Project Evaluation Report

To:	:	The Honorable Chair and Members
		Investment Coordination Committee – Cabinet Committee (ICC-CC)
		Investment Coordination Committee – Technical Board (ICC-TB)

Subject   : Cyber Education Project (CEP)

Proponent   : Department of Education

Date   : 19 March 2007

Background

1. The rapid developments in information and communication technology (ICT) are challenging the Philippine basic education system to provide the Filipino learners with adequate skills to become globally competitive in the shift towards a knowledge economy. The DepEd's initiatives on the use of ICT are embedded in the DECS Modernization Plan which started in 1996. The Program involves the introduction and use of modern technology and its various tools to improve the teaching and learning process. The 1996 General Appropriations Act (GAA) laid the groundwork for the provision of ICT equipment in public secondary schools. Since then, ICT and ICT-based education have been treated as priority expenditure items in the national budget for DepED.

2. While the national government has been pouring huge investments to expand the use of ICT to improve the administration/operations within the basic education system and enhance the teaching-learning process, the sector has been facing the problems on inequitable access to quality ICT both in terms of hardware and software. These include, among others, poor ratios of students and teachers to computers and access to the Internet, the limited access to quality teaching materials, poor ICT competencies of teachers, and the low level of ICT integration in school curriculum and state of the art technology. Worse, the "digital divide" has widened and continued to favor learners in urban areas.

3. Computer penetration at the elementary level is insignificant, with one computer for every 25,000 pupils (1:25,000), while it is one for every 111 students (1:111) at the secondary level. For elementary teachers, it is one for every 728 (1:728) elementary teachers, while it is one for every three (1:3) secondary teachers. The highest penetration rate in schools in the country is in Metro Manila at 85%, followed by the highly industrialized regions of Central Luzon (25%) and Southern Luzon (22%). In the remaining 14 regions of the country, only 16% of the schools (or less) have computers. PC penetration rate of less than 5% are found in the poorest regions – Eastern Visayas (4.9%), Western Mindanao (3.4%), and ARMM (3.2%).

4. The Cyber Education Project is proposed as DepEd's way of fulfilling its vision to use distance education to promote equal access to and accelerate the provision of high quality education to all learners, including those who are in rural, remote and hard-to-reach communities. The proposed project will provide the impetus to launch system-wide ICT initiatives.

Sectoral Program Context

5.   The proposed project is within the context of the DepEd's integrated ICT programs: (a) Philippine Education for All (EFA) 2015 Plan; (b) School First Initiative (SFI); (c) Basic Education Sector Reform Agenda (BESRA); and (d) National Strategic Planning Initiative for ICTs in Basic Education (2005-2010).

These programs aim to solve the problem of inequitable access to real-time high quality education in all schools possible as well as to strengthen/enhance the accountability and responsiveness of management and leadership, with ICT as one of the implementation strategies especially in the development of instructional support materials and enhancing the actual teaching-learning process.

6.   The MTPDP 2004-2010 under Basic Education provides for the wider use of computers to support the teaching-learning processes, the promotion of e-learning and information literacy, and the establishment of e-learning competency centers. The educational goal, as part of the 10-point legacy of the Arroyo administration, is that by 2010 "everyone of school age will be in school, in an uncrowded classroom, in surroundings conducive to learning". Three thousand school buildings a year shall have been built and a computer put in every high school.

Regional and Spatial Coverage

7.   The proposed project will be implemented in 37,794 schools outside the 1st and 2nd cities nationwide; 22,855 elementary schools (ES), 3,763 high schools (HS), and an additional 11,176 schools through the clustering scheme[1]. These schools will be provided with satellite-based interactive facilities.

The 4,282 elementary and high schools located in 1st and 2nd class cities will be served using the proposed National Broadband Network (NBN) Project as backbone network. However, if the 4,282 schools will not be covered by the NBN Project within three (3) years of implementation of the Cyber Education Project, the DepEd would initiate the inclusion of said schools in the Cyber Ed Network.

The project will also cover 665 Alternative Learning System (ALS) learning centers (for out-of-school-youths and adults) with DepED mobile teachers/learning facilitators.

The list of recipient schools per Region is provided in Attachment 1. Project Location.

Project Objectives

8.   With the overall goal of the proposed Cyber Education Project to accelerate the provision of equitable access to the same quality of basic education for all learners, the specific objectives are as follows:

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[1] An arrangement where a number of schools are grouped together primarily based on distance, in terms of physical proximity and travel time, for management, supervision and training purposes, among others. These are basically schools without electricity.

a. To improve the delivery of basic education curriculum in majority of the public elementary and secondary schools and selected Alternative Learning Centers (for out-of-school youth and adults) through the use of satellite-based interactive facilities.

b. To develop the competence of learners in key learning areas/strands through the incorporation of ICT in instruction.

c. To upgrade the competence of school stakeholders in managing learning through massive distance training, particularly in the following areas:

   i)   Teacher's competency on the use of satellite-based interactive facilities in the teaching-learning process and other competency areas based on the National Competency-Based Teacher Standards (NCBTS); and

   ii) Capabilities of school heads and members of the School Governing Council (SGC) on School-Based Management (SBM), including managing an interactive learning environment within the context of SBM.

d. To improve the efficiency of the system in information exchange between and among various stakeholders at different levels within DepEd.

