Republic of Indonesia
FY2015 Ex-Post Evaluation of Japanese ODA Loan Project
"ICT Utilization for Education Quality Enhancement in Yogyakarta Province"
External Evaluator: Masami Sugimoto, SHINKO Overseas Management Consulting Inc.

0. Summary

This project was implemented, as a model project for utilizing Information & Communication Technology (hereinafter referred to as "ICT") in the field of basic education in Indonesia, with a purpose to enhance education quality and to equalize the education level throughout the region by facility development through providing total 500 primary and secondary schools in Yogyakarta Special Province with necessary ICT equipment, ICT environment and e-Learning system development as well as assistance in participatory school operation and activities.

This project is highly relevant corresponding to the Indonesia's development policy and development needs both at the time of appraisal and ex-post evaluation, and also to the Japan's ODA policy at the time of appraisal. On the other hand, the efficiency is fair with its implementation period longer than planned due to the prolonged procurement process, while the project cost is lower than planned.

E-education is actively progressing at five hundred elementary and secondary schools selected as beneficiaries under the project with increased educational motivation in both teachers and students' sides. The project is also contributing to the equalization of the education level throughout the region. In addition to that, the Education Communication Technology Center (hereinafter referred to as "BTKP") of Department of Education, Youth and Sports of Yogyakarta Special Region (hereinafter referred to as "DIKPORA") whose function has been much strengthened under this project has been distributing electronical teaching materials and information through internet networks beyond the provincial border, which enables nation-wide supply of ICT-based education services. In Yogyakarta, the education sector leads trade, manufacturing and other regional industries in promoting ICT application. Therefore, the project has been thus mostly producing planned effects, therefore effectiveness and impact of the project are high.

Operation of the ICT facilities installed at the 500 selected schools is not faced with particular financial problems, however, allocation of budgets for repair and replacement at most of the schools is financially restricted. In the technical aspect, limited use of intranet and helpdesk functions was found. Another technical challenge is that smooth and timely BTKP technical support has not be realized. Thus, some minor problems have been observed in financial and technical aspects. Therefore sustainability of the project effects is fair.

In light of the above, this project is evaluated to be satisfactory.

1. Project Description
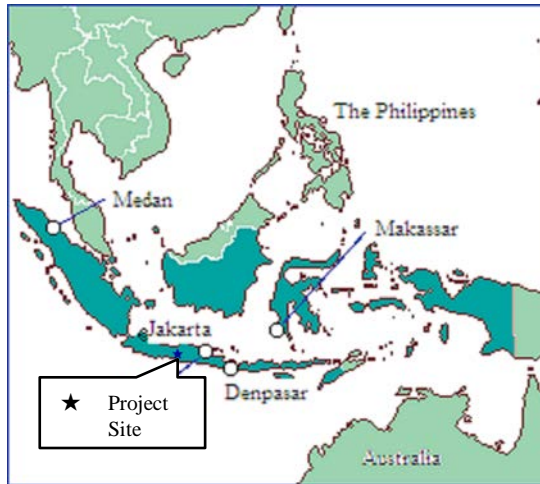
Project Location

ICT Utilizing Classwork at
Primary School PC Lab

1.1 Background

The net enrollment rates[1] of basic education in Indonesia were 94% for primary education and 65% for secondary education in 2006[2]. However, the quality of education still involved challenges. According to the Programme for International Student Assessment (hereinafter referred to as "PISA") undertaken in 2003 by the Organization for Economic Co-operation and Development, (hereinafter referred to as "OECD") on 15-year old students at the time of completion of basic education, Indonesia ranked in the lowest group in all four subject areas[3]. Under this situation, the "National Medium Term Development Plan (Rencana Pembangunan Jangka Menengah Nasional, hereinafter referred to as "RPJMN") 2004-2009 placed importance on improving quality of basic education. The National Education Strategic Plan (RENSTRA DEPDIKNAS: Rencana Strategis Departemen Pendidikan Nasional) 2005-2009 also stated that increasing access to high-quality education was essential for the development of the country. On the other hand in Yogyakarta Special Region which is the implementation site of this project, ICT utilization in every economic and social sectors was promoted under the slogan "Jogja Cyber Province" led by the governor, Sultan Hamengkubuwana X, and its application to the

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[1] Enrolment of the official age-group for a given level of education expressed as a percentage of the corresponding population.

[2] STATISTICS INDONESIA, Central Bureau of Statistics (Badan Pusat Statistik, hereinafter referred to "BPS") Web Site: https://www.bps.go.id/linkTableDinamis/view/id/1051

[3] Indonesia ranked below 37th among the total 40 countries participated on all the four subject areas; "Mathematics Literacy," "Reading Literacy," "Science Literacy" and "Problem Solving."

basic education sector was also prioritized[4].

ICT utilization also gained momentum at the central government level. The Ministry of Communication and Information Technology formulated the "One School One Computer Laboratory Program" based on the Minister's Decision No. 17, 2003, and promoted ICT utilization in education of all the schools in Indonesia.

Reflecting the situation above, the Government of Indonesia officially requested this project to the Japanese Government in October 2006 as one of the ODA loan projects proposed with a purpose to introduce ICT based education to totally 500 schools comprising 300 primary and 200 secondary schools in Yogyakarta Special Region.

1.2 Project Outline

The objective of this project, as a model in the utilization of ICT in basic education, is to promote improvement in quality of education by enhancing educational facilities through the procurement of necessary materials and equipment, the establishment of an ICT environment, the development of an e-Learning system, and by providing assistance with a participatory approach to school management and educational activities, thereby contributing to the total improvement of education quality throughout the country by widespread application of the lessons learned from this project.

Loan Approved Amount / Disbursed Amount	2,911 million yen / 1,520 million yen
Exchange of Notes Date / Loan Agreement Signing Date	March, 2007 / March, 2007
Terms and Conditions	Interest Rate 1.5% Repayment Period 30 years (Grace Period 10 years) Conditions for Procurement: General Untied
Borrower / Executing Agency	Republic of Indonesia / Directorate General of ICT Applications, Ministry of Communication and Information Technology (KOMINFO)
Final Disbursement Date	December, 2014
Main Contractor (Over 1 billion yen)	

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[4] "Blueprint Jogja Cyber Province," Yogyakarta Special Region Governor Regulation No. 42, 2006

Main Consultant (Over 100 million yen)	Consortium led by PT. Nusantara Secom Infotech (Indonesia), in association with PT. Duta Astakona Girinda (Indonesia) and Pasco Corporation (Japan)
Feasibility Studies, etc.	Special Assistance for Project Formation（SAPROF）for Project for Educational Quality Enhancement Through IT Utilization In Yogyakarta Province, JICA, February 2006
Related Projects	(Technical Cooperation Projects) "Regional Educational Development and Improvement Program Phase 1, 2" JICA, 1999-2005 "Local Educational Administration Improvement Program" JICA, 20042008 (Other Aid Agencies and International Organizations) "Decentralized Basic Education Project (DBEP)" ADB (Asian Development Bank), 2002-2009, "Managing Basic Education (MBE) Project" USAID (United States Agency for International Development) 2003-2007

2. Outline of the Evaluation Study

2.1 External Evaluator

Masami Sugimoto, SHINKO Overseas Management Consulting, Inc.

2.2 Duration of Evaluation Study

Duration of the Study: October, 2015 – December, 2016

Duration of the Field Study: February 21 – March 3, 2016, May 28 – June 5, 2016

2.3 Constraints during the Evaluation Study

The project implement plan at the time of appraisal planned to set up a "Project Office" at the Directorate General of ICT Applications, Ministry of Communication and Information Technology (hereinafter referred to as "KOMINFO"), and KOMINFO was supposed to undertake overall project implementation and cost management. However in reality, the comprehensive management including project accounting was not systematically conducted, therefore the total project cost expended from the government was found unknown. Therefore the efficiency was evaluated in this evaluation study based on the actual total cost assumed from the disbursed amount of ODA loan and the expenditure from the Indonesian government reported in the

Mid-term Review carried out in 2012.

