security, wiring, furniture, layout etc
- Availability of at least one (preferably two) staff members trained to operate as school network managers
- Availability of one or two ICT competent subject teachers in priority curriculum subjects and grade levels who have received some introductory training
- MOPE Guidelines that give schools an idea of what they are expected to do with their ICT facilities once they are installed and operational
- An identifiable operational budget of adequate size (MOPE guidelines should also cover this issue). If this budget is not made available then schools have no alternative but to apply to parents for help and in poor areas there is already a limit to how much parents are able to contribute. The result is under-funding and inevitable under-use or even non-use of the expensive hardware

All schools should be required to demonstrate that all of the above factors are satisfactorily resolved prior to authorisation for installation. In addition, there are some other issues that need to be considered and resolved. These are:

- The supervision and signing off of the ICT installation. At present, schools sign for the installation work but they are not technically competent to judge whether or not they have been supplied with full kit or whether the installation has been correctly performed
- Climate control – schools can operate without it but the result will be a requirements for more frequent servicing, which puts strain on the operating budgets, and a reduced life cycle, which increases the overall costs of replacement
- The training requirement has not yet been specified and no specialised training courses have so far been designed and made available to schools to meet the requirements of schools. In 2005-2006, these requirements will be extreme and preparation for training must be started now.

Data required to establish e-Readiness

In order to determine e-Readiness, it will be necessary to have the following details for each school:

Name/Number of school.....
Raion.....
Oblast/Region.....
Urban / Rural / Remote
Name of Head Teacher.....
Telephone number of school.....
Total number of students on roll.....
Maximum class size (Grade 5 and above).....
Average class size over all grades.....
Single or double shift
Typical power supply pattern
- During School Day i.e. 0800 – 1800
  - Power on all the time
  - Power cuts less than 2 hours per day
  - Power cuts less than 5 hours per day
  - No power during this period
- Evenings i.e. 1800 – 2200
  - Power on all the time
  - Power cuts less than 2 hours per evening
  - No power during the evening
- Saturdays 0800 – 2200
  - Power on all the time
  - Power cuts less than 2 hours per day
  - Power cuts less than 5 hours per day
  - No power during this Saturday period

Classroom available (Need to define minimum size) Yes / No
Current computers in school: Number..... Type ..... Date Supplied.....
Networked Yes / No
Telephone connection Yes / No
How many lines? ..... Digital /Analogue
Number of trained network managers .....
Number of Informatics teachers .....
Number of IT competent teachers, other than those above (Need to define competence)

Different Models of Hardware and Connectivity according to level of e-Readiness

A	Installation of a computer network (1 TWS + X SWSs) ± connectivity (the number of SWSs to be determined by maximum class size). It is proposed that the number of SWSs be calculated as Max Class size / 2 Projector and whiteboard X has yet to be defined	
B	Installation of a single TWS in a classroom ± connectivity Projector and whiteboard	
C	Installation of a single PC in a school library ± connectivity	
D	Installation of a single PC in a school administration office ± connectivity	

APPENDIX 19: A TECHNICAL NOTE ON CLIENT NETWORK OPTIONS

Thin Client Networks

A Thin Client network is a server-based network where the majority, if not all, of the processing is done by the server rather than by the individual client machine(s). Software applications and programs are held and run on the server, and displayed on the client machine. The term thin is derived from the small or 'thin' amount of processing done on the client terminals as opposed to a 'fat' client where most of the processing is carried out on the client machine.

Traditionally, Thin Client network architecture was characterised by a powerful server connected to a series of 'dumb terminals' with limited functionality. However, there are a variety of system architectures, which can be described as Thin Client, ranging from the server/dumb terminal approach described above at one end of the spectrum, to many high specification Personal Computers linked to a central server at the other, with several network solutions in between.

A Thin Client network typically includes

- One or more computers to operate as a server. These computers tend to be of a much higher specification and are more powerful than the other computers on the network.
- An Operating System that supports Thin Client computing, e.g. Windows 2003 Server, Windows NT Terminal Server Edition (NT TSE), Linux, UNIX, Mac OS9/ Mac OSX.
- Centralised server software to control which commands are executed and where they are executed (i.e. at the client machine, or at the server). There is a wide range of commercially available and free server software which incorporate features specific to the requirements of a Thin Client server computer (e.g. remote client management), as well as more generic server features like load balancing and failover mechanisms (see below). Server software is produced by the companies who manufacture the operating system as well as companies who specialise in server software.

Use of Thin Client Networks

A Thin Client network can be used anywhere but they have been widely adopted in organisations with multiple sites. Banks and real estate companies often use Thin Client options, where the operatives use a computer with limited functionality, linked to a central server. Thin client options are particularly suited to support remote working.

Birmingham Central Library has recently installed a Thin Client network for public use. This allows them some control over how they permit the public to use their network. The public can use standard software packages for word processing, spreadsheets/finance, drawing, and can gain access to the Internet; however, the system does not permit the use of disk drives (preventing the introduction of computer viruses), and does not permit downloading of software - again preventing potential viruses. The individual client machines are easier to maintain because there is less to go wrong.

Many schools have used a full or partial Thin Client solution (a partial solution is a mixed network environment where there are some computers functioning as networked PCs with other computers being used as Thin Client machines). Some of the advantages of Thin Client networking in certain circumstances can be major

disadvantages in others. As with any network solution, it is important to have a clear idea of requirements.

Advantages of Thin Client Networks

Manageability

- Installation and upgrading of software is considerably easier. It is only necessary to upgrade the software on the server rather than on each individual computer on the network.
- Monitoring the software on the network is also easier as there is only one machine to monitor (the server computer) rather than all the machines on a network. This is also advantageous when trying to carry out a software audit and provides some consistency across the network.

Security

- It is more difficult to introduce viruses to a Thin Client network as there are fewer points of entry to the network; it is usually not possible to download software from the Internet to the client machine; client machines do not have operable disk drives so viruses cannot be introduced through virus infected disks. This is particularly useful in a school environment when you wish to restrict pupil's use of disks brought from home.
- Additional server software can limit the execution of email attached documents and therefore significantly reduce the threat of computer viruses.
- Terminals do not store data so if they are stolen, it is only the equipment, which needs to be replaced rather than the data.
- Schools have reported that Thin Client terminals are considered less desirable to thieves than PCs and therefore are less likely to be stolen.

Administrator control

- Users cannot load their own applications or change configuration settings without the administrator's permission. This in turn helps to prevent unauthorised use of software or the introduction of unlicensed software to the network.

Hardware cost

- Thin client computers tend to be less expensive then PCs on a network. Furthermore, as Thin Client machines have fewer movable parts, they are less prone to breakdown, damage or disrepair and therefore have greater longevity. The longer-term costs of Thin Client machines should be lower than those for a Fat Client network. However, this cost saving is countered to some degree by the fact that the server computers used to service a Thin Client network are invariably more expensive as they need to be of a higher specification. Typically Thin Client network servers need to have greater processing speeds, greater memory capacity and more storage to be able to deal with the higher amounts of processing required.

Ease of upgrade/reduction of downtime

- It is relatively easy to add another terminal to the network and software to be installed on the terminal can often be done remotely from a central location
- Faulty units can simply be replaced without the need to diagnose faults at the machine.
- Energy saving - Thin Client terminals use considerably less energy than PCs because they perform very little processing on the client machine. Various studies have shown that a Thin Client machine can use as little as 10 - 20 watts of electricity an hour compared to up to 280 watts an hour on a PC,
- Facilitates 'hot-desking' or working across various sites.

Disadvantages of Thin Client Networks

Inflexibility

- What you see is what you get. If a particular application or add on has not been installed on the server, it is not possible for a user to download it to the client machine. This is a particular disadvantage for downloading software from the Internet, or trying to install plug-ins or software upgrades. The system administrator needs to be very proactive in anticipating what users will require especially for upgrades to commonly used tools (e.g. Acrobat Reader, Flash plug-ins, the various Media players etc). For users used to using stand-alone PCs and being able to download software as they require it, it can be frustrating to need to seek the help of the system administrator or network manager to perform these tasks.

Reliance on the server

- It is absolutely vital that the network server is robust and very reliable. If the network server fails on a Thin Client network, all terminals on the network are unusable until the network is restored. On a traditional server based network, only access to network resources (shared peripherals devices, shared files) is lost in this event so applications on an individual machine will still continue to work when the network goes down.
- It is very important that the network and servers are configured optimally and that suitable server options are in place. Such options might include
  - *Failover mechanisms* - failover is a mode of operation where some parts of a network system (e.g. a processor, server, network, or database) are carried out by another system component if the main component becomes unavailable (e.g. through breakdown or failure).
  - *Load balancing* - is dividing the amount of work that a computer has to do between two or more computers so that more work gets done in the same amount of time. Load balancing can be implemented with hardware, software, or a combination of both.
  - *Clustering* - is using several computers (and/or other devices) to form one server system. Typically each computer has responsibility for defined tasks. A common cluster configuration in schools might be a file server, an application server, a proxy server, a cache server and a mail server. This ensures that should one server malfunction, the tasks associated with the other servers will continue. An additional backup server may be considered as a complement to the usual backup solution.

Bandwidth issues

- Like any network, the amount of available bandwidth for any user will depend on the number of other users on the network. As Thin Client requires practically all processing to be carried out on the server, there is considerably more network traffic as all processing commands and resulting actions need to be transmitted across the network.

Lack of disk drives

- It is not possible to use floppy disks or CDs on the client machine with a true Thin Client solution.

Use of peripheral devices

- This can be limited. Some Thin Client devices now come with a variety of ports to allow peripheral devices to join the network, though most do not. Therefore integration of devices such as digital cameras or video equipment may not be possible.

Poor multimedia performance

- Graphics intensive applications or multimedia programs which require high levels of processing may not work well on Thin Client networks because processing is performed by the server and is shared with the rest of the network. Recent advances in both processing technology and server technology have helped alleviate this to some extent, but there still remain some problematic areas e.g. real time applications by their very nature will encounter latency on a Thin Client network. There are specific products on the market, which enhance multimedia performance. These products give access to the media player locally (at the client machine) whilst running other applications at the server. For example, certain Windows Based Terminals (see below) have the ability to run more multimedia rich programs, as typically they will have more processing power on the client machine.

Other Options

As mentioned above, there is a range of 'thinness', from a true Thin Client at one end of the spectrum where only mouse clicks and graphics are processed on the client machine with all other processes being carried out by the server; to a network architecture where much of the processing is undertaken on the client machine but with some of the client machine's functionality disabled

Ultra Thin Client

The user has a keyboard, mouse and a monitor. The client machine only processes keyboard input and screen output. All of the remaining processes are carried out by a designated server. These have the added advantage of saving space as there is no 'box' containing the hard disk, expansion cards, disk drives, memory cards etc.
Certain terminals now use smart card technology to log the user onto the machine and to store a user's settings e.g. the Sun Ray range from Sun Microsystems.

Windows Based Terminals (WBT)

There are terminals, which are designed to complement the Windows operating system and Windows products. There are two types
1. Those with Windows Based Terminal Standard where the Windows environment is displayed on the desktop through the use of Microsoft Remote Desktop Protocol (RDP) or the Citrix Independent Computing Architecture (ICA) display protocols (see below)
2. Those which use a proprietary client operating environment with support for Citrix ICA to display Windows applications (e.g. Linux with Tarantella).

Notable providers of WBT are NCD, Wyse, Neoware and Compaq.
Also falling within the category of Windows Based Terminal is a PC configured for Thin Client networking. The key features of these machines is that they permit certain processes, e.g. multimedia applications to be run on the client machine rather than executing them on the server.

Internet terminals

As the name suggests these are terminals with embedded Internet browser support. Internet Terminals are more expensive than Windows Based Terminals as they (Internet terminals) have more functionality.

Low spec PC solution

Because client machines in a Thin Client environment undertake very little processing, older and lower specification PCs can be used as Thin Client terminals. This approach can be used effectively in a school environment to increase and enhance computer provision without the costs associated with either a complete

upgrade or change to a complete Thin Client solution. Instead of disposing of old computers and monitors, they can be recycled and linked to a Thin Client network to undertake less demanding capacity computer tasks (e.g. word processing). This particular use should not be underestimated. As previously mentioned, there will be the additional costs associated with the server and network administration but there is very little cost associated with the terminals themselves.

Tubby clients

Tubby clients are PCs with their own operating system and some applications which are run on the client rather than the server, but which can also connect to the Thin Client network via software installed on the client machine. This allows newer applications that may not run on the client machine (e.g. because it has a legacy operating system) to be run from the server via a Thin Client connection.

It could also permit the use of earlier versions of applications to run on a server with an earlier operating system, even though the client machine may be running the latest version of the software.

This would be particularly useful to schools not wanting to lose the availability of older, but regularly used, software.

Disabled PC solution

Using standard PCs to perform a Thin Client role with floppy disk and CD drives disabled to prevent their use. This is not a particularly good use of resources if used as a long-term solution, but it could be useful in a mixed environment where there is a Thin Client network as well as a standard network. This would enable some flexibility as the disabled PC could be used as a Thin Client machine, or if required, re-enabled to work on the standard network or as a stand-alone PC.

Blade PC architecture

An emerging technology is the blade server, which is sometimes referred to as a high-density server and is typically used for clustering. A Blade PC architecture uses PCs as individual servers as well as maintaining their PC function. These Blade PCs are held in a central location. A manager server controls these individual Blade PCs and manages load balancing between them. The users monitor, keyboard, mouse and other peripherals connect to a connection device on the desktop which in turn connects to the PC Blade chassis via a standard network cable connection (Cat-5).

This is currently an expensive solution, which requires a very experienced network manager to maintain the system. It may not be particularly suited to schools at the current time.

Thin Client Network Protocols

Citrix ICA protocol is a client-server protocol that allows a client device to connect to a Citrix WinFrame or Metaframe server. It also permits a variety of operating systems servers (eg Unix, or Novell) to access and run Windows applications. Microsoft RDP protocol is a client-server protocol that allows a client device to connect to a Microsoft Terminal Server. The dominance of Windows as an operating system and Citrix as server software has meant that other server software and applications have tended to conform to one of these two protocols. The emergence of Microsoft's Windows Server 2003 has meant that Citrix software is no longer required to run Windows applications on non Windows network devices.

Key Issues for Thin Client Networks

The Total Cost of Ownership (TCO) of a Thin Client solution varies. Several analysts have indicated that, in a business context, the TCO of Thin Client is cheaper than a networked PC solution - with figures varying between 20% and 35% cheaper; but these figures do depend on a number of other factors.

a) There are cost advantages when implementing a Thin Client network solution from scratch.
b) Replacing an existing network system and moving to a Thin Client solution may not be cost effective in the long term especially if the existing network is effectively implemented.
c) Adding to an existing system may require more work as there may be issues of compatibility and interoperability between client machines and servers, especially if the existing set up requires machines to be modified to act as Thin Clients. This may be time consuming and may require professional support.

Other factors like size of network, number and experience of network staff, and software used can affect the TCO. The upheaval of moving from one system to another is often not quantified in terms of financial cost; cost alone may not be the best criteria for deciding whether to implement a Thin Client network.