Description

9.   The Cyber Education Project aims to improve the delivery of and/or access to quality basic education services. It will allow majority of the public schools and out-of-school youths and adults through the ALS programs nationwide to access live and interactive broadcast instruction using satellite-based technology as well as other ICT-based instructional packages through a dedicated education network and the Internet.

10. Satellite-based equipment, computers and digital accessories will be deployed in public schools covered by the project. The public schools will be connected with central training studios where the lectures on Mathematics, Sciences, English, Filipino, Technical-Vocational skills, and other subjects of relevance will be conducted and recorded, as well as broadcasted via satellite. Educational courseware/materials on major subjects will be developed and available for free through video streaming services and transcript downloads on some necessary and significant topics of social relevance and scientific interests. The facilities will also be used to implement a distance training program for teachers and other school stakeholders.

11. This e-education system will allow interactivity between and among the learners and teachers. It will allow the learners to deal with interesting and high quality lessons and to become well motivated and receptive to ideas presented through televised and other multi-media instructions.

12. Other members of the communities can also access the program when the facilities are not used by the school. This will serve as a form of informal education to improve their functional literacy and their capabilities in using computers and the

Internet. These will eventually become tools of learning and creativity that could improve work productivity.

Project Components

13. The proposed project have four (4) components as follows:
     a) Cyber Education Infrastructure
     b) Cyber Education Courseware
     c) Cyber Education Training for School Stakeholders
     d) Quality Assurance and Monitoring and Evaluation

14. <u>Cyber Education Infrastructure</u>. This involves installation of satellite-based interactive facilities at different levels within DepEd. Virtual Classroom and Training Studios will be established to provide high-quality real-time and stored instructional materials to schools equipped with computers, TVs, printers and network connection for internet access. There will also be capacity building for purposes of the operations and maintenance of the satellite communication system/facilities.

15. <u>Cyber Education Courseware</u>. This covers the development of new instructional materials/modules in digital/wed-based and interactive format to be accessed all learners and teachers. Existing technology-based instructional materials/modules developed by DepED and other partners in various programs and projects will also be enhanced and converted into digitized formats. The basic education curriculum and functional literacy modules for OSYs and adults will be translated into live video productions that will be broadcasted live via satellite to all schools. These will also be converted to interactive computer-based learning materials to be accessed on-demand by all learners through the Internet.

16. <u>Cyber Education Training for School Stakeholders</u>. ICT-based training (Distance Training) for teachers, school heads and other members of the School Governing Council will be by cluster, district or as preferred. Training will be conducted on live broadcast from the virtual training studios to be supplemented by other course materials in digital/interactive and web-based formats, which can be accessed from the Internet. This will enable the Department to provide teachers and other school stakeholders with equitable access to quality training and opportunity to be trained/coached/mentored by local and national trainors.

17. <u>Quality Assurance and Monitoring and Evaluation</u>. This component will encompass the formulation of the Project Monitoring and Evaluation (M&E) Design that will serve as framework for the regular monitoring, performance evaluation and audit at all levels of implementation of the proposed project. Evaluation of the project will focus on tracking the progress and measuring results not only of the physical accomplishments but more importantly on the success and/or failure in achieving project targets and objectives and assessing impact of the project on the education system.

Project Implementation Schedule

18. The proposed project will be implemented in five (5) years, with an estimated project life of 25 years. Within the 5-year implementation period, the 256,618 schools outside the 1st and 2nd cities, the 11,176 schools under the clustering scheme,

the 665 ALS learning centers, the 4,282 elementary and high schools in 1st and 2nd class cities nationwide will be covered and operational.

As early as pre-implementation phase of the project, DepEd will commence the initial development/enrichment of ICT courseware. The first year of project implementation will be devoted to the procurement and installation of hardware for the Virtual Classroom and Training Studios, Master Production Center, Regional Stations, ICT Units of the Divisions and Multi-Media Classrooms of about 5,324 pilot elementary and secondary public schools. Further development of the courseware and training of teachers in the pilot schools on the delivery of the courseware will also be undertaken in Year 1.

The test-run of the satellite-based instruction in the pilot schools will be during the second half of Year 1. The succeeding years will be the expansion of the project in terms of coverage and content (i.e., subject areas and levels of formal basic education and programs for ALS). It is expected that all of the recipient public elementary and secondary schools will be covered by Year 3 of project implementation.

The number of schools to be covered per year in a period of five (5) years is shown in Table 1.

Year 1		Year 2		Year 3		Year 4		Year 5	
ES	HS	ES	HS	ES	HS	ES	HS	ES	HS
4,571 (20%)	753 (20%)	11,428 (50%)	1,882 (50%)	22,855 (100%)	3,763 (100%)	22,855 (100%)	3,763 (100%)	22,855 (100%)	3,763 (100%)
Total: 5,324		Total: 13,309		Total: 26,618		Total: 26,618		Total: 26,618	

Project Cost and Financing

19. The total project cost is estimated at PhP26.48 billion where PhP22.77 billion will be financed through loan from the Peoples' Republic of China (PROC) and the remaining PhP 3.71 billion will be covered by the Government of the Philippines as counterpart.

