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ADB

Innovative Information and Communication Technology in Education and Its Potential for Reducing Poverty in the Asia and Pacific Region

Old Technology or New? A Study of Video Recording as an Innovative Method for Primary School Teacher Training in Rural Nepal

December 2007

Appendix 10 of Final Report

Sarah Lucas Pouezevara
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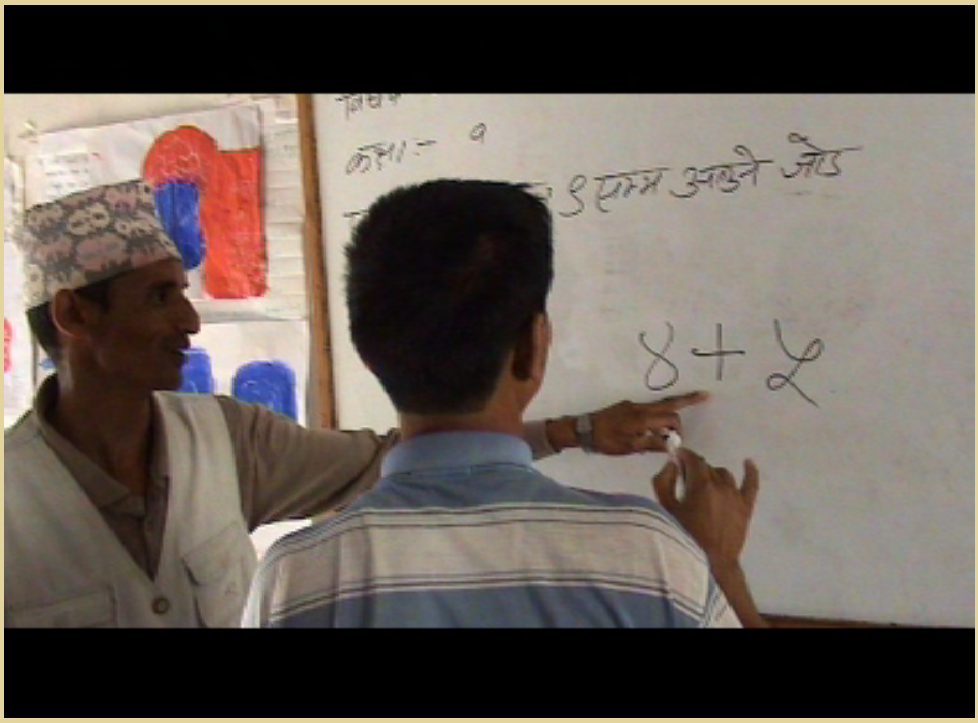

RTI INTERNATIONAL

Technical Assistance Consultant's Report

Project Number: TA No. 6278-REG
December 2007

Appendix 10 of Final Report

Nepal: Innovative Information and Communication Technology in Education and Its Potential for Reducing Poverty in the Asia and Pacific Region: **"Old Technology or New? A Study of Video Recording as an Innovative Method for Primary School Teacher Training in Rural Nepal"**

(Financed by the Poverty Reduction Cooperation Fund, Asian Development Bank)

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RTI International is a trade name of Research Triangle Institute.

Asian Development Bank

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Abbreviations

ADB	Asian Development Bank
AV	audiovisual
BPEP	Basic and Primary Education Programme
CD	compact disc
CIA	US Central Intelligence Agency
CMC	Community Multimedia Center
DANIDA	Danish International Development Assistance
DEC	Distance Education Center
DEO	District Education Office
DFID	Department for International Development
DMC	developing member country
DOE	Department of Education
DVD	digital video disc/digital versatile disc
EFA	Education For All
EMIS	education management information system
ETC	Education Training Center
ETC-A	Primary Education Training Center
ETC-B	Secondary Education Training Center
FOE	Faculty of Education
FTP	file transfer protocol
HRD	human resource development
HSEB	Higher Secondary Education Board
HSS	higher secondary school
ICT	information and communication technology
iEARN	International Education and Resource Network
LCD	liquid crystal display
MOES	Ministry of Education and Sports (MOES)
NCED	National Center for Educational Development
NGO	non-governmental organization
NRs	Nepalese rupees
NPPR	Nepal Portfolio Performance Review
PEDP	Primary Education Development Project
PTTC	primary teacher training center
PPTTC	private primary teacher training center
RETA	Regional Technical Assistance
RTI	Research Triangle Institute
SLC	School Leaving Certificate
SWAp	Sector Wide Approach
TEP	Teacher Education Project (ADB RRP: NEP 32236)
TMIS	teacher management information system
TSC	Teacher Service Commission
TSP	Teacher Support Program
TTC	teacher training center
TVI	tutored video instruction
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Fund

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The ADB staff in Manila and in the Nepal Resident Mission for their support in the implementation of this study.

I. EXECUTIVE SUMMARY

A. Background

1. With the aim of providing developing member countries (DMCs) with better guidance for using information and communication technology (ICT) effectively in education, the Asian Development Bank (ADB) funded a 21-month Regional Technical Assistance (RETA) in Bangladesh, Nepal, Mongolia, and Samoa. The RETA researched approaches to using ICT in education that succeed in improving teaching and learning and also are sustainable given the region's development challenges. The study was implemented by RTI International in partnership with iEARN-USA. Titled "Innovative Information and Communication Technology in Education and Its Potential for Reducing Poverty in Asia and the Pacific Region,"[1] the program commenced in April 2006. Study findings from all four countries were shared at an International ICT for Education Conference that took place October 16–18, 2007, at ADB headquarters in Manila, Philippines.

2. The study's aims were (i) to highlight promising models of ICT integration and best practices, (ii) to identify drivers and barriers to successful ICT integration, and (iii) to share lessons learned, with a specific focus on rural and remote areas. The study combined policy analysis, program evaluation, and small-scale activities. Countries chosen by ADB, based on geographic and demographic characteristics, provided their perspectives and country context. The study linked with existing education projects in each of the four participating countries that already featured ICT elements. The RETA was structured along three technical components:

(i) Policy and Strategy component (regional),
(ii) e-Resources component (Mongolia and Samoa), and
(iii) e-Teacher Training component (Nepal and Bangladesh).

3. The study in Nepal is linked to the existing ADB-funded[2] Teacher Education Project (TEP), which aims to assist the government to improve the quality and efficiency of and access to basic education through provision of better-qualified teachers. TEP is made up of the following four components:

1. Building an effective and sustainable system for teacher education by strengthening administrative capacity;

2. Developing effective teacher education curriculum and teaching-learning materials;

3. Training teachers, educational administrators, and managers; and

4. Educating teachers to better serve the needs of girls and other disadvantaged groups.

4. A major goal of TEP is to clear the backlog of untrained teachers currently serving in the school system, to be in compliance with a government policy that states all newly recruited teachers must have a minimum qualification of 10 months training beyond the 10th grade School Leaving Certificate (SLC). The current curriculum offered by government teacher-

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[1] Referred to as "the study" from here forward.
[2] With co-financing from the Danish International Development Assistance (DANIDA).

training centers is carried out in three phases: (i) 2.5 months face-to-face; (ii) 5 months school-based distance learning; and (iii) 2.5 months face-to-face. With the face-to-face components requiring trainees to travel to a government center, barriers can arise for teachers in remote areas who cannot easily travel long distances. As a result, a mobile team approach was developed so that the training program could take place in remote areas. Trainers were dispatched, with training materials, to remote areas to provide the 2.5-month training under the supervision of the District Education Office (DEO).

5. The study in Nepal focused on the use of digital video recording and laptops as tools in remote teacher training settings. Although VHS video has been around for many years, and has been common in teacher training in some countries since the 1970s, the advent of *digital* recording offers many new possibilities for using video in the classroom, as well as in developing-country contexts, because of the compact and easily distributed nature of this technology. This makes video a particularly suitable tool for remote areas with poor communications infrastructure, such as the mountainous regions of Nepal.

6. The findings from this study, to be described further throughout this report, will help inform the Nepal National Center for Educational Development (NCED, the central teacher education authority, under the Ministry of Education and Sports [MOES]) about ways to optimize the use of existing, but underutilized, equipment provided to major primary teacher training institutes around the country. Furthermore, the study adds to the existing knowledge base of using video in teacher preparation by providing some practical tips for implementing video recording and playback in the classroom and providing suggestions for how the use of video can be expanded beyond its traditional use for self-assessment and critique in microteaching.[3] For example:

- Using video for self-assessment of trainers and subsequent improvement of training skills and the training classroom;
- Helping to address a lack of material resources for teaching aids;
- Using video for whole school supervision and ongoing teacher performance evaluation for certified and serving teachers; and
- Improving relations between the community and school.

B. Study Process and Findings

7. From April 15 to June 30, the three mobile teams carried out their training in the remote training centers. Very little follow-up was carried out by the study team due to a lack of communication infrastructure in the remote regions where the study was implemented. However, an interesting result was that trainers were free to use materials in ways that suited their needs and interests, without solely following instructions from the study team or using the equipment because they were asked to and required to provide results. Therefore, the experience and its results can be characterized as very authentic, though mainly qualitative in nature.

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[3] "Microteaching" is the term used when trainees practice teaching a lesson in front of the classroom, with other trainees acting as pupils. It is distinguished from "student teaching," or school-based practicum, which is when the trainee practices methods in front of an actual school classroom, under the supervision of a trainer or school supervisor.

8. After the implementation period ended, the mobile team trainers participated in in-depth interviews with the study team to understand how the equipment was used and what effect it had on the teaching and learning processes. The study found that video recorders were used mainly to

- Record training activities and classroom lectures;
- Record extracurricular activities, cultural, and community events; and
- Record microteaching practice.

9. Laptops were used to edit and play the videos, as well as for administrative purposes.

10. The outcomes resulting from the use of technology in the teaching and learning process were gathered through questionnaires filled out by trainees participating in a training program using technology, as well as through comparison with a control cohort of teachers who completed the same training program in the same location, with the same mobile teams but without using technology. The results show that overall training satisfaction and learning (as perceived by the trainees) moved toward the positive end of the scale when the technology was introduced. The perceived usefulness of the technology decreased where it was used least frequently, and was highest where it was used the most frequently and where there was one technical person on site throughout the 2.5 months, who managed the video recording and playback processes.

11. There were many positive comments about the use of the technology during the training program, from both trainees and trainers. To summarize, the study found that the use of video recording

- Improves the reputation of the training, as it is a symbol of a more modern approach;
- Improves the trainers' practice, as a result of being recorded and viewing their performance on the video;
- Improves the participation (of trainees and trainers), since they know that their performance may be reviewed again by a superior; and
- Improves the learning experience by making it more interesting and fun.

12. Overall, the trainers addressed the advantages of the technology much more than the inconveniences and constraints. Trainers also strongly expressed a willingness and desire to reuse the equipment in future trainings; they also had many ideas about how it could be used more effectively. There are several ways in which technology proved to be exciting and fun for the participants, but the purpose of the study was to understand its impact on learning. This was very difficult to measure quantitatively, but some of the ways that video technology can improve learning outcomes, as perceived by participants in this study, are as follows:

- Allowed for learning through visual methods.
- Improved content retention through ability to watch lessons more than once.

- Improved content understanding by being more attentive to the lesson when it is being filmed.
- Improved teaching practices through ability to review and self-identify weaknesses.
- Increased self-confidence as a result of being able to watch oneself performing in front of the class.

C. Conclusions and Recommendations

13. With regard to the TEP project and its objectives, this experience does provide some compelling reasons for why video and portable computer technologies can, with appropriate planning, resources, and distribution, be used to address existing constraints *at the school level*, notably the

- Lack of material resources,
- Ineffective school supervision and teacher performance evaluation, and
- Limited community-school relations.

14. The study therefore recommends that the video recorder and laptop remain under the management of the DEO (even if they are officially entered into the inventory of the Education Training Centers [ETCs A and B[4]] to be used for further mobile training sessions. To be most effective, there should be one staff member (DEO or otherwise) in charge of planning the recording schedule, editing, and replaying video clips, as well as keeping track of the clips. Each training center will have to make decisions about the most effective way to integrate video recording and replay into the curriculum, but sharing lessons learned and strategies for optimizing the use of video in teacher training will be important; therefore, establishment of a community of practice among trainers and training centers would be worthwhile.

15. More effective use of the equipment will also be achieved through stronger collaboration between the mobile teams and the regional ETCs. Further benefits of the equipment can be explored when different training institutions—including ETCs, mobile teams, the NCED, and private teacher training centers—begin sharing digital resources, such as model classroom videos, local cultural documentaries or case studies, and clips of innovative teaching materials among each other. Distribution could be carried out either through recorded compact discs (CDs) sent by postal mail or eventually through e-mail or Internet. Another method that could be considered immediately is television, which could complement the radio distance learning program by diffusing model teaching videos, videos of teaching materials preparation, local cultural events and characteristics, and subject-specific educational programs. The use of videos—created either in the ETCs or through NCED—can also be used to enhance the radio distance learning program by diffusion through the television or during weekly contact sessions, through tutored video instructional mode.[5]

16. While these recommendations are specific to further implementation in Nepal, there are also lessons learned that can be applicable on a wider scale, namely, that teachers value the

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[4] The ETC-A is responsible for primary teacher training; ETC-B conducts secondary teacher training. Unless otherwise mentioned, "ETC," when used in this report, refers to ETC-A.

[5] See Cadiz, J., A. Balachandran, E. Sanocki, A. Gupta, J. Grudin, and G. Jancke. (2000). *Distance Learning Through Distributed Collaborative Video Viewing.* Microsoft Research Technical Report MSR-TR-2000-42.

opportunity to see themselves practicing in front of the classroom. The compact and portable nature of today's video cameras make this much more feasible than VHS tapes played back on a television (the way that video has traditionally been used in teacher training in other countries) for remote and resource-poor settings as well as more convenient options for sharing and storing videos.

17. There are potentially many ways that digital video recording and distribution could be used as a tool to improve teacher training. A particularly interesting option to explore in future research—both in Nepal and elsewhere—would be the extent to which it can be used to support remote performance evaluation of teachers and teacher trainers.

18. This report acknowledges the many factors that influence the effectiveness of ICT in education initiatives. The report therefore aims to provide a comprehensive picture of the environment in which those initiatives took place, including country context (Chapter II) and education system context (Chapter III). It also contains an overview of the specific activities carried out under both the Teacher Education Project (Chapter IV) and this study (Chapter V). Chapter VI explains the study methodology applied, and Chapter VII outlines and discusses the findings. This is followed by Chapter VIII, which elaborates on the conclusions listed immediately above; and Chapter IX, which does likewise for the recommendations for future initiatives and research, as well as offering a brief synthesis of the applicability of lessons learned for similar contexts and an overview of knowledge this study adds to existing experiences on the use of video in education. The report ends with a complete list of references, some information about the authors of this report, a map of the study area, and a literature review on use of video in education.

II. COUNTRY CONTEXT

19. Nepal was founded as a modern nation in the 18th century after the unification of several independent Himalayan states. Its total area is 147,181 km^2, and it is bordered to the south and west by India and to the north and east by China. The country is ethnically and religiously diverse, counting 103 caste and ethnic groups and 106 languages and dialects.[6] Hindu is the primary religion, and Nepali is the majority—and official—language spoken by the estimated 27.7 million inhabitants.[7] Nepal uses a solar calendar based on Hindu tradition; for example, they entered the new year 2064 on April 14, 2007, on the Western calendar.

20. The geographic and political contexts of Nepal factor into the state of education in Nepal. About 80% of Northern Nepal consists of rugged and steep mountainous terrain, including the Himalayan range, which reaches 8,848 meters in altitude. The lower 20% of the country is the *terai*, or fertile plains, only 152 meters above sea level at its lowest point. The extreme geography results in a climate that varies from subtropical heat in the *terai* to bitter cold and snowy in the mountain regions. About half of the population lives in the *terai*. In the mountainous region, there is a severe lack of access to basic transportation and communication infrastructure, which has affected socioeconomic conditions for the population in that area. Apart from walking, people in this region can only access expensive and unreliable flight services to travel to urban areas.

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[6] Savada, Andrea Matles, ed. 1991. *Nepal: A Country Study.* Washington: US Government Printing Office for the Library of Congress. Washington, DC. Available: http://countrystudies.us/nepal/34.htm.

[7] World Bank. 2007. *Country Data Profile*. Available: http://devdata.worldbank.org/external/CPProfile.asp?PTYPE=CP&CCODE=NPL.

21. Subsistence farming is the major source of livelihood for about 80% of the population, of which 33% live below the poverty line,[8] with a per capita gross national income of $270 (footnote 7). Nepal's poverty is characterized by much higher child malnutrition and lower literacy rates compared to other South Asian nations and other low-income countries,[9] which is further exacerbated by gender, ethnic, and caste discrimination. In this traditionally patriarchal society, women typically engage in household chores while men earn money and take care of property.

22. Throughout its history, Nepal has been under the control of monarchies and ruling families that kept it largely isolated from external influence until the second half of the 20th century. A multiparty democracy was established in 1991, although there have been 12 different governments since then. Direct rule by the king came to an end in 2006—10 years after the current Maoist insurgency began. More than 12,000 people have died, and 100,000 displaced[10] as a result of this conflict. The current parliamentary democracy, established in 2006, has resulted in a coalition government formed by a Seven Party Alliance, including a power-sharing agreement with the Communist Party of Nepal Maoists. November 22, 2007, was set for Constituent Assembly elections to frame a new constitution.

23. The country is divided into five Development Regions, made up of 75 districts. Each district is divided into municipalities and village development committees. The major metropolitan municipality is Kathmandu, and the next four most significant municipalities are Biratnagar, Birganj, Lalitpur, and Pokhara.

III. EDUCATION SYSTEM CONTEXT

A. General Aspects

24. **History.** Nepal's political isolation has also resulted in an underdeveloped education system, until recently. Under the Rana regime (1846–1950), formal schooling was suppressed except for the ruling classes. However, after serving as soldiers in the British army, many of the soldiers returned to Nepal with reading and writing skills, and, in turn, offered tutoring to children in their villages. High caste families also began sending their children to universities in India. Returning students exposed the injustices of the Rana policies, eventually leading to anti-Rana movements and their overthrow in 1951. It was only at this point that efforts began to establish a national education system, with a National Education Planning Commission, founded in 1954. In 1973, primary education (grades 1 to 3) was made free and compulsory, and the government began paying teacher salaries and providing textbooks. However, education for girls and certain ethnic groups was not common. Investment in girls' education was considered a loss since they were expected to marry after they finished school; boys, however, were expected to earn a living and support their families after being educated.