Need for a Systems Administrator on site

The initial setting up of a Thin Client network infrastructure in a school will have implications in terms of added workload. With a Thin Client solution, software upgrades to client machines can be achieved remotely from the server (this can be done to a certain extent on networked PCs if individual machines are running the same software). This saves a network manager the need to go to every PC on the network to either manually install a piece of software or implement an upgrade, or when undertaking a software audit. On a small network where all the client machines are in the same room this is not so important. On larger sites or where machines are dispersed over a number of areas, a Thin Client solution can improve network management.

Cost Effectiveness

A Thin Client solution becomes more cost effective as the number of machines added increases (less maintenance, less software installation etc). For smaller networks the additional costs of a Thin Client solution, e.g. a more powerful (and therefore expensive) server combined with the additional administrative/ technical overheads may be a problem.

APPENDIX 20: HARDWARE SPECIFICATIONS & COST IMPLICATIONS

Currently there are at least three specifications under consideration by MoPE. These are:

1. **The O'zbeko'quvavtomatika Specification**: This is the specification currently used to equip schools in 2005

The Teachers' Work Station (TWS) is the main server and runs on Windows 2003 Server. It provides a frame for applications and learning software.

TWS requirements:
Case MidTower 300 W ATX 220V / Motherboard with Pentium IV Intel 3,06 GHz / CDRW with the speed at least 52x32x52 / HDD not less than 120 Gb / FDD 3,5 " 1,44 Mb / CD-RW not less than 700 Mb / stabiliser 300 Wt / RAM not less than 1024 Mb/ video card not less than 128 MB / sound card / Monitor SVGA 19" / key board / Laser printer / Optical mouse / mouse pad / microphone / active speakers / network card up to 100 Mbit/sec / modem 56 K Bit/sec / Web cam / Scanner / tripod screen 1,5x1,5 meters. Note – a data projector for display is not included in this specification

The Student Work Station (SWS) should run on Windows XP Pro Rus and perform functions of the w/s of remote automatic start up and provide information exchange option with the network server and operate non-network system and application software.

SWS set requirements:
Case MidTower / Pentium IV Intel 2.8 GHz / FDD 3.5" 1.44 Mb / CD-RW not less than 700 Mb / HDD not less than 80 Gb / CD-ROM not less than 52x / stabiliser 300 Wt / RAM not less than 512 Mb / video card not less than 128 MB / sound card / monitor SVGA 17" / keyboard / optical mouse/mouse pad / earphones with microphone /network card up to 100 Mbit/sec on board
A Multimedia Learning Computer Lab (MLCL) includes 18 SWS.

The Local Area Network should provide:
- Network connection between 18 SWSs and the TWS;
- Up to 100 Mbit/sec speed;
- Simultaneous or individual program start up of SWS from the TWS and data exchange between them;
- Screen monitoring option on TWS for SWS; messages and data exchange between SWS;
- Data exchange between TWS and SWS through HUB at 10/100 Mbit/sec.

The MLCL should be provided with cables for each station of UTP-5 with connectors RJ-45 and 1 HUB.

The Software package should include:
All software packages for the w/s should be licensed and should be provided as a part of new w/s sets.
- OS MS Windows 2003 Server and up;
- OS MS Windows XP Pro Rus and up;
- SP MS Office XP and up (full version);
- Learning software;
- Fast testing and diagnosis software of w/s;
- Archives;
- Antivirus software.

Power supply kit should include:
- UPS 1000 VA only for TWS for 220W 50 Hz network;
- 5 housing extension for each PC;
- 5KWt Stabiliser for 160-260V 50Hz incoming and 220V outgoing voltage.

2. **The Chinese Specification**: The GOU is negotiating with a Chinese company, CNTIC IBC, to equip 2,000 basic schools with 2,000 computer classrooms

through low-interest loans. The estimated cost per classroom is US$9,500 with US$1m reserved for maintenance i.e. US$500 per classroom.

The Teacher Work Station requirements:
Running on Windows 2003 Server – providing a frame for applications and learning software
Case MidTower 300 W ATX 220V
Motherboard with Pentium IV Intel 2.93 GHz: 915PE (with integrated sound card)
CDRW with speed at least 52 x 32 x 52
HDD not less than 120 Gb
FDD 3.5" 1.44 Mb
CD-RW not less than 700 Mb
RAM not less than 512 Mb
Video card not less than 128 MB
Monitor SVGA 19"
Keyboard
Laser Printer
Optical Mouse
Mouse Pad
Microphone
Active speakers
Fast Ethernet card up to 10/100 Mbit/sec
Modem 56K Bit/sec

Note that there is no power stabiliser (UPS), data projector, web cam, tripod screen (1.5 x 1.5 metres) or scanner

Student Work Station requirements:
Running on Windows XP Pro Rus
Case MidTower 300 W ATX 220V
Motherboard with Pentium IV Intel 2.93 GHz: 865PE (with integrated sound card)
HDD not less than 80 Gb
FDD 3.5" 1.44 Mb
CD-RW not less than 700 Mb
RAM not less than 256 Mb
Video card not less than 128 MB
Monitor SVGA 17"
Keyboard
Optical Mouse
Mouse Pad
Microphone
Earphones
Network card up to 10/100 Mbit/sec

Note that there is no power stabiliser (UPS)

Specifications for networking, cabling, software and maintenance are not currently available.

3. **The US Specification**: The MOPE is in discussion with Hewlett-Packard – an American company - to equip basic schools with Appliance servers and Thin Client student workstations. The specifications for the servers and student workstations are taken from the demonstration system, which is currently under test at the Tashkent City In-Service Teacher Training Institute. The following gives an indication of the server specification under test:

hp compaq Thin Client t5300
operating system software - Microsoft® Windows® CE .NET v4.20 with Internet Explorer 6.0
processor type - Transmeta Crusoe TM5600
processor speed - 533 MHz
standard memory - System memory: 64 MB SDRAM; (NOTE: 8 MB of system RAM is reserved for processor usage); Flash Rom: 32 MB
memory type - SDRAM and Flash ROM
expansion slots - No PCI expansion slot
audio - Output: 1/8 inch mini, full 16-bit stereo, 44-kHz sample rate; Input: 1/8 inch mini microphone
external i/o ports - 4 USB ports, RJ-45
keyboard - Enhanced USB with Microsoft® Windows® keys (104 keys) included
mouse/pointing device - Scroll USB mouse included
video ram - 8 MB SDRAM discrete graphics memory
network interface - TCP/IP with DNS and DHCP for easier addressing, 10/100 BaseT Fast Ethernet, twisted pair (RJ-45), Point-to-Point Protocol (PPP), Multiple master browser support on ICA, Supports Citrix load balancing on ICA, SNMP support allows configuration of terminal settings, reporting of terminal configuration and attached devices, and traps, DHCP support for automatic firmware upgrades and unit configuration
power supply type - Worldwide auto-sensing 100-240 VAC, 50-60 Hz energy-saving automatic power-down
dimensions (w x d x h) - 55 x 205 x 195 mm
weight - 1.39 kg

In all three schemes, the number of SWSs is not defined, so to make comparisons on capital investment costs, a mean of 12 workstations (1 Server + 1 TWS + 10 SWS) is assumed. Thus, the estimated capital investment costs in US$ for each of the three specifications is provided below (assuming a mean of 10 SWS + 1 TWS computers per suite):

Specification	per TWS	per SWS	Peripherals	per suite
A O'zbeko'quvavtomatika	1048.70	602.10	329.00	7398.70
B Chinese	825.10	569.10	189.00	6705.10
C Hewlett-Packard Server HP Proliant ML 150 – US$2,323.00 is current cost of the server (this includes cost of MS Windows Server 2003 for 10 SWS)	1037.00	628.00	Printer Scanner Copier – 99.99 Switch – 100 Digital Projector – 999.99 HP 50in Presenter Projector Screen – 299.99	11139.97

Note that only Specification C includes the cost of an MS software license.

Under the Chinese scheme, MOF is expecting to purchase 2000 suites for US$19m i.e. each suite will cost US$9,500 implying that they will be expecting to purchase 18 SWSs + 1 TWS for each computer suite

Distribution of Computer Suites by O'zbeko'quvavtomatika/IREX Projects (1998 – 2004)

Year	Type	No of Computer Suites Delivered to schools	No of Computers Delivered to schools	Total No in Schools Target[80]
1995	IBM 386	264	3036	
1996	IBM 386 / 486	187	2151	
1997	----	0	0	
1998	IBM 486	78	897	
1999	IBM 486 / Pentium I	32	368	
2000	Pentium I	83	955	
2001	Pentium I / Pentium II	158	1817	
2002	----	0	0	10,700
2003	Pentium III / Pentium IV	232	2668	12,700
2004	Pentium IV	276	3174	15,400
	Total 1998 – 2004	**859**	**9879**	
2005/6	Projected	2986*	34,339*	17.800
2006/7	Projected	1912*	21,988*	
2007/8	Projected	1912*	21,988*	
2008/9	Projected	1912*	21,988*	
2010				110,000

NB In this table a mean of 11.5 computers per suite is assumed

In 2005 it is estimated that there are 13,250 IBM compatible PC's already located in 1152 Basic Education schools i.e. a mean of 11.5 computers/school. Of these, 3,370 are estimated to being close to obsolete.

The Ministry of Finance has allocated US$ 73m over 5 years (2005 – 2009) for the purchase of hardware. It has stated that 986 computer suites will be delivered in 2005/6 (a total of 8,633 suites in total will be delivered over the 5 year period). This works out to be US$8,456 per computer suite. Working on the basis of 1 TWS + 18 SWSs, this works out at US$445 per work station. Working on the basis of 1 TWS + 10.5 SWSs, this works out at US$735 per work station. The total number of computer suites likely to be delivered in 2005/6 is 2986, if the Chinese deal goes ahead. On the basis of the projections provided above there should be in 110,183 modern computer work stations in schools by 2010 to serve a current basic school population of 6.1 million – an overall computer to student ratio of 1:55.

There are a number of key issues arising from this complex situation:

a) The distribution of hardware is not planned according to any kind of criteria:
   - E-readiness of schools
   - Readiness of network manager assistants
   - Preparedness of IT, Mathematics, Science and Language teachers
   - Number of work stations appropriate for size of school and classes
   - Likelihood of many schools starting with one or two computers rather than a complete suite (see below)

b) Networking specification

c) Installed software definition
   - Operating System
   - Software tools e.g. MS Office

[80] From Annex 8 to 2002-2010 Program for Development of Computerization and Information and Communication Technologies

- Turnkey software for subject e-learning resources

d) Necessary / desirable peripherals
- Data projector and screen or whiteboard
- Printer
- Scanner
- Digital camera

e) Consumables, including the question of budget allocations
- Printer paper and ink
- Electricity
- Whiteboard pens
- Projector bulbs

The following three options for computer suites need to be considered by MoPE, any one not being exclusive of the others:

Fat client networks

This is a traditional network as supplied through O'zbeko'quvavtomatika. It is by far the most commonly used type of network found in schools world-wide and allows users great flexibility in a wide range of processing e.g. video, sound. An example of a Fat Client is the typical network-ready desktop PC, which does the majority of the application processing as well as storing applications software and data on its own hard disk. It can also be networked to provide access to shared files and resources.

TWS
Socket 478 ASUS P4C800-E Deluxe <i875P, DDR, AGP8x, Sound, SATA RAID, 1394, GB Retail
CPU Pentium 4 530 BOX <3.0GHz, 800FSB, 1024Kb, LGA775>
DDR 512 Mb (pc-3200) 200MHz/ 400Mbps Kingston <Retail>
DDR 512 Mb (pc-3200) 200MHz/ 400Mbps Kingston <Retail>
HDD SATA 120.0 Gb Seagate ST3120026AS Barracuda 7200.7 <7200,8Mb>
HDD SATA 120.0 Gb Seagate ST3120026AS Barracuda 7200.7 <7200,8Mb>
256Mb <AGP> PowerColor R96-HD3C <RADEON 9600 BRAVO, DDR, 128bit, TV-Out, DVI, Retail>
DVD+RW+DL SONY DRU-720A 16-/16+R/4DL+R/6-/8+RW/16x, 48/24/48x <IDE, Retail>FDD 3.5 HD NEC <Silver>
MidiTower InWin J-551T ATX (P4-Ready) 350W 12V Fan&Audio
MOUSE Genius 5C026 Nets optical PS/2
MOUSE PAD INTERNEXT
KEYBOARD 107 Logitech TIGER W
MICROLAB X-AUDIO X1/2.1 subwoofer
Headphones with mic Cosonic CD-830MV (with volume control)
"17"" HP-COMPAQ V7550 CRT Monitor 16.0"" via Flat faced shadow mask. Dot pi"
Network filter (PILOT) 6 SOCKET 3m UNIVERSAL
SWS
Motherboard Socket 478 ASRock P4S61 SIS661FX FSB800 3DDR400 AGP8X \
6xUSB2.0 \SVGA64\ SOUND5.1 \ LAN 10-100
CPU Celeron-D 320 BOX <2400MHz, 533FSB, 256Kb, 1.400V, Socket478>
DDR 256 Mb (pc-3200) 200MHz/ 400Mbps PH
HDD 40.8 Gb Seagate Barracuda ST340014A ATA100 7200,7rpm
128Mb <AGP> AXLE GeForce FX 5200 AGP8X+DVI+TV-Out DDR(128bit)
CD ROM DRIVE 52X IDE LG CRD/GCR-852X <Silver>
FDD 3.5 HD NEC <Silver>
Case Pentium-4 COMPUTEK 101B ATX 300W
KEYBOARD 107 PC/2 Slim
MOUSE INFORMIX 800 dpi OPTICAL PS/2
MOUSE PAD INTERNEXT
ACTIVE SPEAKER Genius SP-Q06 120W
HEADPHONE Soncm SM-806
17" KTC 7002FD <0.25, 50-160Hz, 1280x1024@60Hz
Network filter (PILOT) 6 SOCKET 3m UNIVERSAL
Peripherals
UPS 1500VA Back POWER COM Line-Interactive,Automatik Voltage Regulator
Digital camera Genius G-Shot G511, Silver 3.1Mp, 4x Zoom, слот SD/MMC
Laser printer CANON LBP-1120 2400*600dpi, A4 10k/m.USB
Scanner HP Scan Jet 4070
HUB Switch MERCURY S124 24-port
RJ-45 Connector Cat.5
Cable UTP 4 pairs cat.5 <hank 305m> Alcatel/PCNet/GCI Gen.Cable
ZyXEL Omni 56K UNO Ext Retail
WebCam INTOUCH <640*480,color>
Acer Portable Projector PD116 (DLP, 800x600, D-Sub, RCA, S-Video, USB, Remote control)

Tripod screen DRAPER DIPLOMAT 5 MW/BB/BC <429174>
CD-RW 80min 700Mb Melody <4-12x Speed>Slim Case

Tubby client networks

Tubby clients are PCs with their own operating system and some applications which are run on the client rather than the server, but which can also connect to the Thin Client network via software installed on the client machine.