3. Results of the Evaluation (Overall Rating: B[5])

3.1 Relevance (Rating: ③[6])

3.1.1 Relevance to the Development Plan of Indonesia

At the time of appraisal, RPJMN 2004-2009 attached importance of quality improvement of the basic education. The National Education Strategic Plan (RENSTRA DEPDIKNAS: Rencana Strategis Departemen Pendidikan Nasional) 2005-2009 also stated that increasing access to high-quality education is essential for the development of the country, and remarked (1) increasing educational opportunities, (2) improving quality of education and (3) improving governance and accountability as the three pillars of the strategy. In RENSTRA DEPDIKNAS, ICT was also referred to as playing a role in effective learning at the stage of basic education. On the other hand, the President Instruction (INPRES: Instruksi Presiden) No.3, 2003 regarding "Policy and Strategy for Promoting e-Government" placed all the central and regional ministries and agencies under an obligation to prepare and implement Strategic Development Plans (RENSTRA) to accelerate introduction of e-Government. Under that policy of e-Government promotion at the national level[7], Yogyakarta Special Region especially put emphasis on ICT utilization and was promoting it in whole sectors in the region based on the Governor Regulation No.42, 2006 "Blueprint Jogja Cyber Province." The education sector was placed as one of the priority sectors there.

RPJMN 2015-2019 at the time of ex-post evaluation strongly reflects the manifesto of President Joko Widodo who was inaugurated in preceding year, 2014, which mentions "education quality betterment" for improving quality of human life as one of the nine priorities "Nawa Cita." In that framework, the RPJMN aims for improving primary and secondary education through policy measures like "Smart Indonesia Program." The President has been making much of bottom-up political approach making full use of ICT since the former position as governor, and continuously makes much of ICT promotion in the public sector after the presidential inauguration. Current RENSTRA 2015-2019 of the Ministry of Information and Communication Technology also places "Human Resource Development" as one of the seven priority areas, and puts forward this project as one of its performances of the preceding RENSTRA 2010-2014 in that particular field. At the regional level, the ICT utilization has been continuously promoted in all the social and economic sectors including education under the Blueprint of the above stated

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[5] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory

[6] ③: High, ②: Fair, ①: Low

[7] The government policy to promote ICT utilization as interfacing measure widely open to the nation and users for the purpose to deliver better public services.

Governor Regulation No.42.

Thus, this project is relevant to the country's national, regional development plans of the education and information sectors both at the times of appraisal and ex-post evaluation.

3.1.2 Relevance to the Development Needs of Indonesia

The net enrollment rates of basic education in Indonesia at the time of appraisal were 94% for primary and 65% for secondary education in 2006, which had not reached the level required as the compulsory education. The quality of education also involved weakness resulting in the performance in which Indonesia ranked in the lowest group in all four subject areas in the test of "PISA" of OECD, therefore its improvement constituted one of the serious problems of the country.

The following table shows some improvement in the conditions of basic education at the time of ex-post evaluation, however, the challenges have not been removed both at national and regional levels. (Table 1)

(1) National Level

Table 1: Conditions of Basic Education in Latest Years at the Time of Ex-post Evaluation

	Primary Education	Secondary Education
Net Enrollment Rate	96.7% (2014)	77.8% (2014)
Rate of Enrollment Disparity between Regencies (Kabupaten) and Cities (Kota)	1.9% (2014)	12.75% (2014)
Ratio of Schools above B Grade in School Accreditation	68.7% (2013)	62.5% (2013)

Source: STATISTICS INDONESIA (BPS), RENSTRA 2015-2019 Ministry of Education & Culture

The net enrollment rate should be aimed at 100% as compulsory education, however as indicated above, it has not reached (especially for secondary education) the target, and in addition, the enrollment regional disparity is still significant. The ratio of schools that get above B Grade which is regarded as satisfactory as an educational institution by the country's institutionalized accreditation system is also low[8]. In the recent result of PISA of OECD in 2012, Indonesia further fell from 2009 to almost the bottom; namely, 64th (mathematics literacy), 60th (reading literacy) and 64th (science literacy) among 65 countries participated. Thus, basic education in Indonesia needs further improvement in terms of access, equal opportunity and quality.

In the communication and information technology sector, "RENSTRA of the Ministry of

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[8] In Indonesia, schools are individually evaluated by the "Accreditation Board for Schools/Madrasah" established at the central and regional levels. Full score is 100 and schools are graded A (86~100), B (71~85) or C (56~70). RENSTRA of the Ministry of Education & Culture (2015-2019) takes the ratio of schools above B grade as an indicator of development performance.

Communication & Technology" points out prevailing disparity in people's access to information due to the ICT utilization gap which hinders "improvement of human life quality" as one of the nine priorities of the national goal "Nawa Cita." It also mentions challenges of unsatisfactory internet connections at schools, and emphasizes needs of improvement in those weaknesses.

(2) Regional Level

Yogyakarta Special Region is known as a leading educational district in Indonesia. According to the BPS statistics, the net enrollment rates are 99.2% (1st rank among all 33 provinces) and 82.9% (4th), well above the national average (96.7% for primary and 77.8% for secondary schools). However, respective RENSTRA of Yogyakarta Special Region and DIKPORA point out challenges in (1) quality and equitable education, (2) ICT utilization in education and education based on regional sense with international insight, (3) dissemination of compulsory education at the village level and (4) synergy of improvement between education and other sectors, and emphasize importance of improvement. As the final goal of this project is the rollout of the ICT based education to other provinces, it corresponds to the project needs to have selected Yogyakarta Special Region which already has the base for introduction with high-standard education level as the pilot region.

On the other hand in the communication and information technology sector, the provincial RENSTRA 2012-2017 points out unsatisfactory establishment and operation of ICT infrastructure to promote improved e-Government services, and aims for improvement.

Thus, challenges in the education sector found in appraisal have not been solved up until now, and needs for improvement of the basic education and ICT utilization in whole sectors including education are high at the central as well as regional levels. Therefore this project is consistent also with the current development needs of Indonesia.

3.1.3 Relevance to Japan's ODA Policy

"Creation of democratic society" which was one of the priority areas of the "Country Assistance Policy for Indonesia" in 2004 included improvement of public services of education and health as a part of poverty alleviation. In addition to that, the "Medium-term Strategy for Overseas Economic Cooperation Operations" by JICA (April, 2005) mentioned "Infrastructure Development for Sustainable Growth," "Assistance in Human Resource Development" as priority areas, and recognized that promotion of ICT utilization leads to quality improvement of education and other social services. The "Country Assistance Strategy for Indonesia" in 2006 also mentioned education quality improvement led by regional governments under decentralization as one of the priority themes.

Thus, consistency of this project with the Japan's ODA policy at the time of appraisal is high.

In light of the above, this project has been highly relevant to the country's development plans and needs both at the times of appraisal and ex-post evaluation, as well as the Japan's ODA policy at the time of appraisal. Therefore its relevance is high.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

This project[9] implements variety of activities summarized as follows to strengthen capacity and develop facilities in order to be able to conduct ICT-based education in totally 500 selected schools comprising 300 primary and 200 secondary schools in Yogyakarta Special Region. The figure below illustrates an image of the total system being developed by this project. (Figure 1)
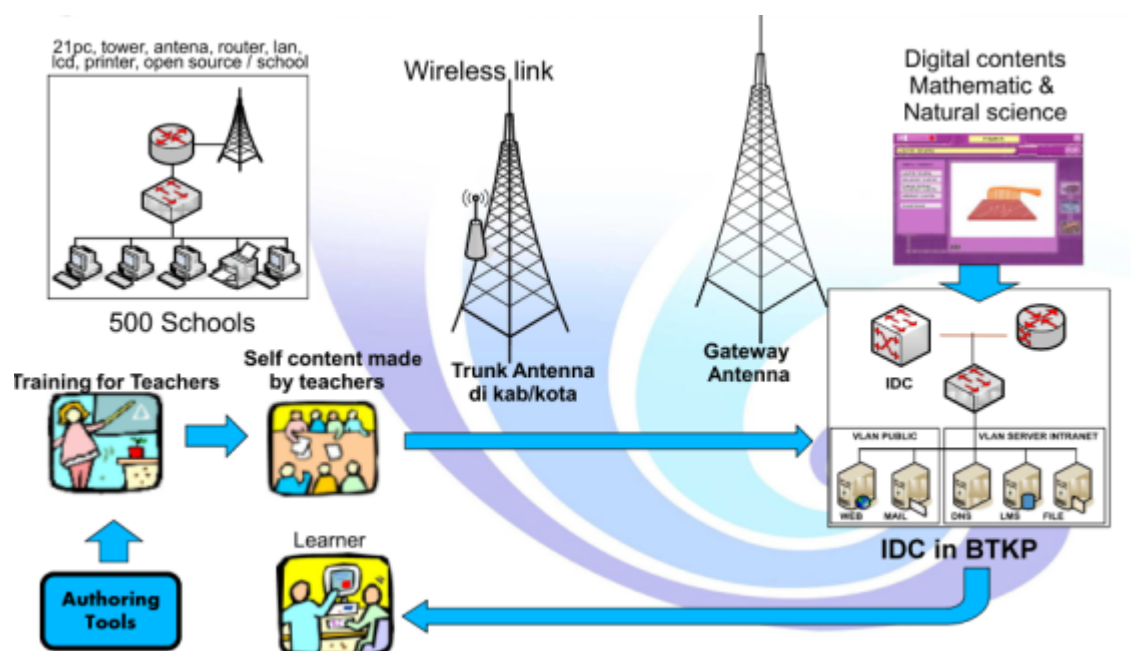

Figure 1: Conceptual Scheme of Total System

Source: "Role Model: ICT Utilization for Education Quality Enhancement in Yogyakarta Province" Boni Pudjianto, International Conference on Innovative ICT, CIO and Natural Disasters, Manila, October 6-7th, 2011

The actual outputs of each component are shown against the plan as follows. (Table 2)

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9 This project is commonly known as "ICT-EQEP" standing for ICT Utilization Project for Education Quality Enhancement in Yogyakarta Province in Indonesia.