The DepEd is also exploring with the PROC a possible grant financing (estimated at US$0.5 to 1.0 million) to cover portions of Components 2 and 3. The table below shows the cost breakdown per item of expenditure, per funding source:

Expenditure Items	Investment Requirements (In million Pesos)		
	Loan	GOP Counterpart	TOTAL
A. Component 1. Cyber Education Infrastructure	18,767.66		18,767.66 (70.87%)
B. Component 2. Courseware	70.58	343.36	413.94 (1.56%)
C. Component 3. ICT-based Training of School Stakeholders		125.08	125.08 (0.47%)
D. Component 4. Quality Assurance and Monitoring and Evaluation	44.53		44.53 (0.17%)
E. Project Operations Cost	2,615.54	290.62	2,906.16 (10.97%)
F. Contingencies (2% of Items A to E; 90% loan; 10% GOP	400.63	44.51	445.15 (1.68%)
G. Inflation (5% per annum starting Year 2 from Items A to E)	874.66		874.66 (3.30%)
H. Duties/Taxes (15% of Item A. Component 1)		2,812.90	2,812.90 (10.62%)
I. Management Fee (0.4% of the loan)		91.09	91.09 (0.34%)
TOTAL	22,773.60 (86%)	3,707.56 (14%)	26,481.16 (100%)

For further details of the estimated project cost, refer to Attachment 2. Project Cost Annual Breakdown.

20. During the pre-implementation stage of the proposed project (Year 0), the Department of Education needs to allocate about PhP152.49 million to cover the initial activities of courseware development (PhP61.40 million) and Management fee to be paid to the PROC (0.4% of the loan amount or PhP91.09 million) within 30 days after the signing of the loan agreement.

21. In Year 1, the project will require an estimated amount of PhP5.39 billion to cover the establishment of ICT-equipped structures from central down to the pilot schools, development of courseware, conduct of staff development programs, and payment of VAT/custom duties. The bulk of financing will come in Years 2 and 3 with an estimated total amount of PhP 19.38 Billion which is about 73.18% of the total project cost.

PROC Loan Assistance

22. During the Philippines-China Economic Partnership Forum on 5 June 2006, the National Economic and Development Authority (NEDA), Department of Trade and Industry (DTI) of the Government of the Philippines (GOP) and the Ministry of Commerce of the People's Republic of China (PROC) signed a Memorandum of Understanding (MOU) concluding the ten main points of economic cooperation which included an ICT-based education.

As a follow-up to the said MOU, the Secretary of Education visited Tsinghua University and Jingshan School. The main purpose of the visit was to look into the status, technology and operation of E-Education Program (EEP) in different year levels of the education system in China.

As provided for in the MOU between the two governments, the PROC will extend financial assistance through Official Development Assistance (ODA) funds with liberal terms under a preferential buyer's credit for the development of the public educational system in the Philippines.

23. The indicative terms of the proposed loan financing are as follows:

Maturity Period	18 years
Grace Period	3 years (36 months)
Repayment Period	15 years (180 months)
Interest Payment	Interest charges of 3% based on diminishing balance
Other Financing Charges	Commitment and Management fee of 0.4% of the principal amount, to be paid in one lump sum within 30 days after the signing of the loan agreement.

Operations and Maintenance Costs

24. The operations and maintenance (O&M) costs of PhP3,351.31 million for the nationwide 5-year implementation period is embedded in the estimated total project cost. These include costs for the labor (consultants, engineers/technicians, etc.), equipment upgrade/replacement, trainor's training, lease payments for the transponder, contingencies and other O&M costs such as electricity consumption in the main hub/training studios.

25. Upon deployment, management of the equipment/facilities will be transferred to the schools. Electricity cost, other consumables such as CDs, inks for printers, etc., and other utilization costs related to the implementation of e-learning will also be shouldered by the schools.

26. On the 6th year and onwards, the schools will have to source out funds from their MOOE budget and other sources (e.g., through sponsorship of local government units, partnership with interested parties/groups/institutions) to be able to operate and maintain the equipment/facilities. The school will be responsible in ensuring the sustainability of the equipment/facilities and access to live/interactive satellite broadcast lectures and other web-based instructional packages. For the breakdown of cost of equipment per school, see Attachment 3. Hardware Component and Deployment Costs, Per School.

Institutional Arrangement

27. The overall responsibility for the proposed project will be vested in DepEd. It is envisaged that the project will be implemented at all levels in DepEd: central, regional, divisional and school. The different units will perform their respective roles as defined in R.A. 9155 or the Basic Education Act of 2001.