25. **Education Structure.** Education in Nepal consists of primary school from grades 1 to 5 (ages 6 to 10), lower secondary from grades 6 to 8, and secondary for grades 9 and 10. A national School Leaving Certificate Examination is administered at the end of grade 10. Grades 11 and 12 are known as higher secondary level, and are part of the tertiary education system,

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8 Central Intelligence Agency (CIA). *CIA Factbook*. 2007. https://www.cia.gov/library/publications/the-world-factbook.

9 World Bank. 2007. *Nepal at a Glance.* Available: http://devdata.worldbank.org/AAG/npl_aag.pdf.

10 British Broadcasting Corporation. 2007. *Country Profile: Nepal*. Available: http://news.bbc.co.uk/2/hi/south_asia/country_profiles/1166502.stm.

providing either preparation for higher education or immediate human resources for the world of work.[11] The Higher Secondary Education Board (HSEB) supervises higher secondary schools (HSSs), which are mostly under private management. Three- to 4-year bachelor's, 2-year master's, and PhD degrees can be obtained within the higher education system, consisting of five major universities and 414 colleges.[12] Some technical schools also provide vocational training for pre-SLC students and SLC graduates alike.

26. There are approximately 27,500 public and private primary schools (known as "community" or "institutional" schools, respectively). There are about 10,000 pre-primary classes and private Early Childhood Development Centers, which were established under the Ninth Development Plan (1997–2002), although preschool is not mandatory, and there are no teacher certification processes for pre-primary care.[13] Community schools receive regular government grants, whereas institutional schools are funded by schools themselves or through other nongovernmental sources.

27. Public schools are managed by a head teacher, who is responsible for day-to-day activities and school administration. All public school teachers, who are permanent staff, are considered employees of MOES; however, schools and DEOs have the authority to hire teachers within the community as temporary teachers, who are not considered government employees eligible for benefits such as ongoing professional development. Private schools are not subject to specific requirements for qualifications, and the past 15 years have seen an emergence of private boarding schools with English curricula that have gained a reputation for being of higher quality. This perception, however, may be because private schools simply tailor teaching methods to an exam-based system (i.e., rote learning) and therefore show better exam scores. On the other hand, private schools have been harassed by rebel groups for raising their fees annually, and because they are also considered a profit-making enterprise. Either way, the historical dual-class education system is perpetuated in modern times, with upper-class individuals attending private schools, and public schools remaining the only choice for poor and marginalized communities.[14]

28. The basic primary education curriculum (grades 1 through 5) includes the following subjects: Nepali; math; English; social and environmental education (including health education); physical education; creative and expressive arts; social studies; and an optional subject. In grades 5 and 8, all private and public schools must sit for standardized exams administered by the DEO.

29. **Education Goals.** The country is currently at the end of its Tenth Development Plan (2002–2007), which includes the following specific goals: improving access to education through decentralization and transfer of responsibilities to school management committees; improving access to literacy, income-generating, vocational, and nonformal education programs; enforcing

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[11] MOES is currently proposing a school sector reform program that will expand basic education from grades 1 to 8 and secondary education from grades 9 to 12, creating one integrated system. This is expected to begin about the same time as the second phase of the Education for All (EFA) program, in 2009. (See paragraph 54 for more information on the EFA-sector-wide approach (SWAp).

[12] MOES. 2003. *Education in Nepal.* Kathmandu. Available: http://www.moe.gov.np/admin/res_reports/Education_Nepal.pdf.

[13] National Center for Educational Development (NCED). 2006. *Effectiveness Study of the Primary Teacher Training in Nepal: A Compilation of Thematic Reports.* Kathmandu.

[14] Context of public versus private schools gathered from informal discussions with Nepali educators and education-sector experts. See also Nepalese Children's Education Fund. 2006. *GYAN Monthly Newsletter.* Vol 2, Issue 18. Available: http://www.nepalchildren.org/newsletters/letters/0611news.pdf.

minimum qualifications for entering teaching professionals and strengthening supervision at all levels of education; and mobilizing youth and sports activities.

30. At the primary school level, the national educational goals (see Exhibit 1, below) translate into the following specific objectives:

- To develop the innate ability of each individual child;
- To advance the habit of exploration through curiosity;
- To help create interest in arts and culture;
- To enhance the ability to communicate and exchange ideas, both orally and in writing;
- To augment the mathematical skills required to solve everyday practical problems;
- To build positive awareness of health issues and develop awareness about the importance of the environment;
- To develop a cooperative and responsible attitude and an appreciation of democratic values and social norms; and
- To make citizens proud of their nation and devoted to national unity.

Exhibit 1. The National Education Goals

- [To] Nurture and develop the personalities and innate abilities of each individual;
- [To] Instill respect for human values, and the will to safeguard national and social beliefs;
- To enhance social unity;
- To help the individual keep his or her identity in both the national and international context and to lead a socially harmonious life in the modern world;
- To aid the modernization of the nation by creating able human resources for its development;
- To teach the thoughtful protection and wise use of Nepal's national resources; and
- To help disadvantaged citizens to enter the mainstream of national life.

Source: MOES. 2003. *Education in Nepal.* Kathmandu. Available: http://www.moe.gov.np/admin/res_reports/Education_Nepal.pdf.

31. **Current Challenges.** Since the Maoist insurgency began in Nepal, in February 1996, schools have been among the most affected institutions. Abduction of teachers and students,

financial extortion, and bombings and gun firing in school compounds have resulted in frequent school closures and a drop in attendance rates, including teacher absenteeism due to low motivation and fear.[15] Rebels also force school closures to pressure the government to concede to their demands, or take control of schools to indoctrinate students. Teachers have been tortured and have even gone missing as a result of noncompliance with Maoist demands. According to a Nepali human rights group, at least 141 teachers have been killed during the conflict, both by rebels and security forces.[16] In response to the challenges created by the conflict, MOES has adopted a decentralized model that aims to strengthen the governance of and accountability for education at local levels.

32. Apart from insecurity, the challenges to quality education for all, related to the geographic and political conditions outlined above, include the following:

- Gender and caste differentiation and exclusion;
- Lack of motivation in children and teachers;
- Poor or nonexistent systems of performance appraisal and promotion (leading to lack of incentives to improve teaching practice);
- Low entry-level qualifications of teachers;
- Poor school infrastructure and overall lack of schools in rural areas;
- Wide variation in student-teacher ratios, at times extremely high;[17]
- Difficulty accessing schools in rugged mountain areas;
- Outmoded curriculum and teaching practices; and
- Poverty.

33. Only 48 out of 100 adults can read and write. For every 100 men who are literate, only 60 women can read and write. This ratio is expected to equalize by 2015.[18]

34. **Management and Administration.** MOES is the main oversight body for educational issues, policy development, planning, monitoring and evaluation, and donor coordination. There are also five regional directorates and 75 district-level offices to facilitate decentralization. Various functional offices carry out specific technical functions related to the educational goals. Exhibit 2 shows the overall organigram for education sector administration. Some of the functional units that are important to this study are described further below.

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[15] Bista, M.B. 2006. *Status of Female Teachers in Nepal*. United Nations Educational, Cultural, and Scientific Organization (UNESCO). Kathmandu.

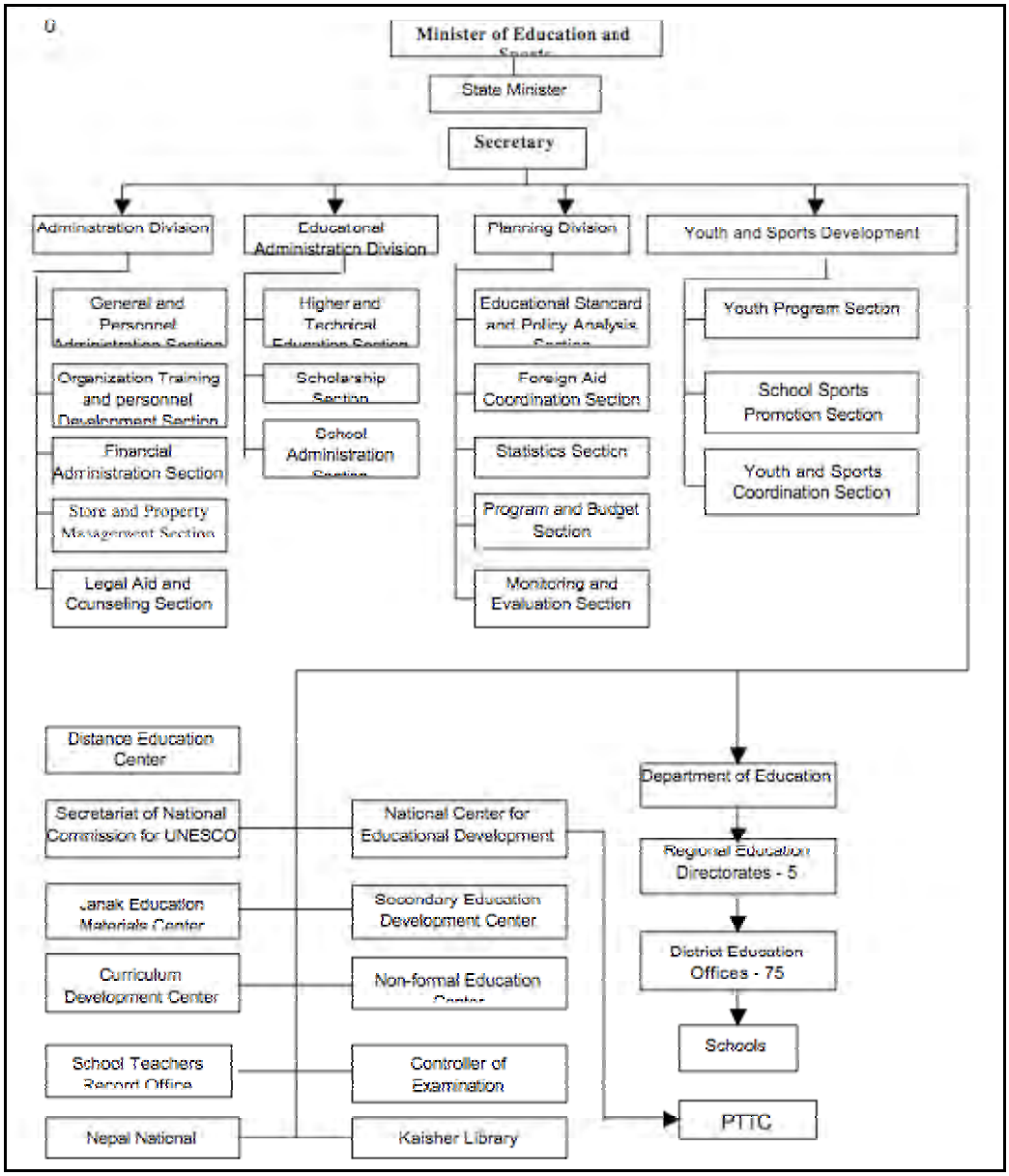
[16] Irin News. *Between Two Stones—Nepal's Decade of Conflict*. Available: http://www.irinnews.org/InDepthMain.aspx?InDepthId=11&ReportId=33600.

[17] Averaging 70 to 80 students per teacher in some areas, according to DANIDA. 2004. *Evaluation Nepal: Joint Government–Donor Evaluation of Basic and Primary Education Programme II*.

[18] Ministry of Foreign Affairs of Denmark, Embassy of Denmark, Kathmandu. 2007. *Education.* Available: http://www.ambkathmandu.um.dk/en/menu/DevelopmentCooperation/Education.

35. The Department of Education (DOE) was established in 1999 as the implementing agency for the multidonor BPEP (see Section III.D., External Assistance to Education). DOE's role is to provide oversight to the district offices and Resource Centers; prepare plans and budgets related to basic through higher secondary education; prepare staff development plans; and keep records related to primary education with support from regional offices. See Exhibit 2 for an overview of the relationship between the Ministry of Education and key decentralized offices.

Exhibit 2. Structure of Education Management and Administration



PTTC = Primary Teacher Training Center (since renamed to ETC-A and ETC-B for primary and secondary teacher training centers, respectively); UNESCO = United Nations Scientific, Educational, and Cultural Organization

Source: Ministry of Education and Sports (MOES). 2003. *Education in Nepal.* Kathmandu.

36. The Regional Education Directorate is mainly responsible for coordinating, monitoring and evaluation of education activities, and ensuring consistent standards across district-level activities.

Exhibit 3. Distribution of Responsibilities of Key Education Authorities

Ministry of Education: Policy making, donor coordination, and oversight

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DOE: Administrative and financial authority for implementing education programs

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Regional Offices: Coordination and monitoring and evaluation

↓

DEOs: Implementation

↓

Resource Centers: Individual support to schools and teachers

37. District Education Offices manage administrative work, such as teacher recruitment, salary distribution, identifying teachers for training, maintaining teacher management information system, conducting student exams, and carrying out school-level supervision of schools through a cluster system. Clusters consist of 3 to 33 schools, depending on location and size.

38. Each cluster has a Resource Center, with a designated Resource Person to provide support and services to schools. The Resource Person supports teachers in entering and completing training programs, as well as with making schools visits. Resource Centers provide information to the DEO, such as school statistical information and surveys of school infrastructure. A Resource Center consists of a simple classroom in one of the schools. The DEO is given and annual budget of approximately $140 for administrative costs, and the Resource Person receives a stipend of about $12 on top of his or her salary as a head teacher or school supervisor.

39. The National Center for Educational Development (NCED) was established in 1993 as an apex body for education and human resource development. It is the implementing agency for the ADB TEP. The NCED manages training programs for teachers, educational managers, and Ministry of Education officers. This includes development of training curricula and materials and accrediting training programs conducted by other institutions. The NCED also conducts research studies to help understand key education issues and formulate policy recommendations.

40. The Distance Education Center (DEC), housed within NCED, was established out of the government's Radio Education Teacher Training Project in 1993, to provide regular in-service training of teachers. Currently the 10-month in-service training course is required for all untrained teachers who are currently teaching in schools. The TEP includes a 5-month phase delivered by radio, with weekly face-to-face contact sessions at the local Resource Center. The DEC is responsible for preparing these radio-based lessons, as well as supplementary learning materials. Additionally, part of DEC's objectives are to launch communication campaigns through radio programs to raise community awareness of education issues; a weekly education program broadcast on Monday mornings covers news and information related to all types of education. DEC was recently merged with NCED, in line with the TEP administrative restructuring objectives.

41. Formerly known as PTTCs, there are now 9 ETC-As in Nepal, under the supervision of NCED, that are responsible for primary teacher training. There are 20 ETC-Bs responsible for secondary teacher training. Each ETC covers 10 districts. They are the coordinating center

responsible for private training centers, teacher certification examinations, oversight and quality control of private schools, including provision of technical support and some materials. In addition to various other refresher trainings and practicums for pre-service and in-service teachers, they also act as a lead Resource Center, delivering physical equipment to other Resource Centers. ETCs also conduct model contact sessions and coordinate with DEOs to conduct training for Resource Persons for the distance education (radio) component of the standard 10-month training program.

42. Whereas NCED, under the DOE, handles in-service and ongoing professional teacher training, pre-service training is outsourced to private training providers, known as private PTTCs (PPTTCs) However, about 75% of trainees in a PPTTC pre-service program may be currently serving as a teacher in a part-time or temporary capacity in government schools, and are therefore not eligible for the government-sponsored three-phase training (see Exhibit 4). However, if they complete the pre-service training, they are allowed to sit for the government competition and eligible to be hired as a government teacher, (in which case they are required to complete the 10 month in-service training, as well).

43. The National Teacher Service Commission (TSC), established in 2000, is in charge of the appointment and promotion of teachers, including providing a teaching license to eligible individuals. They are also charged with linking teacher performance appraisals to their promotion based on performance. TSC is initiating collaboration with DOE to establish a teacher management information system (TMIS) that reflects reports of teachers' performance. However, at present there is no systemic performance review system or any real incentives for performance.

B. Teacher Education and Training

44. The minimum requirement is a 10-month mandatory training program after the SLC. An individual who wishes to become a teacher may begin after receiving the SLC and by joining a 2-year program at an HSS. This leads to a Certificate of Education, which is the most common program for training primary school teachers. The Ministry of Education also organizes pre-service primary teacher training programs through the Faculty of Education (FOE) at Tribhuvan University. The minimum qualification required for these programs is still a SLC. Tribhuvan University offers a 2-year bachelor's degree program, 2-year master's of education, and postgraduate diploma. The University of Kathmandu offers a 3–4-year bachelor's degree program in education.

45. Though the government has clearly indicated that all teachers *should* have 12 years of education, this has not been systematically enforced.[19] Surveys collected for this study show that teachers enter the teaching profession as early as 18 years old or as late as 34. Most of them had only 10 years of formal schooling, and little or no ongoing professional development or specific teaching training (prior to beginning the three-part teacher education module made possible through the TEP program.) A 2004 Danish International Development Assistance (DANIDA) report (footnote 17) estimates that only 14.7% of teachers are fully trained to the criteria of having completed the 10-month certification program as fully trained; only 51.8% have completed some training of any kind beyond the SLC. It is also widely recognized that there is a lack of transfer of teacher training concepts to the classroom[20]—an important reminder that

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[19] Although this is a condition for the ADB Teacher Education Project (see Chapter IV).
[20] Footnote 15 and NCED. 2005. *Monitoring Report of Teacher Training Programmes*. Kathmandu.

teacher training alone is only one piece of overall policy and practical factors that lead to improved teaching and learning.

46. **Education Training Policy.**[21] The Government of Nepal has outlined a comprehensive training policy that addresses both teacher and management training in the following areas:

- Training requirements for entry into primary school teaching (minimum grade 12 completion and passing of 10-month pre-service curriculum), and decentralization of teacher selection functions to local institutions.

- Reducing the backlog of untrained teachers, enforcing the requirement of licensing as a prerequisite to teaching, and providing recurrent training through NCED. Point 6c specifically states that: "Teacher qualification, work experience, training achievement, research and innovative works, [and] student achievement will be considered as basis for role assignment, promotion, and other incentives."

- Quality assurance mechanisms in relation to curriculum and materials, training of trainers, training facilities and monitoring and evaluation. In particular, NCED is responsible for providing support to public and private training institutions and accrediting training institutions that meet the minimum standards. Point 12d specifically states that: "Capacity of district level managers and head teachers will be developed to enable them to facilitate effective application of teacher training into the classroom and provide post-training support to the teachers in need." It also specifies the development of performance indicators for good teaching and effective school management.

- Equity considerations, especially efforts to maintain gender sensitivity and gender balance throughout training programs.

- Induction and recurrent management training programs that are linked to performance-based deployment schemes.

- Teacher trainer preparation and minimum standards to ensure qualified, trained, and committed training professionals.

- The institutional arrangements that link the various training and research institutions in an extensive network with specific roles and responsibilities of different organizations.