Table 2: Project Components and Output Performance against the Plan

Project Components	ODA Loan	Plan*1	Performance
<Main Part>			
1.Installation of ICT Equipment & Connecting Environment			
(1) ICT Equipment for Schools	Financed	500 Schools	500 Schools
(2) ICT Equipment for Project Offices	Financed	One Set	As Planned
(3) ICT Equipment for IDC*2	Financed	One Set	As Planned
(4) Upgrading of Schools' Electric Power Capacity	Out of Finance	500 Schools	500 Schools
(5) ICT Operation & Maintenance (Anti-virus Software License Fee, Internet Connection Fee, Help Desk Operation Cost, Maintenance Contract Fee)	Out of Finance	One Set	As Planned except Anti-virus License Fee
2. Provision of Necessary Materials & Equipment for Schools and Assistance in School Activities (Block Grant)	Out of Finance	500 Schools	500 Schools
3. Conducting Training Programs for Teachers, Etc.	Partially Financed	3,130 People	Over 5,000 People
4. ICT-based Teaching Materials Development *2	Partially Financed	-	75 Study Topics
5. System Development for IDC*3	Financed	4 System Areas	4 System Areas
<Consulting Services>			
1. International Consultants	Financed	33.0MM	45.75MM
2. Domestic Consultants	Financed	196.0MM	296.25MM

*1 Planned targets reviewed in the Mid-term Review

*2 Consists of procurement of ready-made teaching material development software and outsourced teaching materials by the former. No planned quantity was provided in appraisal and other documents. Only the number of study topics of the latter performance is shown here.

*3 Internet Data Center

<Main Component>

(1) Installation of ICT Equipment & Connecting Environment

a) ICT Equipment for Schools (500 primary & secondary schools)

Main contents are desktop computers (21 sets for students of each school and 1 set for teachers which is also used as a server, totally 22 sets per school), antennae, and necessary materials & equipment for LAN (Local Area Network), printers, projectors and other supporting equipment.

Yogyakarta Special Region consists of one City (Kota) and 4 Regencies (Kabupaten). The numbers of total and selected schools under this project are indicated as follows (Table 3). The performance of implementation was as planned.

N3 Wonosari Secondary School at Kabupaten Gunung Kidul and Tower Antennae installed under this Project

Table 3: Distribution of Numbers of Total and Selected Schools in the Project Region

Kabupaten, Kota	Total Number at the time of Project Implementation			Number of Selected Schools for this Project Implementation			Ratio
	Primary	Secondary	Total	Primary	Secondary	Total	
Gunung Kidul	487	107	594	65	34	**99**	17%
Sleman	498	104	602	72	61	**133**	22%
Kulon Progo	349	67	416	38	25	**63**	15%
Bantul	346	85	431	78	50	**128**	30%
Kota Yogyakarta	182	57	239	47	30	**77**	32%
Total	1,862	420	2,282	300	200	**500**	22%

Source: Consultant's Completion Report

(Note)：The latest figures in 2015 are 1,844 (primary school) and 435 (secondary school) respectively. (Source:

   BAPPEDA <Regional Development Planning Board> Yogyakarta Website:

   http://bappeda.jogjaprov.go.id/dataku/data_profil)

b) ICT Equipment for Project Offices

A set of equipment for project administration is installed in the project offices set up at the KOMINFO (executing agency) and DIKPORA (operation & maintenance agency) consisting of desktop and laptop computers, printers and other supporting equipment. The performance of

implementation was as planned.

c) ICT Equipment for Internet Data Center (hereinafter referred to as "IDC")

IDC is a unit mainly functioning for system development relating to establishing educational information database, helpdesk operation, educational contents management and gateway functions [10], which was set up at BTKP. Main equipment installed under this project consists of various kinds of servers, UPS (Uninterruptible Power Supply), antennae, helpdesk equipment and materials for developing educational contents. The performance of implementation was as planned.

Server and Other Equipment
Contained in the Rack Mount in IDC

d) Upgrading of Schools' Electric Power Capacity

This component consists of improvement of power receiving facility and contract ampere increase at 500 schools where the project PC equipment are installed for their stable operation. The performance of implementation was as planned.

e) ICT Operation & Maintenance

This component consists of "anti-virus software license fee," "internet connection fee," "helpdesk operation cost" and "maintenance contract fee." The performance of implementation was as planned except the "anti-virus software license fee."[11]

(2) Provision of Necessary Materials & Equipment for Schools and Assistance in School Activities (Block Grant)

The "Block Grant" is a government's education improvement model scheme (commonly known as "REDIP") based on the concept that the party concerned in the field knows best about the actual priorities of education development there. It finances education development activities proposed with bottom-up approach (hereinafter referred to as "BUA") appraising proposals submitted by schools or communities concerned. In this project, having appraised proposals from the selected 500 schools regarding supporting activities to effectively implement education

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[10] Gateway is a device or equipment that enables mutual communication of data having different protocols in a network and/or system.

[11] As an Operating System (OS), open-source Linux was adopted. Based on the idea that Linux is virus-free, pay virus software was not installed, so no license fee was incurred. Objection against that view is also prevailing, however, no case of virus infection in PC of this project was found during the ex-post evaluation study.

utilizing installed ICT equipment, this scheme allocated necessary fund according the following purposes. The provision of the proposals are assisted by the "professional facilitators (hereinafter referred to as "PF") employed under the project consulting services. The performance of implementation was as planned. Amounts of the grant are uniformly 15 million rupiah for primary and 20 million rupiah for secondary schools respectively. The criteria of provision according to different purpose of use are as follows. (Table 4)

Table 4: Criteria for Provision of Block Grant according to Categorized Purpose of Use

Purpose of Use	Criteria of Provision	Examples of Use
(1) Procurement of Materials & Equipment	Max. 45%	Capacity increase of receiving power, Equipment for security purpose of PC lab, PC security measures, Facilities in PC lab, Air conditioning of PC lab.
(2) ICT Using Activities	Min. 50%	● ICT training at school 40% ● Education material development 40% ● ICT materials 20%
(3) Preparation &Reporting Activities		Stationery for preparing activity reports, Postal charges, Printing cost, etc.

Source: Consultant's Completion Report

(Note) In order to set the descending order of priorities, (2), (1) and (3), minimum percentage for (2) and maximum percentage for (1) are fixed respectively. Additionally, use for (3) is conditionally allowed only when purposes of (2) an (1) have been achieved.

(3) Activities for Capacity Development on ICT

A. Domestic Training

(a) Technical Training on ICT Utilization (ICT Literacy)

In order to become able to carry out ICT-based training utilizing equipment provided by the project, the training scope covers technical training on utilization of hardware, OS (Linux), software, operation and maintenance of PC labs in the field and also includes DIKPORA's education policy. The participants include both teachers and ICT trainers. It was implemented from May 2010 up to June 2013 involving totally 3,580 participants. The planned number of participants was 2,920 people at the time of appraisal.

(b) Technical Training for Education Material Development

The development of e-Learning materials is outsourced as well as self-made by teachers themselves. This training was carried out for the latter type to develop teachers' capacity. A cas-

cade method[12] was adopted, and totally 1,170 teachers primarily trained in two batches consisting of 20 to 30 trainees each (totally 40 to 60 people) from July 2011 until May 2013. They are requested to conduct technical transfer to other teachers after this training. As a post training follow-up, hands-on facilitation by the project consultants was conducted at selected one school from each Kabupaten as well.

(c) Training for BUA Activities

The purpose of this training is the enhancement of BUA self-management, and the major contents include ICT-base accounting control regarding school management and educational data collection and management on a BUA basis. Dissemination of ICT related regulations of DIKPORA was also attempted. Through this training, technical transfer of ICT technologies to be applied to school management in addition to the education itself was performed involving totally 750 teachers and school staffs during the period from March 2011 until May 2012.