28. The Secretary of the Department of Education shall serve as the Project Director. A Program Committee (PROGCOM) will be formed to handle cross-cutting policy and operational issues of the project. In line with its mandated function to manage/coordinate the implementation of foreign-assisted projects, the Education Development Projects Implementing Task Force (EDPITAF) will be the Project

Management Office. Within EDPITAF, a Project Management Unit (PMU) will be established, composed of existing staff, supported by contractual staff to be hired under the project and seconded staff from the Bureau of Elementary Education (BEE), Bureau of Secondary Education (BSE) and Bureau of Alternative Learning System (BALS).

The BEE, BSE and BALS will be responsible in overseeing the implementation of the project in their respective sub-sectors. Specifically, they will take the lead in the development of new and updating of existing courseware, development of the framework and guidelines for the monitoring and evaluation of the courseware, and actual conduct of M&E activities.

The DepEd's Office of Planning Service will be part of the project monitoring and evaluation activities for the project. The Physical Facilities and Schools Engineering Division will assist EDPITAF in overseeing the establishment of the physical structures of the Master Production Center, Virtual Classroom Studios and the 17 Regional Stations.

29. The National Educators Academy of the Philippines (NEAP) will be responsible in managing the training programs for teachers, school heads and on-site training facilitators. Specifically, the said office will lead to the refinement/development of training designs and monitoring of the training programs.

30. The Technical Service group will be created to assist EDPITAF in the supervision of the entire operations of the broadband satellite content delivery system, from the main/central hub, to the virtual model classrooms and training studio, to the regional stations and to the multi-media classrooms.

31. The Regional Offices (ROs) will be responsible in assuring the quality of project implementation within its area of jurisdiction, and in ensuring that immediate results and outcomes are attained. The ROs will be directly responsible in the operation and maintenance of the Regional Studio Centers. The Regional Project Communications/ Electronics Engineers and Technicians to be hired under the project will be directly supervised by the Regional Offices. The ROs will also undertake M&E activities and provide technical assistance to the Divisions.

The Division Offices (DOs) will supervise, monitor and evaluate the implementation of the project courseware within the division.

32. To complement the manpower requirements of the project, a total of 163 consultants/experts/engineers/technicians will be hired under regular-contractual arrangement for five (5) years. The DepEd would be required to seek the Department of Budget and Management (DBM) approval and/or clearance for the creation of positions needed for the purpose.

33. The schools will play a very critical role in the implementation of the proposed project. Unless the schools are ready and committed to maximally and appropriately utilize the ICT facilities for teacher-learning, the facilities will not contribute to enhancing the said process. The schools will be mainly responsible in the delivery of ICT-based instructions, including the assessment of learners' progress through the On-Site Learning Facilitators (teachers).

Maintenance and security of the equipment to be provided under the project will also be the responsibility of the schools. This will require, among others, the allocation of financial resources, from the school's MOOE budget and/or other sources like partnership with or sponsorship of LGUs/interested parties/groups, for the electricity and other consumables such as CDs, inks for printers, etc.

34. The decentralization and engagement of local initiatives with school affairs will be further strengthened with the DepEd's School-Based Management (SBM) program. The underlying principle of SBM is that all schools have more or less the same organizational and resource capacity for implementation and that the local environment (LGU and community) is well prepared to support the governance and investment requirements of basic education at the school level. Also, stakeholders directly involved in and affected by school operations are the best persons to plan, manage, and improve the school.

35. To operationalize the clustering scheme, the school head(s) of the cluster will be responsible in preparing the schedule and in coordinating the actual implementation of inter-school activities that will enable all pupils/students in "non-recipient" schools to use the facilities, especially in learning difficult lessons and in accessing printed supplementary instructional materials.

Socio-Economic Analysis

36. The DepEd attempted to quantify the potential savings that would accrue to the Department because of the project. The potential benefits identified would come from: (a) savings in the procurement of textbooks; (b) communication expenses; and (c) training expenses. These would amount to PhP60.32 billion for the 25-year duration of the project. The economic costs identified are the investment and operation and maintenance costs.

37. Based on these assumptions, the Secretariat computed for the economic NPV and IRR. Using the social discount rate of 15%, NPV is negative PhP11,236.52 million while IRR is 5.12%. While the NPV is negative and the IRR is below the social discount rate, the undertaking of the project is still justified on the basis of the societal benefits that the DepEd failed to quantify.

38. The primary benefit of having the project in place is the provision of access to quality education to all learners. From an equity perspective, this brings learners from the marginalized areas to equal footing with those in the first class cities in terms of access to high quality learning materials/resources.

39. Conversely, the project is envisioned to address the lack of basic resources such as competent teachers, academic classrooms and instructional materials which largely contribute to the quality of education.