C. Current Status of ICT in Education

47. Although the Tenth Plan has articulated a long-term vision the for usage of ICT in education "with a view to addressing Human Resource Development (HRD) needs within a framework of formal/ non-formal and technical and vocational education programmes" (footnote 21), implementation of the required infrastructure has been slow to follow. Therefore, current examples of ICT in education are mainly situated in urban areas within the *terai*, and not in rural or mountainous regions which face major barriers in the use of electronic communications devices (e.g., computer, phone, television, or otherwise) in rural areas

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[21] MOES. 2006. *Training Policy*. Kathmandu.

requiring electricity or telecommunications infrastructure. The low levels of literacy, high poverty, and high costs associated with ICT are other factors that limit access for most of the population.

48. Many private secondary schools have a computer lab and access to the Internet, which is used mainly for computer skills or research rather than being linked to subject-specific goals. Computer education has not yet been made a compulsory subject in the national curriculum. This is a goal in the Tenth Plan, but the focus is exclusively on computer literacy,[22] not on a tool for teaching and learning. Some well-resourced private schools also have audiovisual (AV) facilities, and it is common for secondary students to use audiocassettes to prepare for the SLC, especially the English section. The Internet interests students a great deal, and where available, it may be used as a tool for research and correspondence. Some students prepare their project work electronically and submit it to teachers. However, all types of computer use, and especially access to the Internet, are only available in major urban areas at this time. On the other hand, innovative efforts are being made to connect rural villages despite difficult regulatory and communications infrastructure.[23]

49. At the administrative level, schools and teacher training centers (TTCs) use computers for administrative purposes (e.g., information management and financial management), but it is rare that that principals or other staff use the advanced features of the computer, including e-mail, even if connectivity is available. There is a computer-based education management information system (EMIS) processing system at the central and regional levels; however, at schools and in many districts, the data are collected and processed manually, and data are not consistently shared between district and central levels. Constraints include a lack of awareness, skills and resources, along with the fact that TMIS/EMIS are not effectively linked, and may be unreliable (footnote 17) or of limited practical value. (For example, the teacher database is not yet linked with performance data for promotion and deployment purposes). There is also a delay of several years for reporting education statistics. NCED has an ambitious plan to connect all ETCs through videoconferencing technology, but actualization of this goal is still several years away.

50. The majority of teachers do not have computer literacy skills. ICT (excluding radio) is not used widely in teacher training except for presentations using overhead projectors, and occasionally a liquid crystal display (LCD) multimedia projector, if a computer is available. Computer use in teacher training institutes mainly consists of viewing videos on CD (e.g., tsunami footage, classic artwork, astronomy, etc.) and occasionally using the computers to make presentations or for word processing. Radio, on the other hand, has been a standard part of teacher training since 1973, when the government introduced the Radio Education Teacher Training Project. Currently, five of the required 10-month in-service training courses for primary school teachers are delivered via radio while teachers continue working in their classrooms.

51. In the private sector, there are a large number of training institutions in Kathmandu that conduct a variety of vocational training courses (e.g., computer, hardware, networking, and telecommunications); however, there is very limited provision in rural areas for training and no

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[22] Stated as a strategy for improving the quality of education (p. 12): "Apply computer literacy programmes at all levels of education and provide support for expanding contemporary modern education. Make arrangements for teaching Information and Communication Technology as school subjects in line with the national policy on science and technology."

[23] Nepal Wireless Networking Project. Available: http://www.nepalwireless.net. Also see UNESCO. 2007. *Nepalese Teacher Wins Leadership Award for Connecting His Village to the Internet.* Available: http://www2.unescobkk.org/education/ict/v2_2/detail.asp?id=389226.

provision of vocational education and training through ICT. Appropriately trained trainers are limited, as well.

52. Overall, perceptions about ICT in teacher training generally revolve around ICT as a subject, or in other words, learning how to operate computer equipment and software. This is consistent with findings from across the region, which indicate that there are widespread misconceptions about ICT in education, namely that ICT is another subject to be studied rather than a means of enhancing the teaching of all subjects.[24]

D. External Assistance to Education

53. The ADB has previously provided assistance to the Government of Nepal in the education sector under the Primary Education Development Project, approved in 1991 and completed in 2000. It was under this project that NCED and nine PTTCs were established. The project also supported the development of teacher training curricula and teaching materials, capacity building of management personnel in primary education and teacher trainers, policy analysis, and construction and rehabilitation about 1,500 primary schools in underserved areas. At the same time, from 1992 to 2000, ADB supported the Secondary Education Development Project, which involved in-service training for secondary school teachers; curriculum and textbook development; and provision of science equipment, materials, and library books to 1,000 schools. They also supported a Technical and Vocational Training Development project. ADB's current education-sector portfolio totals $103.7 million (of which one $30.7 million loan is approved but not yet effective).

54. Alongside ADB, the World Bank is the largest lender in the education sector, with total support in 2007 amounting to $115 million.[25] Large-scale donor support to the primary education subsector began in 1992 with the first Basic and Primary Education Programme (BPEP), which aimed to increase access to and improve the quality and management efficiency of basic education. Involving DANIDA, the Government of Japan, the United Nations International Children's Fund (UNICEF), and the World Bank, it closed in 1999, but provided the foundation for the current "basket funding" or sector-wide approach (SWAp) to the sub-sector, known as BPEP II. Known as the "EFA SWAp," because it supports the government's Education For All program, the partners—ADB, UNICEF, World Bank, DANIDA, Finland, and the United Kingdom's Department for International Development (DFID)—have agreed to pool donor and government funds, allow government rules and procedures for disbursement and monitoring expenditures, and endorse a common monitoring framework.[26] This approach aims to enhance national ownership and improve partnerships with donors. TEP complements many of the goals of BPEP II, including efforts to provide recurrent training and to increase the number of female teachers in the system.

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[24] See also Appendix 7 of the RETA Final Report, the Policy and Strategy Report.

[25] Not including contributions to the pooled fund for BPEP II, according to the Government of Nepal. 2007. *Nepal Portfolio Performance Review (NPPR) 2007: Budget Implementation and Improving Portfolio Performance. A Government of Nepal Perspective.* Available: http:/www.mof.gov.np/facd/policies/pdf/ NPPR_Background_Paper_2007.pdf.

[26] World Bank. 2005. *Nepal—Education for All: Project Appraisal Document.* Washington, DC.

55. These interventions have contributed to significant additions to and improvements in infrastructure and improved capacity for planning, management, and delivery of education. The interventions have also contributed to quantitative gains in enrollment over the years.[27]

IV. TEACHER EDUCATION PROJECT OVERVIEW

A. Overview

56. The Teacher Education Project, approved in January 2002, is a follow up to the first Primary Education Development Project (PEDP), which established NCED and nine PTTCs. It also follows on the multidonor BPEP (1992–1999), and complements the current BPEP II by addressing the issue of teaching quality. The objective is to assist the government to improve the quality and efficiency of and access to basic education through provision of better-qualified teachers. It is made up of the following four components:

1. Building an effective and sustainable system for teacher education through strengthening administrative capacity;
2. Developing effective teacher education curriculum and teaching-learning materials;
3. Training teachers, educational administrators, and managers; and
4. Educating teachers to better serve the needs of girls and other disadvantaged groups.

57. **Building an Effective and Sustainable System for Teacher Education.** This component aims to strengthen capacity of key training institutions, including NCED, public HSSs, faculty of education campuses, PTTCs, private training providers, and the DEC to provide sustainable, long-term teacher training. This primarily involves extensive staff development and administrative reorganization, as well as some building refurbishment, including upgrading the DEC recording studios and building a training Resource Center at NCED with library, audiovisual and computer facilities.[28] At least 65 PTTCs, HSSs, and education campuses will be accredited to provide pre-service training and an estimated 900 staff will be trained as trainers. This component also makes provisions for improving the TMIS at NCED and linking it to the DOE's EMIS, as well as improving institutional linkages among all training providers, NCED, and the DOE.

58. **Developing Effective Teacher Education Curriculum and Teaching-Learning Materials.** The purpose of this component is to shift from a content-based curriculum to one that aims to "make training more effective, participatory, activity-based, and linked to school practices." This includes improving the 5-month distance education component of the 10-month

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[27] ADB. 2001. *Report and Recommendation of the President to the Board of Directors on a Proposed Loan to the Kingdom of Nepal for the Teacher Education Project*. ADB RRP: NEP 32236. Manila.

[28] The training facilities of NCED were completed during the study period; however, this was not soon enough for the computer and AV labs to be a focus of the study activities.

pre-service curriculum, improving training manuals and guides, and preparing materials for cultural and gender awareness-raising for teachers and administrators.[29]

59. **Training Teachers, Educational Administrators, and Managers.** An estimated 38% of primary school teachers at the time of project preparation had received no formal training. This component provides in-service training to currently serving, but untrained teachers, so that at the end of the project period, they will have completed all or a portion of the minimum 10-month required curriculum (see Exhibit 4 below). Pre-service training, using the approved curriculum, also will be expanded. Management programs will be provided for school principals, MOES officials, regional and district education officials, school supervisors, and headmasters. To scale up teacher training under this component, mobile training units were mobilized to provide training in rural areas.[30]

60. **Educating Teachers to Better Serve the Needs of Girls and Other Disadvantaged Groups.** In addition to providing training on the extent and nature of discrimination and gender sensitivity, this component aims to help increase representation of females and other disadvantaged groups in the teaching force.

B. The Teacher-Training Curriculum

61. A major goal of TEP is to clear the backlog of untrained teachers currently serving in the school system. The government is enforcing a policy that all newly recruited teachers must have a minimum qualification of 10 months training beyond the SLC. To that end, there is both a 10-month pre-service curriculum for prospective teachers, and a 10-month in-service curriculum being offered to all existing government teachers.[31] Exhibit 4 provides an overview of the format and provider of each of these training programs.

62. Most training centers have partnerships with local schools to use school classrooms for training, although these facilities usually lack training necessities such as appropriate lighting, blackboards, and libraries, as well as basic infrastructure such as water and separate toilets for men and women. The training delivery process throughout the system is also characterized by direct lecture, with little or no lesson preparation, teaching aids, or group interaction.[32] In general, the quality of alternative training providers needs to be improved, and many of the pre-service training programs at the PTTCs are not yet accredited by the HSEB.[33] TEP is working to improve the quality and accountability of these institutions.

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[29] This study provides a solution for helping teacher training to be effective, participatory, culture/gender-sensitive and linked to school-practice by using equipment previously provided by the ADB. See Chapters VIII and IX of this report.

[30] The study focused its intervention on these mobile training units, in order to improve the quality of training in the rural areas through improved communication and sharing of resources between urban training centers.

[31] There are still some teachers hired at the community level who are not eligible for this training program. Some of these teachers voluntarily participate in the pre-service training programs at their own expense.

[32] NCED. 2005. *Monitoring Report of Teacher Training Programmes*. Kathmandu.

[33] ADB. 2007. *Aide-memoire, Loan Review Mission 26 June to 04 July 2007.*

Exhibit 4. Comparison of Pre-Service and In-Service Primary Teacher Training Program

	Pre-service	In-service
Format	2 semesters of 5 months each face-to-face (of which 1 month school-based)	2.5 months face-to-face 5 months distance mode (radio) 2.5 months face-to-face (of which 1 month school-based)
Provider	99 PTTCs	9 ETC-A and 65 alternative providers, including the mobile teams. The distance phase is managed by DEC

63. Because the face-to-face components of the 10-month training program require trainees to come to the ETC-As or to alternative providers, this can be a barrier for teachers in remote areas who cannot easily access a training center. For this reason, a mobile team approach was developed to allow the training program to take place in remote areas by sending trainers with training materials to provide the 2.5-month training under the supervision of the DEO. The third phase, which this study was involved with, is divided into the following three parts:

- Thirty-one days of face-to-face residential training. The training is designed in block format, which means, for example, that math will be allocated for a certain number of days, during which the math trainer will arrive and then complete his/her course in that particular time; then the next subject trainer arrives to teach the next subject.

- Twenty-eight days of teaching practice. The trainees are split into six to eight groups and sent to schools near the training location. In this model, trainees go to classrooms and teach using the knowledge and skills learned during the training. Their classroom teaching is observed by trainers and school supervisors on a rotating basis and feedback provided.

- Nine days return to residential face-to-face training to share experiences and conclude.

64. See Exhibit 5 for a profile of a typical mobile team structure and functioning, and Section VII.B, Context of Mobile Training Teams, for further details.

65. As of January 2006, the project had trained approximately 60,000 teachers in various packages of the 10-month program (at least 24,000 teachers have completed the 10-month training), which represents 52% of the total for the project period.[34] After the backlog of untrained primary school teachers has been cleared, NCED and ETC-A will be responsible for in-service recurrent training only. Pre-service training will be the responsibility of PTTCs, HSSs, and FOE campuses.

[34] ADB. 2006. *Aide-memoire, Loan Review Mission 30 December 2005 to 17 January 2006*.

Exhibit 5. Profile of a Mobile Teacher-Training Team

A mobile team is made up of approximately six people who are either School Supervisors, Resource Persons, or Subject Expert Trainers (known as Roster Trainers, who are called upon to teach short-term workshops in addition to their regular teaching jobs) working under the DEO. The DEO serves as the coordinator of the mobile team and is paid by the ETC-A. The DEO arranges a space for training in a nearby school within walking distance of the DEO office. The training is organized in a block schedule so that Subject Expert Trainers come to the training center only for one week, and then return to their school to continue their regular teaching duties. The trainers are provided with an overhead projector, cassette player, harmonium, books for training, and a training manual provided from the ETC-A budget. The DEO makes logistical arrangements and purchases additional stationery when necessary from its own budget.

Since trainees come from all over the district, they either rent rooms in the village near the training Resource Center, or if they are in walking distance from their homes, they manage to travel every day to the training site. Trainees are provided NRs8,000 (approximately $115) as a living allowance to cover their basic expenses during this training period for 64 working days. The selection criteria[35] are based on the following:

- Permanent teachers who completed first phase 2.5 months training and radio program;
- Women, for gender balance;
- *Dalits,* or Scheduled Castes,[36] to encourage them to benefit from such opportunities; and
- Ethnic minorities, to have mixed communities for cultural exchange.

The training (the first and third phase) counts for 330 credit hours each over 75 days, 64 of which are considered as working days. The training class starts from 10:30 AM to 16:00 AM, with a 30-minute break for lunch. Trainees are evaluated on the basis of participation marks and internal assessments done by trainers and through a standard national exam from NCED.

C. TEP Components Involving ICT

66. There are three components of TEP that involve ICT:

1. The 5-month in-service training program delivered via radio
2. Multimedia laboratories in nine ETC-As
3. The computer laboratory established as part of the NCED training Resource Center.

67. **Radio Program.** The 5-month distance mode training that comprises phase 2 of the 10-month in-service program allows teachers to remain in the classroom, but to follow printed self-learning materials, audiocassettes, and a weekly radio program. The radio program is produced by the DEC and is broadcast in the evenings, from 5:30–6:00 PM. The program is further supplemented through weekly face-to-face "contact sessions" in a location generally within walking distance for the trainee. These sessions are held every Saturday by a Resource Person who follows a detailed contact session curriculum created by NCED. The cassettes contain the

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[35] Based on Nepalese official policy, not study related.

[36] "In Nepal, there are certain groups of people who for historical, social, or cultural reasons have become, or remained poor. The word 'dalit,' which mean oppressed, is of relatively recent origin. It refers to the lowest caste group, the Shudra, in the Hindu caste hierarchy. Traditionally, the Dalits have been relegated to doing dirty, menial work, and as a result, have been considered unclean, and therefore 'untouchable' by the higher-caste groups who have reserved for themselves the right to do business, run the government, and educate themselves." Quoted from ADB. 2002. *Poverty Reduction in Nepal: Issues, Findings and Approaches.* Manila. Appendix 1. These historically disadvantaged groups receive government protection and are referred to formally in law as "Scheduled Castes," a term held over from British rule.

same content as the radio program so that there is a choice of synchronous or asynchronous audio. All radio programming is pre-recorded, and is therefore not flexible to changing needs or live questions. A minimum of 12 of 18 sessions is mandatory, but teachers are given extra marks for attending more than 12.

68. Teachers participating in the program report that the evening hours of the radio program are not convenient, and the broadcast is often difficult to understand because of poor transmission. However, when they do listen to the program, they find it helpful as a support to the self-learning materials. They also find the contact sessions very valuable, except that it is sometimes difficult to reach the Resource Center because of geographical constraints (footnote 32). There is also a toll-free number that trainees can call to receive help on demand, but this service is not being used, according to NCED staff.

69. **ETC Multimedia Labs.** By 2005, all nine ETC-As had received a computer, LCD projector, and digital video recorder for use in their training hall. Staff of each ETC-A also received a basic orientation on computer use, but there has been no training, or even orientation, on how to use ICT equipment for more effective teacher training. ETC-As also face a lack of human resources that prohibit them from effectively using the equipment even where there is motivation to do so, resulting in the material remaining in storage most of the time. NCED is working on establishing a system to connect ETC-As and NCED through video conference, but the facilities are not yet available throughout the country. Most ETC-As are not connected to the Internet and have very limited phone connectivity.

70. **NCED Resource Center.** The Training Resource Center is a new building, erected through TEP, which includes a library, training hall, computer lab, and residential facilities for the trainees. It was completed and opened in June 2007, although some computer training had already begun in the computer lab as early as February 2007. The computer lab has 22 computers, with LAN and Internet access and an LCD projector. Refresher training has been provided for DOE staff in basic computer operation and productivity software (e.g., word processing, spreadsheet, and presentations). NCED has also merged 2 days of computer training into its existing Education Management training for DEOs, in which they were trained to use Internet and e-mail as a part of effective communication.

V. STUDY ACTIVITIES

A. Overview

71. Mongolia, Bangladesh, Samoa, and Nepal were the focus countries in this RETA. As described in the Executive Summary, the study featured three technical components: (i) the Policy and Strategy component, (ii) the e-Resources component, and (iii) the e-Teacher Training component. Based on the nature of existing ADB education projects in each of these countries, activities of the e-Resources component were conducted in Mongolia and Samoa, while the e-Teacher Training component was implemented in Nepal and Bangladesh.

72. The study in Nepal focuses on the use of multimedia technology in teacher training institutions—in particular, the use of video as a pedagogical tool, and the use of technology to bring equivalent in-service teacher training to remote areas. As mentioned in paragraph 69, there are nine ETC-As, which have been given support for multimedia Resource Centers through the ADB-funded TEP. These ETCs provide in-service, residential training to primary-level teachers throughout Nepal. The ADB-TEP is also supporting delivery of mandatory 10-month training for all untrained teachers currently teaching in the school system. This is

delivered through a 10-month package consisting of 5 months delivered via radio-based distance learning and two 2.5-month face-to-face trainings delivered at the ETCs.