B. Oversea Training[13]

The main purposes of the Oversea Training were to study actual implementation practice in Japan regarding (1) e-Learning material development (2) required school activities for ICT utilizing education and (3) building of e-Learning systems by developing ICT including networks. The training was conducted in four batches (Kyoto 3, Tokyo 1), totally 55 participants (teachers 26, KOMINFO 20, DIKPORA 9) during the period from October 2010 until December 2012. Institutions visited included Kyoto Prefectural Education Center, Otemae University and Kyoto University of Education in Kyoto, the sister city of Yogyakarta, NHK and Secom Data Center in Tokyo. They also visited totally 11 schools (primary school 6, secondary school 4 and high school 1) and observed classrooms where ICT-based education was going on. According to the participants' report afterwards, especially the school visits to directly observe actual ICT-based education and direct contact with field education activities associated with its visual image through discussions with teachers much contributed to this project operation. They also mentioned that they had learned high morality and ethics of Japanese by experiencing the school lunch system, observing classroom cleaning by students after school and clean spaces of corridors and rooms.

Total number of teachers trained in various schemes above reached over 5,000 people, which is well over the target, 3,130, set at the mid-term review.

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[12] Like a Telephone Game, it is a mechanism to disseminate certain new knowledge or information to others stagedly via multiple layers. Practically, a small number of experts or master trainer initiate training contents to some trainees first, and then the trainees transmit what they have learnt as sub-trainers to other lower-layer trainees. Finally, the knowledge or method learnt is transmitted down to the field implementers for pragmatic application.

[13] The oversea training was conducted as a part of the consulting services under ODA loan. However, it is classified under the category here as one of the components of the ICT capacity development,

C. Workshop Activities

As a part of capacity development activities, various workshops were conducted to supplement the trainings above. The contents widely vary from the type of complementing A. Domestic Training above to individual particular items such as e-Learning media evaluation, baseline studies, problem analyses of project activities and model schools development. Total number of participants reached 2,201 people spreading over various positions including teachers, principals, lab managers, administration staff and educational officers of the province and kabupatens. The baseline studies had been originally planned to constitute a set with a counterpart "advanced studies" to conduct the end-line research. However, this intended monitoring practice was not realized eventually due to the project implementation delay and resultant extension of the consulting services. Instead, the consultant proposed at their service completion periodic self-monitoring and evaluation one year, two years and five years after the project completion, however, this proposal is indicated not to have been systematically practiced by related Indonesian agencies.

As these workshop activities were not clearly stated in the project plan at the time of appraisal, it is deemed additional practice to support planned trainings.

D. Direct Facilitation Activities at Schools

In addition to the intensive capacity development activities (A to C), ad hoc hands on facilitation was widely conducted by the consultants, PF and BTKP staff.

Facilitation at a Primary School

(4) Development of Teaching Materials

Besides the self-developed materials by teachers, development of teaching materials (learning and testing materials) used in PC labs were also outsourced[14], and the products were stored in school servers. As they are also stored in the IDC server, they are externally accessible via intranet and internet networks by anyone.

ICT-based teaching materials developed under this project cover arithmetic for 4th, 5th and 6th grades of primary schools and mathematics and science for 7th, 8nd and 9th grades of secondary schools[15], and totally 75 materials were developed. The breakdown according to the curriculum

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[14] Open-source software "Moodle" was used for the LMS (Learning Management System) as an e-Learning platform. For teaching material production, e-Learning material development tool "LECTORA INSPIRE" and "LECTORA INTEGRATE" were procured and used.

[15] In Indonesia, grades of compulsory education are summed up from primary school, therefore secondary school grades are indicated as 7th, 8th and 9th.

topics is shown below. (Table 5)

Table 5: Breakdown of Developed Teaching Materials

	Primary School			Secondary School		
	4th Grade	5th Grade	6th Grade	7th Grade	8th Grade	9th Grade
Arithmetic /Mathematics	8	11	7	7	8	6
Science	-	-	-	8	11	9

Source: Consultant's Completion Report

(5) System Development for IDC

The roles of IDC being set up at BTKP are collective management and publishing of education-related information in Yogyakarta Special Region (database function), provision of helpdesk support to the 500 schools, guidance on ICT-based education, distribution and storage of developed teaching materials and operation of gateway function for providing internet connection services for the 500 schools. Moreover, its service includes distribution of comprehensive ICT-based educational services through the developed portal site entitled "jogjabelajar: http://jogjabelajar.org/." (Figure 2) Various areas of system development[16] were planned to enable provisions of those services, and implemented as planned.

From the left, **jbmedia** (teaching materials storage site) **jbtube** (animation distribution site) **jbradio** (radio distribution site) **jbbudaya** (cultural information distribution site) **jbclass** (online Q&A site with teachers <member enrollment is required>)

Figure 2: "jogjabelajar" Homepage

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16 It consists of (a) Network system development, (b) Database system development, (c) e-Learning system development and (d) Helpdesk system development (e) Website system development.

It can be concluded that this project has mostly produced the outputs of each component as planned.

<Consulting Services>

The consulting services were performed comprehensively covering almost all the main project components above. Outline of implementation is as follows.

1. General implementation management (review and preparation of the implementation plan, coordination among institutions involved, implementation supervision, selection of schools, preparation of the rollout plan, etc.)

2. Implementation assistance of the main component (detailed designing, preparation assistance of tender documents and procurement plans, procurement supervision, tender evaluation, assistance in contract negotiation, facility installation supervision, contractor payment supervision, assistance in request for JICA disbursement, etc.)

3. Assistance in teaching materials development (study on current conditions of education and needs for teaching materials in Yogyakarta Special Region, preparation of specification for outsourcing materials development, procurement supervision, facilitation for teachers on materials self-development, etc.)

4. ICT-based education, BUA and oversea training implementation assistance (needs research, preparation of specification guidelines for outsourced training, assistance in preparing block grant proposals through PF, planning of oversea training in Japan and implementation supervision, etc.)

5. Others (assistance in preparing progress reports, assistance in JICA's mid-term review implementation, etc.)

In addition to normal assistance services like planning, designing and implementation supervision in infrastructure development projects, the consulting services of this project directly participate in implementing the main project components and include various kinds of technical assistance. The whole activities were carried out as planned.

Thus, both the main components and the consulting services were mostly implemented as planned in each sub-component, and planned outputs were produced as well.

3.2.2 Inputs

3.2.2.1 Project Costs

The total project cost was initially planned to be 4,376 million yen (out of which 2,911 million yen was to be covered by Japanese ODA loan). Actually disbursed amount of the ODA loan was 1,520 million yen, but the actual amount of the total project cost is unknown because the accounting record of project expenditures from the Indonesian government side is incomplete. However, from the facts that the loan disbursed amount is 52% of the approved and the reported amount of the actual government expenditure at the mid-term review in October 2012 was only 15% of the planned amount, the total project cost actually incurred is presumed significantly smaller than the planned. The main reasons of the significantly lower actual cost than the planned are considered to be as follows.

(1) The average rupiah exchange rate against yen during the implementation period was 0.0091 (2009-2014 average rate from the International Financial Statistics of IMF), which was depreciated 27% against 0.0124 applied at the appraisal.

(2) As stated in (4) below, due to the remarkable delay in the procurement of ICT equipment, the actual price of the goods with the same specification was much lower than the appraised estimated price.

(3) Estimated costs of OS and license fee of anti-virus software were saved by adopting open-source Linux[17].

(4) The procurement of ICT equipment was performed in three packages. Due to the significant delay, contractual penalty (reduction of payment) was imposed to the contractor concerned.

(5) Some project activities planned were cancelled without affecting the project purpose achievement. They include oversea visits to China to observe state of affairs of ICT materials and equipment supply, which had turned unnecessary because it became possible to be confirmed domestically.

In light of the above, although the actual total project cost is unclear, it can be considered lower than planned. It is also assumed from the large amount of unused ODA loan balance.

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[17] In the technical training of ICT literacy (P.12), users were intensively trained how to use Linux, and successful result was proved by the questionnaire survey to teachers executed in the consulting services. The visiting survey of this ex-post evaluation to schools also found that teachers and students were well handling Linux as well. No negative effect of the introduction of Linux has been observed.