TWS
Socket 478 Albatron PX865PE PRO <i865PE.DDR.AGP8x.Sound.SATA Lan.ATX.Retail>
CPU P4 Socket 478 2800E BOX <533FSB, 1024Kb, 1.400V, Socket478>
DDR 512 Mb (pc-3200) 200MHz/ 400Mbps Kingston <Retail>
DDR 512 Mb (pc-3200) 200MHz/ 400Mbps Kingston <Retail>
HDD SATA 120.0 Gb Seagate ST3120026AS Barracuda 7200.7 <7200,8Mb>
256Mb <AGP> PowerColor R96-HD3C <RADEON 9600 BRAVO, DDR, 128bit, TV-Out, DVI, Retail>
DVD+RW+DL SONY DRU-720A 16-/16+R/4DL+R/6-/8+RW/16x, 48/24/48x <IDE, Retail>

FDD 3.5 HD NEC <Silver>
MidiTower InWin J-551T ATX (P4-Ready) 350W 12V Fan&Audio
MOUSE Genius 5C026 Nets optical PS/2
MOUSE PAD INTERNEXT
KEYBOARD 107 Logitech TIGER W
MICROLAB X-AUDIO X1/2.1 subwoofer
Headphones with mic Cosonic CD-830MV (with volume control)
"17"" HP-COMPAQ V7550 CRT Monitor 16.0"" via Flat faced shadow mask. Dot pi"
Network filter (PILOT) 6 SOCKET 3m UNIVERSAL
SWS
Motherboard Socket 478 ASRock P4S61 SIS661FX FSB800 3DDR400 AGP8X \ 6xUSB2.0 \SVGA64\ SOUND5.1 \ LAN 10-100
CPU Celeron-D 320 BOX <2400MHz, 533FSB, 256Kb, 1.400V, Socket478 DDR 256 Mb (pc-3200) 200MHz/ 400Mbps PH
CD ROM DRIVE 52X IDE LG CRD/GCR-852X
Case Pentium-4 COMPUTEK 101B ATX 300W
KEYBOARD 107 PC/2
MOUSE INFORMIX 800 dpi OPTICAL PS/2
MOUSE PAD INTERNEXT
ACTIVE SPEAKER Genius SP-Q06 120W
HEADPHONE Soncm SM-806
17" KTC 7002FD <0.25, 50-160Hz, 1280x1024@60Hz
Network filter (PILOT) 6 SOCKET 3m UNIVERSAL
Peripherals
UPS 1500VA Back POWER COM Line-Interactive,Automatik Voltage Regulator
Digital camera Genius G-Shot G511, Silver 3.1Mp, 4x Zoom, слот SD/MMC
Laser printer CANON LBP-1120 2400*600dpi, A4 10k/m.USB
Scanner HP Scan Jet 4070
HUB Switch MERCURY S124 24-port
RJ-45 Connector Cat.5
Cable UTP 4 pairs cat.5 <hank 305m> Alcatel/PCNet/GCI Gen.Cable
ZyXEL Omni 56K UNO Ext Retail
WebCam INTOUCH <640*480,color>
Acer Portable Projector PD116 (DLP, 800x600, D-Sub, RCA, S-Video, USB, Remote control)

Tripod screen DRAPER DIPLOMAT 5 MW/BB/BC <429174>
CD-RW 80min 700Mb Melody <4-12x Speed>Slim Case

Ultra Thin client networks (with *dumb* terminals)

The user has a keyboard, mouse and a monitor. The client machine only processes keyboard input and screen output. All remaining processes are carried out by a designated server.

TWS
Socket 478 Albatron PX865PE PRO <i865PE.DDR.AGP8x.Sound.SATA Lan.ATX.Retail>
CPU P4 Socket 478 2800E BOX <533FSB, 1024Kb, 1.400V, Socket478>
DDR 512 Mb (pc-3200) 200MHz/ 400Mbps Kingston <Retail>
HDD SATA 120.0 Gb Seagate ST3120026AS Barracuda 7200.7 <7200,8Mb>
128Mb <AGP> MANLI GeForce FX5700 LE-8x DDR, DVI TV-Out (128 bit)
DVD+/-RW TEAC (DV-W58G) 4-/ 4+R/ 2-/ 2, 4+RW/ 12x, 16/ 10/ 32x <IDE,OEM Black
FDD 3.5 HD NEC <Silver>
Miditower model RL-212 ATX 300W (for PIV)
MOUSE Genius 5C026 Nets optical PS/2
MOUSE PAD INTERNEXT
KEYBOARD 107 PC/2 GENIUS COMFY KB16E
ACTIVE SPEAKER Genius J06
Headphones with mic Cosonic CD-830MV (with volume control)
17" KTC 7002FD <0.25, 50-160Hz, 1280x1024@60Hz
Network filter (PILOT) 6 SOCKET 3m UNIVERSAL
SWS
Motherboard Socket 478 ASRock P4S61 SIS661FX FSB800 3DDR400 AGP8X \ 6xUSB2.0 \SVGA64\ SOUND5.1 \ LAN 10-100
CPU Celeron-D 320 BOX <2400MHz, 533FSB, 256Kb, 1.400V, Socket478
DDR 256 Mb (pc-3200) 200MHz/ 400Mbps PH
Case Pentium-4 COMPUTEK 101B ATX 300W
KEYBOARD 107 PC/2
MOUSE INFORMIX 800 dpi OPTICAL PS/2
MOUSE PAD INTERNEXT
HEADPHONE Soncm SM-806
17" KTC 7002FD <0.25, 50-160Hz, 1280x1024@60Hz
Network filter (PILOT) 6 SOCKET 3m UNIVERSAL
Peripherals
UPS 1500VA Back POWER COM Line-Interactive,Automatik Voltage Regulator
Digital camera Genius G-Shot G511, Silver 3.1Mp, 4x Zoom, слот SD/MMC
Laser printer CANON LBP-1120 2400*600dpi, A4 10k/m.USB
Scanner HP Scan Jet 4070
HUB Switch MERCURY S124 24-port
RJ-45 Connector Cat.5'
Cable UTP 4 pairs cat.5 <hank 305m> Alcatel/PCNet/GCI Gen.Cable
ZyXEL Omni 56K UNO Ext Retail
WebCam INTOUCH <640*480,color>
Acer Portable Projector PD116 (DLP, 800x600, D-Sub, RCA, S-Video, USB, Remote control)
Tripod screen DRAPER DIPLOMAT 5 MW/BB/BC <429174>
CD-RW 80min 700Mb Melody <4-12x Speed>Slim Case

An estimate of the capital investment costs associated with each of the three options (assuming a mean of 11.5 computers per suite) is provided below:

Scheme	TWS	per SWS	Peripherals	per Suite
Fat Client	1334.50	452.50	1875.70	8413.95
Tubby Client (mixed)	1091.50	341.50	1875.70	6894.45
Ultra Thin Client	814.50	317.50	1875.70	6341.45

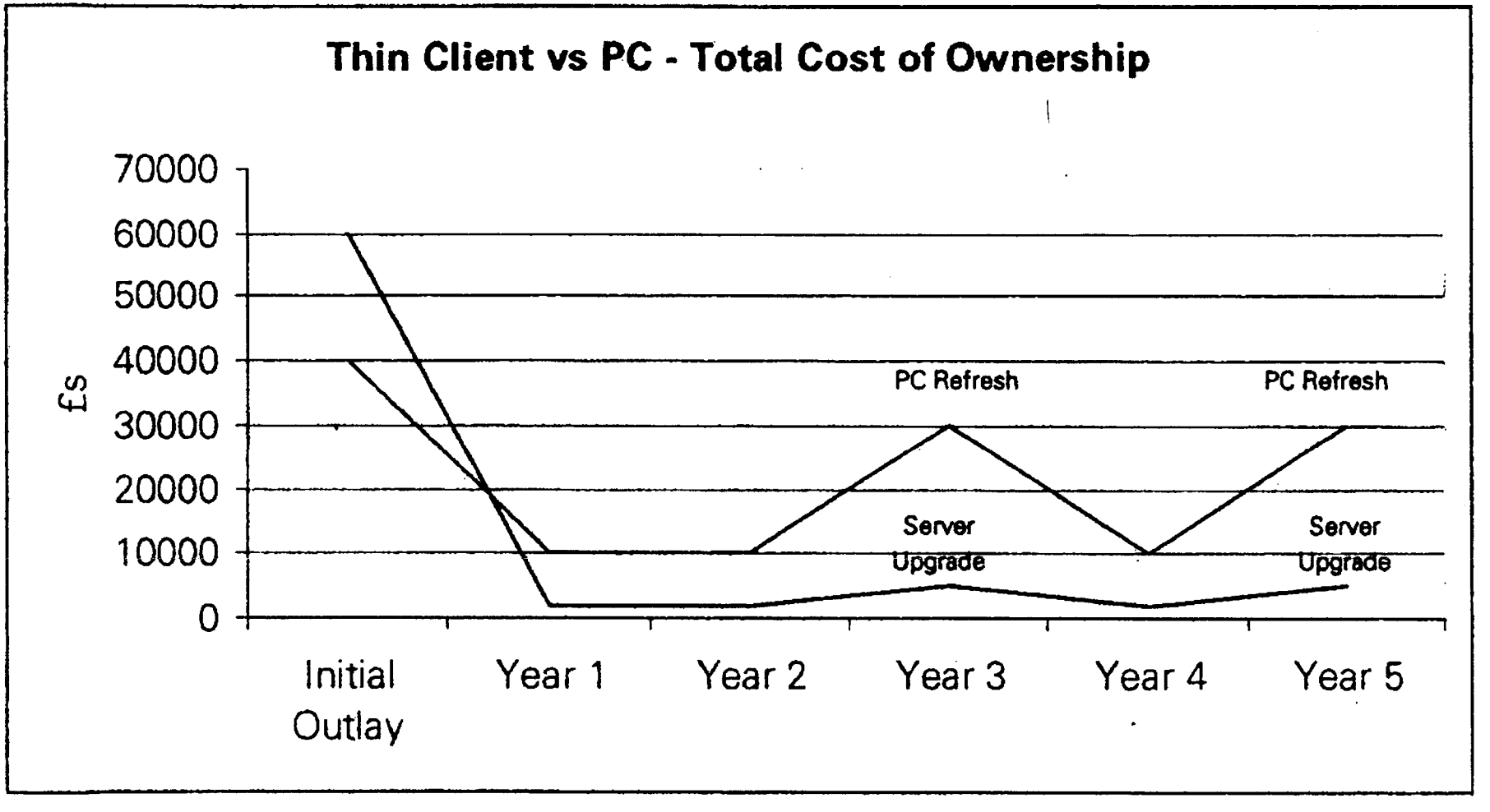
None of the above costings include any software.

Savings in initial investment costs of 18% for Tubby Clients and 25% for Ultra Thin Client options are therefore possible

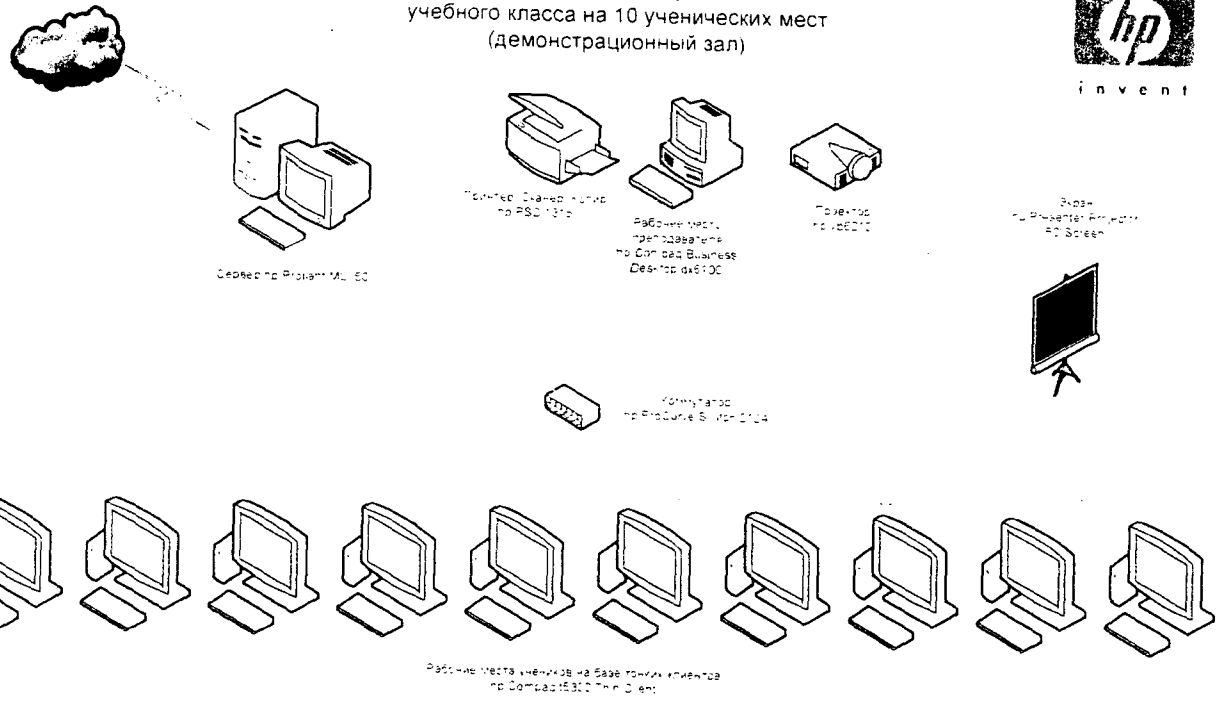
The comparative advantages and disadvantages of the three client options are provided in the Table below

Network Features	Fat	Tubby	Thin
Access to the Internet	✓	✓	✓
Application licensing for workstations	**YES**	**NO**	**NO**
Bandwidth	☺	😐	☹
Control	☹	😐	☺
Cost	☹	☺	☺
Dial-in access for remote users	✓	✓	✓
Ease of installation	☹	😐	☺
Ease of upgrading	☹	☺	☺
Energy use	☹	☺	☺
Firewall security for the internal network	✓	✓	✓
Flexibility	☺	☹	☹
Heat generated	**HIGH**	**AV**	**LOW**
Maintenance	☹	😐	☺
Manageability	☹	😐	☺
Multimedia performance	☺	😐	☹
Peripheral devices e.g. digital camera	☺	☺	☹
Reliability on server	☺	☹	☹
Security	☹	😐	☺
Space required	**HIGH**	**AV**	**LOW**
System Complexity	☹	😐	☺
User memory devices	☺	☺	☹
User security and file sharing dependent upon login	✓	✓	✓
Web access control by user, group, date and time	✓	✓	✓
Web caching for faster retrieval of web pages	✓	✓	✓

At present, there is a strong feeling that hardware and network specifications are being determined as a result of negotiations with suppliers. GOU/MOPE needs to turn this situation around and decide for itself the specifications that would best serve the educational, pedagogic, technical and financial objectives of ICT provision to Basic Education in Uzbekistan.