73. Six mobile teams run the face-to-face components in remote areas of Nepal. The trainers are teachers and school supervisors of relevant districts. Although the mobile teams fall under the regional ETCs in the organizational structure of the DOE, overall coordination and supervision is handled through the DEO, since the mobile Resource Centers are not easily accessible and do not have a reliable means of communicating. Only five mobile teams were functional during the study period because of the security situation. Mobile teams from Taplejung, Rolpa, and Dolpa were chosen as sites for the study since they fall under three different ETCs: Surkhet, Rupendehi, and Sunsari. (See map, Appendix 1of this report.) In the past, these trainers left with only an overhead projector, cassettes, flip charts, markers, handouts, and musical instruments to supplement the texts; the training was delivered in a school classroom with only basic infrastructure.

74. To complement these teaching materials, the study provided a laptop and digital video recorder each for three mobile teams. Two trainers per team were brought to a workshop to learn basic equipment handling and techniques for using the equipment in the classroom for pedagogical purposes. The equipment was used during a third phase in-service training program that ran from April 15 to June 29, 2007. After the training period, trainers returned to Kathmandu for a workshop to share experiences. Targeting the mobile teams for the study served the following two purposes:

- To know the impact of technology in rural areas; and
- To have a clear control group (a training that did not involve technology) that could be compared with the study group (a training that involved the use of technology) to determine the impact of the technology on training.

B. Site Assessment and Study Development

75. The research process was launched with an initial country visit to Nepal from January 9 to 25, during which the study team met with key stakeholders associated with the TEP and initiated extensive document review pertaining to the ADB-funded programs and the existing context of teacher training and ICT in teacher training. This especially included the TEP project implementing unit—the NCED. The purpose of this visit was to gain a clearer understanding of the current primary teacher training system in Nepal, especially the components involving ADB-supported initiatives on ICT (see Section IV.C, TEP Components Involving ICT). The meetings and visits to TTCs provided insight into the extensive training network managed by the DOE through NCED (described in Section III.B, Teacher Education and Training, above).

76. Two stakeholder study launching seminars were held. The first was in Kathmandu on January 16 and included representatives of international development agencies, NCED staff, local nongovernmental organizations (NGOs), and individuals from educational institutions. Fifty-three participants listened to presentations in the morning from a number of key speakers from the Ministry of Education, ADB, and NCED. In the afternoon, a smaller group of about 26 participants conducted a situation analysis of some of the key aspects of ICT in education in Nepal; then in small groups, they developed mock proposals to the government for improvement of ICT use in different areas. The second seminar was held in Biratnagar (southeastern Nepal), with school-level officials, teachers, and teacher-trainers. Twenty-one workshop participants outlined the qualities of a good teacher; they then matched the acquisition of these qualities with specific teaching methods, brainstorming how new

technologies could also help acquire these skills. These workshops helped to provide various perspectives on existing ICT initiatives and attitudes toward ICT integration in education.

77. The site visit identified four key issues, which helped to define the focus of the study intervention.

- The radio program has great potential to reach teacher trainees, while allowing them to continue teaching in their classrooms. It is therefore a very efficient way of providing training; however, most teachers report not listening to the program regularly because it is not interactive and is broadcast at an inconvenient time. Instead, they substitute listening to the radio program by listening to the cassettes, reading the self-learning materials, or catching up during weekly contact sessions. Thus, the value of the radio program compared to its cost is questionable. NCED has already conducted extensive evaluations of the radio distance learning component; thus, there is clear baseline information and data about existing constraints that are areas for improvement.[37]

- Teachers appreciate the training programs (face-to-face and via distance), but once they return to the classroom, they do not implement the methods that are taught. The following are some of the concerns and perceptions raised by informants that indicate why training is not always transferred to the classroom: lack of material resources; lack of support from head teachers (who feel their job might be threatened), school supervisors (who have too many teachers to supervise and cannot provide necessary feedback to each), school administrators (who discourage teachers from practicing student-centered teaching methods because it takes more time and prevents teachers from finishing the school curriculum during the year), and other teachers (who are untrained, but perhaps have more years of experience and ridicule the new methods); a traditional exam system that encourages ”teaching to the test”; lack of pressure from parents; and an overall lack of incentives to improve performance (since contrary to the published *Training Policy*, promotions and other benefits are given based on seniority or personal relationships rather than performance.)

- From a technological perspective, teachers have very limited exposure to any type of technology, with the exception of mobile phones, which most people have in urban areas. Even basic computer literacy is rare. The country situation is such that mobile phone coverage is only available in the *terai* regions of Nepal, and Internet access is even less accessible. Villages in rural areas are located far from basic services, and electricity can even be scarce. There are, however, some important experiences under way, where NGOs and the United Nations Educational, Scientific and Cultural Organization (UNESCO) are establishing wireless connectivity or Community Multimedia Centers (CMCs) for rural areas.

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[37] The study considered testing an approach in which mobile phones could be used to improve the engagement of trainees with the training content and resource person; however, mobile connectivity is not yet available in most of the mountainous regions, so the study would have been limited in terms of geographic scope. However, the Nepal DEC could benefit from studying the study intervention and outcomes in Bangladesh, which focused on the use of mobile phones as a learner support tool during distance-mode in-service professional development. (See Appendix 11 of the RETA Final Report, the Bangladesh Country Report.)

- NCED has conducted extensive evaluations of the 10-month in-service teacher training program. NCED has mechanisms in place for continued monitoring and evaluation of basic inputs and outputs. However, there is a lack of in-depth research on the school-level impact of the teacher training program. NCED expressed strong interest in any study that would, first, demonstrate the added value of the existing ICT infrastructure (mainly the multimedia equipment in the teacher training institutions) and, second, provide insight into its impact at the classroom level.

78. Given the above context, a study framework was developed with and approved by NCED that focused on examining the way ADB-funded multimedia equipment was being used in teacher training institutions, and whether the technology added value to the learning process. There is a wealth of worldwide experience on models for integrating technology into basic education, but few that focus on the pre-service teacher as the student and the teacher training institution as the school. Most examples of ICT in teacher education either center around teaching basic computer literacy or how to use technology as a teaching aid, but they rarely look at how the use of multimedia and other modern communicative devices can help impart the key knowledge and skills required in the teaching profession: i.e., social (child development, motivation, and facilitation), academic (subject knowledge), and methodological (teaching and assessment methods, and classroom management).

C. Training and Equipment Procurement

79. To learn more about the impact of technology in teacher training, the study provided a laptop and a digital video recorder, as well as consumables, such as CDs and DVDs, for three of the six mobile teams, which began a new 2.5-month training period on April 15, 2007. The goal was to determine whether the technology could reduce feelings of isolation and enhance the learning experience for rural teachers. Some of the anticipated uses of the equipment were as follows:

- Use video recording and playback as a teaching and learning tool;
- Gather additional multimedia materials to bring to the remote sites, including sample video clips of model classrooms, teaching methods, and instructional materials development; and
- Share video clips from trainers in remote areas with ETCs so they can begin building a repository of model teaching practices to be shared easily through digital media.

80. As part of the study objectives, the laptops were installed with Open Office, a free suite of office software (e.g., word processing, spreadsheets, and databases), rather than purchasing licenses for Microsoft Office products, to determine whether open software presents any barrier to use of technology in this context.

81. Two equipment handling sessions were conducted during which two mobile trainers and one ETC representative from each mobile team received the equipment package, and training on how to use it. On April 8 and 9, a training session was held in Nepaljung for mobile trainers from Rolpa and Dolpa and the corresponding ETCs, Rupandehi and Surkhet. A Resource Person from NCED assisted the study trainers to deliver specific training on technical aspects of the equipment. On April12, a training session was held in Biratnagar, for the mobile team from Taplejung. The orientation aimed to give participants basic skills and knowledge about operating and maintaining the equipment in good working condition, using the equipment to improve teaching and learning, using specific software for the teaching and learning purposes (in

particular, the video editing software and basic word processing and spreadsheet data entry), and storing data on recordable disks. They were also given an orientation to the study and data collection procedures for which they would be responsible.

82. In addition to learning basic operating procedures for the equipment (e.g., on/off, saving data, recording, and transferring video), the participants were able to view and edit some teacher training videos previously produced by NCED. This was the first time these trainers viewed video from NCED, even though it had been created for the purpose of teacher professional development. As such, the technology had an immediate outcome by allowing trainers access to this video. The facilitators reported that during the workshops, participants stayed late hours and arrived early so they could have as much time possible practicing with the equipment before the workshop ended, indicating that enthusiasm for the experience was very high.

83. The second workshop in Nepaljung was limited to one day due to operational constraints, but since there were only three participants, significant amounts of material were covered on that day. The participants still received the basic orientation on use of the equipment and how to use the study log sheet. They practiced recording and editing video and creating CDs and DVDs, as well as preparing a plan for the coming months. Because the training hall was still available for them the next day, they were able to continue practicing.

D. Implementation

84. From April 15 to June 30, 2007, the three mobile teams carried out their training in the remote training centers. Due to difficult communication infrastructure and great distances between mobile teams, it was not possible for the study team to carry out regular monitoring or otherwise provide recurrent support to the teams over the implementation period. An interesting result was that the trainers were free to use the materials in the way that suited their needs and interests, without simply following instructions from the study team or using the equipment because they were asked to and required to provide results from the study input. Therefore, the experience and its results can be characterized as very authentic, though mainly qualitative in nature.

E. Analysis and Closing Activities

85. The following data collection and evaluation activities were conducted in July:

- Analysis of questionnaires from control and study groups of the three sites, including translation;
- Meetings with key NCED personnel;
- In-depth discussions with two representatives of mobile teams from Rolpa and Dolpa, and one representative of the team from Taplejung (five people total);
- Meetings with ETC-A (PTTC) coordinators;
- Presentation of preliminary study findings to an entire group of ETC coordinators and other staff; and
- Verification of the good working condition of all of the new equipment, and handover to the designated officials.

86. The methodology and findings chapters of this report (Chapters VI and VII, respectively) provide more details about the process and results of these activities.

VI. STUDY METHODOLOGY

87. As previously explained (Chapter IV, Teacher Education Project Overview), the objectives of the TEP project in Nepal are to

- Build capacity for policy, planning, management, and delivery of teacher training;
- Enhance professional skills of teachers and trainers; and
- Promote representation of females and other disadvantaged groups in the teaching cadre.

88. During the project's midterm review (December 2005), both ADB and NCED agreed on the need to address the issue of transfer of teacher training to the classroom. They suggested establishing a Teacher Support Program (TSP) that would strengthen the ability of Resource Centers to follow up with trained teachers and improve student learning. The study input was designed to complement the original project outcomes, as well as the proposed TSP and additionally, to make suggestions for expanding positive outcomes under the EFA program.

89. The research questions, therefore, were designed to provide insight on the use of ICT in teacher education in a general manner—insights which could be applicable to other DMCs, as well as contribute to TEP project performance and specific objectives. The following research questions were developed:

- How do ETC media labs improve teacher training?
- How does ICT improve the effectiveness of mobile training teams to deliver quality teacher training in remote areas?

90. To answer these questions, the research design intended to observe and record activities in the ETCs over the course of 6 months and then assess the impact of the technology based on trainee feedback and performance (to the extent it is possible to measure). Variations in use, as recorded, would be studied and correlated with differences in student achievement and satisfaction. Exhibit 6 below is the corresponding research framework that was developed for the study.

91. The result would be recommendations on the appropriateness and effectiveness of the use of multimedia technologies for teacher training, including additional dimensions of (i) practical factors such as funding required, infrastructure, classroom layout, staff development, student and teacher support services; (ii) pedagogical issues (catering to individual needs, multimedia assessment, impacts on teachers, access to worldwide activities, and resources for teachers and students); and (iii) policy issues (connecting people, ICT literacy, and instructional policies).

Exhibit 6. Study Research Framework

Question	Methods/Instruments
1. How do ETC media labs improve teacher training?	• Using existing EMIS, trace trainee cohorts trained at ETCs before they received the AV equipment, and cohorts trained after. Compare performance assessments and student achievement at the school level for both groups. • Catalogue the uses of the equipment during the current term, according to curriculum goals (i.e., social, academic, and pedagogic) and create case studies of how ICT is used in and among ETCs. • Request feedback from ETC heads or ICT administrators about the level of use and benefits to teaching and learning processes.
2. How do ICTs improve the effectiveness of mobile training teams to deliver quality teacher training in remote areas?	• Equip mobile teams with a laptop and digital video recorder. • Comparing feedback from trainee teachers in the implementation cohort (where the technology was used in the classroom) and a control cohort (all of whom had finished the session prior to the implementation cohort, where no technology was available). • Cataloguing the use of the equipment to create a case study of intended and possibly unintended uses of the equipment for improving training quality in remote situations. • Comparing end-of-cycle exam scores and classroom performance between teachers trained by mobile teams with equipment and teams without equipment.

A. Questionnaire Analysis

92. A total of 77 questionnaires from control groups (31 Taplejung, 14 Rolpa, and 32 Dolpa) and 104 questionnaires from the study groups (56 Rolpa, 22 Taplejung, and 26 Dolpa) were filled out, collected, and analyzed after each group's training period ended. The control groups were cohorts of face-to-face trainees from Taplejung and Rolpa who completed the third-phase curriculum during the period January to March 2007. The Dolpa mobile team did not operate during that period because of severe winter weather and snowfall that makes travel impossible in that region. However, they did manage to contact trainees who completed the same third phase training in 2006.

93. Questionnaires for both groups were identical except that for the study group, a third section pertaining to the use of technology was added. The questionnaires covered basic demographic information, satisfaction with training content and methods, and training relevancy (according to the stated goals of the training). Most questions were on a three- or four-point scale, and there were several open-ended questions. The questionnaires were prepared in English, and then translated and reformatted into Nepali. The scaled responses were coded and entered into a spreadsheet for analysis. Open-ended responses were translated back into English.

94. See Section VI.E, Limitations to the Study, for some discussion of the limitations of the questionnaire instrument.

B. Interviews with Mobile Team Trainers

95. During the data collection period, after the three mobile teams had completed the 2.5 month-training program (July 2007), mobile team representatives were again invited to Kathmandu to return the equipment to the study team and share their experiences. Mobile trainers arrived in a staggered manner between July 12 and July 15 and in-depth discussions were held with each team individually, drawing out important aspects of study implementation and outcomes in each site. The three groups overlapped on 2 days, such that Rolpa and Dolpa could share experiences together, as well as Dolpa and Taplejung.

96. The interviews covered basic questions such as

- What did you use the equipment for, and why? What purpose did the equipment serve in each case and did it improve teaching/learning compared to the same activity when there was no technology?
- What problems did you face with implementation of the study? With the technology? Were there things that you wanted to do but didn't because you didn't know how?
- What do you consider to be the main difference between teaching with and without the technology? Would you to use the equipment again in the future, and if so, what would you do differently?
- Are you prepared to reuse the video clips that you created? Do you have a system for finding a particular clip within your digital archives?

97. Questionnaires from control and study groups had been translated and analyzed from Dolpa and Taplejung prior to the meetings, which enabled the study team to share preliminary findings, clarify specific questions or feedback from the training participants, and interpret the quantitative findings together.

C. Interviews with ETC Heads

98. Similarly, during the data collection period in Nepal, the study team met with several ETC heads who were present in Kathmandu for an NCED planning meeting over 4 days. Because of the intensive schedule of the existing workshop, there was very little time to hold in-depth discussions with the ETC heads, but the study team managed to collect some feedback from five of nine ETCs (Rupandehi, Sunsari, Janapur, Bhojupur, and Surkhet).The trainers also briefly presented the experience to the entire group of ETC personnel, allowing time for some reaction from the audience. The team also received one completed log sheet. Despite the fact that these brief encounters with the ETC heads did take place, most of the analysis pertaining to the use of video in teacher training comes from the experience of the mobile teams and not the ETCs, even though they were intended as an additional level of analysis in the original study framework (see Exhibit 6 above).

D. Laptop Analysis

99. During interviews with mobile trainers for the evaluation visit, teams presented and described some of the videos that they recorded. Furthermore, after the mobile trainers returned the laptops to NCED and participated in a debriefing with the study team, documents that had been saved to the laptop were reviewed. All files found on the computer were sorted and counted. This analysis helped us to understand and verify information given by the trainers during interviews, as well as the responses given by trainees on their questionnaires. It also

gave some insight into problems encountered with the interface and limitations to effectively using the laptops. Each mobile team was also provided with 10 one-hour video cassettes, but the actual amount of video recorded was not compiled or analyzed, since two of the teams did not bring the recorded video back to the training workshop with them.

E. Limitations to the Study

100. The reliability of the questionnaires may have been compromised since they were not pilot tested, and therefore there were some misunderstandings that rendered certain questions invalid, or that reduced the number of total respondents, in cases where some responses had to be eliminated. In particular, it was sometimes not clear which answer was being checked in a multiple choice question. Some questions were inadvertently omitted due to a transmission error encountered because the questionnaires were sent by fax. One entire section of the questionnaire had to be excluded from analysis because the responses were too inconsistent—It was not clearly explained how to answer items on a scale, or that each item in the list needed a response.[38]

101. The trainers also reported that the questionnaires were distributed on the last day of the training, and they felt that many teachers were in a hurry to finish and might not have given their answers a great deal of thought. The study team could not access the trainees, because of the distances and lack of communication infrastructure, to conduct interviews that would have helped verify and add clarity to the written questionnaire responses. Therefore, most of the in-depth analysis comes from the point of view of the trainers, who, in some cases, were not present full-time during the entire 2.5-month training. During these interviews, it proved very difficult to get clear answers about *why* they chose to use the video camera in the way they did. It seems they were using the video camera at every opportunity, but without a specific didactic purpose in mind, and so the line of questioning was not clear to them when they were asked to explain their rationale on an activity-by-activity basis.

102. The sample sizes of each group and the control groups were very different, and overall very small. This makes it very hard to discern with certainty whether the outcomes observed would be the same outcomes that would result in a different context, if the experiment were repeated. Also, the Dolpa control group did not fill out the questionnaires immediately after their training program, and more time passed between the training and the time they received the questionnaire. There is no way to know how the lapse in time might have affected the results.