3.2.2.2   Project Period

The overall project period was planned from March 2007 to December 2012 (5 years and 10 months or 70 months). The actual period was from March 2007 up to December 2014 (7 years and 10 months or 94 months), which is 134% of the plan. The selection of consultant commenced in November 2007, but after committing unsuccessful invitation, two-time retendering due to imperfect proposal documentation and other procedural errors delayed service commencement for about two years until July 2009 (planned to start in December 2007). In addition to this main cause, there were some other reasons for delay; such as, prolonged procurement process due to reshuffling of the contract packages, service delay of the third-package contractor whose service commencement was overlapped with the transition between 2012 and 2013 fiscal budgets and delivery and installation delay due to worker allocation failure of that contractor.

Although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair.

3.3 Effectiveness[18] (Rating: ③)

Such evaluation indicators to measure the effectiveness were assumed as (1) ratio of schools with IDC access (%), (2) number of teaching staff who have undergone training, (3) number of students per PC in primary and secondary schools, (4) number of subjects utilizing ICT, (5) ratio of schools which have computer labs and use PCs during class, (6) net enrollment rate at primary and secondary schools. However in actual fact, IDC access is possible for anyone with internet environment (1), it was found in the field studies of this ex-post evaluation that the direct influence of introducing ICT-based education on school enrollment is minimal (6) and the ratio of schools which have computer labs and use PCs during class (5) is not statistically captured. Therefore those are not adopted as quantitative effect indicators in this ex-post evaluation. For (2) and (3), they are output indicators inherently. However, focusing only on the 500 schools, their target figures were reviewed as quantitative effect indicators at the mid-term review. Following that attempt, this ex-post evaluation tries to compare the reviewed targets and performance and evaluate the effectiveness by means of whole 500 school online questionnaire survey and direct survey visits to selected 50 schools.

3.3.1   Quantitative Effects (Operation and Effect Indicators)

The mid-term review conducted in 2012 updated and revised the quantitative targets assumed at the appraisal as follows. (Table 6)

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[18] Sub-rating for Effectiveness is to be put with consideration of Impact

Table 6: Indicators at Mid-term Review and Performance

Indicators	Baseline At Mid-term Review （2012）	Revised Targets （2014） 1 Year After Completion	Actual （2015） 1 Year After Completion
Number of teaching staff who have undergone training	2,170 (Primary & Secondary Schools)	3,130	4,750
Number of students per PC in primary schools	18	15	11
Number of students per PC in secondary schools	19	11	
Number of original ICT teaching materials that teachers have developed based on available ICT teaching materials	352 (Primary:215 Secondary:137）	500 (Primary:300 Secondary:200）	673*

Source: Questionnaire answer at mid-term review

Note: The project was estimated to complete in 2013 at the time of mid-term review in 2012, but the actual completion was delayed until 2014.

* Number of items stored in the IDC sever only

(1) Number of teaching staff who have undergone training

Number of teachers who have undergone the domestic ICT technical training reached 3,580 people, and participants of the teaching material development are 1,170. Total number of people is 4,750 teachers, which exceeds the revised target.

(2) Number of students per PC in schools

Based on the average number of students per primary and secondary school in Yogyakarta Special Region (cf. 3.5.3 Financial Aspects of Operation and Maintenance), the number of students per PC in the 500 schools is 7.6 people for primary schools and 14.2 people for secondary schools (10.9 people on average[19]), which has achieved the targets for the year 2014 revised at the mid-term review, 15 and 11 (13.0 on average) respectively[20]. However, not a small number of the selected 500 schools already possess PCs out of this project whose number is unknown. Therefore the numbers of students per PC above were calculated only for the PCs provided under this project.

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[19] The comparison with the target was made on average, because the number of distributed PCs is uniformly 21 sets per school while primary school students are about 2.2 times of the number of secondary school students.

[20] Individual number of students at each school was statistically available only for all the schools (2,279 as of 2015) collectively. To precisely pick out the 500 schools one by one is infeasible within the limited time of the evaluation study. Therefore, the total number of students of the 500 schools was estimated applying the average number of whole schools.

(3) Number of original ICT teaching materials that teachers have developed

The "Number of original ICT teaching materials that teachers have developed based on available ICT teaching materials[21]" is a newly prepared indicator at the mid-term review, and the target was set at 500 items. Against this target, the number of actually developed teaching materials up to the time of ex-post evaluation reached 673, just ones stored in BTKP database. As will be stated in the following section 3.3.2 Qualitative Effects, the "500 school online survey" revealed the fact that number of schools which have ever self-developed at least one teaching material was 385, and also there were schools that have developed well over 10 materials. Therefore, it can be assumed that the total number has considerably exceeded the target of 500.

3.3.2 Qualitative Effects

Project effects on the basic education and ICT utilization in Yogyakarta Special Province were evaluated from the results of the following two kinds of surveys.

A: Online questionnaire complete survey of 500 implementing schools under this ex-post evaluation

B: Direct visiting survey of optionally selected 50 schools under this ex-post evaluation

A. Complete online questionnaire survey of 500 implementing schools

A complete online questionnaire survey was conducted in this ex-post evaluation, and answers were fully collected (includes partly no answer to some of the questions). In advance to the survey, a preliminary visiting survey was executed in five sample schools including one good-performance school and four questionable schools based on hearing to BTKP. Key checkpoints were then identified from the actual conditions on usage of the project facilities; namely, (1) school subjects utilizing ICT, (2) teaching staff of ICT utilizing subjects, (3) ICT teaching materials being used, (4) conditions of teaching materials self-development and tools used, (5) communications with BTKP and (6) physical conditions of provided equipment. Questionnaire to ask those points were prepared and sent online to whole implementing schools. Points of questions and summarized results from the answers are as follows.

(1) e-Learning using School Subjects and Activities

Although 7% of the schools use the facility only for ICT training, the ICT systems provided under the project are used in all the implementing schools, including cases of ones having ever used, without exception. 93% of the schools apply ICT to mathematics (including arithmetic in

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[21] Because tools for teaching material self-development are an authoring tool LECTORA and other Windows Office Applications, the expression "based on available ICT materials" is not precise. But it is applied replacing it with a suitable wording.

primary schools, the same shall apply hereinafter) and science which are the priority subjects, and 67% extend its application to other subjects and activities.

(2) Teaching Staff for e-Learning

Primarily, e-Learning of each subject shall be conducted by teachers in charge of the subject concerned (training is also provided for that purpose under this project), however, ICT teachers and staffs are doing instead in 12% of the schools mainly due to insufficiency of ICT capability of subject teachers.

(3) Teaching Materials Used

35% of the schools use only materials stored in "jogjabelajar" developed under this project. In addition to that, 39% use self-developed and/or procured materials.

(4) Usage of Self-developed ICT Materials and their Tools

77% of the schools have ever developed at least one material, among which 52% developed teaching materials only and additionally 25% schools have ever developed testing materials as well. Only 37% utilize the authoring tool "LECTORA," and most of others use software of Windows Office (PowerPoint: 86%, Word: 69% and Excel: 59%).

(5) Usage of BTKP Intranet

Usage of the intranet device prepared under this project is not so satisfactory. Schools which answered making full use are no more than 24%. While 25% answered having ever used, 15 answered never used. According to the direct visiting survey dealt with in the next section, however, there prevails confusion among the schools between "Intranet" and "Internet," therefore the above figures seem to involve connections with "Internet," consequently the intranet usage may therefore be further lower. It is also represented by remarkably low helpdesk usage (only 11% that use it even partially).

(6) Occurrence of Equipment Breakdown

91% of the schools have ever experienced breakdowns of ICT equipment. The overwhelming majority is student PCs (1,439 cases), which is followed by UPS (349 cases) and headsets (270 cases). While showing that ICT equipment is physically vulnerable, it also indicates high utilization rate of the facility in the field.

(7) Communication with BTKP

Only 11% of the schools answered that they are using the helpdesk to mainly settle technical troubles even partially. Means of communication which is most frequently used is Short Message Service: SMS (65%) which is followed by telephone communications (13%). Multiple devices are used, so the figures are duplicate.

In spite of no dead line of the answer submission fixed in advance, whole the 500 school that received the questionnaire sent their answers almost within 10 days. This response itself evidences smooth connection environment has been established through the ICT network developed in this project.

The result of A Survey indicates generally good performance of the ICT utilizing education implemented with materials and equipment introduced under this project.

B. Direct visiting survey of optionally selected 50 schools

Following the above complete online survey, this ex-post evaluation carried out visiting survey in order to directly grasp field conditions deeply and organically by means of direct observation and hearing to the beneficiaries.

(1) Method of selecting 50 sample schools

Ten schools from each four kabupaten and one kota (six primary schools and four secondary schools) were selected. A field survey was conducted visiting ten schools consisting of one good-performance school and nine other questionable schools in terms of conditions and performance in utilizing PC lab facilities provided under this project based on the explanation of BTKP[22].