Thin Client vs PC - Total Cost of Ownership
70000
60000
50000
40000
30000
20000
10000
0
£s
PC Refresh
PC Refresh
Server Upgrade
Server Upgrade
Initial Outlay
Year 1
Year 2
Year 3
Year 4
Year 5

КОНФИГУРАЦИЯ
учебного класса на 10 ученических мест
(демонстрационный зал)



APPENDIX 21: ANALYSIS OF MAINTENANCE AND SERVICING COSTS IN UZBEKISTAN

This analysis is based upon an examination of the maintenance and servicing charges offered by;

(a) the USAID funded IREX Internet connectivity project;
(b) maintenance and servicing charges from O'zbeko'quvavtomatika;

At the request of the Ministry of Finance schools No. 50 and 110 in Tashkent city were also visited because these were considered to have realistic maintenance and servicing charges which were lower than those offered by IREX and O'zbeko'quvavtomatika. Finally there was a visit to the Raion Accountant in Mirabad Raion in Tashkent City Oblast in an attempt to establish Raion based contributions to maintenance and servicing costs for school No.110.

1. IREX maintenance and service charges

IREX maintains Internet connectivity in 60 pilot schools throughout the country in urban and rural areas but, generally speaking relatively close to Oblast centres. All IREX schools have a site manager who is paid $100 per month by the project. This will shortly cease and the schools will have to do without site managers. IREX schools are supplied with between 6 to 10 work stations and the hardware is used not only by the school but it is also made available to the local community in the evenings, an activity which has been quite successful in some cases.

IREX has used some of the O'zbeko'quvavtomatika engineers but have found that they had to be trained to a higher standard to cope with the work. IREX uses Cisco Academy Training. IREX assumes that one technician will be able to cope with no more than 10 schools.

On the basis of the above IREX estimates the following average maintenance costs for its 60 schools as follows:

- salary and expenses of technical repair specialists = US$13.6 per month per school;
- part replacement = US$16.40 per month per school;
- total = US$30 per month per school;

Assuming an average of 8 work stations per school this suggests an average cost of US$3.75 per PC per month. IREX also estimate that school consumables, based on an average 8 work stations, and comprising electricity, paper, tonor, print cartridges, disks, etc, averages out at US$37.50 per month per school and that connectivity charges averages around US$ 80 per month per school. In urban areas it can be significantly cheaper, in rural areas considerably more expensive.

2. O'zbeko'quvavtomatika

O'zbekio'quvavtomatika was created in 1984 but is now 'privatised' and has to bid competitively for MOPE and MOHSSE contracts. Although dominating in the field, it does not win every contract. The company has US$ and UZS bank accounts and is a registered tax payer.

O'zbeko'quvavtomatika offers regular maintenance for the first three years after intial delivery of equipment to a school. It provides regular intervals, four times a year, to check hardware and software. It is not clear if problem solving call outs are included in the quarterly charge for routine maintenance. In practice most schools do not have budgets within the school or Raion so very little maintenance or servicing is carried out. O'zbeko'quvavtomatika charges are considerably higher than those of IREX because their engineers are based in regional centres and may have to travel long distances to reach schools. The IREX engineers have significantly lower overheads concerning travel as most of the IREX schools are clustered around large towns. Also, O'zbeko'quvavtomatika has to maintain staff and a centre in every Oblast Raion and has to charge to cover these overheads. Most of their turnover comes not from the basic education system, which is considered to be seriously under-funded in this area, but through servicing and supplying ICT materials to lyceums, colleges, higher education institutions and private companies.

According to O'zbeko'quvavtomatika schools are selected to receive computer suites on the following basis. Annually, MOPE asks each oblast for a list of priority schools. The Oblasts ask their Raion Education Departments for a list of schools which are considered to be ready to receive a computer lab. Preparation of a school to receive the hardware is funded by the Raion Education Department in combination with sponsors and parental contributions. Self-evidently, this method favours schools in richer communities, because poorer communities are less likely to be able to afford the parental contributions, or to have the sponsors, who can support the necessary preparations. An alternative scenario is that schools are inadequately prepared in order to save money and this is a situation which has been noted quite frequently during school visits.

Taking all of the above into consideration O'zbeko'quvavtomatika offers the following breakdown of maintenance and servicing charges:

- salaries and expenses of technical repair specialists (including software support and fault handling) = $720 per annum per school or US$60 per month per school;
- part replacement, etc, - $300 per annum per school or US$25 per month per school.
- Total is equivalent to US$ 85 per month per school which assuming an average of 11.5 PCs per school works out at US$7.40 per PC per month.

Self-evidently the O'zbeko'quvavtomatika charges are very substantially higher than those of IREX.

3. Schools No. 50 and 110 in Tashkent Oblast

Both of these schools were suggested by the Ministry of Finance as worthy of visiting because they apparently had very low levels of maintenance and servicing costs. Both of the schools were in relatively affluent areas and one of the schools is a "show" school to which visitors are often taken. Both schools achieve substantial contributions from parents and both schools maintain funds for school development activities using these contributions.

Discussions with ICT staff and the school revealed that in neither school was there a clear understanding of the cost of maintaining and running ICT suites. The electricity

bills were paid directly by the Raion and there was no disaggregation that the bills linked to electricity charges associated with ICT could be identified. With computer suites of 10+1 machines it is likely that electricity usage will be in the region of 7kw/hour and thus electricity usage from the computer room is likely to be substantially greater than any other electricity usage in the school. Similarly, the Raion Education Department pays the schools' telephone bills and once again there is no disaggregation into Internet access charges and normal telephone traffic. Thus the school has no way of knowing how much cost it is incurring for these utilities.

On the basic operational costs of maintenance and servicing one of the schools receives free maintenance and servicing from a former pupil who runs a nearby Internet café and the maintenance and servicing for the other school is paid for from the parentally funded School Development Fund. The exact costs were not known to the ICT staff. A similar pattern exists with consumable costs, which again were picked up by the School Development Fund in both schools.

Superficially, the school has very low maintenance and servicing charges because none of the charges are accumulated in one place. None of the charges incurred within the school have to come from government funded budgets because they are all covered by parentally funded budgets.

It is clear that the situation in these two schools could hardly be regarded as typical for the country as a whole. Schools in poor areas would certainly need substantial budgets for maintenance and servicing and cannot be expected to generate the kind of parental contribution that appears to be normal for these two schools in Tashkent City.

4. Mirabad Raion Education Department

The main purpose of the visit was to put the conversations with school No. 110 into the context of the Raion Education Department.

School No. 110 has two budgets, one fixed by the state and the other privately funded by parents and sponsors.

The school's budget is fixed on a calendar basis by the Tashkent City Finance Department which divides available finances up Raion by Raion and then school by school with allocations made on the number of enrolments, the number of classes and the capacity of the school. There is a standard national format used to itemise expenditure under different budget headings, e.g. electricity, telephone, water, maintenance, etc and money can be vired between budgets to cope with over and under-spending. However, it is impossible for the Raion accountant to know how much electricity is used by the two computer rooms in the school compared to the electricity used in the rest of the school. Similarly, the accountant cannot disaggregate Internet charges from normal telephone traffic charges for the telephone account. The only items related to ICT that can be accounted accurately are maintenance and servicing for which the school director has signed a contract with O'zbeko'quvavtomatika. This is paid for on a quarterly basis and is covered by the state budget (not by the School Development Fund as claimed in the school). O'zbeko'quvavtomatika servicing and maintenance invoices relating to the fourth quarter 2004 and the first quarter of 2005 for school No. 110 were scrutinised. The quarterly rate was charged and US$243. Work carried out in the fourth quarter of 2004 was specified as the repair of five mice and three keyboards. Large repairs and more expensive replacements are not apparently covered by the service agreement.

There are 17 basic schools and one specialised boarding school in the Raion. All schools had some computers but it was not known which had new and which had old computers. The RED thought that most schools probably had contracts with O'zbeko'quvavtomatika for servicing.

5. Summary

There are significant differences between the IREX servicing charges and the servicing charges of O'zbeko'quvavtomatika, which are partly explained by the need for O'zbeko'quvavtomatika to travel considerable distances to supply services and the need to pay the overhead charges of Oblast based offices.

It is clear that school No. 110 does not operate at unusually low maintenance and servicing charges. It has a servicing contract with O'zbeko'quvavtomatika for which it pays close to US$1,000 per year from the Raion Education Department budget. School No. 110 maintains 24 computers and it pays the equivalent of US$ 40.50 per year or, on the assumption, of an effective 10-month operational year, US$4.05 per month. This is somewhat cheaper than the prices quoted by O'zbeko'quvavtomatika and is roughly comparable to the servicing charges made by IREX. It is worth noting, however, that school No. 110 is within Tashkent City and that travelling costs for servicing are therefore very low.

APPENDIX 22: CRITERIA FOR THE SELECTION OF CLUSTER LEADER SCHOOLS (CLSs)

Schools selected to be Cluster Leader Schools should meet the following criteria:

- They should be centrally located within their designated cluster of schools
- They should be no further than 20-25 kilometres from every other school in the cluster
- They should be easily accessible by normal transportation links (road and railway where appropriate)
- They should have at least one (preferably two) digital phone lines and should be easily connectable to the Internet
- The School Director, staff and parents should signify their willingness to act as a CLS
- The schools should have two rehabilitated classrooms (one for school ICT use and one for cluster training purposes) adequate for the required number of computer workstations and wired up to acceptable safety standards
- There should be adequate, secure storage for the peripherals and consumables
- CLSs must have at least two staff trained as School Network Managers
- CLS staff should be actively concerned to develop ICT use across the curriculum
- CLS staff, students and parents should all be willing to participate actively, if so required in a variety of pilot projects and experiments

APPENDIX 23: INSETT ISSUES

The current INSETT system in Uzbekistan operates at two levels: (a) the provision of residential courses at 16 oblast-based Regional In-Service Teacher Training Institutes (RITTIs). One RITTI is specialised on pre-schools and the A Avloni Institute is responsible for training School Directors, Oblast and Raion management staff and oblast and raion methodologists. The courses are demand driven by requests from schools to raions, which are consolidated and passed to oblasts, which are again consolidated and passed to MOPE. MOPE scrutinises the annual requirement and, based on budget availability, creates an annual INSETT programme for each RITTI. The A Avloni Institute in Tashkent is generally responsible for course development, and designed courses are sent to each RITTI, who can amend or adapt the core courses for their own purposes as required. All INSETT training in RITTIs is residential and course duration is generally from 2-4 weeks. Ordinary teachers are allocated 4 weeks of residential in-service training every 5 years in a speciality of their choice (or one agreed with the raion methologists). Methodologists, school directors and management staff are allocated 4 weeks of residential in-service training every 3 years; (b) at the school level, every teacher is paid on the basis that 20% of their working time will be allocated to Continuous Professional Development activities. In general, every teacher is required to spend one day a week on CPD activities. In reality, this now often takes the form of lesson preparation or marking students' work or completing the paperwork required for the current student rating system. Because operational budgets in schools and raions/oblasts have deteriorated it is probable that a majority of school teachers no longer engage in meaningful CPD activities on a weekly basis[81]. The teacher focus group interviews in the PPTA School Survey suggest that many teachers feel the need for far more upgrading than they currently receive, particularly on ICT, student-centred and individual learning and higher order thinking skills etc.

The current system of INSETT is widely considered to be unsatisfactory for the current demands from the education system[82] for the following reasons: it is (a) inflexible; (b) too centralised; (c) poorly targeted; (d) infrequent; (e) residential, which is a problem for many women teachers who also have families to look after, particularly in poor rural areas, and who would prefer to have training closer to home and more flexibly delivered. The INSETT system needs to be adjusted to become more flexible, closer to schools, more responsive to a rapidly changing education environment and the new demands placed upon teachers by MOPE policies, in line with the personal and professional skills required by teachers, students, schools and parents, and much more highly prioritised and targeted on the key skills needed to support reform. Ideally, a revitalised and redirected INSETT system should also provide incentives for teachers by providing salary premiums for the achievement of high priority courses/skills

School based CPD, while conceptually excellent, is failing because of a lack of allocated budgets to provide a comprehensive, high quality programme and the lack of school-based training and development activities and facilities, which are in line with current teacher needs. Most raion methodologists themselves require intensive training in many of the new skills, and most teachers are not in a position to develop appropriate skills in other teachers. MOPE also considers that there is a lack of suitably qualified, appropriately skilled staff in many of the RITTIs and that intensive programmes of inspection, training and recruitment are necessary.

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[81] A few teachers have reported that INSETT costs at raion/oblast level have been deducted from their salaries

[82] The need to adjust and rethink INSETT ivia the RITTI system in Uzbekistan is implicit in the objectives of the ESDP. The Rector of the A Avloni ITTI also believes that current INSETT is too centralised, too irregular and too inflexible and that reforms are overdue. He argues however that the basic RITTI system should be retained but should be made more responsive to the needs of schools and teachers. The concept of the school clusters restores the continuous professional development capacity of the system at a school level and should not affect the reforms in INSETT currently underway via ESDP

RITTIs are funded by the MOPE budget. A Avloni will receive an annual budget in 2004/2005 of around US$0.5 million. This budget is supposed to cover staff salaries (63 permanent staff), course development and printing costs, utilities and maintenance, other operational costs, transport for trainees and subsistence and accommodation for trainees. In 2004/2005 A Avloni will provide approximately 18,000 person weeks of training to 4,500 trainees. Thus, the approximate unit cost of one week of residential training at the A Avloni ITTI is approximately $28 per person per week. A Avloni also houses the Distance Education Development Centre funded by the ESDP Project.

RITTIs are basically trainers. The A Avloni ITTI is a course developer and a trainer. None of the RITTIs consider themselves to be inspectors and quality control over the training is not exercised by the RITTIs but by MOPE. Meetings with the Teacher Education Department in MOPE confirm that MOPE is concerned by current variations in training quality between different RITTIs. A new MOPE resolution is in preparation, which will send teams of inspectors to each RITTI in order to report on quality and performance and to recommend improvements. A recent inspection of the Khorezm ITTI comprised two representatives from MOPE, two from other RITTIs and one Oblast Deputy Director of Education. There is also an RITTI Rectors Council which meets every two months, chaired by the First Deputy Minister of Education, which also provides a forum for raising issues of concern.

MOPE considers that variations in INSETT quality within the RITTI system have the following causes: (i) lack of suitably trained staff (only 10% of RITTI staff have higher qualifications. 34% are basically qualified while 56% are considered to be under qualified); (ii) RITTI staff are themselves in urgent need of training and upgrading; (iii) a number of the Oblast RITTIs have sub-standard facilities; and (iv) there is a problem of inadequate operational budgets which tends to operate against the consistent delivery of high quality in-service teacher training.

MOPE estimates that 75-80% of RITTIs have modern computer rooms. A Avloni, for example, has five classrooms each with 10 Pentium I machines. ESDP will provide equipment upgrading to the computer facilities in the RITTIs.