103. All three mobile teams were able to describe and provide evidence of the manner in which they used the video recorder and laptop during the 2.5-month training period. However, the teams were not successful in recording actual usage on the log sheets provided. Only one mobile team returned its log sheet. The other team reported that they had kept a log sheet by hand, but they did not produce a copy of it despite requests. Likewise, only one ETC provided a log sheet of the actual use of the equipment in the multimedia lab provided through the ADB

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[38] This was a section that asked respondents to: “Give your opinion about how much you think you learned, compared to what you knew before.” The format of the question was a rating exercise that instructed them to “Place one of the following numbers next to each objective: “1 = I did not learn enough, I don’t feel comfortable to do this”; “2 = I learned a lot, but I still have some questions”; or “3 = I learned very much, and I am ready to do this in my classroom.” There were 22 such items, corresponding to the stated curriculum goals. However, most respondents only placed a check next to several items (probably those that they felt they learned the most about). The purpose would have been to see whether there were certain teaching curriculum goals that lent themselves more or less to the use of video recording and playback. Due to the inconsistency of responses, meaningful analysis could not be conducted.

TEP. Due to communication difficulties and time constraints, the log sheets and instructions were not delivered to the ETCs in time to have a full 6 months of data collection from all nine ETC-As as planned. Although they did receive the log sheets and instructions with at least 1 month to fill them out, there was only one ETC that completed it—the rest were too busy or lacked clear incentives to do so (they felt like this was an additional burden for them, and they did not know they were required to comply).

104. Data for the EMIS analysis were not available within the time frame of this study, since it was compiled first from the mobile teams, then from the regional ETCs, and finally sent to the central location. Therefore, it was not possible for this study, as planned, to compare the marks of ETC trainees prior to the addition of the ADB-funded equipment and those trained afterwards. Although this would be a worthwhile exercise to complete in the future, it would be difficult to attribute the results only to the addition of the technology when there are other influences at work (i.e., change in classroom environment at different times of the year, different roster trainers used, different classroom compositions). Therefore, any further analysis must be read with care.

VII. STUDY FINDINGS

A. Use of Technology

105. **Overview.** This section summarizes the different ways that trainers used the equipment, according to their own descriptions, trainee questionnaires, and records saved on the laptops and video cameras. It also explains some of the constraints to using the equipment optimally. Exhibit 7 summarizes examples of technology use across all three mobile teams. The mobile trainers had a difficult time articulating why they chose to do each type of activity and what purpose it served, but it was clear that they very much enjoyed the process, and the benefits they cited are listed below.

Exhibit 7. Summary of Technology Use in Mobile Teacher Training During This Study

Summary uses of video recorders
- To record actual training activities and classroom lectures
- To record extracurricular activities, cultural events, and community events
- To record microteaching practice

Summary uses of laptops
- To edit and play back videos
- For administrative purposes (creating teacher lists and writing letters)

106. Video recorders were used to record and play back (using the laptop) the following types of activities.

1. *Actual classroom lectures and activities.* This seemed to be the most common use of the video recorders. According to the trainers, this activity served the following purposes and intentions:
   - Trainers could improve their training practice by reviewing the video and self-assessing performance; they would also be able to review the video before the next time they taught the lesson (maybe after several months) to remind themselves what worked and what did not.
   - Trainers would be able to review trainee participation over the course of the 2.5-month period, which helped them to give final marks.
   - Trainees could retain the subject-matter content better, and could review lessons for which they had specific questions by replaying the video later. Similarly, trainees who were absent could review the actual lesson on the video.

- Trainees were more attentive and participated more, knowing that the lesson was being filmed.

- DEOs and other training supervisors could verify the quality of training and provide feedback to trainers, or adjust the curriculum as necessary.

- Trainees could take a CD copy of these activities, which would help to remind them of some processes, especially leading games and developing teaching aids.

- One team also recorded group work and feedback sessions, which allowed the trainees in other groups to see what their fellow peers were discussing.

2. *Extracurricular activities,* including school opening and closing ceremonies and local cultural events.
   - Trainers could use these videos later to support social studies lessons.

   - Video recordings could be shared among different training institutions, to show differences between urban and rural settings, or different cultures and regions.

3. *Microteaching* (practice teaching in the training center with peers) and *student teaching* (school-based, with children).
   - Trainees were able to see their performance, self-assess their weaknesses, and make corrections.

   - Trainees could also compare their performance during microteaching with performance in the actual classroom.

   - School supervisors' comments on practice teaching to trainees in school, with help of video recording, was more effectively and positively received by trainees than without the recording.

107. Many trainees requested copies of all types of videos on CD to review them again after the training period. The mobile teams explained that although most schools and homes did not have computers, it was usually possible to find a computer somewhere in the village or neighboring village, including district education offices, so it was possible that they would be able to view videos later.

108. Laptops were mainly used for processing the video from the cameras to edit it to a reasonable amount of time, organize important clips, and play back video to show the students. (No other projection equipment was provided). The laptops had CD drives, allowing them to play back pre-recorded model teaching videos provided by NCED. This was the first time any of the trainers had ever seen these videos, much less used any kind of video as a teaching aid. The trainers also used the laptops for administrative purposes, where they had the skills to do so. One trainer started a spreadsheet with student information; another team used the word processor to write letters and reprint a training manual for civic education. They also discovered how to use the computers to store and listen to music. One trainer was able to connect to the Internet with his computer, and may have used it for Internet phone calls, according to records on the computer. The analysis of the laptop hard drives shows that apart from the video clips (both unedited and edited), the application used the most by all teams was the word processor, with about six new documents created and saved per team. Very few edited video clips or movie files were created. Most of the video was the full, original clips, indicating that either the task of editing the clips down to the most useful parts was too time consuming, or the trainers

felt that all of the video was worthwhile to keep. Interviews with the trainers indicate that both explanations are likely, and more training will be necessary in order to help users limit the amount of video stored on the computers to a useable amount.

109. None of the teams used the video cameras for taking still photos. In two cases, this was because they did not know how. In another case, it was because they still had traditional cameras for this purpose.

110. **Differences between Anticipated and Actual Use.** The anticipated uses of the video recorder and laptop, when the study was originally designed, were somewhat different from the ways they were actually used by trainers. For example, the equipment log sheet asked trainers to note the purpose each time they used the laptop or the video recorder. A set of suggested categories was given, with the option of adding others as needed. For the laptop, the following suggested purposes were:

- Personal learning (practicing computer skills, or learning how to do something new);
- Personal use (using for a purpose unrelated to the training program, i.e., watching a movie, listening to music, or writing a personal letter);
- Administrative use (conducting administrative tasks related to the training program, including lesson planning, data collection, etc.);
- Curriculum learning (teaching something related to the curriculum of the third-phase training); and
- Basic skills learning (improving basic subject knowledge such as math, English, or science).

111. The video recorder the purposes were as follows:

- Classroom demonstration (showing a model classroom demonstration);
- Self-assessment (assessing a trainee practicing teaching skills from the training curriculum);
- Personal learning;
- Personal use; and
- External relations (creating or showing video about the training program or training outputs to the community or other concerned individuals).

112. The main difference between anticipated and actual use was that the study did not expect that the trainers would use the video cameras for recording actual lectures or recording trainees' participation in classroom activities (except for microteaching [defined in footnote 3]). However, this turned out to be the most frequent use of the video recorders, and trainers and trainees alike mentioned the benefit of having a record of the actual training session. This finding exemplifies how technology integration also can lead to unexpected results and new practices. In a climate of innovation, ICT can be more than a lever or tool to improve teaching and learning; it can even become a catalyst for change.

113. Another difference between anticipated and actual use was that the equipment (particularly the laptop) was never used for basic subject knowledge training, no doubt because the trainers had neither supplementary resources—i.e., educational CDs—nor training to do so. Except in the case of Taplejung, the trainers did not make a specific effort to improve their own computing skills outside of the tasks related to the study, although they certainly did improve their skills indirectly as a result of the study, mainly concerning video capture and editing. Although the study suggested using the equipment for community outreach purposes (a use identified during the initial site visit to an ETC-A in Kathmandu), it was not anticipated that the video camera would be used to create videos relative to the local culture, which could be reused *in an instructional setting* later. There were no reports of the computers or videos being used to share information with the community and parents, although they were shared with DEOs as an accountability tool. Finally, it was not anticipated that CDs could be given to trainees, since there would be no computers available for watching them later. According to the trainers, it is often possible to find a computer in a nearby village, even if the trainees do not have computers at home.

114. The study's main intention was that the video recorders would be used for self-assessment of the trainees' own teaching practice and to develop a repository of model teaching videos to share with other teacher training institutes. However, the equipment orientation period did not leave a sufficient amount of time for training the users on these purposes. (Most of the 2-day training period was spent just learning how to operate the equipment). Moreover, developing a repository of best-practice or model teaching videos, or even subject-specific videos such as local cultural events or preparation of teaching aids using locally available resources that could be shared among ETCs, would require the support and buy-in of the ETCs to make this an effort worth the trainers' time. The short study period did not leave enough time for that level of advocacy.

115. An important unintentional outcome of the study was that the *trainers* actually used the video for self-assessment and reflection of their teaching practice in the manner expected for the trainees. It also became a supervision tool, to help record training participation marks. Similarly, DEOs and other training supervisors at the ETC level had an opportunity to see how the mobile training sessions were actually carried out and some of the issues they face (for example, the condition of the classrooms).

116. **Constraints.** Due to the fact that the computer operating system is in English, it was understandably much more difficult for trainers to learn to use the computer through trial and error. This was compounded by the fact that they were very nervous about being held responsible for any damage to the equipment; anything that they were not specifically trained to do they were unlikely to discover on their own. The open-source software had Nepali fonts installed, but there were no Nepali software programs available for these computers. The open-source software did not seem to pose a problem, since it was a new learning experience for most of the trainers anyway (i.e., they would have had as much of a learning curve with any other commercial software packages).[39]

117. Some features that could have been included in the equipment package include the following:

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[39] See also Appendix 7 of the RETA Final Report, the Policy and Strategy Report, which includes sections on free and open-source software and localization of software and content.

- Antivirus software for the computers. This will be important in the long term, if ETCs begin sharing equipment among themselves; however, it is a recurring cost, and most packages require a connection to the Internet in order to update the software regularly, both of which pose difficulties in the particular context.

- Tripod for filming. This would have been a minor additional expense, but would have made it much easier for trainers to film themselves teaching or film trainees without being preoccupied by the act of filming. It would also mean that there would not necessarily be a need for a separate camera operator every time, and it would also improve the quality of the videos.

- Projector and/or external speaker for viewing videos on the computer as a group. The projector is an important piece of equipment for effectively using the video playback feature as a learning activity. However, it is not very feasible in a context where there is no reliable electricity source, and where transportation constraints would make it very difficult to transport such a fragile piece of equipment. A set of external speakers (if they run on battery power, as well as AC/DC supply) would be feasible to add to the package, although the impact would be less important. Cords were provided with the cameras to allow projection through a television, but none of these teams had a television available.

B. Context of Mobile Training Teams

118. During the evaluation mission, the study team held in-depth interviews with mobile team trainers who used the equipment. Most of the feedback was similar from each team, but the specific contexts—especially trainers' prior knowledge and interest in using the technology—made a difference to the overall extent to which the equipment was used. Therefore, this section briefly describes the experience of each training team.

119. **Rolpa.** The DEO at Rolpa does not have a telephone, and postal service is available but is very slow. Messages to the mobile team must be conveyed through the District Office Chief or Police Office's telephone. The DEO arranged for a space in Lewang Resource Center, about 20 minutes' walking distance from the DEO. Two halls were provided: one that could comfortably accommodate 40 participants and another that could house 20 participants, but had limited capacity to exhibit education materials or conduct group discussion and role play. A total of 57 participants (40 male and 27 female) completed this third and final phase of the 10-month curriculum during which the new video equipment was used by trainers in the classroom for the first time. These participants were from 30 different schools of Rolpa district.

120. The training was facilitated by seven trained teacher trainers as subject resource persons and experts in the following subjects: math, social studies, Nepali, art and creativity, English, science, generic (primary education and development for professional study), and administrative assistance. According to questionnaires filled out for the study, trainees in this cohort had an average of 29 years of teaching experience; however, the range varied from 5 to 49 years. The majority were math and Nepali teachers, or they taught all subjects at all grade levels. Only about one quarter of the teachers had completed more than 10 years of schooling.

121. In Rolpa, one person was assigned to use the camera for recording various activities, including training sessions, games, extracurricular activities, and cultural events in the district. He was not a trainer but an administrator in the DEO, who is involved in keeping records and handling logistic matters for teacher training. He recorded sessions in the training hall and then reserved a time for trainees (after 2:00 PM) to view recorded clips. At the end of the training,

some teachers were given CD-ROM copies with video clips to take home with them. This was the only team where an experienced technology user was in charge of storing and replaying the video on the laptop, and the only team where they made CD-ROM copies for the trainees to take with them.

122. They experienced difficulties because of a lack of electricity at the Resource Center. The electricity comes from Lewang, but no budget has been made available to install it in the center. Therefore, the trainers had to plan carefully how to charge the equipment at the DEO's office or at their own residences. The lack of electricity also meant there was insufficient lighting in the training hall, resulting in dark and low-quality video recordings. Rolpa also experienced difficulties due to a lack of training staff. (Because of its extremely rural location, they have difficulties finding trainers who are willing to spend 2.5 months there.) Therefore, instead of having six school supervisors, there were only three, who divided the workload among themselves. Thus, there was very little time to visit each trainee teacher to review teaching practice during the school-based practicum. Many trainees remarked in their post-training questionnaire that the trainers needed more training on the use of the equipment since they appeared nervous. They also felt that the training center classrooms were too dark and congested.

123. **Dolpa.** The Dolpa Resource Center has only one training hall, at Saraswati HSS in Dunai. A total of 27 participants (trainees) attended the training with the new technologies. Eight Resource Persons conducted the session, in the following subject areas (four from DEO staff and others were Roster Trainers): English, math, classroom management, physical education, creative activity, primary education and development, social studies, English, environment, and Nepali. These 27 trainees were split into four schools in the district for the school-based portion of the training. From a sample of 58 teachers surveyed in this region for the study (control group plus implementation group), about 34% had completed more than 10 years of schooling, to a maximum of 15 years. The average age was 33 (range from 20 to 46), and they had been teaching on average 10.5 years (range from 2 to 25 years.)

124. The English trainer attended the equipment handling workshop. During the 2.5-month implementation period, this trainer was the main person in charge of using the camera to record training activities. After completing his 8-day training block with the trainees, he was still able to go to the training hall to record the sessions of other trainers and trainee activities. When he was unavailable or out in the field, another colleague assisted with recording. Together, these trainers managed to record video of all trainees at least once during their classroom practice session. They were also able to record training activities almost every day, and replayed select recordings for trainees once a week, on Friday. They also used a log sheet to maintain the equipment usage but faced problems saving the purpose column, therefore it was not logged correctly and could not be used for data analysis. The trainers recorded every day's first session, consisting of a review of earlier training during which comments were made by a group of trainees on what other trainees thought about the training. The recording helped supervisors and the DEO understand the actual situation of the every-day training. Since the third-phase training is particularly designed for group work, trainees perform many projects in groups. The trainers felt that recording group work presentations would give trainees a chance to hear what other groups were discussing. They did not make CD copies for the teachers, however.

125. The main problems encountered were that trainers were not very familiar with equipment usage, and the schools in which teachers were placed for their in-service practicum were very far away from the Dolpa Resource Center. It was impossible to record school-based teaching practice for all of the teachers since there was often no place to recharge the camera between

trips. Trainees also remarked, in the post-training questionnaires, that the training hall was too congested and dark. However, this team managed to record all of the trainees during microteaching at least once, which might explain why perceived usefulness of recording (Exhibit 8B, below) was slightly higher, even though they recorded and showed video as often as Rolpa. As in Rolpa, a major constraint to using the equipment was the lack of electricity in the training hall.

126. **Taplejung.** There are typically 30 trainees in one training session. As elsewhere, the trainers are Resource Persons, school supervisors, and subject-matter expert teachers who belong to a training roster. Some of the materials used include flashcards, cardboard, board marker, white board, flip chart, training guide, and important handouts. Teaching methods employed include group discussion, group division, hands-on material development, display and exhibition, and lectures. Marks are based on unit tests, subject block tests, internal assessment (of classroom performance and participation, day-to-day activity, attendance, daily report, lesson plan, question preparation), and classroom observation during the school-based period (by both the mobile trainers and the head teacher of the host school). The Taplejung mobile team does not have its own training hall, but has an arrangement with Pathivara Multiple campus, which is located 15 minutes walking distance from the DEO. Construction is under way for a new building at the DEO to serve as a Lead Resource Center for the area.

127. Of five trainers who were working during the study period, one was female and four were male. They were all Resource Persons selected by the DEO and were working full time as school supervisors. The 22 participants were divided among three schools in the area for their practice teaching. Five subject trainers were brought for the following subjects: social studies, math, science, English, Nepali, primary teaching, and professional development. According to questionnaires filled out for the study, the teachers in this training were on average 39 years old, with 14 years' experience in the profession, though some had as little as 3 years and others as much as 29. Forty-five percent of teachers had completed more than 10 years of schooling.

128. Two trainers were given 1 day of training to use the equipment before the training began. However, one of the trainers never used the equipment at all and did not return to speak with evaluators during the evaluation mission. This was the only woman who had been trained, and she reportedly never felt comfortable enough with the technology to be able to use it on her own. Therefore, there was one person primarily responsible for the video equipment in Taplejung, who was a subject trainer. As in Dolpa, this trainer completed his week-long block, but returned to the training center regularly because he lived within walking distance. He went there frequently to record the sessions and activities of trainees or any other events. During his own session, one of his colleagues assisted him in using the camera and recording his session. The second trainer who was brought to the equipment training workshop never felt confident using the equipment and did not end up participating in the experience.

129. Therefore, only one trainer was in charge of the equipment the entire time, and he faced the following two major technical problems while using the equipment:

- A picture appeared on the desktop while using Internet, which he could not remove; and
- He could not transfer video to the laptop after the first half of the training, because a setting had been changed in the camera and he did not know how to fix it.

130. This trainer was the only one who had the opportunity to use the equipment for something other than the 2.5-month primary teacher training; it was also used in the secondary-

level 1.5-month training. (This is school-based training, where the trainees attend a 3-day workshop three times.) The video recorder was used for opening, closing, and special events. According to the equipment log sheet, the video recorder was used 22 times over 2.5 months, or about 7 times per month. He also used the laptop for a 2-week life skills training for primary school teachers, where there were 50 participants in two groups. He used the laptop to save and print the curriculum, and is working on creating a teaching guide based on the curriculum. This trainer appreciated having the opportunity to develop his own capacity in typing and documentation.