(2) Persons interviewed

Interviews were held to principals, school lab coordinators (in some cases, teachers assume the assignment concurrently), teachers and students. Summarized survey results are as follows.

(3) Confirmed project effects

As an educational effect, enhanced motivation was found both in teachers' as well as learners' sides. At practice of e-Learning classes, students' learning attitudes were serious, and all the students interviewed responded that e-Learning was enjoyable. Principals and other school management staff feel proud of being selected as an implementing school and providing advanced education applying ICT devices. Some of the schools newly introduced entrance examinations to select from considerably increased applicants for enrollment after introducing ICT-based education, which further enhanced educational incentive there. It was also seen in the teachers' side, which is reflected in the fact that a number of teachers have already developed ICT utilizing teaching materials by themselves based on the technical knowledge acquired through trainings under this project and use them in their classes.

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[22] Since the already completed 500 online survey above showed that conditions of project performance were generally satisfactory, the visiting survey tried to mainly select questionable schools on purpose rather than choosing good-performing schools. However, the schools deemed questionable beforehand were found not to have particular problems in PC lab operations, which proved high standard ICT utilizing education practice in general in 500 implementing schools.

Additionally, the ex-post evaluation revisited following two selected primary schools whose performance stood out from others identified in the 50-school beneficiary survey to obtain detailed explanation concretely. The schools had further developed their own ICT skills from the technical training given in the project, and produced and was operating their own portal site that contains self-developed teaching materials and other rich contents for education. In addition to their full use for their own education purpose internally, it is open to the public enabling anybody to have access through internet.

➢ Muhammadiyah Bodon Primary School（http://sdmuhbodon.net/intra/）
➢ Muhammadiyah Condongcatur Primary School (sdmuhcc.net/elearning/）

At Muhammadiyah Bodon Primary School, in addition to the production of own ICT teaching materials using LECTORA introduced in the project, one of the teachers has written and published a detailed book manual regarding teaching material development using LECTORA. The book is being commercially sold at bookshops, and it is already the third impression which is published since the first publication in November 2012 contributing to dissemination of method of e-Learning material production to many educators and educational agencies[23]. The performance of the two schools above is prominent from others, which is judged due to individual talent and capability of the teachers in charge who directly dealt with this project implementation and operation.

Figure 3: Example of e-Learning Material Developed
(Primary School Geometry: "Flat Figure" and "Solid Figure")

Source: ICT EQEP in Indonesia
(https://inafu6212-001-2012-3.wikischolars.columbia.edu/ICT+EQEP+in+Indonesia)

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[23] Electric PDF version is open to the public at
https://fe.uny.ac.id/sites/fe.uny.ac.id/files/Tutorial%20Lectora%20Lengkap.pdf.

Although schools BTKP considers questionable in performance were mainly selected for the visits, the PC lab facility installed under the project was well utilized in general (other than one exceptional school below) as a survey result. However, following minor problems in individual cases were found.

(a) Insufficient number of PCs (Some schools procured additional PCs with their own budget. There was another case in which wifi connection was installed to enable remote access from ordinary classrooms.)

(b) Resistant sentiment against ICT among aged teachers (over 50 years old)

(c) Fund raising for repairs and replacement (Possibility and amount of budget allocation depend on each school and community's degrees of recognition of advantage and necessity of ICT utilizing education)

(d) Insufficient dissemination of understanding on "intranet"

(e) Limited BTKP support (technical support and training)

There was a secondary school which does not use the project equipment at all due to the lack of will of the former principal[24].

As a result of the surveys, although minor problems were partly found individually, the performance of ICT utilizing education introduced by this project is satisfactorily achieved in general, and it was also confirmed that educational motivation in both teachers' and learners' sides had been enhanced.

3.4 Impacts

3.4.1 Intended Impacts

The purpose of this project is the education quality enhancement and the ICT utilization is the means to attain it. Aspects of qualitative change prevail in education quality enhancement, but a school record representing improvement in students' academic ability is suitable to measure its achievement. Further goal of this project is rollout of the project attainment to other provinces aiming for nationwide development. The impact evaluation examines those two aspects and other impacts of this project on education and ICT sectors.

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[24] This fact was reported to BTKP after the school visit. Hearing that fact, the head of BTKP promptly visited the school and discussed with the present principal. As a result, the present principal corrected his unrecognition of this fact, and promised to carry back a set of equipment presently stored in the warehouse to the PC lab and would resume its utilization for the school's ICT-based education.

(1) Scores on Graduation Exams

Both appraisal and mid-term review set "difference in the average scores on graduation exams in targeted primary and secondary schools (difference in average scores before and after the project of target schools less the difference in the average scores before and after the project of non-target schools), however, the aggregated score of the whole subjects is not suitable to judge presence and/or degree of project impact, because ICT applied school subjects are quite limited and degree of application varies. Therefore this ex-post evaluation tried to make before (2010) and after (2015) comparison of graduation exam scores on two priority subjects on ICT introduction, mathematics and science, between whole schools in Yogyakarta Special Region (including targeted 500 schools) and purely 500 targeted schools. The result is shown below. (Table 7)

Table 7: Before/After Comparison of Average Scores of Graduation Exams

Schools	Subjects	School Groups	A 2010 (Before Project)	B 2015 (After Project)	B-A/A (%)
Primary	Mathematics	Whole Schools	6.98	6.84	△2.00%
Primary	Mathematics	Targeted 300 Schools	7.28	7.18	△1.37%
Primary	Science	Whole Schools	6.97	7.70	10.47%
Primary	Science	Targeted 300 Schools	7.16	7.92	10.61%
Secondary	Mathematics	Whole Schools	6.43	5.33	△17.11%
Secondary	Mathematics	Targeted 200 Schools	6.91	6.16	△10.85%
Secondary	Science	Whole Schools	6.68	5.76	△13.77%
Secondary	Science	Targeted 200 Schools	7.09	6.42	△9.45%

Source: Calculation from DIKPORA statistics

(Note) Cf. "Table 3: Distribution of Numbers of Total and Selected Schools in the Project Region" for the total number of schools in 2010, and 2015

The fact that the average scores in 2015 are generally lower than that of 2010, except for primary school science, indicates that degree of difficulty comparatively increased in 2015. In those circumstances, the rates of before/after change in average scores of the targeted schools are superior to the whole schools throughout all subjects[25], which suggests that the utilization of

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[25] As the whole schools include targeted 500 schools, the difference would have been bigger if the comparison had

ICT in education may have positively contributed to the academic performance of the targeted 500 schools to a certain degree.

(2) Rollout to Other Provinces

As clearly mentioned in the project purpose, the rollout of this project experience to other provinces is specified as the project impact. The "Roll Out Team" was supposed to be organized calling KOMINFO and Ministry of National Education (Ministry of Education & Culture at the time of ex-post evaluation) as its members and would take charge of the task. In November 2011, the "e-Government Forum was held inviting 14 provinces to explain this project and promote understanding regarding necessary considerations for practical application. However, any particular rollout activities have not been conducted afterwards by the central government up until the time of ex-post evaluation. On the other hand, as will be mentioned in section 3.4.2 (2) ICT Development Promotion by BTKP in Yogyakarta Special Region below, e-Learning contents by various ICT media contained in the portal site "jogjabelajar" are being distributed via internet and become widely known over the country. According to BTKP, it has received several groups of observation visits from multiple provinces. It can be said that natural flow of rollout without involvement of the central government has begun to proceed. This kind of demand-pull natural rollout is considered solider and more preferable than government led supply-push-type rollout. Like an example of the two excellent primary schools taken in section 3.3.2, there appear cases in which the performance attained in this project was constructively internalized and numbers of useful self-developed educational contents contained in well-established portal sites are being widely distributed via internet. In this way, this project is already indirectly influencing education of other schools nationally. KOMINFO and the Ministry of Education & Culture should support this movement from the side by means of public relations and other functions to actively promote the rollout.

3.4.2 Other Impacts

(1) Education Service and Its Quality Equalization in Yogyakarta Special Province

Yogyakarta Special Region consists of a kota and four kabupatens, and quality gap between city and remote areas is prevailing in education in terms of teachers and facilities.

This project also contributes significantly to level regional disparity in education enabling provision of equalized education services by ICT utilization. In some of official documents, the project title/purpose is indicated as "Educational quality improvement and equalization." For instance, the "Operational Handover Note (Serah Terima Operasional)" entitles this project as "ICT Utilization Project for Education Quality Enhancement and Equalization in Yogyakarta

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been made with non-targeted schools.