Project Concerns/Issues

PGMA's Instructions

40. Last 13 February 2007, subject project was presented in the joint NEDA-ICC Cabinet Group and NEDA Cabinet Group meeting, held at the Malacañang Palace, with the following directives/agreements:

a) Compress the timeline for coming up with a recommendation to four (4) weeks. The Department of Finance (DOF), as chair of the ICC, noted that the ICC-ministerial level could present its recommendations on the proposal to the President within one week after the ICC-Technical Board made its recommendations.

b) The CICT to provide technical experts on computers and telecommunications for the evaluation of the DepEd's proposal.

c) The Department of Transportation and Communications (DOTC) to sort out possible overlaps of the proposed Cyber Education Project (CEP) with existing and proposed projects of similar nature, i.e., digital backbone project and China proposed ZTE, before the end of four-week timeline. The ICC shall hold its recommendation on the DepEd's proposal pending the DOTC's study.

d) The Department of Trade and Industry (DTI) to turn over the 286 additional computers from the last leg of the PCs for Public Schools (PCPS) project to the DepEd for distribution.

28 February 2007 ICC-Technical Board

41. Notwithstanding the pending submission of the study/recommendation of the DOTC and CICT, the status of the proposed project was presented to the ICC-Technical Board (TB) last 28 February 2007. The ICC-TB then advised the NEDA-ICC Secretariat to follow up DepEd's submission of a revised complete proposal, incorporating the study/recommendation of the DOTC and CICT, and prepare for the presentation of the results of the evaluation/recommendation on the project in the next ICC meeting.

DOTC and CICT Recommendations/Observations

42. In compliance with the President's instructions during the meeting at Malacañang and as agreed during the 19 February 2007 meeting at NEDA, the following are the major observations/recommendations of the DOTC and CICT, as a result of the study made by the Bids and Awards Committee (BAC) for ICT, through a joint letter of Secretary Leandro R. Mendoza and Secretary Ramon P. Sales received last 07 March 2007:

a) The DepEd's proposal to establish its own broadband system to provide internet connectivity to all elementary and secondary schools nationwide under a government-to-government arrangement directly overlaps with the proposed Internet Protocol (IP)-Based National Broadband Network.

b) The DepEd project appears to be a huge infrastructure for a single user only and the use of satellite communications technology may require high operating expenditures and DepEd may be forced to hire non-teaching personnel to operate and maintain the system during and after the five (5) year project period.

c) The DepEd may continue to develop and implement e-Education projects focused mainly on courseware development and establishment of e-learning

facilities/laboratories with the Government Broadband Network as provider for its transmission requirements instead of building its own backbone network using satellite communications or any means. This will also prevent DepEd in being forced into a perpetual operation of an ICT network outside of its actual core of competence.

d) Establishment of a single national broadband network to cater to the needs of the Government in VoIP, e-Governance, delivery of e-Government services and e-Learning services is ideal. However, the system should be designed and implemented considering the demand in areas still not covered by the existing services being operated by the private sector.

e) Establishment of a single national broadband is recommended subject to the following conditions:

  i.   The project should satisfy the network requirements of government agencies for VoIP, e-Government and e-Education;

  ii. The system should be designed implemented considering the demands in areas not covered by existing services. Corollary, the system shall take into account and utilize and integrate if possible the existing private and public telecommunications infrastructure; and

  iii. The funding shall fully cover all requirements of the project, including those for the initial operation and maintenance.

DepEd's Response/Action on DOTC and CICT Recommendations

43. *Establishment of DepEd's own broadband network to provide internet connectivity.* Internet connectivity is a by-product in the DepEd system, and internet connectivity for the scope of the schools considered would not be at broadband speeds. The DepEd system is intended primarily for real time multi-channel broadcasting of instructions/lectures. The main bandwidth use in the DepEd system is for the broadcast/multicast (video) of the courseware. Since the broadcast is a point-to-multi-point application, satellite would be more efficient in terms of bandwidth (at relatively low cost) because the same bandwidth being used for the broadcast/multicast streams are shared by all the schools. Unlike terrestrial network, the bandwidth provisioning is very much point-to-point. Hence, the deliver of courseware would require replication and not sharing of the bandwidth by all schools. This would require increase on the overall bandwidth requirement of the network.

44. *DepEd's capacity and competency to operate the system.* Operating a satellite network is much simpler than operating a nationwide terrestrial network considering that there are only two points of possible failure for a satellite system such as the main hub for sending the content and the receiving school. The terrestrial broadband network has more possible points of failure due to the 50-km coverage limitation of each point/node. Given that, DepEd would only require a limited number of technical expertise to operate and maintain the satellite system. The DepEd has its existing technical expertise based on its experience in operating the Knowledge Channel's satellite-based project and other small scale ICT-based projects.

Lastly, the issue of DepEd having to hire non-teaching personnel to operate and maintain the network is a question of mandate rather than capability. A parallelism today that we would draw is that of OFW money remittance via Smart/Globe, which are not financial/banking companies and do not have the intrinsic mandate but they have the efficiency because of their pre-paid platform. In the same manner, because of the huge scope of its network, DepEd will have more than sufficient economies of scale to justify their own maintenance and support staff. Training is provided in the project scope for this. But nothing precludes this service from being outsourced.