C. Added Value of Technology

131. **Training satisfaction.** Exhibits 8 and 9 below show the trainees' recollection of how much the equipment was used in the classroom to either show video or record training events, respectively. Though the answers vary in terms of the actual number of times that the equipment was used, the charts do confirm what was learned from the trainers themselves during interviews—that the equipment was used much more frequently in Dolpa and Rolpa than in Taplejung (see Exhibits 8A, 9A on equipment use). Therefore, the next question on the usefulness (see Exhibits 8B, 9B on its perceived usefulness) of the equipment use in the classroom can be analyzed in terms of its relative use. This analysis shows, not unsurprisingly, that the perceived usefulness of the technology decreased where it was used the least frequently (Taplejung). It was also highest at the site where the trainers were most comfortable with the equipment (Dolpa). In Rolpa, the perceived usefulness of watching video was rated as very useful by a slightly larger percentage of trainees, and this may be related to the fact that teachers were able to watch the video individually, after school hours, rather than as a group (on a small screen).

Exhibit 8. Trainee Responses on the Extent That Recorded Video Was (8A) Shown to the Class and (8B) Perceived as Useful, at Three Training Sites

Exhibit 8A

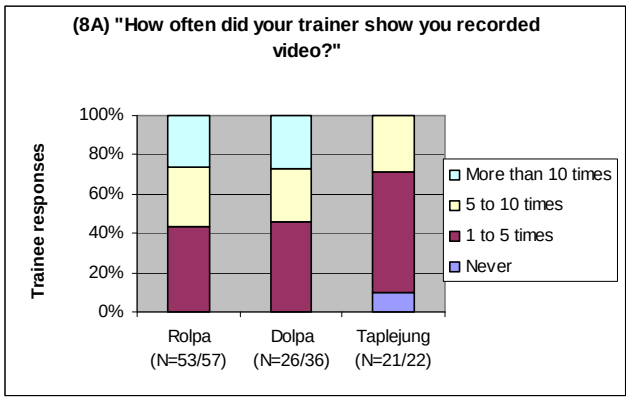


Exhibit 8B

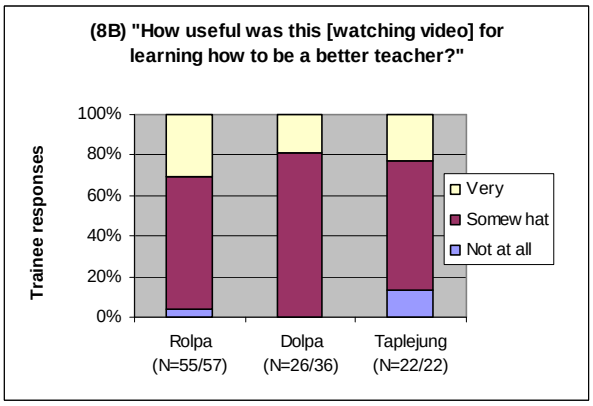


Exhibit 9. Trainee Responses on the Extent That Video of the Trainees Was (9A) Recorded and (9B) Perceived as Useful in Three Training Sites

Exhibit 9A

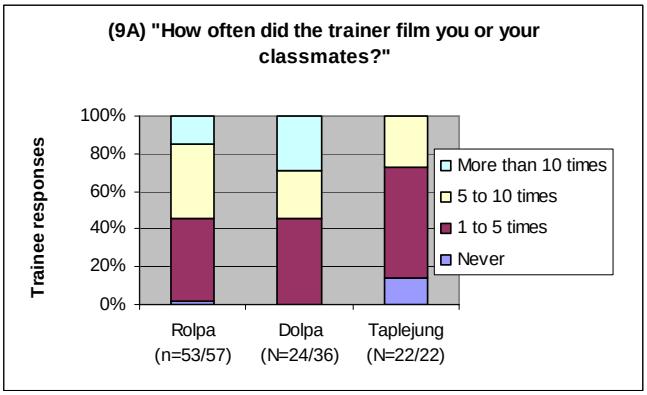
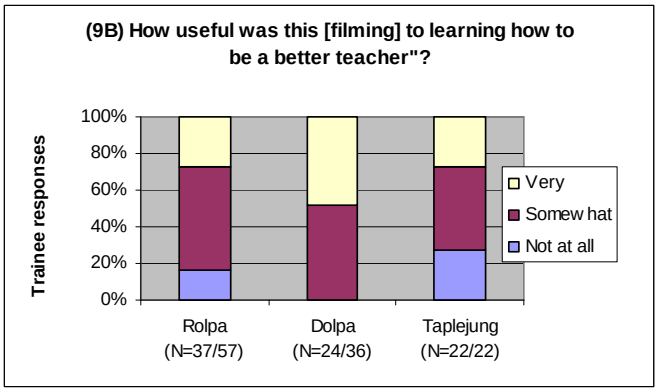


Exhibit 9B



132. Furthermore, a comparison of training satisfaction between the study (implementation) group and the control group indicates that the most difference in overall training satisfaction (as perceived by the trainees, when asked: “How much did you enjoy this training?”) can be seen from the Rolpa team (see Exhibit 10B, below), where the study group showed considerably higher training satisfaction than the control group. There were no significant differences in the percentages of favorable responses between the Dolpa and Taplejung mobile teams (Exhibits 10C and 10D, respectively).[40] On the other hand, the Rolpa team was the only site where anyone in the study group answered “Very little.” These results may simply be because the Rolpa cohort was almost twice as large as the others (with a total of 57 trainees), and therefore there is more chance for variation in the responses, as well as more reasons for dissatisfaction on the part of the trainees regardless of the use of technology. Overall, when results from the three sites are combined (see Exhibit 10A), only a slightly higher rating for overall training satisfaction can be seen for the study group, to be explained by the variation from the Rolpa team.

[40] In all cases throughout the report, reliability of comparison between the control group and the study group in Dolpa could be affected by the fact that the control group was selected from teachers having completed their training earlier than November 2006 (see paragraph 102). The training teams were not necessarily the same and trainees' recollection of the quality of the training might be affected by the time that had passed since the training ended.

Exhibit 10. Training Satisfaction Comparison Between Control and Study Cohorts

Exhibit 10A

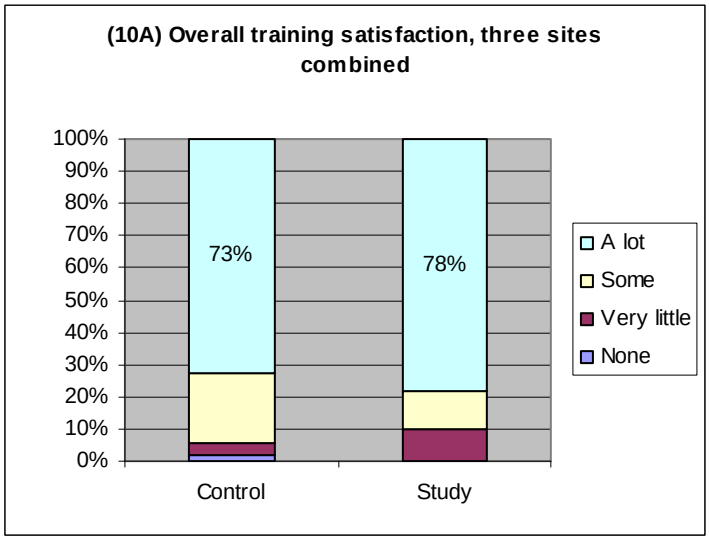


Exhibit 10B

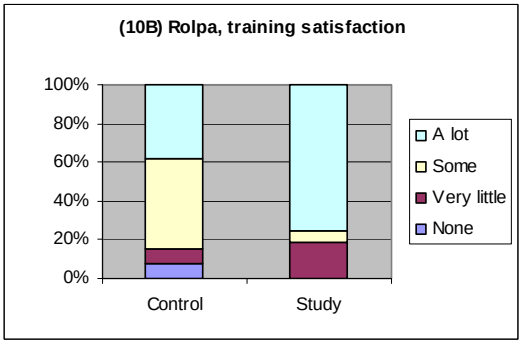


Exhibit 10C

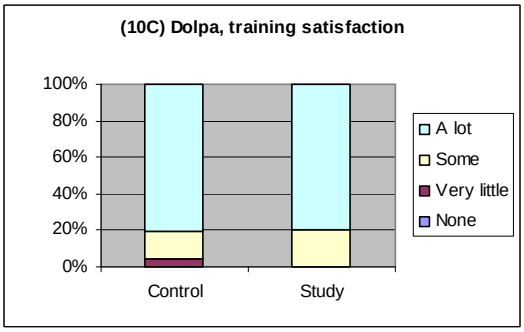
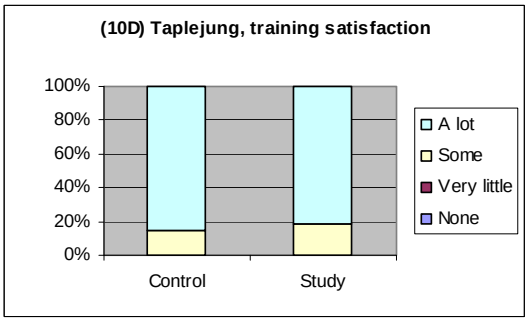
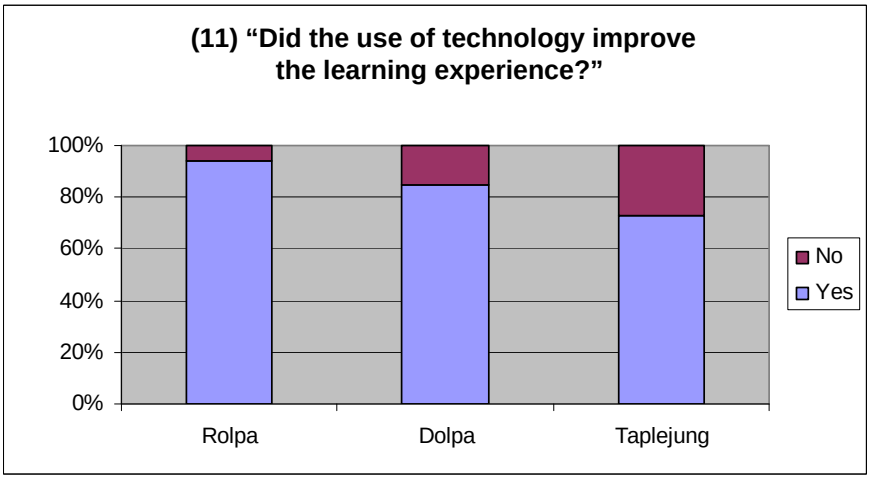


Exhibit 10D



133. However, when trainees from the implementation group were asked only about whether they believed that the use of these technologies improved the learning experience, they overwhelmingly answered yes (see Exhibit 11, below). Again the Rolpa team has a slightly higher percentage of favorable responses, which may be due to the way they managed to integrate the technology into the training program with the help of one administrative staff member of the DEO, who was usually responsible for recording and processing the video clips throughout the 2.5 month period. This meant that the trainers were not distracted from their training tasks, and there was one staff member who was able to develop expertise in processing and replaying the video.

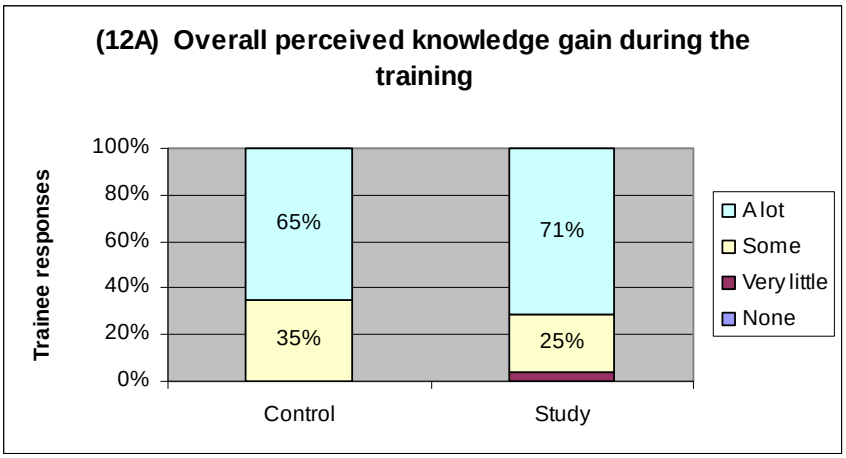
Exhibit 11. Perceived Added Value of Technology in the Training Program



134. **Learning Outcomes.** Along with asking trainees from both the study group and the implementation group about their level of satisfaction with the training (as presented in Exhibit 11, above), they were also asked "How much new knowledge did you gain during this training?" The answers can be seen below from Exhibit 12A.

Exhibit 12. Self-Reported Learning Gains: Comparison Between Control and Study Cohorts

Exhibit 12A



135. When the three training sites were combined, there was no significant difference in the perceived learning gains of the trainees. Results by training site follow in the second part of Exhibit 12, Exhibits 12B, 12C, and 12D, below. When Rolpa and Dolpa sites (where the technology was used most) are viewed one by one, there are quite important differences between the control and study groups, with the study groups expressing much more often that they learned "A lot." Again, there was a very small percentage of trainees in the Rolpa study

team that expressed a negative opinion about the learning gains during the training period.[41] On the other hand, in Taplejung, the control group more frequently chose “A lot” of learning gained. While there are many things that could have positively or negatively influenced learning outcomes between the two cohorts, it is interesting to note that, again, where the technology was used the least frequently (Taplejung), the perceived knowledge gain was much less. Triangulating this self-reported data with official exam scores will be important for further analysis, although it was not possible within the timeframe of this study.

Exhibit 12 *(continued).* Self-Reported Learning Gains: Comparison of Control and Study Cohorts

Exhibit 12B

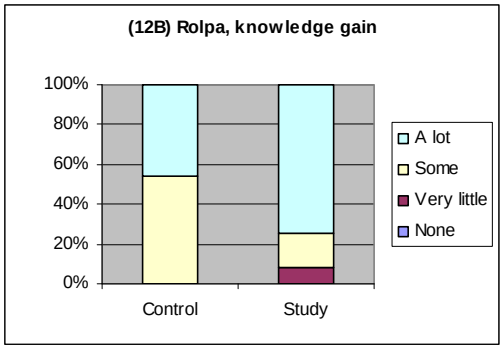


Exhibit 12C

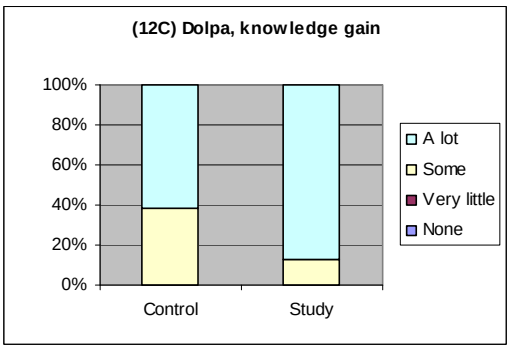
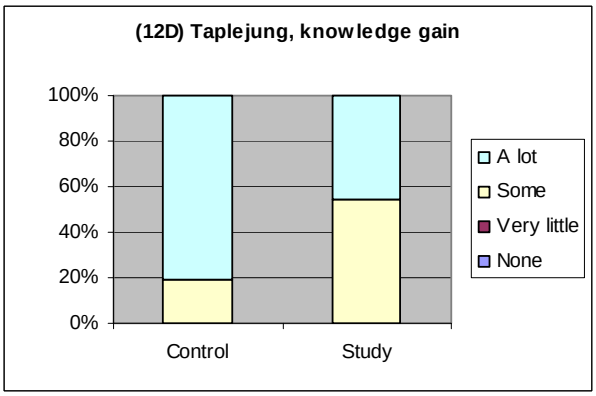


Exhibit 12D



136. To further analyze what other factors might have influenced training satisfaction and outcomes, as well as to understand whether or not the technology had any influence on the teaching behavior of the trainers, trainees were asked a series of questions about the quality of the teaching in their training program. The questions were on a scale of three: “Not good”; “Somewhat good”; and “Very good.” Responses were compared between the control group and the study group. As mentioned in paragraph 115, the trainers did report using the technology to help improve their own practice, since they were also able to watch their performance and

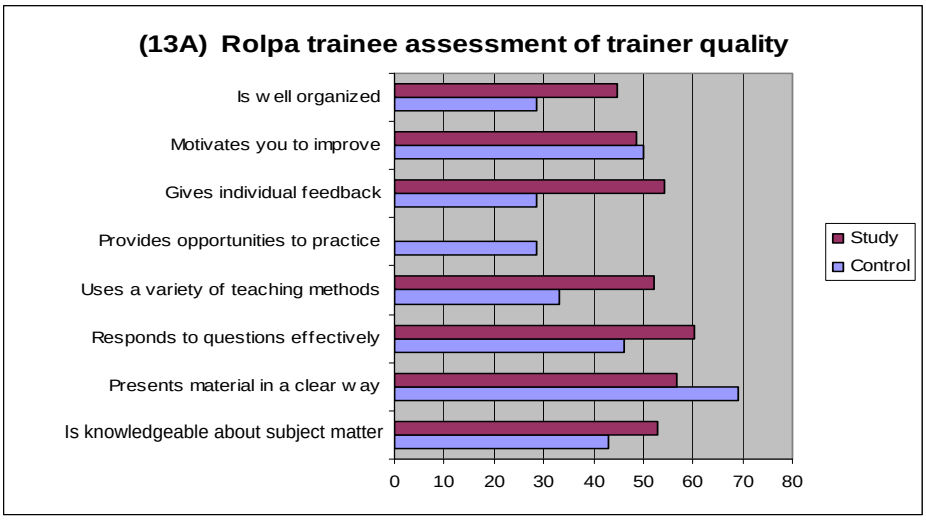
[41] Some of the questionnaires from respondents who answered negatively were reviewed to see if there could be any other explanation for their dissatisfaction. On possibility might be that they were teachers with more than 25 years of experience (compared to an average of 15 in the Rolpa cohort). Several teachers also came from the same village, so there might have been an incident that caused all of these participants to react negatively. Otherwise, there was nothing in the short answers that indicated that there was dissatisfaction for a particular reason. Therefore, this might also reflect an error in filling out the questionnaire.

correct lesson delivery as necessary. Analysis of the results—as presented in Exhibit 12—does not confirm that the trainers may have actually improved their practice while using technology.[42] In fact, it is the Taplejung trainers (who used the technology the least) who were rated higher by the study group than by the control group in most areas (see Exhibit 13C).

137. It is of concern that the rating for "Provides opportunities to practice" went down significantly for the Dolpa team (see Exhibit 13B), since this goes against one of the main purposes of using the video equipment. (This question was inadvertently omitted from the Rolpa questionnaire due to a fax transmission error.) Likewise, it would have been interesting to see the results for "Gives individual feedback" increase with the use of technology, although this was only the case in Rolpa, where it was a very significant gain (see Exhibit 13A). Again, this could be because the Rolpa team chose to allow trainees to view the video clips in small groups or as individuals after school hours, rather than as a full group. On the other hand, trainers from Dolpa did motivate trainees more in the session where they used technology. This could be due to the addition of technology and the ability to view model classrooms from elsewhere.