APPENDIX 24: NOTES & PRO FORMAS FOR CONTINUOUS PROFESSIONAL DEVELOPMENT

- Current INSETT in Uzbekistan is unsatisfactory because it is inflexible, poorly targeted, not "just in time" and provides for residential in-service training for 24 days once every five years at a RITTI

- INSETT needs to be flexible and responsive to a rapidly changing education environment and new demands upon teachers and their own set personal and professional skills

- A system of performance management (PM) would identify, on an annual cycle, the continuing professional development needs (CPD) of staff and link this to remuneration and progression

- Each teacher would agree personal targets for the coming year; these would include targets for the achievement of the students for whom the teacher is responsible as well as CPD targets for themselves

- Targets should be reached by mutual agreement between teachers and their immediate line manager

- Teachers CPD needs would be framed in the context of the needs of the school establishment and could be aggregated to achieve economies of scale (e.g. In the early days CPD on the use of ICT across the curriculum will be a common feature of most CPD/PM plans)

- Training and CPD would be delivered as short half or one day courses in geographical locations close to the school (e.g. at CLSs) on a "just-in-time" basis rather than at distant oblast centres according to a formal curriculum

Implications and consequences

- The creation of a performance management system in a school requires the prior training of key people who receive training on the system and can cascade this expertise within the school

- The performance management system implies that there exists, within the school, a management structure with School Director, senior management team and middle managers (e.g. Heads of Department)

- Each performance management team would have a leader and no more than five other members

- Performance would be judged on direct observation of professional practice in the classroom coupled with the achievements of the students, and the teacher's success in completing the annual CPD targets

- Performance judged against objective performance criteria and CPD targets to be agreed logged and tracked (see attached sheets)

- Prior to the introduction of this PM system, there would need to take place considerable training and preparation of managers and middle managers

Lesson Observation: Assessment

Date: Teacher:

Lesson: Observer:

Development

	Excellent	Good	Satisfactory	Needed	N/A
1. The teacher plans effectively and sets clear objectives that are understood.	☐	☐	☐	☐	☐
2. The teacher shows good subject knowledge and understanding.	☐	☐	☐	☐	☐
3. The teaching methods used enable all students to learn effectively.	☐	☐	☐	☐	☐
4. Students are well managed and high standards of behaviour are insisted upon.	☐	☐	☐	☐	☐
5. Students' work is assessed thoroughly.	☐	☐	☐	☐	☐
6. Students achieve productive outcomes.	☐	☐	☐	☐	☐
7. The teacher makes effective use of time and resources.	☐	☐	☐	☐	☐
8. Homework is used effectively to reinforce and extend learning.	☐	☐	☐	☐	☐

Conclusions and Feedback:

Strengths:

Areas for Development:

Teachers comment (optional):

Lesson Observation: Guidance

1. The teacher plans effectively and sets clear objectives that are understood.
a) Objectives are communicated clearly at the start of the lesson.
b) Materials are ready.
c) There is a good structure to the lesson.
d) The lesson is reviewed at the end.
e) The learning needs of those with I.E.P.s are incorporated with the teacher's planning.

2. The teacher shows good subject knowledge and understanding.
a) Teacher has a thorough knowledge of the subject content covered in the lesson.
b) Subject material was appropriate for the lesson.
c) Knowledge is made relevant and interesting for students.

3. The teaching methods used enable all students to learn effectively.
a) The lesson is linked to previous teaching or learning.
b) The ideas and experiences of students are drawn upon.
c) A variety of activities and questioning techniques is used.
d) Instructions and explanations are clear and specific.
e) The teacher involves all students, listens to them and responds appropriately.
f) High standards of effort, accuracy and presentation are encouraged.
g) Appropriate methods of differentiation are used.

4. Students are well managed and high standards of behaviour are insisted upon.
a) Students are praised regularly for their good effort and achievement.
b) Prompt action is taken to address poor behaviour.
c) All students are treated fairly, with an equal emphasis on the work of boys and girls, and all ability groups.

5. Students' work is assessed thoroughly.
a) Student understanding is assessed throughout the lesson by the use of the teacher's questions.
b) Mistakes and misconceptions are recognised by the teacher and used constructively to facilitate learning.
c) Student's written work is assessed regularly and accurately.

6. Students achieve productive outcomes.
a) Students remain fully engaged throughout the lesson and make progress in the lesson.
b) Students understand what work is expected of them during the lesson.
c) The student outcomes of the lesson are consistent with the objectives set at the beginning.
d) The teacher and students work at a good pace.

7. The teacher makes effective use of time and resources.
a) Time is well utilised and the learning is maintained for the full time available.
b) A good pace is maintained throughout the lesson.
c) Good use is made of any support available e.g. learning assistants and older students.
d) Appropriate learning resources are used, e.g. ICT.

8. Homework is used effectively to reinforce and extend learning.
a) Homework is set if appropriate.
b) The learning objectives are explicit and relate to the work in progress.
c) Homework is followed up if it has been set previously.

Development and training to support achievement of objectives

Development and training (including target knowledge and skills, and target dates)	How to be achieved	Date completed

Comments:

Objectives agreed by:

Post holder: ..... **date:** ...../...../.....

Team leader: ..... **date:** ...../...../.....

APPENDIX 25: A MODEL FOR A NEW INFORMATION & COMPUTER LITERACY SYLLABUS FOR GRADES 5 & 6

Finding things out

Unit 1C. The information around us
Unit 2C. Finding information
Unit 5C. Evaluating information, checking accuracy and questioning plausibility
Unit 6D. Using the Internet to search large databases and to interpret information

Developing ideas and making things happen

Unit 1A. An introduction to modeling
Unit 1F. Understanding instructions and making things happen
Unit 2D. Routes: controlling a floor turtle
Unit 3D. Exploring simulations
Unit 4B. Developing images using repeating patterns
Unit 4E. Modeling effects on screen
Unit 5E. Controlling devices
Unit 5F. Monitoring environmental conditions and changes
Unit 6B. Spreadsheet modeling

Exchanging and sharing information

Unit 1B. Using a word bank
Unit 1D. Labeling and classifying
Unit 1E. Representing information graphically: pictograms
Unit 2A. Writing stories: communicating information using text
Unit 2B. Creating pictures
Unit 3A. Combining text and graphics
Unit 3B. Manipulating sound
Unit 3C. Introduction to databases
Unit 3E. E-mail
Unit 4D. Collecting and presenting information: questionnaires and pie charts
Unit 5A. Graphical modeling
Unit 5B. Analysing data and asking questions: using complex searches
Unit 5D. Introduction to spreadsheets
Unit 6A. Multimedia presentation

APPENDIX 26: EXTENDING COMPUTER ACCESS TO STUDENTS

The following is an example to show how schools can extend Complete Access hours to accommodate ICT use across the curriculum. This may require some sophisticated school timetabling, which is why timetabling software has been included in the School Administration Software Package.

(a) assume a school of 1,000 students (of whom 400 are in P1-P4) with 20 computers (1:50 ratio) and a 38 hour weekly timetable.
(b) number of computer access hours = 20 computers x 38 hours = 760 hours per week;
(c) computer access per enrolled student = 760 hours / 1,000 students = 45.6 minutes per student per week.
(d) Informatics is taught in Grade 8 for 1 hour per week and Grade 9 for 2 hours per week in four streams of 25 students each. Thus requirement for informatics access is 20 computers x 4 streams x 3 hours per week = 240 hours per week.
(e) Thus 520 computer access hours remain for all other uses in other subjects and for individual student access. This is equivalent to 540 computer access hours divided by 1,000 students = 32.4 minutes per students per week. Thus, if the computers in the school were to be used for additional subjects and additional grades all additional use would have to be achieved in 32.4 minutes per week, which is not very realistic.
(f) However, there are ways in which access to the computers can be increased.
(g) Reduce computer to student ratio to 1:2 – informatics now requires only 120 computer access hours leaving 640 hours for other uses = 38.4 minutes per student per week.
(h) Apply 1:2 student ratio to usage in other curriculum subjects = 76.8 minutes per student per week.
(i) Restrict computer usage to Grade 5 and above. 640 hours of available time is now allocatable to only 600 students not 1000. Thus, computer access time is now 640 hours x 2 (computer:student ratio) / 600 = 2 hours 8 minutes per student per week.
(j) Extend access to computers outside school hours. Open 1 hour earlier and close three hours later. This provides 20 hours per computer per week in extra hours i.e. 400 extra hours. Thus the available access time is 640 hours plus 400 hours = 1040 hours x 2 (computer:student ratio) / 600 = 3 hours 28 minutes per student per week.
(k) Open computer lab at weekend for 6 hours. This provides an additional 6 hours per computer per week which equals 120 extra hours. Thus the number of computer access hours for other curriculum subjects is now 640 + 400 + 120 = 1,160 x 2 (computer:student ratio) / 600 = 3 hours 52 minutes per week. On this basis five subjects could share 7 hours 44 minutes of computer access time between them every 2 weeks. On this basis ICT across the curriculum becomes possible.

APPENDIX 27: THE ROLE OF THE MAKHALLAS

The Makhalla is a community council. In a recent survey of 30 Makhallas conducted by the PPTA team the Makhalla varied in size from 2,250 families (Farobiy Makhalla in Andijon City Raion) to 198 families (Amudarya Makhalla, Muzrobad Raion in Sukhandarya Oblast). Most Makhallas have one basic school in their area of operation[83] and providing support to the basic school is one of the prime functions of the Makhalla. The other main function is the provision of social welfare support to vulnerable families in the community. Makhallas are part-funded by a grant from the Raion Hokkimyat. In general the grant is sufficient to pay a small wage to up to four staff members and to provide office rental and basic utilities. Other funds available to the Makhalla come from charitable donations from individuals and local businesses or from community work donations (ie there are periodic days when the salary for the day worked is donated to the local Makhalla).

Each Makhalla has a ruling council of "elders" which takes decisions on the use of the charitable funding held by the Makhalla. Makhallas also assist schools in hanlding children with behaviour problems, persistent non-attenders and truancy. All Makhallas also identify vulnerable families in their communities and try to provide assistance. The survey of 30 Makhallas demonstrates the wide-range of vulnerability. Makhalla records of economically vulnerable families varied from 2% (a Makhalla in Tashkent City) to 97% (a Makhalla in Ferghana Oblast). Other Oblasts recording high levels of economic vulnerability were Namangan, Karakalpakstan, Sukhandarya and Tashkent Oblast. It is also clear that there are striking contrasts within Oblasts and with Raions. The average level of economic vulnerability over the 30 Makhallas was 25.1%, which accords quite well with the 2004 World Bank estimate of 27.5%. of the population on or below the poverty threshold. Interestingly, a majority of Makhallas do not have the financial muscle to support all of the vulnerable families recorded. Thus, the Makhalla in Ferghana that recorded 97% economic vulnerability was only able to provide social welfare support to 14% of the families. The Makhalla in Namangan Oblast that recorded 76% economic vulnerability was only able to provide financial support to 28% of the vulnerable families. The average number of families supported out of the 30 Makhallas surveyed was 18.5% compared to the average percentage of vulnerable families of 25.1%.

Economic vulnerability was defined by 29 out of the 30 Oblasts by the calculation of a threshold per capita income value for families in the Makhalla. Any family which had an average per capita income below the calculated threshold level was recorded as vulnerable and was eligible for Makhalla support if sufficient funds were available. Of the 30 Makhallas surveyed the average poverty threshold was UZS 7,165 but this average concealed individual variations in Makhallas from UZS 12,000 in Karakalpakstan to UZS 1,000 in Sukhandarya. There is a rough correlation between Makhallas with the highest poverty threshold and those with the highest number of vulnerable families. It is quite possible therefore that some Makhallas set their poverty threshold at a level which will enable Makhalla charitable funding to be best utilised. In other words the poorer the Oblast, the higher the poverty threshold so that the number of vulnerable families can be reduced in order to reduce pressure on the use of scarce charitable funding.

The poverty related support offered by Makhallas is generally in terms of grants to families but Makhallas also pay directly for the cost of some utilities, may provide food, clothing or educational materials. In most cases families are invited to apply for

[83] There are approximately 9,700 basic schools and 9,500 Makhallas in Uzbekistan.

assistance but in some Makhallas it is clear that there is a pro-active attitude and the Makhallas go out and actively investigate levels of poverty.

20 out of 30 Makhallas interviewed specified that they provided active assistance to schools in persuading non-attenders to turn up to schools. Typical Makhalla activities were to visit the parents concerned and to interview the parents and the children and to determine the causes of non-attendance. Overwhelmingly the Makhallas reported that the main cause of non-attendance was poverty and the need for children to work to support their family. Other reasons given included lack of clothes and shoes (a particular problem in winter) and children who are out of control (usually as a result of family breakdown). Makhallas also report that they assist schools in determining which families are entitled to school-based poverty relief.

Makhalla involvement in education is based on the concept of a triangular partnership between school, Makhalla and parents. Many parents would place the Makhalla in a pivotal position in the provision of support activities to schools. In this context the Makhalla assists schools in making parents accountable for the behaviour and attendance of their children and also assists schools in identifying and alleviating poverty both from it's own funds and in the use of the school's poverty support.

The USAID/PEAKS Community Support Project has recently concluded a study which showed that many households have not received the support from the Makhallas that have been claimed by the Makhalla committees. This includes issues related to education.

It is clear that Makhallas have a potentially important role to play in school support. It is also probable that most Makhallas conscientiously attempt to fulfil this role. Most Makhallas claim that they have insufficient funding to provide the supported needed by the level of economic vulnerability within their communities. As a result there is a clear pattern of Makhallas being unable to support all of the vulnerable families that have been identified.

APPENDIX 28: PARENT SCHOOLS INTERACTION – THEORY AND PRACTICE

Schools are required to report regularly to parents on the performance of their children in school. The most basic method of doing this is via the student school diary into which marks and assessments are recorded every semester. Most schools also organise regular meetings with parents to discuss academic performance and behaviour and many parents attend these sessions. In 2000, the UNESCO organised "Monitoring of Learning Achievements" identified the level of parental participation and interest in schooling as a major determinant of the quality of education provided by schools in Uzbekistan. Out of 6,123 households residing in eight Oblasts, 98.1% of parents considered that schools in Uzbekistan provided a good standard of education. The preliminary PPTA survey results also show high levels of parental satisfaction with the schools that their parents attend and with the quality of basic education that their children receive. However, the PPTA survey results also show considerable parental dissatisfaction with the financial contributions they are now required to make, to the new student rating system[84], to the lack of heating in schools in winter, to the lack of laboratory and computer facilities and to the increased barriers to access to higher education caused by contract charges. Thus, although in general parents are extremely supportive of the education system they also have many detailed criticisms of it.

Parents are also widely supportive of the professionalism and commitment of the teachers in their local school. Parents value teacher willingness to discuss the progress of their children and strongly support increased teacher involvement and interaction with the local community.

Both school management and parents believe that parent committees have an important role to play in improving the quality of school education. In Uzbekistan, most parents support the need and importance of a parents' committee. By tradition, most parent committees are responsible for extra curricula activities, discussions with teaching staff on student behaviour, the implementation of laws and regulations relating to education and most importantly the levels of parental contributions required for the maintenance of school facilities, equipment and consumables. Parent committees only rarely consider syllabus, curriculum, state educational standards, student and teacher workloads and classroom methodologies as valid topics for discussion. This is probably a hangover from the Soviet system where parental involvement was intended as a school support mechanism rather than an opportunity to comment on the nature of the education provided.