45. *DepEd to focus on courseware development while transmission requirements to be provided by the Government Broadband Networks.* According to the DepEd, the proposal to provide and maintain the transmission requirements of its education-dedicated portal is justified from the viewpoint of economies of scale. However, this does not necessarily mean that DepEd per se, will be the one to handle the day-to-day maintenance of the network. Part of the project's O&M costs is the engagement of a service provider to assist and capacitate DepEd in operating the education portal. Moreover, as also highlighted in the revised project proposal, experiences of other countries (China, Thailand, India, Mexico, etc.) show that the Ministry of Education has the business of providing and managing its own transmission requirements. India even maintained a satellite solely for education purposed (EDUSAT).

46. *Huge infrastructure cost for a single user.* The use of satellite is more cost-effective than any other proposed technology as shown in the table below:

Costs	Satellite	Terrestrial
1. Capital Expenditure	• Much higher than terrestrial technology (i.e., sending/receiving antenna which will be installed in all recipient schools constitute about 75% of the total capital expenditures per school)	• Lesser capital expenditures than the satellite due to availability of terrestrial technologies in a number of schools especially in urban areas. However, providing services to remote areas is a limitation
2. Bandwidth requirement for video streaming	• 45 Mbps (3 Mbps x 15 channels) for unlimited number of schools	• 3 Mbps per school x 26,618 schools = 79854 mbps
3. Recurrent bandwidth cost	• P850 per school, per month for 10 video channels (satellite rental of about P60 Million per year). Recurrent bandwidth cost per school will be further reduced as additional schools will be covered.	• P40,000 per school, per month at 256kbps (based on current rate of corporate DSL) and $225 or P11,250 per school/month at 512 kbps or 1 video channel (based on AHI)

Moreover, without having to consider the cost requirement, two major factors necessitate the exclusive use of satellite technology:

a) Technical Superiority. Terrestrial networks have never been successfully used in wide-scale live education broadcasting. Only satellites can provide a Committed Information Rate (CIR) of 3Mbps for live broadcast at reasonable rates. Also, satellite technology minimizes the potential failure points in the system, whereas all connections in terrestrial networks are potential points of failure. Lastly, satellite technology has unlimited geographical reach and has no market limitations. Market forces, on the other hand, inhibit private-owned terrestrial networks from serving less populated remote areas.

b) Cost-effectiveness. It is widely accepted that satellite-based technology requires more capital than terrestrial networks. However, at the school level, the lease for the satellite bandwidth will cost only around PhP850 per month. On the other hand, subscription to existing wireless internet providers that can provide the CIR will cost more than PhP40,000 per month. At this level, any differential capital investment incurred for the satellite technology will be recouped in 4 months, and the following months will be operated on very cheap costs.

c) Proven successes. Numerous countries have adopted satellite-based education. India launched its own education satellite to ensure quality education. Mexico has expanded its existing satellite-based education network. Even the King of Thailand has spearheaded a similar project. The experiences of these and other countries provide good models on operations which will benefit local implementation. The positive results enjoyed by these countries will be the benchmark that the CEP will be measured.

Other Technical, Institutional and Budgetary Considerations

47. _Use of mixed technologies, i.e., where cable and wireless technologies are not available, use satellite connectivity._ The DepEd maintained its position, as indicated in their letter to NEDA, dated 05 February 2007, to use purely satellite technology instead of "hybrid" technology as suggested by NEDA, CICT DOTC, etc. The DepEd finds the adoption of a hybrid network as not advisable because of the following reasons:

a) Economies of scale will not be maximized under a technology combination strategy. While savings will be incurred in terms of capital expenditures in areas with existing terrestrial technology, recurrent bandwidth cost per school is still very high. On the other hand, the capital expenditure and recurrent bandwidth costs for the satellite technology will almost be the same regardless of the reduced number of schools to be covered since the project will still maintain the number of channels (1 per grade and year levels) for the live broadcast.

b) The network will be more complicated to manage. Under the satellite system, there will be very distinct and very minimal points of failure. These can be easily detected and the solution will be uniform for all users in the network. Under a terrestrial system, the possible points of failure increase exponentially as the number of users increases, not to mention the number of service providers the project will deal with in addressing failures. If these two systems are merged, the total number of failure points will be combined.

Based on the foregoing, DepEd firmly believes that the use of satellite technology is the most cost-effective and efficient option for the Department to attain the project's main objective to "accelerate access to the same high quality of basic education

services at the shortest possible time." Hence, instead of building on in the National Broadband Network, the proposed CEP should be considered as the main platform and source of quality education courseware for other on-going and future ICT-related initiatives for basic education.

Moreover, while the public schools in 1ˢᵗ and 2ⁿᵈ class cities which may have existing broadband network will not be covered by the proposed project, such schools will still have access to the education courseware the proposed project will deliver. Provided however, said schools through various sources will shoulder the procurement of necessary equipment and recurrent costs (i.e., monthly broadband subscription fee).

48. *Contingency plan for the satellite transmission requirements after the 5ᵗʰ year of project implementation given the life span of Agila 2 Satellite, which will only be up to 5 years from 2008.* The DepEd expressed that the company that owns the satellite is a "going concern". This means that even after the life span of Agila 2, the continuation of service is assured. The Agila 2 is so far the only option for the satellite-based technology in the country. In fact, the next satellite that will be launched before Agila 2 expires provides the possibility for a dedicated government bandwidth that can be acquired at a cheaper cost, estimated at PhP250.00 million per transponder. If the government so decides, it can enter into a "Condominium Satellite" (CondoSat) and invest in its satellite requirements which includes the proposed project.