Exhibit 13. Trainee Assessment of Trainer Quality[43]

Exhibit 13A



[42] Although their practice may not have improved this time, it is possible that for the next training session it will, since they will not have a chance to reteach the same lesson since viewing their performance on video. Trainers were mostly the same for the control group and the study group, although there could have been some variation.

[43] The scale indicates the percentage of responses given to the highest of three possible ratings for the question, i.e. "Very well organized" or "A lot."

Exhibit 13B

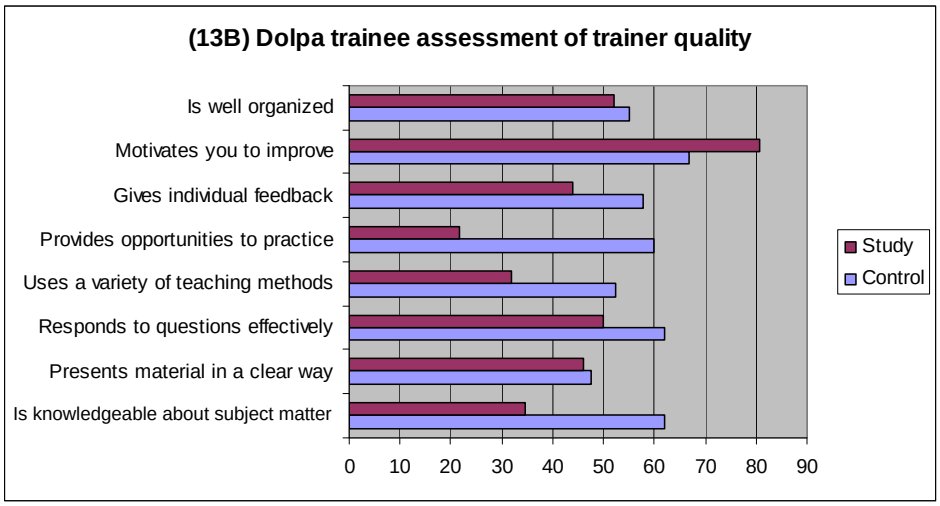
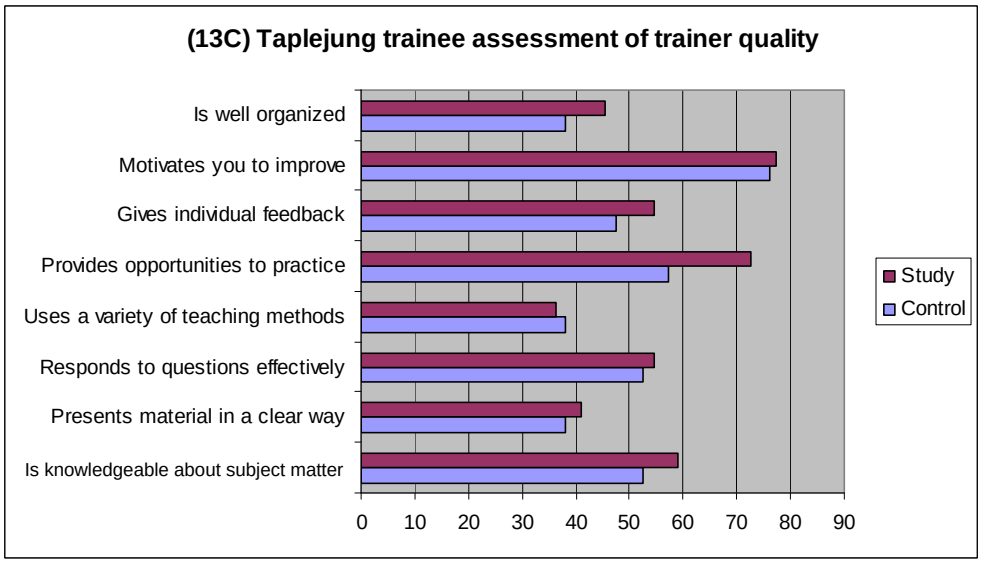


Exhibit 13C



D. Trainee Feedback about Pros and Cons of Technology Use in the Classroom

138. The qualitative feedback received from trainees and trainers through interviews and questionnaires is important to consider to build a case study of the potential for use of video in the classroom. To complement the absolute "Yes" and "No" responses from Exhibit 13, above, participants were queried about the specific advantages and disadvantages of using this technology in the classroom. A summary of their answers is provided in Exhibit 14 below.[44]

139. In some cases, it is difficult to know how to interpret the findings, or what conclusions to draw. On one hand, respondents did not comment that the technology alone (i.e., learning about

[44] Listed in order of frequency, the comments are combined from both the open-answered opportunity to say why they answered either "Yes" or "No" to the question from Exhibit 11, as well as the open-ended opportunity to list pros and cons of technology use at the end of the questionnaire.

technology) was the attraction. On the other hand, the most frequent type of comment was that technology made the training interesting and fun—which does suggest that being exposed to modern technologies is attractive in and of itself (i.e., it is fun to see oneself on the screen). Is this, however, a good enough reason to introduce technology in the classroom? How can we really know its impact on learning (i.e., can it been assumed that a fun training is a more effective training)? Similarly, trainees repeatedly (as did the trainers) commented that the technology was useful because one could see a record of classroom activities (even just lectures) and review them again. But what was not clearly articulated was why it is useful to review a lecture or an extracurricular activity again? Can this improve learning even in the absence of any structured protocol for reviewing the videos? Each one of the above issues could be the starting point for further research in the future.

Exhibit 14. Positive and Negative Aspects of Technology in the Classroom

Positive Aspects of Technology	Negative Aspects of Technology
• Makes training interesting, exciting, unique, fun, and creates learning environment • We could know about our performance, get feedback, and identify our weaknesses • Permanency; having a record for a long time of our performance and activities • Learning is more effective, practical, real, and meaningful • Visual/sound is more effective way of learning • It is helpful for trainers to conduct training (organization, workload, and more active) • Various topics (including subject topics) related to training were shown • Can view colleagues activities, share best practices, and get to know other places • Trainees were encouraged for participation, discipline, support, and cooperate to learn • Could learn about technology • Arouses competition among participants • Can analyze overall training • As a tool for entertainment • Can show to students and parents	• Classroom congested, dark, and visual not clear • Lack of electricity and limited battery power • Lack of adequate resources (other resources) • Technical difficulties • Not used enough • Not enough video cameras • Time constraint so could not see all of our recorded activities • Use less creativity; less thought with video involved • Trainers were nervous; needed more training • Trainee did not get to use the video recorder • Expensive • Screen not big enough to see as a group • Too much attention on technology part • Not proper planning • Not used appropriately • Everyone could see other people's weaknesses[45]

[45] Only one person mentioned this as a concern, but it is an important risk to consider when assessing whether the context is appropriate for and how to manage the use of video in teacher training.

E. Use of Equipment at the ETC and NCED Level

140. As indicated in the study research framework (Exhibit 6), this was also an experience for DEOs, ETCs, and NCED to learn how video and computer technology could be used in education, since the initial study site visit (January 2007) found that the ADB-provided equipment (particularly video cameras) is being underused in the ETCs. According to data collected during interviews with ETC directors and one ETC log sheet, the laptops and overhead projectors are being used often for lectures, although the specific use was not recorded (i.e., showing presentation slides, photos). However, the video cameras, if used at all, are mainly used to create videos of the training center and exhibit educational materials created by the teachers. Some trainers and trainees benefit from reviewing educational materials created in past years, and the videos are used as a public relations tool to attract participants to the training program. The video recorders are only rarely used for recording microteaching or student teaching with the intent of playing back and self-assessing, but this experience has made them interested in trying to use model classroom videos more often. The computers and digital camera are used more often, but still mainly for administrative purposes and not pedagogical purposes. In one ETC, they stopped making videos for lack of human resources and individuals properly trained in using the equipment. To be able to continue, they will need full-time computer operators who can tape the instructor delivering lessons or examples of microteaching practice, and then distribute those recordings.

141. In NCED, the training Resource Center was not yet completely functional, so the study did not involve the use of technology at the central administration level. However, interviews with NCED staff indicate that they would like more guidance on how to effectively use the equipment that they will be receiving. The conclusions and recommendations sections of this report (Chapters VIII and IX, respectively) may provide some ideas in this area, since the Resource Center is now functioning.

VIII. CONCLUSIONS

A. Use of Video in Teacher Training

142. Drawing conclusions about the added value of technology in teacher training (see Exhibit 15 for a summary) must keep in mind that the sample sizes in this study are relatively small, and there were some limitations to the study implementation and instruments, as outlined in Section VI.E, Limitations to the Study. However, it should also be considered that there were few incentives for and very little ongoing support to the project participants (especially the trainers) for using the technology. Therefore, the fact that the trainers did not abandon the study or the use of the equipment despite having only had a brief orientation as to how it could be used (both technically and pedagogically), as well as recurrent difficulties with charging and transporting equipment, is encouraging. Furthermore, several trainers were involved beyond their required training block, simply for the purpose of using the technology (see paragraphs 124 and 128). All of this is evidence that they believe that the technology can add value to the teaching process; all of the respondents spoke much more about the advantages of the technology than about the inconveniences and constraints. The trainers also strongly expressed a willingness and desire to reuse the equipment again in future trainings, and they had many ideas about how it could be used more effectively. It will certainly take more time for the trainers to become comfortable with the equipment, discover the different pedagogical purposes that it can serve, and determine the most appropriate strategy for managing the technology integration. Also any research in education must bear in mind that there are many factors that

can influence learning, and isolating these factors can be as difficult as proving that meaningful learning has occurred at all.

143. Regardless of the limitations, the study does show that the technology generated a great deal of enthusiasm on the part of both trainers and trainees, and may have additional added value in many ways besides increased learning on the part of the trainees. This section summarizes the added-value of the technology, based on the discussion of findings in the previous sections.

Exhibit 15. Summary of the Outcomes of Video Technology in Teacher Training

1. Improves the reputation of the training, as it is a symbol of a more modern approach.
2. Improves practice on the part of the trainers as a result of being recorded, and viewing their performance on the video.
3. Improves participation (of trainees and trainers), since they know that their performance may be reviewed again by a superior.
4. Improves the learning experience and learning retention.

144. **Training Reputation.** One of the key ways that technology can make a difference in teacher training is to increase interest in and willingness to attend training programs. According to data from interviews, the introduction of technology seems to have improved the status of the participating trainers and training institutions. Community members have heard about the new training techniques, and other untrained teachers have expressed interest in joining the training program. Trainees and trainers alike also feel proud to have participated in a training program that is more “modern” due to the addition of new technologies. They feel like their institution is now on a more equal level with urban institutions, and not a second-class program for the rural areas. Even with very little training, the teams were able to learn how to operate the equipment, and find useful ways of incorporating video into the training classroom. This is likely related to a desire to live up to this apparent improvement in professional status and credibility through the use of new technologies.

145. Although the mobile teams did not use the equipment exactly the way the study had intended, the survey results show that the training participants enjoyed the use of video, and feel it did improve the learning process. Similar to the trainers, the participants felt that they were part of a more professional learning environment, which they should take seriously, and so their active participation improved. Two teams (even though they did not meet with the study team at the same time) described reactions to the study among the local community as a rumor. They state that people have heard that training is now being conducted with technology, and they are eager to find out how. They see this as an exciting and positive change and, as a result, it is helping to attract participants for future training sessions.

146. **Improved Trainer Competence.** The technology may have as much impact on improved teaching practice of the trainers as it has had on the training participants. The trainers themselves feel that they were better prepared for their lessons when they were aware that it would be recorded. Trainees also felt that the technology helped the trainers to be more active, which was also evidenced by the fact that two of the trainers stayed involved throughout the training period, even though they were only required to teach one subject block. In the future, trainers will be able to review previous sessions’ lessons to get ideas about how to improve. These recordings can also be used to get feedback from their supervisors.

147. **Improved Participation.** The trainers (and trainees) also repeatedly remarked that using video for recording classroom activities was useful for supervision and performance

evaluation purposes (of trainees and trainers). It seems that the mere presence of the video camera in the classroom caused the trainees to be more attentive and to participate more. The trainers were also able to review video clips to assign participation marks to the students. There were almost no comments from the trainees or teachers that indicated that they felt uneasy in the presence of the cameras. (One trainee mentioned as a disadvantage that other trainees could see one's performance.) The trainers felt that improved participation was the main difference between training with and without the technology. This included improved trainer participation, which makes for a better training environment, according to them.

148. **Improved Learning.** There are many ways in which technology proved to be exciting and fun for the participants, but the purpose of the study was to understand its impact on *learning*. This is very difficult to measure quantitatively, but some of the ways that video technology can improve learning outcomes, *as perceived by participants in this study*, are as follows:

- Improved content retention, by being able to watch lessons more than once;
- Improved content understanding by being more attentive to the lesson when it is being filmed;
- Improved teaching practice by being able to watch and self-identify weaknesses;
- Increased self-confidence as a result of being able to watch oneself performing in front of the class; and
- Learning through visual methods is better.

B. Implementation Issues

149. Using video effectively in the classroom requires changes in teaching schedules, classroom management, lesson plans, and possibly even overall curriculum. These changes will have to be determined at the level of the institution and the classroom, depending on capacity and goals of technology use. This study shows at least three models, with advantages and disadvantages of each.

- Reviewing video immediately after recording. No trainers in this study actually used this method, but it remains a possibility to consider, especially when the goal is to record microteaching practice. This allows teachers to immediately see their performance and check it against pre-established criteria. However, it is also the most time consuming, and may not be feasible in large classrooms with limited equipment, and no projector.
- Reviewing video at a set time every day (after regular teaching hours or during a free period). This was the method employed in Rolpa, though it was a voluntary activity for the trainees. The advantage to using this method is that if individuals come alone or as small groups, the viewing experience is more manageable, and they can tailor the review to their own needs (e.g., reviewing the clip that they need, rewinding as needed).
- Reviewing video at the end of the week. This is the method that was applied in Dolpa. There were not significant differences in training satisfaction between these two teams; thus, the option of reviewing video at the end of the week with the whole

class appears to be effective. The advantage may be that the whole class can review certain lessons and therefore benefit from improved content retention through repetition. Allowing several days to pass might indeed be beneficial to allow trainees time to reflect on aspects of the lesson that need more explanation.

150. The data from the Rolpa team experience suggest that effective use of the technology is enhanced greatly if there is one staff member who works nearly full time on technical aspects of the video use, such as recording, editing, preparing for playback, archiving, and distributing as necessary.

151. **Training.** The mobile trainers need sufficient training on the use of the equipment, on the topics covered by this study (see paragraphs 81–83), but also including the following:

- Organizing video clips into folders and/or a database (list) to make it easier to find them later. Most files were saved only on the desktop or in a root directory of one of the drives; the file names were not specific, making it difficult even for the person who created the clips to find them later, much less someone else, like a supervisor, to eventually find and use an interesting video clip.

- Advanced features for operating the computer and camera. For example, one team could not save any clips to the computer because a small button had been pushed on the camera which locked it from this purpose. They also never used the cameras for taking still photos.

152. Given that this was the first time the trainees had ever operated a laptop or a video camera, most of the time in the workshop had to be spent learning how to operate the equipment. As such, there was no time left to learn about how to use it for pedagogical purposes. The workshop should have lasted 3 to 4 days to be more effective. Furthermore, it might have been easier for the trainers to learn to use the equipment if the laptop had been configured differently, i.e., without unnecessary icons on the desktop, or a reminder to register and update virus software every time they used the computers.

C. Application of Findings to TEP

153. As indicated above, use of video technology may indeed help improve the quality of teacher training, although concrete evidence is hard to find given the limitations of the study. Beyond this, the study site visit identified several issues relative to the TEP's responsibility to "improve the quality and efficiency of and access to basic education through provision of better-qualified teachers" (footnote 27). TEP staff recognize that training alone does not necessarily result in changes in teaching practice, and therefore improving the quality of basic education also requires improving transfer of training to the classroom. Teachers also admit that although they appreciate the pre-service and in-service training programs (face-to-face and via distance), once they return to the classroom, they do not implement the methods that are taught. The following are some of the concerns and perceptions raised by informants that indicate why training is not always transferred to the classroom:

- Material resources are lacking;

- There is little or no support from head teachers (who feel their job might be threatened);

- School supervisors have too many teachers to supervise and cannot provide necessary or adequate feedback to each;
- The school administration discourages teachers from practicing student-centered teaching methods because it takes more time and, therefore, prevents teachers from finishing the school curriculum during the year;
- Other teachers who are untrained, but perhaps have more years of experience, scoff at the new methods;
- A traditional exam system encourages ”teaching to the test”;
- There is little pressure from parents; and
- Overall, there are no incentives to improve performance (since contrary to the published *Training Policy* (footnote 21), promotions and other benefits are given based on seniority or personal relationships rather than performance).

154. Clearly, technology alone cannot change most of these issues, which require much more strategic policy-level implementation. However, this experience does provide some compelling evidence that video and portable computer technologies can, with appropriate planning, resources, and distribution, have an impact on certain aspects of transfer of training *at the school level*, notably the following:

- Lack of material resources;
- School supervision and teacher performance evaluation; and
- Community-school relations.

155. **Material Resources.** The in-service training curriculum spends a great deal of time preparing teachers to prepare teaching materials using locally available, low-cost resources. This was the first thing that trainees noted in the study post-training evaluation form, when asked to list the top three things they learned. Therefore, on a nationwide scale there are many examples of these types of teaching materials that can be used in the classroom. Video technology could help expand access to those examples by providing step-by-step examples of how to prepare certain materials (e.g., an origami figure) that may be difficult for teachers to recall later. It could also help provide examples to teachers who have not yet completed the training, and resources from different regions may provoke creativity and new ideas when shared with teachers in other areas.

156. The combination of having a video camera, the possibility to take still pictures, and a computer (at least on ETC level) also opens entirely new possibilities for the production of electronic resources for teachers and teacher trainers, such as embedding videos in digital texts, developing presentations, and including pictures and videos. Under the e-Resource component of this study, which took place in Nepal and in Samoa, the issue of e-Resources and teacher production and use of electronic teaching and learning aids in the classroom has been investigated in more detail. For more information, see the Mongolia Country Report.[46]

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[46] See Appendix 8 of the RETA Final Report, Mongolia Country Report.