Province," which will be mentioned later in section 3.5.1 Institutional Aspects of Operation and Maintenance.

(2) ICT Development Promotion by BTKP in Yogyakarta Special Region

BTKP is an institution under DIKPORA mandated to conduct hard and software ICT development and service delivery in Yogyakarta Special Region. Its function was considerably strengthened as stated below both in name and in reality as the communication technology center of Yogyakarta Special Region in financial and human capacity aspects as well as physically by establishing the IDC within under this project.

(a) Education Sector

The enhanced function of BTKP includes distribution of e-Learning contents and cultural information by means of developing a portal site "jogjabelajar-Unlimited Learning Experience." ("belajar" means "learning" in Indonesian language) It also operates radio and television studios, and the digital voice materials and animation educational contents produced there are widely delivered via internet networks. In addition, it also operates internet-connected direct communication site between teachers and students. It should be considered that these services are already realizing national level rollout of ICT utilizing education over the boundary of Yogyakarta Special Region.

(b) ICT Sector

As stated in section 3.1.1 Relevance to the Development Plan of Indonesia, Yogyakarta Special Region has been promoting ICT utilization in health, agriculture, trade & industry, service and other industries under the slogan "Jogja Cyber Province," and the leading sector is the education in reality where BTKP that has been significantly enhanced by this project is playing the central role.

The points are summarized as follows. The ICT utilizing education was highly developed in the targeted 500 schools with enhanced educational motivation both in teachers' and learners' sides under this project. The project is also contributing to the regional equalization of education. In addition to that, variety of ICT teaching materials and information are being distributed by enhanced BTKP by this project through internet over the boundary of Yogyakarta Special Region. It enables ICT

Education Communication Technology Center (BTKP）

utilizing education delivery with nation-wide scope, which can be considered that the rollout to other provinces have been already proceeding spontaneously. It is also recognized that BTKP is playing a leading role in promoting ICT utilization in other sectors in Yogyakarta Special Province.

Thus, the project has largely achieved its objective, therefore effectiveness and impact of the project are high.

3.5 Sustainability (Rating: ②）

3.5.1 Institutional Aspects of Operation and Maintenance

Operation and maintenance responsibility is carried by each target school for the PC lab facilities or by DIKPORA for the network facilities respectively, which is basically the same at present as the time of appraisal.

Four professional organizations are instituted under DIKPORA; namely "Technical Education Training Agency (BLPK)," "Development of Learning Activities Agency (BPKB)," "Educational Communication Technology Agency (BTKP)," and "Youth and Sport Agency (BPO)." BTKP is the professional agency that solely undertakes ICT-related development, service delivery and capacity development in the education sector and plays a central role of operation and maintenance of this project.

BTKP is an organization staffed with totally 51 personnel under the head officer, and 22 ICT engineers as a "technical working team" engaging in field works are assigned in addition to 20 administrative staff members. In relation to this project, the development & production division deals with the development and preparation of ICT technical guidelines, teaching material development and production, and capacity development (training), while the provision of various ICT education services, dissemination of developed e-Learning materials and operation of the portal site "jogjabelajar" are handled by the service promotion division. In addition to that, the helpdesk was established within BTKP in this project and ready to render technical support for individual target schools, but a minor problem that it has not been fully operational is prevailing as will be mentioned in the following section.

BTKP is thus charged with the central role in promotion of developing ICT utilization and its operation in the education sector of Yogyakarta Special Region. As the head officer has ever articulated that the ICT-EQEP (this project) has finished for KOMINFO, but for BTKP it has started, BTKP will be continuously engaged in total project operation and management including non-hard aspects as the core agency. As for the rollout to other provinces, while KOMINFO is officially nominated to conduct it as the executing agency, BTKP is expected to give substantial contribution as a central body to present a vital example of actual practice.

Under this overall management by BTKP, ICT materials and equipment installed out of BTKP are operated and maintained under the responsibility of each agency to which they belong, which is considered appropriate corresponding to the respective locational responsibility.

3.5.2 Technical Aspects of Operation and Maintenance

Technical guidance by means of training, workshops and hands-on facilitation is provided for the targeted schools under this project (cf. 3.2.1 (3) Activities for Capacity Development on ICT) and operation manuals for operating PC labs are also prepared and delivered.

It is necessary to get BTKP's assistance through its helpdesk or direct technical support regarding technical problems which cannot be solved independently, however, the helpdesk is not fully operational due to incomplete spread of understanding of intranet operation and therefore support request by telephone and SMS is prevailing. As stated above, technical capability of BTKP is organizationally enough with 22 professional engineers, however in practice according to the beneficiary survey result, timely support is not satisfactory enough mainly due to its understaffed condition. The online questionnaire survey to the 500 schools tells that student PCs of almost all the schools have ever experienced or are currently suffering physical troubles. Most of those troubles are spontaneous due to their long time use, not by users' technical failure or insufficiency. It is basically not possible for the schools to fix those troubled machines by themselves and have to resort to onerous repair services outside, which needs to be treated as a "financial" issue of the sustainability dealt with in the next section.

3.5.3 Financial Aspects of Operation and Maintenance

As stated in section 3.5.1 above, IDC and network facilities are operated and maintained by BTKP. Annual amounts of budget for each fiscal year allocated for this project operation and maintenance are as follows. Reflecting the high priority of the ICT sector in Yogyakarta Special Region, ample budgets are allotted.

Table 8: Operation and Maintenance Budget Expenditure for BTKP

Year	Budget Expenditure (thousand rupiah)	Particulars
2013	45,000	
2014	400,000	
2015	1,200,000	Including special budget of 605,745 thousand rupiah for replacement of the tower antennae installed in this project[26] for enhancement
2016	800,000	

Source: BTKP answer to the questionnaire

On the other hand, operation and maintenance responsibility of PCs and supporting equipment installed at each school is left to respective schools concerned. The right of operation of assets installed in this project has been transferred from the central government (KOMINFO) to each school by "Operational Handover Note (Serah Terima Operasional)," however the problem is that the ownership has not yet been transferred[27]. For assets without ownership, schools are not allowed to request budget for operation and maintenance to controlling regional governments concerned, therefore they are presently managing to apply insufficient "school operation subsidies" provided in the forms of BOS (central government) and BOSDA (regional governments). Those are allocated to subsidize educational operation during the nine-year compulsory education for six and three years at primary and secondary schools respectively. The following are each amount provided in the latest 2015. (Table 9)

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[26] This tower antennae was already removed at the time of the field survey and stored at BTKP to be reused at a school in future.

[27] According to the mention made by the Director General of KOMINFO at the wrap-up meeting on the last day of the second field survey, decision of the ownership transfer had been approved by the president. Further development needs follow up.

Table 9: Annual Provision of BOS/BOSDA per Student

	Primary School		Secondary School		System of Provision
	Rupiah (Rp.)	In Japanese Yen (¥)	Rupiah (Rp.)	In Japanese Yen (¥)	
BOS	Rp.800,000	¥6,960	Rp.1,000,000	¥8,700	Remittance through provincial governments to schools
BOSDA	Rp.110,000	¥957	Rp.190,000	¥1,653	Direct remittance to schools

Source: Information provided by BTKP

(Note) Conversion into Japanese Yen is based on the month-end rate, May 2016, of IFS (International Financial Statistics, IMF)

BOSDA is provided based on the Governor Regulation No.14, 2010 (amounts are revised every year). It gives prominence to the use for the operation and maintenance of the facilities introduced under this project (ICT-EQEP) as an example.

Calculating from the average numbers of students per school in Yogyakarta Special Province, 159 for primary and 299 for secondary schools, amounts of the annual school operation subsidies per school are Rp.144,690,000 (¥1,258,803) for primary and Rp.355,810,000 (¥3,095,547) for secondary schools[28].

As identified in the online questionnaire survey of 500 schools, PCs became out of order in almost all the target schools. In most cases it is difficult to repair them by the schools' limited technological skill from the nature of equipment, and needs to be sent for repair outside or replaced with new ones. The main fund source for the operation and maintenance is presently BOS/BOSDA above. However, since that fund is to be used for school operation in general, the limited fund is shared among various operational uses, and the allocation depends on schools' operational policy set by principals and school management as well as priority of each operational activity. Cases vary, for instance, while there were schools which could not send broken PCs for repair, some schools self-invested in wifi system installation to facilitate remote e-Learning at individual classrooms. In an extreme case of a school which have fallen on burglary[29] and lost whole 21 sets of PCs under this project, the school gave priority to allocate

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[28] Calculated based on the statistics of the Regional Development Planning Agency (BAPPEDA) Yogyakarta Special Region in 2015 on the homepage (http://bappeda.jogjaprov.go.id/dataku/data_profil): total number of schools (primary: 1,844, secondary: 435), total number of students (primary: 292,301, secondary: 130,203).