49. *Choice of the Ku Band as frequency band for its Satellite transmission and multi-cast system.* While some say that the use of Ku band is not advisable because it is subject to "rain fade", especially in tropical weathers and advocate the use of C band, which is not susceptible to weather interferences. The DepEd explained that according to current industry practitioners, there are new counter-measures that correct this inherent flaw in the use of Ku band, making it virtually "rain-proof". The C band, on the other hand, has two major weaknesses. First, it is susceptible to interference from Broadband Wireless Access (BWA) points and there are no known countermeasures for this yet. As more BWA sites get established nationwide, the quality of a C band dependent technology will diminish. Second, it requires bigger and more expensive antennas. This will make safeguarding the equipment against adverse forces of nature more difficult. More damage and depreciation can be expected.

The following table further illustrates the comparison between the Ku Band and C Band:

	Ku Band	C Band
1. Susceptibility to "rain fade"	• Old technology was susceptible to "rain fade". Current technology provides effective countermeasures against the inherent flaw making Ku Band "rain-proof".	• Not susceptible to "rain fade"
2. Susceptibility to interference from Broadband Wireless	• Not susceptible to interference from BWA which is expected to flourish in all major cities in the country in the near future	• Susceptible to interference from BWA; no effective countermeasure has been

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Access (BWA)		invented/discovered yet
3. Features of antenna	• Fewer technical restrictions, therefore antenna is smaller (1.2 m) and cheaper in cost. The size of the antenna makes it easier to transport and set-up and more capable to withstand strong winds. The antenna can also be easily dismantled (and re-installed) in anticipation of a very strong typhoon.	• Bigger (2.5m) and more expensive antennas; greater susceptibility to destructive natural forces because of its size.

The on-going satellite-based distance learning of China, India, Thailand, Mexico, Netherlands, among others, are also using the Ku band technology.

50. *Sustainability and continuity plan as well as budget cover during and funds availability after project implementation period.* To address the issue, the DepEd proposed the following strategies to be undertaken:

a) The satellite based interactive facility to be installed in each of the recipient school has access to the internet. Thus, schools may opt to implement income-generating activities during off-peak hours. However, the use of the facilities for income-generating activities should not compromise the conditions of the equipment which will be maximally used for teaching-learning and training purposes both for formal schooling and alternative learning system for out-of-school youths.

b) The training of school heads and other members of the School Governing Council on SBM will include among others, modules on how to mange/maintain a technology-enhanced learning environment and resource mobilization to support the needs of the schools.

c) The operation and maintenance cost of the facilities which is estimated at P5,000 per school, per month, is deemed minimal which could be easily funded through various local sources.

d) In terms of the maintenance and operation costs of the entire satellite-based interactive system including the recurrent bandwidth cost/satellite rental (P60 Million per year/P5 Million per month) will be covered under the MOOE budget of the Department. The adoption of the recommendation of the Phil. Education for All (EFA) 2015 Plan for financially-capable LGUs to fund the MOOE requirements of the public schools within its jurisdiction will free-up substantial amount from the MOOE budget of DepED. Savings will be re-directed to cover among others, the maintenance and operation of the entire satellite-based interactive facilities.

51. *Prioritization of remote areas, those without electricity to be provided with power generating sets.* Recognizing the urgent need to cover the marginalized/disadvantaged schools such as those without electricity under the proposed project, DepEd has already incorporated in the revised proposal the inclusion of a total of 6980 elementary schools and 381 high schools. Specifically, Section II, B. Project Areas and Location (page 17) of the revised proposal states: "*The project will be implemented in 37,794*
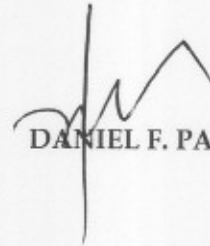
schools outside the 1st and 2nd class cities nationwide…This figure includes public schools currently without electricity, provided that the National and Local Government will accelerate rural electrification efforts and/or supply of dependable power sources to these schools."

The compliance of the government with the recommended condition will ensure the inclusion and sustainability of the proposed project in areas which currently do not have electricity. The maintenance and other operating costs of schools without electricity are much higher compared with other recipient schools due to fuel cost estimated at PhP10,600 per month per school. Please note that the inclusion of non-electrified schools accounts for the increase in the total project cost from PhP23.7 billion to PhP26.5 billion.

52. *Related existing and proposed projects and institutional arrangements*. The DepEd acknowledges that it is possible to harmonize the proposed project with the proposed broadband connectivity, i.e., IP-Based National Broadband Network Project (digital backbone project and China proposed ZTE), and with other existing projects of similar nature, i.e., PREGINET of DOST-ASTI, etc., in government, it will not address the huge, urgent and specific needs of the DepEd. Specifically, the use of the proposed government broadband as backbone of the envisioned distance education program of DepED has the following limitations:

    a) The infrastructure has yet to be installed which may take longer time. This option will further delay the provision of quality education services, especially to remote schools.
    b) Geographical coverage may be limited to selected areas (i.e., urban). Providing services to remote schools will require huge investment from the government.

    c) Terrestrial technology is not efficient for multicasting, thus will affect the envisioned interactivity of instruction (real time/non-real time).