Because most parents believe that the quality of education and the performance of their own children is largely dependent on the teacher there is a traditional tendency for parents to reward teachers in the form of gifts or other "in kind" contributions. Parents also hire teachers to provide coaching for their children, particularly in grades 8 and 9, which often leads to conflicts of interest when teachers find it difficult to mark down students to whom they have already provided additional paid coaching.

Parents also widely accept that they should provide financial contributions toward the cost of their children' education although there are many complaints about the extent of the contributions currently required. Because a significant proportion of school

[84] This system is universally disliked by students, parents and teachers and was the single most mentioned complaint in all focus groups. Students and parents don't understand it and teachers have to spend a great deal of time administering it. Teachers complain that the need to record ratings during lessons, reduces effective classroom contact hours.

operational budgets are now financed by parents there is a risk of growing inequality in the standards of education provided. Schools with a high proportion of vulnerable families are obviously going to be in a much weaker position in terms of raising funds from parents than schools in areas where a majority of parents are above the poverty threshold.

APPENDIX 29: CHECK-LIST OF KEY ISSUES FOR A SUPERVISION OF CORRECT INSTALLATION

Before signing the acceptance documents, the School Director in agreement with the school's Network Manager should:

- Check for any external damage in the equipment supplied
- Check the hardware supplied carefully against the hardware inventory e.g. number of student workstations, printer, projector etc.
- Check the software installed against the software inventory e.g. operating system, utilities, tools, printer drivers etc. (ask the supplier to demonstrate each individual piece of software prior to acceptance
- Ensure that the CDs for rebooting the system should there be any problems later have been left with the school
- Ask for the cabling diagram
- Switch each machine on and check the desktop to ensure that they are working
- Check for sufficient operations manuals regarding first line trouble-shooting (in appropriate language i.e. Uzbek/Russian as appropriate)
- Make sure that Virus Checker has been installed + CD and update documentation.
- Check connectivity via Modem (if Internet is made available)
- Print a small document to check the prin ter

It is worth keeping some of the packaging if room allows as it makes for easier transportation in the event of having equipment to be replaced or repaired off site.

Please note: If the school does not have its own Network Manager, the Cluster Leader School Network Manager should be present to sign off the delivery.

This list is the minimum and should be expanded in respect of different sets of hardware and settings.

APPENDIX 30: A NOTE ON THE PARTICIPATORY APPROACH TO PROJECT PLANNING AND DESIGN

The preparation of the Feasibility Study for the ICT in Basic Education Project utilised a positive participatory approach. The project planning period was proceeded by two workshops funded by the ADB for senior staff in the Ministry of Public Education concerned with the development and implementation of ICT Policy. These workshops, which concentrated on broad policy issues, were held in October 2004 in Tashkent and in January 2005 in Beldersoy. On March 16th 2005 an inception report was prepared and an inception workshop was held in Tashkent attended by MOPE and representatives from MOF and MOE. At the end of April a further workshop to discuss emerging issues was held in the conference room of the Ministry of Public Education. This workshop was chaired by the First Deputy Minister of Education and was attended by all main heads of department and by representatives from the Ministry of Finance, the Ministry for the Economy and the Ministry of Higher and Specialised Secondary Education. On the 11th and 12th of May a residential workshop was held in Beldersoy to consider and discuss the first draft of the National Strategy for ICT in Basic Education and the first draft of the proposed Feasibility Study. This workshop was attended by representatives from MOPE, MOHSSE, MOF, UZAgCI, Uzbek Telecom, the Ministry of the Economy and the Cabinet of Ministers. Throughout the research phase in the preparation of the Feasibility Study data was provided from MOPE, MOHSSE, MOF, MOE and from Oblasts, Raions, Makhallas and individual schools. Detailed data was researched all 14 regions of the country, from 40 Raions, 40 Makhallas and over 60 schools. Within each of the 60 schools separate focus group discussions were held with students, teachers and parents. Thus detailed notes on over 180 focus group discussions are available for analysis. Regular meetings between the ADB, the PPTA team and senior middle management in MOPE and the Ministry of Finance have been a feature of the participatory approach in the project design. Frank and open meetings between the ICT department in the Ministry of Public Education and the management of the school fund in the Ministry of Finance also took place on a regular basis. During Fact Finding and Appraisal there will be further discussions on project concepts and ideas and it is planned that the finished National Strategy for ICT in Basic Education in Uzbekistan will be presented to, and discussed at, a national conference in November 2005.

APPENDIX 31: NOTES ON RELEVANT ICT EXPERIENCES IN OTHER COUNTRIES

1. Armenia – Education Quality and Relevance Project (WB)

The second component of this project is entitled Education Technologies in Schools. A budget of US$7.9 million has been allocated. The component will help to ensure that schools in Armenia have facilities and the capacity to integrate a variety of educational technologies as part of teaching and learning. The project will: (a) build the necessary infrastructure for the integration of ICT into the curriculum and thus into general education; (b) assist teachers and students to apply modern teaching and learning methods in schools using ICT-related instructional materials.

Project funds will be used to establish and equip computer labs in 600 out of 1,400 schools in Armenia. Sustainability will be attempted through the operation of a computer revolving fund. In addition, the component will fund an Internet-connected school network for 150 schools and will provide technical assistance to develop educational software, software operating manuals and teacher training modules. An educational portal will be established for Armenian language software and e-Learning materials and a national centre for education technologies will be established to oversee all educational technology activities including the computer revolving fund and contributions by other donors. Servicing and maintenance will be contracted to commercial suppliers on a competitive basis except in isolated parts of the country where no suppliers are available, in which case alternative arrangements will need to be made.

The educational technology component is supported by a national curriculum and assessment component which has already created a new curriculum framework with fewer subjects and less content in an attempt to accommodate new teaching and learning methodologies and a steady increase in the use of ICT in all curriculum subjects. This component will also fund the development of a new assessment and testing centre. There is already close contact between the Curriculum Working Group and the Assessment Working Group on new styles of assessment to cope with the use of ICT within a range of curriculum subjects. One of the problems identified already in Armenia is the difficulty in developing consistent assessment for ICT when different schools in the country will be equipped with ICT at different times. This requires a degree of flexibility and transitional curriculum, syllabus and assessment arrangements until all schools are operating with similar levels of hardware availability.

The ICT component is also supported by a teacher development component which will train teachers to align their teaching to the requirements of the new national curriculum and assessment system, the use of active and skill-based teaching methods and the use of ICT in the classroom across curriculum subjects.

2. Mongolia – Education Sector Development Project (ADB)

Many donors have been active in Mongolia but without any co-ordination or over arching strategic orientation. Schools have been supplied with hardware from private sponsors or members of parliament (and sometimes by donors) generally without regard for local conditions (i.e. supplying hardware to schools with no electricity) and without any supporting manuals or e-Learning materials. As a result there is under-utilisation of the hardware and students have little access.

ICT is a priority up to the highest level of government but there is a clear lack of direction and consensus. Government policy is ambitious but vague. Current investments over emphasis hardware and underplay the need for software and training.

ICT policy is currently driven by hardware and technology considerations and not by the needs of the education system. There is a clear perception that the balance should be restored and that educational objectives and requirements need to be clearly defined before expensive hardware decisions are taken.

Within the education system the main usage for ICT has been to teach informatics rather than to use it as a learning and teaching tool across curriculum subjects. The use of ICT to support a highly academic approach to informatics is coming to be regarded as a waste of investment because of its limited educational value and its lack of relevance.

There is growing concern over the issue of long term financial sustainability particularly in the telecommunications sector where continued state domination maintains user charges at a high level.

There are also concerns over equity. Substantial sums of public money are being used to train students in richer schools. The problems of finding a sustainable financing model for poor schools is a major issue.

Clearly, many of the issues in Mongolia are issues which are also familiar within Uzbekistan.

3. Ukraine – Education Sector Reform Program Adjustable Program Loan – Phase I: Equal Access to Quality Education Project

Component 2 of this very large Adjustable Program Loan (APL) is improvement of the learning process. Within this component there are a number of sub-components comprising 2.1 Modernisation of Curriculum, 2.2 Teaching and Learning Tools, 2.3 Quality and Student Achievement, 2.4 School Improvement Initiative.

ICT investment and policy is part of sub-component 2.2. The goal of the sub-component is to establish a comprehensive national policy for the development, production and dissemination of teaching and learning resources in all schools in the Ukraine with specific targeting of rural schools. The national policy will be aligned with the overall process of curriculum assessment and school optimisation reforms.

A large part of sub-component 2.2 is concerned with resolving textbook supply problems in order to achieve a sustainable textbook policy that ensures both efficiency and quality in the textbook system. At the same time government enthusiasm for teaching aids is also a priority. As in Uzbekistan, the GOU wishes to upgrade multi-media facilities, science laboratories, foreign language teaching laboratories and computer rooms. There is a specific programme for the computerisation of rural schools to which the World Bank investment will contribute.

Despite the very large size of the World Bank investment the scale of finance required to supply computer suites to 20,000 schools and to maintain them is a daunting task. At present, a great deal of attention has been given to the supply of hardware and it is probable that much of this investment will be unsustainable when replacement costs kick in. No sustainable financial projections have been produced. The problems of servicing and maintenance, the recurrent budget needed to sustain

operational costs and the lack of high quality e-Learning materials in Ukraine are not yet part of the policy focus although there is a clear concentration on training teachers to use ICT in the classroom. Many of the regional in-service teacher training institutes are already developing their own software of variable quality.

There is also a clear disparity between supplies to rural areas and supplies to urban areas and the equity question which is an issue in Mongolia, Armenia and Uzbekistan is also an issue in the Ukraine.

In rural areas there is already a policy to develop school ICT facilities as rural telecentres providing services to the community in return for funding to help maintain the overhead costs.

4. Romania – Management and Information Systems for Education (World Bank)

There is also a project to revitalised education in rural areas which also provides ICT to schools. This project is also funded by the World Bank and the Romanian Government.

The main aims of national ICT policy in Romania are:

- to develop a technical information environment to support education reform;
- to ensure that ICT is widely used in education across the curriculum;
- to improve the processes of teaching and learning.

The strategies adopted to achieve these aims are:

- developing the necessary infrastructure at all levels of education;
- training teachers to use ICT as a resource for teaching and learning;
- training school heads in ICT and ICT issues;
- training students to use ICT as a learning resource;
- producing educational software geared to curriculum requirements;
- developing open and distance education to support ICT;
- introducing courses for ICT at post-graduate level;
- involving the private sector in teacher training, the procurement of equipment and the development of e-Learning materials.

5. Pakistan – ICT in Schools Programme

The main strength of the ICT in schools programme in Pakistan has been the strong ownership of the programme by the teachers. Teachers have formed an association called PACES which runs its own INSETT programme and produces a regular magazine distributed to all its members. PACES has branches in all of the main cities in Pakistan and many of the branches hold regular meetings for their members inviting speakers from industry and commerce. Teachers are encouraged to write about new ideas in teaching in the magazine and give demonstrations at branch meetings.

6. United Arab Emirates (Abu Dhabi Educational Zone)

The Abu Dhabi IT in Schools Project has been administrative and technology led over the past two years rather than directed by the educational needs of students and teachers. The technology assembled to support the projects aims is well

designed and apart from some final adjustments is close to being able to deliver. The problems have occurred in the overall management, the development of educational software and the lack of teacher training. A Thin Client e-box network system has been installed in 32 pilot schools and is proving difficult for both the teachers and the students. The maintenance help desk receives a large number of calls daily for e-box repairs.

7. Egypt

Egypt has suffered from the usual problems associated with the cascade teacher training model, which is that bad practice cascades more rapidly than good practice and spreads out to the teacher work force. In Egypt considerable thought was given to solving this dilemma. The Ministry of Education had the task of training 10,000 Mathematics teachers and 15,000 Science teachers in the use of ICT to support teaching and learning in their specific subjects. A modified cascade model was adopted as follows:

Several one-week residential courses were offered to selected advisers and teachers of Mathematics and Science. There were 30 participants on each course and at the end of the courses five or so participants from each course were noted as being good trainer. After six of such courses the 30 selected potential trainers were invited to attend a training the trainers course. This course focussed on how to run training courses for teachers of Maths and Science again, from this course, potential national trainers and assistant national trainers were identified. This in turn then ran course for further groups of teachers supervised and monitored by the course leaders. Those that performed well were confirmed as national trainers and were presented with laptop computers by the Minister of Education. The cycle of training continues.

APPENDIX 32: SAMPLE SCHOOL CLUSTERS IN BUSTONLIK RAION, TASHKENT OBLAST

In order to test the viability of the school cluster concept a survey was undertaken in Bustonlik Raion, Tashkent Oblast. This raion was selected because it is a large rural raion, with a number of remote schools in inaccessible mountain areas and is thus a "difficult" raion. The raion has 51 basic schools and 2 boarding schools. Working closely with the RED the raion was quickly divided into 5 clusters as follows;

- Gazelkent Cluster – 17 schools (most distant school 13 kms)
- Nanay Cluster – 8 schools (including 2 remote schools, the furthest 55 kms from the CLS and only accessible by horseback for the last 25kms)
- Buruhimulla Cluster – 6 schools (most distant school 25 kms)
- Charvak Cluster – 7 schools (most distant school 9 kms)
- Chirchik Cluster – 15 schools (most distant school 26 kms, of which 15 kms is accessible only on horseback. All other schools are within 14 kms of the CLS).