[29] Successive burglary by a professional gang of five thieves has occurred at 20 target schools from 2012 to 2014. Supported also by strengthened school security, no such cases have occurred since their arrestment in December 2014.

budget to PC purchase for gradual replacement and eventually more than the original number 25 sets were acquired. In another example in which the surrounding community's awareness toward ICT utilizing education is high, the visiting survey has found cases where a part of the budget of the school committee was used for repair and replacement purchase of PCs and other ICT equipment.

There was also an idea to rent the PC labs during unoccupied hours to other schools (open school) or to district communities to earn fund for operation and maintenance, but it has not been apparently observed at the time of ex-post evaluation.

As have been examined in this section, no particular financial difficulty was observed for operation of the ICT facilities installed in the targeted 500 schools, however, funds for repair and replacement are limited in many schools. Therefore, there is a little concern regarding the financial sustainability of this project in future.

3.5.4 Current Status of Operation and Maintenance

From the result of both 500 school online questionnaire and 50 school visiting surveys, conditions of the installed materials and equipment utilization were found generally fine. However by their very nature of a PC, spontaneous machine troubles (especially in student PCs) are prevailing in most of the schools. But few schools leave them as they are, but most of the schools are trying to sustain lab function partially or gradually by outside repair or replacement within the limited BOS/BOSDA subsidy funds.

3.5.5 Summary

Operation and maintenance of this project is carried out by individual schools under the leadership and guidance of BTKP and no significant institutional problems are found there. No particular financial difficulty was observed either in operation of ICT facilities installed at 500 schools, but funds for repair and replacement are limited in many schools. Although technical capability of BTKP as an institution is judged satisfactory, it is pointed out that the intranet and helpdesk are not optimally operated and their technical supports are sometimes not smoothly and timely delivered. Thus, some minor problems have been observed in terms of technical and financial aspects of operation and maintenance. Therefore sustainability of the project effects is fair.

4．Conclusion, Lesson Learned and Recommendations

4.1　Conclusion

This project was implemented, as a model project for utilizing ICT in the field of basic education in Indonesia, with a purpose to enhance education quality and to equalize the education level throughout the region by facility development through providing total 500 primary and

secondary schools in Yogyakarta Special Province with necessary ICT equipment, ICT environment and e-Learning system development as well as assistance in participatory school operation and activities.

This project is highly relevant corresponding to the Indonesia's development policy and development needs both at the time of appraisal and ex-post evaluation, and also to the Japan's ODA policy at the time of appraisal. On the other hand, the efficiency is fair with its implementation period longer than planned due to the prolonged procurement process, while the project cost is lower than planned.

E-education is actively progressing at five hundred elementary and secondary schools selected as beneficiaries under the project with increased educational motivation in both teachers and students' sides. The project is also contributing to the equalization of the education level throughout the region. In addition to that, BTKP whose function has been much strengthened under this project has been distributing electronic teaching materials and information through internet networks beyond the provincial border, which enables nation-wide supply of ICT-based education services. In Yogyakarta, the education sector leads trade, manufacturing and other regional industries in promoting ICT application. Therefore, the project has been thus mostly producing planned effects, therefore effectiveness and impact of the project are high.

Operation of the ICT facilities installed at the 500 selected schools is not faced with particular financial problems, however, allocation of budgets for repair and replacement at most of the schools is financially restricted. In the technical aspect, limited use of intranet and helpdesk functions was found. Another technical challenge is that smooth and timely BTKP technical support has not be realized. Thus, some minor problems have been observed in financial and technical aspects. Therefore sustainability of the project effects is fair.

In light of the above, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1　Recommendations to the Executing Agency

（1）As regard to the monitoring of conditions of ICT facility utilization and operation of the ICT-based education at the targeted 500 schools, it is recommended that DIKPORA assign respective monitoring responsibility among those who are involved in management and operation of the project, namely BTKP, kota, kabupatens, kecamatans and the schools, and regularly supervise their periodic monitoring and evaluation activities along the following points proposed by the consultant during the project implementation. Systematic monitoring and evaluation were not conducted institutionally at the time of ex-post evaluation, however by doing that, it will be able to continuously grasp active effects and prevailing challenges in the field, thus enhancing

project sustainability by executing corrective actions and measures for improving.

a. Rating by school accreditation

b. Students' academic achievement

c. Development of ICT-based teaching materials by teachers

d. Level of intra and internet usage

e. Level of parental and school committee's involvement in educational activities

In conducting the monitoring, it can be recommended to utilize online questionnaire survey, as one of the effective measures, based on the questionnaire applied in this ex-post evaluation with additional items considered necessary.

(2) The implementation plan at the time of appraisal intended to perform the rollout of this project performance to other provinces based on the rollout plan proposed in the project under cooperation between KOMINFO and the Ministry of Education & Culture, however there has been no concrete progress after the e-Government Forum held in November 2011. Meanwhile, the performance of this project has been widely disseminated through the BTKP portal site and other means, which consequently led the project' effectiveness into its spontaneous rollout including visits of several observation missions from other provinces. KOMINFO and the Ministry of Education & Culture should positively facilitate　indirect promotion to accelerate these rollout movements　through means of public relations and other promoting activities.

4.2.2　Recommendation to JICA

JICA should follow up the progress and performance of the above (1) and (2) actions, which have not been implemented during and after the project, for five years or so. The proposed five years follows the consultant's proposal in this project, but it is also based on the view that if the positive effects and impacts have been confirmed after five years, further development will be expected afterwards.

4.3 Lessons Learned

(1) Comprehensive Approach in ICT-related Projects.

Project formation and implementation of ICT-related projects tends to focus only on hardware aspect such as provision of PCs with supporting equipment and technical aspect of ICT skills. However, it is also important to establish and develop a central operation and management unit with strengthened technical and management capability like BTKP in this project, and thus factor comprehensive system management element into the project design　in order to consolidate realization of project effects and self-reliant sustainability. It was done in this project, which led the project into the successful performance. An international report about negative effect of

ICT-based education warned lately "the more PCs, the lower students' academic performance"[30]. Projects without establishing and strengthening the central agency of operation and management and lack of comprehensive implementation with biased focus only on equipment supply and technical training of ICT staff may possibly invite those results.

(2) Project Management during Implementation

For small-scattered type projects comprising complicate multiple components like this project, it is required to establish a project implementation unit that comprehensively control the whole project implementation and organize site-level individual project management and regular reporting system to the central implementation unit at the time of project formulation. JICA should monitor whether the organized system is working as planned during the project implementation. This project lacked comprehensive management by the executing agency and project accounting, which prevented the ex-post evaluation from precisely grasping actual total project cost incurred and restricted the overall evaluation.

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[30] "Computers 'do not improve' pupil results" OECD, September 2015
(http://www.bbc.com/news/business-34174796)

Comparison of the Original and Actual Scope of the Project

Item	Plan	Actual
1.Project Outputs	<Main Part> 1.Installation of ICT Equipment & Connecting Environment (1) ICT Equipment for Schools (500 schools) (One set) (2) ICT Equipment for Project Offices　(One set) (3) ICT Equipment for IDC (One set) (4) Upgrading of Schools' Electric Power Capacity (500 schools) (5) ICT Operation & Maintenance (One set) (Anti-virus Software License Fee, Internet Connection Fee, Help Desk Operation Cost, Maintenance Contract Fee) 2. Provision of Necessary Materials & Equipment for Schools and Assistance in School Activities (Block Grant) (500 schools) 3. Conducting Training Programs for Teachers, Etc. 4. ICT-based Teaching Materials Development 5. System Development for IDC (1) Network System (2) Database System (3) e-Learning System (4) Helpdesk System (5) Website System <Consulting Services> International: 33.0MM Domestic: 196.0MM	<Main Part> Except the Anti-virus Software License Fee in 1.(5) ICT Operation & Maintenance, implemented as planned <Consulting Services> International: 45.75MM Domestic: 296.25MM
2. Project Period	March 2007-December 2012 (70 months)	March 2007-December 2014 (94 months)
3. Project Cost Amount Paid in Foreign Currency Amount Paid in Local Currency Total Japanese ODA Loan Portion Exchange Rate	 116 million yen 4,260 million yen (343,548million rupiah) 4,376 million yen 2,795 million yen 1rupiah = 0.0124 yen （As of September 2006）	 Unknown except Japanese ODA Portion 1,520 million yen