53. Bandwidth requirement and utilization. The bandwidth allocation may not be sufficient for Internet access and may not meet the requirements for interaction between pupils and teachers/lecturers. Satellite system is a shared network, hence shared bandwidth. Some providers offer guaranteed bandwidth allocations but these options will require higher cost of the system. Nevertheless, technically speaking, although the uplink/downlink bandwidth can be configured for say 1Mbps (dedicated), the actual speed of data transmitting/receiving will still depend on the total amount of bandwidth the satellite is handling at a particular time and how much it can dedicate to the end-user. The concern is whether the proposed total satellite capacity can provide the required bandwidth with the intended type of applications, especially for peak demand and interactive video conferencing. Otherwise, the intended output/outcome of the project may not be attained.

54. Further details on the costs. While the DepEd has provided details of the project cost, there is still a need for a further breakdown of the identified costing, e.g., per school/site estimate, indicating the local and foreign costs.

55. Impact on budget deficit. The DepEd should be able to provide its budget strategy for the loan repayment and budget source for the upfront payment of the Management Fee, which is 0.4% of the loan amount or PhP91.09 million, to the PROC within 30 days after the signing of the loan agreement.

Action/Recommendation

56. Given the highly desirable objectives of the project, the Secretariat endorses the DepEd proposed project, subject to the following conditions:

   a. Issuance of the corresponding forward obligational authority for the project; and

   b. Procurement of power generating sets for schools without electricity.

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Attachment 1. Project Location

Region	Number of School	Elementary Schools without Electricity	Secondary Schools without Electricity
CAR	486	402	22
CARAGA	820	569	51
NCR	2,864	4	0
I	1,483	26	10
II	1,019	238	5
III	2,805	137	4
IV-A	3,242	266	25
IV-B	974	445	1
V	2,003	829	44
VI	2,359	468	10
VII	2,048	804	67
VIII	1,470	1222	20
IX	1,166	213	7
X	1,313	435	24
XI	1,338	505	24
XII	1,228	304	35
ARMM		113	32
TOTAL	**26,618**	**6,980**	**381**

Note:

Schools in the NCR will be distributed among regions 5,6 and ARMM, the 3 lowest scores performing regions based on 2006 NAT scores

Attachment 2. Project Cost

Expenditure Items	Year 0			Year 1			Year 2			Year 3			Year 4			Year 5			Grand Total
	Loan	GOP	Total	Loan	GOP	Total	Loan	GOP	Total	Loan	GOP	Total	Loan	GOP	Total	Loan	GOP	Total	Total
Component 1: Cyber Education Infrastructure				4,275.46		4,275.46	5,433.07		5,433.07	9,053.12		9,053.12	3.00		3.00	3.00		3.00	18,767.66
Component 2: Cyber Education Software		61.40	61.40		70.58	70.58		70.40	70.40		70.58	70.58		70.40	70.40	70.58		70.58	413.94
Component 3: Cyber Education Training for School Stakeholders					27.89	27.89		17.31	17.31		35.06	35.06		17.31	17.31		27.52	27.52	125.08
Component 4: Quality Assurance				8.91		8.91	8.91		8.91	8.91		8.91	8.91		8.91	8.91		8.91	44.53
Project Operations Cost				288.02	32.00	320.02	618.88	68.76	687.64	672.88	74.76	747.64	587.55	65.28	652.83	448.22	49.80	498.02	2,906.16
Contingencies				40.06	4.45	44.51	120.19	13.35	133.54	120.19	13.35	133.54	80.13	8.90	89.03	40.06	4.45	44.51	445.15
Inflation (5% p.a.)							310.87		310.87	495.77		495.77	37.62		37.62	30.40		30.40	874.66
Duties / Taxes					640.87	640.87		814.51	814.51		1,357.52	1,357.52							2,812.90
Management Fee (0.4% of loan)		91.09	91.09																91.09
Total		152.49	152.49	4,612.45	775.79	5,388.24	6,491.91	984.34	7,476.25	10,350.86	1,551.28	11,902.14	717.20	161.89	879.10	601.17	81.78	682.95	26,481.16

Attachment 3. Hardware Component and Deployment Costs, Per School

Description	Qty	Price per unit	TOTAL
VSAT including antenna & inst materials	1	180000	180000
Router and hub switch	1	10000	10000
Cabling per roll	5	10000	50000
Server	1	50000	50000
PC's	2	30000	60000
Windows OS & Applications	2	10000	20000
32" LCD TV's	4	25000	100000
Distribution amplifier	4	5000	20000
Nuctech education software bundle	2	25000	50000
System Integration	1	45000	45000
Installation	1	95000	95000
Total per school			**680000**