The Cluster Leader Schools (CLSs) were all selected on the basis of the criteria provided for selection in Appendix 22 and all CLSs are conformable with these criteria. Three out of the five CLSs are considered to be schools in 'poor' rural areas and the siting of the CLSs in these schools would bring benefit to these poor communities[85]. In the Nanay Cluster (see Appendix 34.2) it would be possible to achieve improved accessibility by 15 kilometres for Schools #45 and #46 by moving the CLS from School # 44 to School #47 but this would reduce accessibility to three other schools in the cluster without increasing the likelihood of greater participation in the work of the cluster by the two remote schools. Out of 53 schools in the raion, 50 have easy accessibility to the designated CLSs on the basis of the 5 clusters specified above. In this configuration only 3 schools are inaccessible and each of the inaccessible schools is reachable only on horseback. The Table below provides a summary of key data on the schools and clusters. In the accessibility diagrams the following colour coding is used:

CLS 

Cluster School 

Boarding School 

Raion Centre 

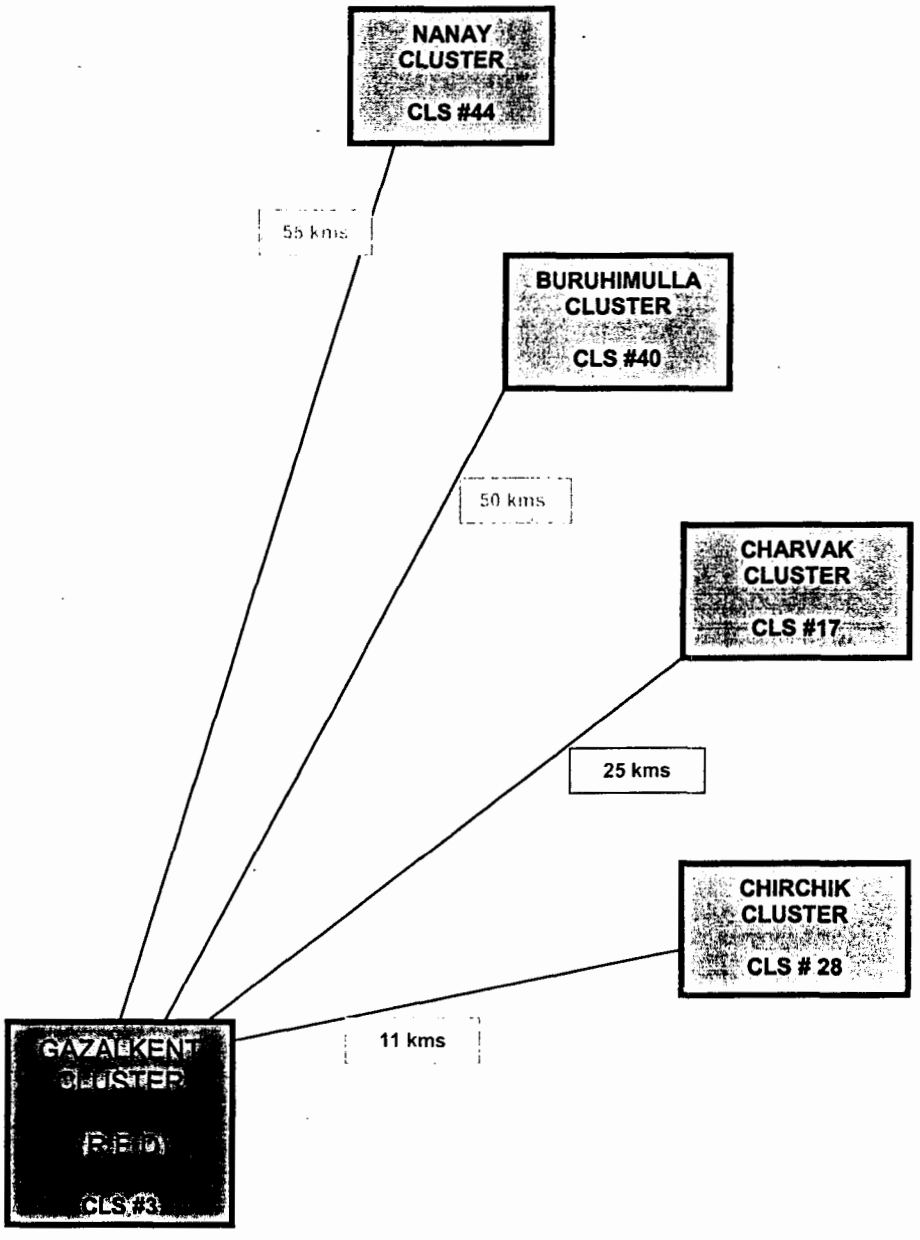
School	Roll Nos	No of Classes	LOI	Type[86]	Poverty Status	Distance from CLS (kms)
GAZALKENT CLUSTER						
#3	1413	44	Uzbek	Standard	Average	-
#1	802	26	Kazakh	Standard	Average	1
#2	1375	47	Russian, Uzbek	Standard	Average	1
#4	610	22	Uzbek	Standard	Average	5
#5	716	29	Kazakh	Standard	Average	8

[85] The 3 poor schools are School #28 in the Chirchik Cluster, School #40 in the Buruhimulla Cluster and School #44 in the Nanay Cluster.

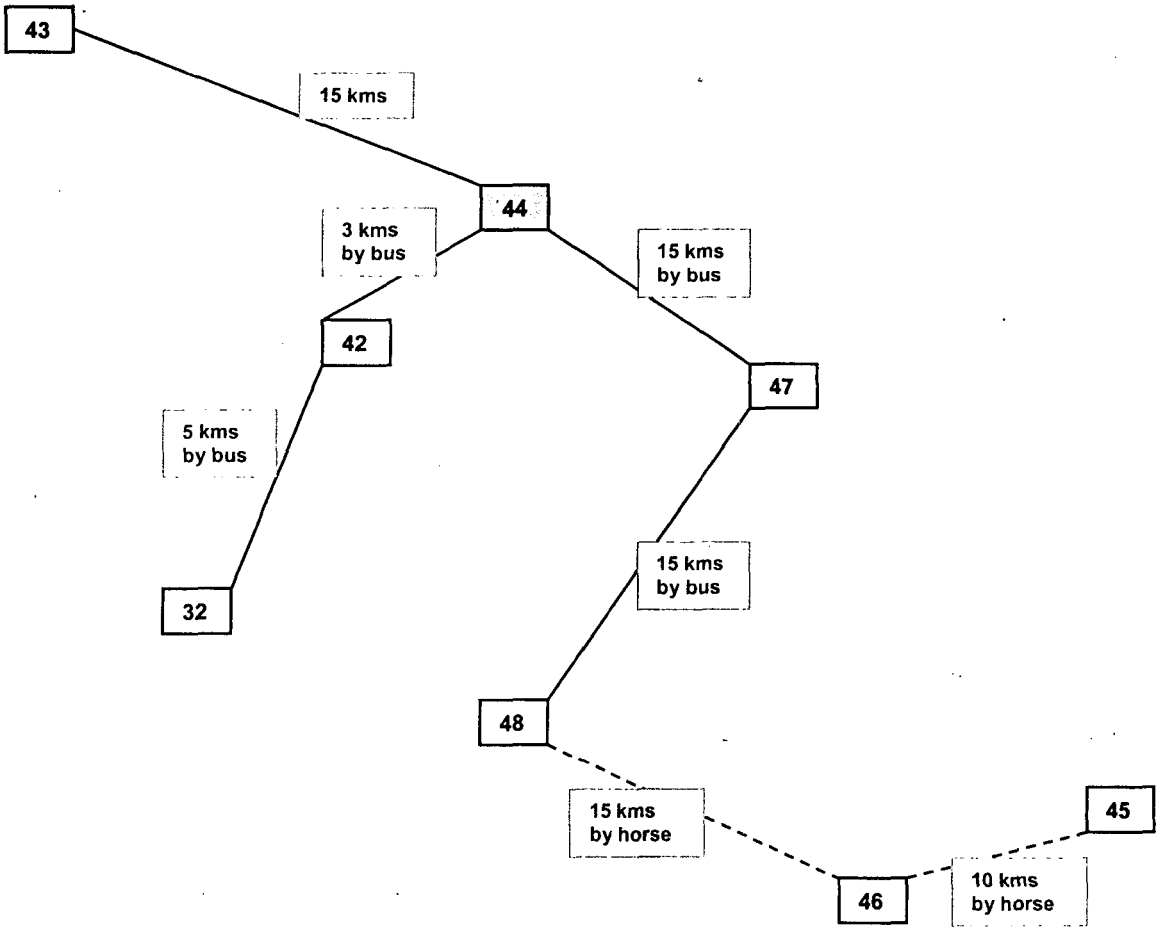
[86] In this context Standard = a traditional school design from the 1970s; Adapted = a school created by the conversion of a building originally designed for another purpose; Modern = a recently constructed school

#6	572	20	Russian Kazakh	Standard	Poor	12
#7	930	33	Russian	Standard	Average	10
#8	251	10	Kazakh	Standard	Poor	13
#9	373	15	Kazakh	Standard	Average	9
#10	1186	42	Uzbek	Adapted	Poor	5
#11	1331	43	Uzbek	Standard	Poor	3
#12	1262	39	Uzbek	Standard	Average	11
#20	1019	33	Russian Uuzbek	Standard	Average	1
#21	113	9	Kazakh	Standard	Poor	8
#22	1008	33	Uzbek	Standard	Average	3
BS#6						2
BS#25						2
CHIRCHIK CLUSTER						
#28	837	28	Kazakh	Standard	Poor	-
#23	169	10	Uzbek	Standard	Poor	8
#24	178	11	Kazakh	Standard	Poor	13
#25	234	16	Uzbek	Standard	Poor	11
#26	539	20	Kazakh	Standard	Average	8
#27	405	18	Kazakh	Standard	Average	3
#29	631	26	Kazakh	Adapted	Poor	3
#30	1176	37	Uzbek	Standard	Average	3
#31	297	26	Kazakh	Adapted	Poor	8
#33	694	25	Kazakh	Adapted	Average	6
#34	664	23	Kazakh	Standard	Poor	8
#35	91	9	Kazakh	Adapted	Poor	26
#51	151	10	Uzbek	Adapted	Poor	10
#53	975	38	Kazakh	Standard	Poor	10
#49	59	7	Uzbek	Adapted	Poor	14
CHARVAK CLUSTER						
#17	749	31	Uzbek Russian	Standard	Average	-
#13	374	12	Uzbek	Standard	Poor	9
#14	345	22	Kazakh	Adapted	Poor	6
#15	568	23	Uzbek	Adapted	Poor	3
#16	435	22	Uzbek Russian Kazakh	Standard	Average	3
#18	367	28	Uzbek	Standard	Average	1
#19	307	30	Uzbek	Standard	Average	5
NANAY CLUSTER						
#44	293	18	Tajik Uzbek	Standard	Poor	-
#32	136	12	Tajik	Adapted	Poor	8
#42	256	19	Tajik	Adapted	Poor	3
#43	691	21	Uzbek	Modern	Poor	15
#45	219	11	Tajik	Standard	Poor	55
#46	247	20	Tajik	Adapted	Poor	45
#47	156	16	Tajik	Adapted	Poor	15
#48	79	9	Tajik	Adapted	Poor	30
BURUHIMULLA CLUSTER						
#40	675	25	Tajik	Standard	Poor	-
#36	254	12	Tajik	Standard	Average	20
#37	157	11	Tajik	Adapted	Poor	15
#38	498	27	Kazakh Kyrgyz	Modern	Poor	25
#39	240	17	Russian	Adapted	Poor	1
#41	432	21	Tajik	Adapted	Average	1

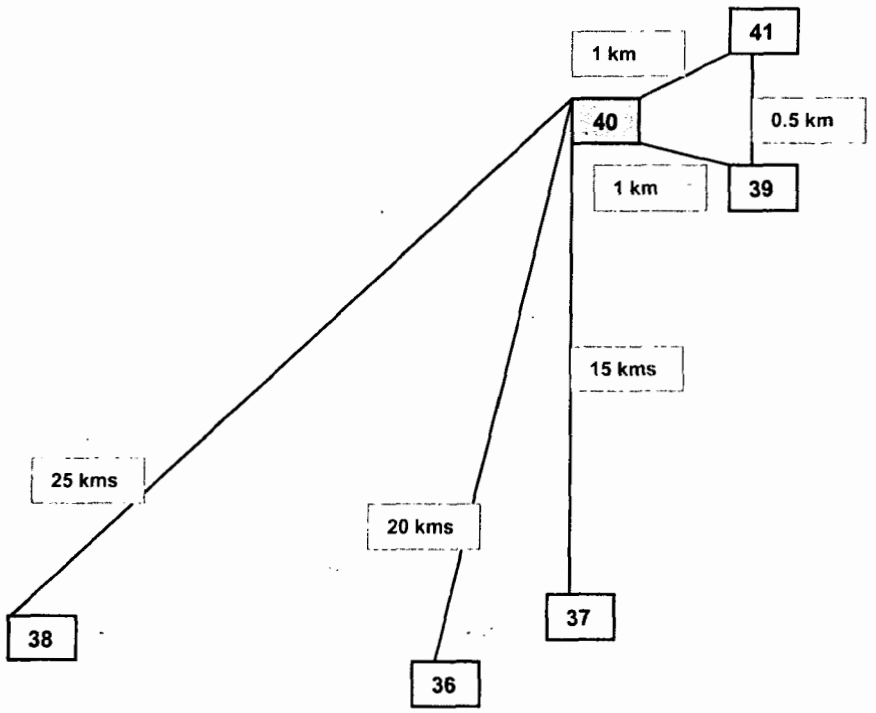
APPENDIX 32.1: CLUSTER LOCATIONS IN BUSTONLIK RAION



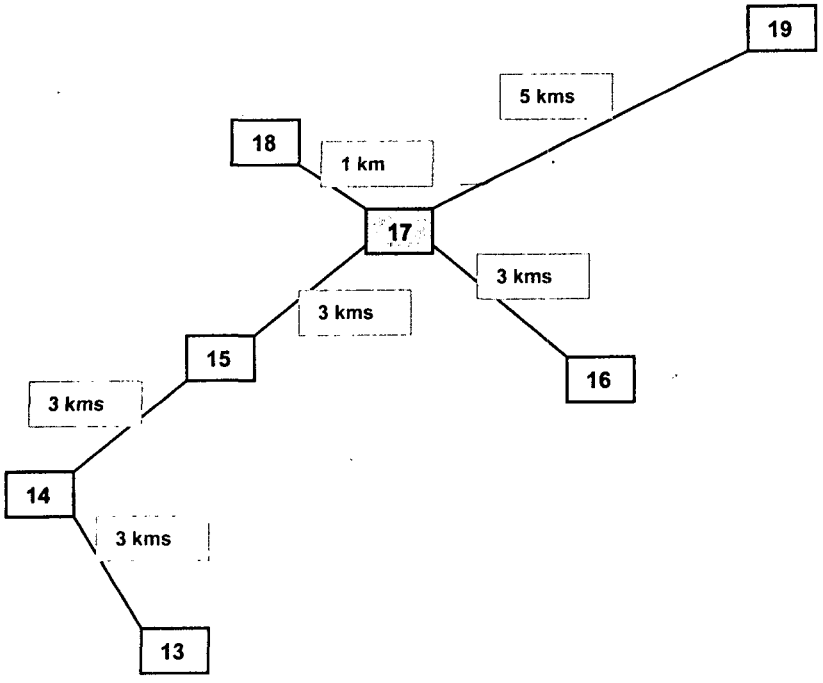
APPENDIX 32.2: NANAY CLUSTER (8 SCHOOLS)



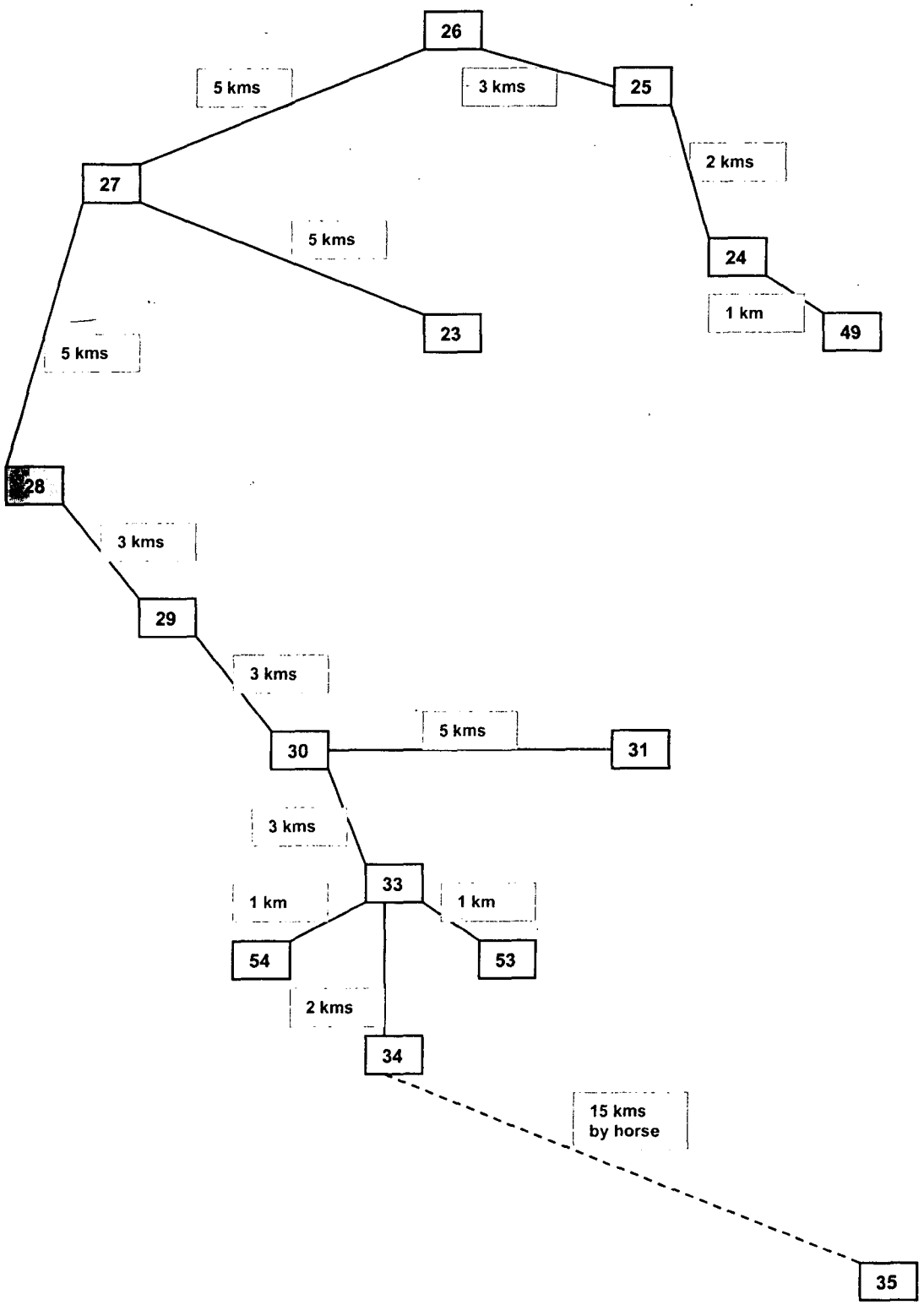
APPENDIX 32.3: BURUHIMULLA CLUSTER (6 SCHOOLS)



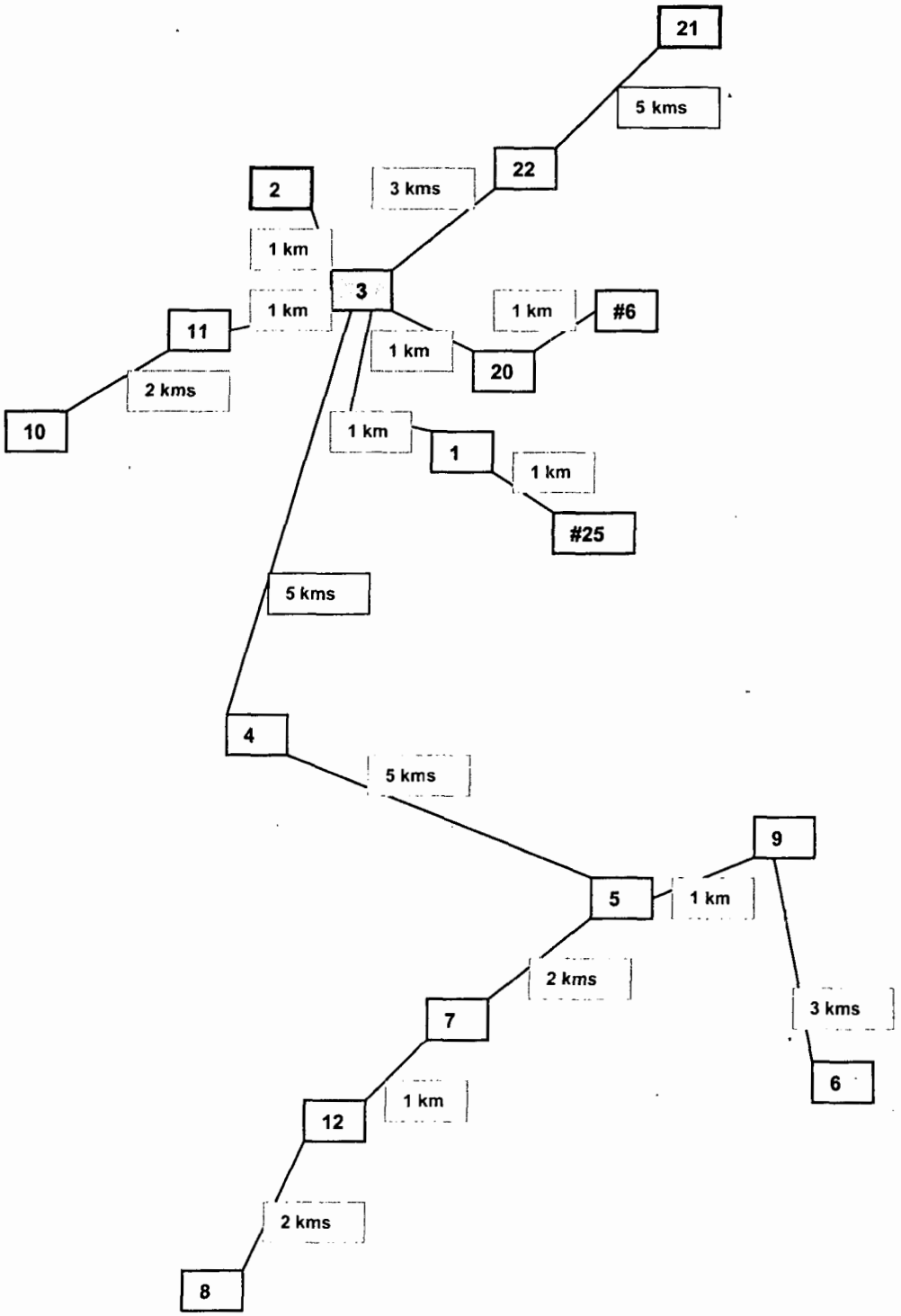
APPENDIX 32.4: CHARVAK CLUSTER (7 SCHOOLS)



APPENDIX 32.5: CHIRCHIK CLUSTER (15 SCHOOLS)



APPENDIX 32.6: GAZALKENT CLUSTER (17 SCHOOLS)



APPENDIX 33: CLS JOB DESCRIPTIONS

APPENDIX 33.1: SCHOOL ICT CO-ORDINATOR

An effective ICT co-ordinator needs:

- vision for the future direction of ICT in the school
- the support of the Head Teacher and Heads of Department, especially the one concerned with curriculum
- status as a subject leader
- effective teaching skills
- good communication and interpersonal skills
- familiarity with the teaching approaches used by other teachers and subjects
- non-contact time to devote to non-technical issues
- opportunities for personal and professional development which is specific to the role

An effective ICT Co-ordinator will support the use of ICT in the following areas:

1. **Curriculum**

- liaise with the Deputy Head (curriculum) and subject leaders to create and update a long term planning overview for ICT
- monitor cross-curricular references to ICT in all subject plans, particularly Mathematics, the Natural Sciences and Language teaching
- monitor the quality of teaching and learning
- monitor student assessment, recording and reporting
- organise and moderate a school ICT portfolio (X-curricular mapping) which illustrates all aspects of ICT
- encourage all appropriate subject teachers to maintain a portfolio illustrating the use of ICT in their curriculum area

2. **Staff**

- raise colleagues' awareness in the school of the potential of ICT
- use ICT skills in every day practice as a model for other teachers
- audit staff ICT skills
- support staff development either by organising or by delivering in-service training
- liaise with their local Cluster Leader School in respect of professional development for the teachers in his/her school

3. **Resources**

- timetable access to the ICT suite and managing peripherals
- manage the ICT cost centre budget
- maintain and develop resources for the teaching of ICT
- ensure resources are used efficiently and effectively

4. **General**

- keep abreast of current ICT issues
- attend any meetings in the school or raion when ICT is on the agenda
- self-evaluation of ICT skills and knowledge
- plan school ICT development
- produce and review policy documents
- ensure that displays in the school reflect all aspects of ICT in education and are maintained to a high standard

- carry out risk assessments in line with Health & Safety requirements
- liaise with the ICT technician to ensure hardware is always available for curricular use
- ensure Internet Safety
- liaise with the Head Teacher to develop and review Internet safety policies
- support the Head Teacher in developing an appropriate strategy should serious incidents occur
- maintain a log of all incidents relating to Internet safety in school
- lead in a staff development programme relating to raising the awareness of Internet Safety issues
- ensure that the teaching of Internet safety is embedded in the curriculum

The ICT co-ordinator would not generally be expected to be responsible for ICT in school administration and preferably should not take on the role also of Network Manager. There should be strategies in place for the maintenance of all ICT equipment.

It should be noted that the ICT Co-ordinator need not necessarily be an IT teacher but should be well-versed in the full curriculum. Programming and technical skills are not necessary in order to fulfil the role.

APPENDIX 33.2 SCHOOL NETWORK MANAGER (SCHOOL ICT SITE MANAGER)

Responsible to the school's ICT Co-ordinator.
Main purpose of the role is to provide technical and network support, including troubleshooting, resolving user problems and undertaking specific maintenance and upgrade tasks on the school's XYZ network.

Responsibilities

1. Systems Management

- Be responsible for the safe and efficient working of the computers, network, and telephone system, including regular safety checks and necessary cleaning;
- Control access to all systems, regularly check for unauthorised use of all systems, virus-check all disks and memory devices copied to the systems and regularly check all servers for viruses, updating anti-virus software as necessary;
- Manage email server, Internet and intranet sites;
- Provide network administration services, including setting up new users, maintaining email distribution lists, maintaining the user database, password security, managing access policies and monitoring performance;
- Carry out daily backup, archiving, housekeeping and other maintenance tasks on a regular and as required basis;
- Install new workstations and printers, relocate existing ones and dismantle, dispose of old ones. Install operating system upgrades as required.

2. Providing Technical and other support to users

- First line support for users in all aspects of hardware and system devices. Troubleshoot and resolve hardware problems, for example crashed PCs, jammed printer etc. Provide support for hubs, routers and system cabling as required. Organise off site repairs as necessary.
- First line support for users for all operating systems; resolve all related problems;

3. Providing Administrative Support

- Prepare and send correspondence relating to the running, maintenance and support of the systems, including registration of hardware and software;
- Maintain the school's IT Procedures Guide / Operations Manual (made available to all teachers);
- Control the budget for consumables, external maintenance, warranty, software, minor hardware purchases and to be responsible for other resources needed for system operation including peripherals and manuals. Manage stocks of IT consumables, records of usage and printer throughput;
- Maintain all necessary documentation including system manuals, cable diagrams, patching schedules, equipment inventories, orders, service records, loans etc.
- Ensure that legal obligations are met in respect of the control of software.

4. Other Duties

- Support the ICT co-ordinator in providing training for teachers in the school as necessary;
- Undertake other appropriate work as delegated by the ICT Co-ordinator, including involvement with new projects and ICT facilities;

- Help to evolve and maintain school policies in Data Protection (e.g. sensitive student records) and Security, email policy and Internet access;
- Liaise with the local Cluster Lead School on all technical matters concerning ICT
- Participate as a member of staff at the school, supporting initiatives and objectives (e.g. liaising with local Makhalla, fund raising activities, extending use of the IT facilities etc.)
- *Take responsibility for own personal development e.g. Cisco*

APPENDIX 33.3: CLS ICT OUTREACH TECHNICIAN

Responsible jointly to the Raion chief ICT technician and the Head Teacher of the CLS.
Main purpose of the role is to provide technical and network support, including troubleshooting, resolving user problems and undertaking specific maintenance and upgrade tasks in the schools supported by the CLS, which do not have their own on-site network manager.

Responsibilities

1. Outreach Activities

To provide technical ICT and computing support to the schools in the CLS catchment area. In the cases where there is only an ICT Co-ordinator, the Outreach Technician (OT) will share the responsibilities by agreement with the school ICT Co-ordinator as outlined below. It is expected that the OT will visit each school once a week in rotation and be prepared to visit any school in an emergency situation. Suggested OT responsibilities are underlined:

2. **Systems Management**

- Be responsible for the safe and efficient working of the computers, network, and telephone system, including regular safety checks and necessary cleaning;
- Control access to all systems, regularly check for unauthorised use of all systems, virus check all disks and memory devices copied to the systems and regularly check all servers for viruses, updating anti-virus software as necessary;
- Manage email server, Internet and intranet sites;
- Provide network administration services, including setting up new users, maintaining email distribution lists, maintaining the user database, password security, managing access policies and monitoring performance;
- Carry out daily backup, archiving, housekeeping and other maintenance tasks on a regular and as required basis;
- Install new workstations and printers, relocate existing ones and dismantle, dispose of old ones. Install operating system upgrades as required.

3. **Providing Technical and other support to users**

- First line support for users in all aspects of hardware and system devices. Troubleshoot and resolve hardware problems, for example crashed PCs, jammed printer etc. Provide support for hubs, routers and system cabling as required. Organise off site repairs as necessary.
- First line support for users for all operating systems; resolve all related problems;

4. **Providing Administrative Support**

- Prepare and send correspondence relating to the running, maintenance and support of the systems, including registration of hardware and software;
- Maintain the school's IT Procedures Guide/Operations Manual (made available to all teachers);
- Control the budget for consumables, external maintenance, warranty, software, minor hardware purchases and to be responsible for other

resources needed for system operation including peripherals and manuals. Manage stocks of IT consumables, records of usage and printer throughput;

- Maintain all necessary documentation including system manuals, cable diagrams, patching schedules, equipment inventories, orders, service records, loans etc.
- Ensure that legal obligations are met in respect of the control of software.

5. **Other Duties**

- *Support the ICT co-ordinator in providing training for teachers in the school as* necessary;
- Undertake other appropriate work and delegated by the ICT co-ordinator, including involvement with new projects and ICT facilities;
- Help to evolve and maintain school policies in Data Protection (e.g. sensitive student records) and Security, email policy and Internet access;
- Liaise with the local Cluster Lead School on all technical matters concerning ICT
- Participate as a member of staff at the school, supporting initiatives and objectives (e.g. liaising with local Mahalla, fund raising activities, extending use of the IT facilities etc.)
- Take responsibility for own personal development e.g. Cisco