157. **Supervision and Performance Evaluation.** As previously explained, an unanticipated outcome of this study is that the video cameras were used, without any prior instructions or encouragement for this purpose, for improving the performance of trainers and overall supervision of training implementation. If this purpose could be served in the teacher training institute, then there is every reason to believe that the same purpose could be served at the school level. Interviews during the initial site visit indicated from several sources that, on one hand, there is no systematic performance appraisal of teachers, and promotions are based solely on seniority.[47] Therefore, there is little incentive for improving teaching practice. The use of video could be instrumental in changing this, as video could easily be used for developing electronic teaching portfolios and centralized or decentralized performance assessment (i.e., at the school level, or sending copies of videos to ETCs to be reviewed). The TSC is charged with linking the performance appraisal to the overall EMIS. TSC is initiating special collaboration with the DOE to establish a database that also reflects reports of teachers' performance appraisal (according to the director of the DOE). Therefore, video portfolios would provide clear and objective measures of performance that are unaffected by the influence of personal relations or other forms of dishonesty.

158. On the other hand, reports indicate that the Resource Person and school supervisors who are in charge of performance assessment (usually by classroom observation) do not always have time to properly assess all teachers in the school. Furthermore, the school supervisor might not be knowledgeable in the subjects taught and thus incapable of judging the quality of the lesson; similarly, older teachers often do not like to be evaluated by younger teachers. Video could have an impact on these constraints if teachers could be recorded and have their performance assessed remotely by a subject-matter expert who is unknown to the teacher.

159. **Community-School Relations.** The study team spoke with one ETC-A, and viewed some of their videos that are used for outreach purposes. This mainly consisted of an overview of the training campus and teaching materials prepared by the teachers. During the study implementation period, trainers used the video cameras for recording many different types of classroom activities, including games, group work, student presentations, and teaching materials prepared by the teachers. Similar exercises at the school level, followed by presentation to the community and parents, could help to improve school-community relations by showing parents the role of teachers, and the difference that participatory, creative, and joyful learning environments can make to the classroom experience. In turn, perhaps, parents would begin to demand better performance on the part of teachers, and begin to invest more (personally and financially) in school operation.

IX. STUDY RECOMMENDATIONS

A. Planning for Effective Use of Video in Teacher Training

160. **Administrative Aspects.** As mentioned in Section VIII.B, Implementation Issues, making effective use of video for teacher training will require institutions to do careful planning to find the most efficient way to integrate recording and replay into the classroom in such a way that all trainees can benefit, and the curriculum can still be completed. These decisions will have

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[47] This was also one conclusion of research conducted by VSO Nepal, as cited in Bista, 2006 (page 194 of footnote 15): "VSO research suggests that teachers lack supervision and that the monitoring and evaluation of teachers has not been implemented effectively."

to be made at the level of individual training centers, based on class sizes and available resources, but sharing lessons learned and strategies for optimizing the use of video in teacher training will be important.

161. **Technical Aspects.** Regardless of the training institution that keeps the equipment, it is also recommended that there be one staff member (DEO or otherwise) in charge of planning the schedule for recording, editing, and replaying the video clips, as well as keeping track of the clips through an appropriate electronic or paper filing system. During the final closing workshop, the study facilitators helped trainers develop a simple spreadsheet database to track video clips by name, date, size, subject, and type. It will be important to keep a good record of video clips from the start, so that they can be easily reused later; otherwise, it is likely that trainers will become overwhelmed by the number of video clips and will lose time trying to find what that they need. Likewise, it is important from the start that trainers and administrators have a clear purpose in mind before saving video clips, so as not to maintain an archive of hundreds of hours of video, if those videos do not have an anticipated reason for reuse. The clips that are saved should be edited down to the most valuable amount of time. Each institution will have to determine which type of clips should be saved and for how long. For example, a certain number of clips might be deleted at the end of the training session, or after a microteaching lesson (unless the clip is judged a “model” teaching video and therefore saved for that purpose).

162. The need to have a good organizational system for managing the clips cannot be overstated—when the amount of clips becomes unmanageable, this can be a deterrent to their effective use. There are also limitations to the storage capacity of the computers, so external storage devices (including CD and DVD) should be available for use, and these will also need to be accompanied by a plan for safe storage and retrieval.

163. Even if there is one person responsible for equipment, institutions should still allow more people in the mobile training institution to be able to use the equipment. During the study, the two trained participants from each team signed a form holding them responsible for loss or damage to the equipment. For this reason they were very “protective” and did not let a lot of other trainers or any trainees use the equipment. In the future, trainees should also have a chance to use the video camera for teaching practice, as this can also help them see the classroom in a different way, and also focus on observing the reactions that students have during a lesson, not just teacher presentation.

164. **Collaboration with ETCs.** From interviews with trainers and ETC heads, there seems to be very little pedagogical support from ETCs to the mobile teams. For example, relative to the study, there were ETCs heads serving the same region as the mobile teams. Although they had digital resources available and they knew that the mobile teams were receiving a laptop and digital video recorder, they never offered to share any of those resources with the mobile teams. The teams are under the DEOs for management and administration, but because they are carrying out the same training functions as the ETCs, they should receive the same support in terms of pedagogical resources and training of trainers. The study attempted to raise awareness on the part of both ETCs and mobile teams about the possibility now of sharing digital resources such as model classrooms, local cultural documentaries or case studies, and clips of innovative teaching materials among each other. Since e-mail is not yet available for sharing information among all of the ETCs, this will require a minimal financial investment in recordable CDs or DVDs and postage for distributing the digital recordings.

B. Sharing Videos for Maximum Impact

165. **Television.** Many of the benefits of video technology, including some of the ideas raised in Section VIII.C, Application of Findings to TEP, could be increased if video were more widely distributed. This could include distribution via recorded CD and postal mail to other concerned institutions, or it could mean distributing video clips via e-mail or through a file transfer protocol (FTP) server available via the Internet. However, since most schools and institutions do not yet have computers, much less access to the Internet, this possibility is still quite a long way off, though the possibility should be considered in the future. Another distribution method that could be used immediately is television.[48] Where available—perhaps in Resource Centers if not in individual homes—television could complement the radio distance learning program by diffusing model teaching videos, videos of teaching materials preparation, local cultural events and characteristics, and subject-specific educational programs. As many teachers reported on the questionnaires for this study: "Learning through visual is better." The television could also be a mode of diffusion for model school practices, which could help to raise the expectations of parents about the quality of teaching in schools, and subsequently increase community pressure to transfer teaching quality to the classroom.

166. **Sharing Among Training Institutions.** It is expected that considerable changes can take place when the mobile teams and ETCs with digital video recorders begin to share electronic resources with other training institutions, and also develop specific pedagogical videos to share with each other. Each institution, and possibly the central level, should work on developing a repository of "best practice" model teaching videos, and subject-specific videos such as local cultural events or preparation of teaching aids using locally available resources that could be shared among ETCs. In addition to serving as a digital resource for training classrooms (i.e., to the benefit of the trainees that watch the videos), this could also be a way to encourage improved training practice and learning outcomes by creating a sense of competition and a desire to be recognized. For example, trainees who know that there will be examples from their training period sent to the central level for possible broadcast on the national educational television channel[49] may be more attentive and work harder to serve as a good example.[50] Similarly, training institutions that repeatedly provide models of good practice may be recognized at the central level, and trainers may subsequently strive to be part of the institution that creates the best practices. Whether or not the idea of fostering competition or other incentives is pursued, even simple sharing of clips among training institutions will require the support and buy-in of the ETCs to make this an effort worth the time that it requires to implement. This concept of sharing among training institutions is equally valid for the Resource Centers and Resource Persons who assist with contact sessions for the radio distance learning program. The tutored video instruction (TVI) model (see Appendix 2 of this report) could be used during these sessions using video developed during the face-to-face training sessions.

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[48] Latest figures (2005) indicate that 3% of households have a television, according to the World Bank ICT at-a-glance table for Nepal. Available: http://devdata.worldbank.org/ict/npl_ict.pdf.

[49] This is a hypothetical, ideal scenario—no such ETV station currently exists in Nepal—although it might be feasible for NCED to purchase a certain amount of time on existing stations for teacher-training programming, just as it does with the radio distance learning programming.

[50] A similar effect was observed in Mongolia, where teachers were found to put more effort into the preparation of PowerPoint presentations, because they were more "visible" and because they also would be sharing it with others, and therefore wanted to share good work of which they could be proud. See Appendix 8 of the RETA Final Report, the Mongolia Country Report (Chapter VIII).

167. **e-Resources.** It would be interesting to try to apply lessons from Samoa and Mongolia to Nepal, since ETCs are not currently using a large variety of e-Resources[51] in teacher training, although they have the equipment needed to do so (computer, projector, digital camera, digital video recorder, and some have access to the web). In Mongolia, in one of the ICT initiatives under investigation by the ADB regional study,[52] teachers in rural schools were specifically trained to develop electronic teaching and learning materials in Mongolian, something that was nearly entirely lacking in the country at that point in time. Teachers received training on how to use the digital camera and computer provided under the project, to develop electronic teaching and learning materials. Teachers were also trained on how to integrate such materials in didactically appropriate ways with their instruction. Similarly to Nepal, Mongolian teachers usually use locally available materials to develop their own teaching aids. Because it is not provided by their schools, they have to either purchase raw materials such as cardboard, pens, and colored paper from their personal money, or do without.

168. Results from the study in Mongolia indicate that the capacity to develop and use electronic teaching and learning materials, which are easy to manipulate, reuse, and share with other teachers, proved to be an innovative means to increase teachers' use of visual aids and materials (other than the textbook and the teachers guide) in their classroom teaching. At the same time, this approach allowed teachers to spend less of their personal money on the raw materials that they need to carry out their jobs. Study outcomes suggest that participation in this ICT initiative positively affected teacher collaboration, stimulated by the ability to share the electronic teaching and learning aids, and improved teacher job satisfaction. Study outcomes also indicated that participation in the ICT initiative increased the frequency of teachers' use of other materials and equipment, such as books, science models, and technologies such as cassette recorders and television, in their teaching. In doing so, the ICT initiative under investigation addressed key challenges rural schools in Mongolia are facing— especially the lack of teaching and learning materials, as well as teacher and student motivation. Likewise, NCED and ADB should be encouraged to begin distributing more electronic resources for use in TTCs and Resource Centers, such as multimedia demonstrations of subject-specific lessons, language resources (for English and Nepali lessons), interactive CD, software and hardware tutorials, model teaching videos, and cultural videos from different parts of the country—especially involving marginalized populations—to name just a few examples.

D. Synthesis and Conclusion

169. The above recommendations are specific to further implementation in Nepal, but there are also lessons learned that can be applicable on a wider scale, namely, that teachers—both school teachers in training or teacher trainers—value the opportunity to see themselves practicing in front of the classroom, and therefore to correct their weaknesses, and gain confidence in their teaching ability. The compact and portable nature of today's video cameras make this much more feasible than VHS tapes played back on a television (the way that video has traditionally been used in teacher training in other countries) for remote and resource-poor settings. Short video capture is now available in most digital cameras and many mobile phones. Some phone networks also allow sending short video clips across the network, similar to a traditional phone call.[53] Furthermore, digital video provides more convenient options for sharing

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[51] This refers to any type of multimedia teaching aids such as educational videos, presentation slides, internet sites, interactive software, etc.

[52] The ADB-funded *ICT for Innovating Rural Education of Mongolia* project, described in Appendix 8 of the RETA Final Report, the Mongolia Country Report (Chapter IV).

[53] See Appendix 11 of the RETA Final Report, the Bangladesh Country Report.

and storing videos. Sharing digital clips can be an effective way to enhance teacher training programs by allowing trainees to see current practices in other schools and share cultural and methodological videos. Again, this is particularly beneficial to remote schools that might not otherwise have this opportunity.

170. Furthermore, the study adds to the existing knowledge base of using video in teacher preparation (see Appendix 2, Literature Review on the Use of Video in Education*)* by providing some practical tips for implementing video recording and playback in the classroom (see Section VIII.B, Implementation Issues, for example) as well as suggestions for how video can be expanded beyond its traditional use for self-assessment and critique in microteaching, such as

- Having trainers self-assess and subsequently improve their training skills and the training classroom;
- Helping to address a lack of material resources for teaching aids;
- Carrying out whole-school supervision and ongoing teacher performance evaluation for certified and serving teachers; and
- Improving relations between the community and school.

171. Videos in education are most often used as a resource for content knowledge (i.e., visualization of complicated scientific or cultural topics), where they may also form part of what are known as "Learning Objects."[54] Research and experiences related to Learning Objects are relevant to this study, because—as described in paragraphs 167–168 above—the video recorders used in teacher training centers can be used to create learning objects that show both examples of model teachers and practices that could be improved. It is generally accepted that instruction is more effective when presented using a variety of modes, including visual, although the direct relationship between visual-based instruction and learning outcomes has not been isolated. Some critics of the use of video in teacher training are concerned that the trainees being taped are not behaving in an authentic way because they are preoccupied with their appearance on tape. However, during the study in Nepal, only one individual expressed a concern with being videotaped. (The concern was that other trainees would be able to view and criticize that person's practice.) Otherwise, there was no indication that trainers or trainees were uncomfortable being taped.

172. There was no way to verify during this study period whether the study teachers became more apt to apply new teaching methods in their classrooms. A follow-up to this study might seek to recontact these teachers, as well as the control groups, and see whether or not they have used or would be inclined to use the new teaching methods. As soon as data were available, a first comparison could be done to determine whether or not exam scores were equivalent or different between control and study groups. Also, since the same three teams (Rolpa, Dolpa and Taplejung) will most likely be able to use the equipment for one more training year, there is an opportunity to review with them, after this period, whether new uses of the equipment in teaching and learning or further implications of the same have been discovered.

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[54] For the purpose of this study, Learning Objects are defined as follows: "A Learning Object is an electronic resource that purposefully combines digital assets, such as pictures, video or audio snippets, bits of text, or smaller Web-delivered applications to communicate a specific concept or message, and therewith has an explicit learning objective inscribed to it."

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XI. AUTHORS

173. **Sarah Lucas Pouezevara** is a consultant in international education and development with over 10 years of experience with the United Nations, multilateral and bilateral donors, NGOs, universities, and foundations in the role of program evaluator, program manager, instructional designer, trainer and technical writer. She has worked on other projects involving large-scale teacher training improvement in Mongolia and Indonesia, and has extensive experience with the use of ICT in education, including distance learning, mobile learning, and creating online communities of practice. She is a 2001 graduate of the Master of Arts in Education program at Columbia University Teachers College (New York, USA), department of International and Transcultural Studies. She was born and raised in Denver, Colorado (USA), and is currently a resident of France.

174. **Binita Parajuli** was born in 1974 in the eastern region of Nepal, Jhapa-Damak, as the eldest in a family of five. She remembers from her childhood that investing in girls' education in a family was not common, but she was fortunate in that her parents enabled her to complete not only basic education, but also her master's degree in statistics and postgraduate diploma in Women and Development Studies in 1998. These qualifications have been translated into practical experiences in her current role as fundraiser and coordinator of iEARN, where she is focusing on promoting ICT in education and using new technologies in teaching and learning. She will be pursuing further studies (PhD) in uses of new methods and technology in education in the United States in 2008.

APPENDIX 1: MAP OF NEPAL, INDICATING STUDY AREA

Source: ADB

APPENDIX 2: LITERATURE REVIEW ON THE USE OF VIDEO IN EDUCATION

1. Although the use of video in teacher training is not necessarily considered an "innovation" in many parts of the world,[1] this was the first experience in Nepal of using video in a purposeful way to improve the teacher training experience. It is important to note that this constitutes an innovation in Nepal, and further so because *digital* video creates many new opportunities for viewing, editing, and sharing that were not possible with videotape recorders and televisions.

2. Prerecorded video can be used in higher education as either a resource to supplement lectures or to substitute for lectures, but the most common use is the former.[2] It is generally selected to help deliver curriculum in cases where visualization is important to understanding, such as scientific simulations, natural phenomenon, microscopy, etc. A common constraint faced by teachers is selecting appropriate video resources; therefore, central management and dissemination of appropriate videos linked to specific curricular goals encourages optimal use of video in higher education. It is also crucial to recognize that video alone does not make an appropriate lesson, but must be combined with preparatory and follow-up activities in a holistic lesson plan.

3. The use of prerecorded video, as described above, is translated into "Learning Objects" in the modern age of computers and digital resources. A Learning Object can be defined as an electronic resource that purposefully combines digital assets—such as pictures, video or audio snippets, bits of text, or smaller web-delivered applications—to communicate a specific concept or message, and that has an explicit learning objective ascribed to it. The importance of this definition, in the context of this study, is that prerecorded video can be reused over and over again, according to the needs identified by the teacher. Teachers who can access a repository of learning objects can integrate them into their lesson plans as needed, providing an additional source of teaching aids to enrich the training program.

4. One study on the use of video in teacher training in the developing world context comes from Nigeria, where two groups of trainee teachers were studied—one group that used video recording during its microteaching practice, and another group that did not. The difference between pre- and post-test scores was significantly higher for the group that used the technology. Additionally, "...students of the experimental group behaved more confidently and positively towards the micro-teaching lesson. In contrast, the members of the control group were less enthusiastic and were still found to be inadequately prepared for subsequent micro-lessons" (page 486 of footnote 1). The author also cited research that disagrees that video recording and playback is effective in a microteaching situation. The concern is that the trainee being taped will be preoccupied with his or her appearance on the tape, rather than on effective teaching. However, this concern does not seem to be reiterated in future research, as the benefits of using video outweigh this potential pitfall.

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[1] Articles on the subject appear as early as 1970, according to a literature review by Kpanja in Kpanja, Edward. 2001. A Study of the Effects of Video Tape Recording in Microteaching Training. *British Journal of Educational Technology.* Vol. 32. Issue 4. 483–486.

[2] Moss, R., B. Gunter, and C. Jones. 1991. *Television in Schools.* John Libbey (for the Independent Television Commission). London. Cited in J. Barford, and C. Weston. 1997. The Use of Video as a Teaching Resource in a New University. *British Journal of Educational Technology*. Vol. 28. Issue 1. 40–50. National Council for Educational Technology. London.

5. Education research has provided some verification of the preference, often cited by trainees in this study, for learning through visual methods including the specific use of instructional video on learning outcomes. One study[3] specifically showed that learning is enhanced when students watch lecture videos together and discuss, pausing from time to time. This is known as tutored video instruction (TVI). In general, the use of video is considered, for example, more attractive and consistent, and provides an element of interactivity that helps to create a more meaningful learning environment. Findings related to the impact of visual instructional materials on learning are inconsistent,[4] but it is generally widely accepted that instruction is more effective when presented using a variety of different modes, in order to cater to different individual learning styles and preferences.

6. A United Nations Educational, Scientific, and Cultural Organization (UNESCO) study on female teachers in Nepal, though unrelated to the use of video in teacher training, made many recommendations on improving teacher training policies and practices in general, including revising the pre-service teacher training curriculum to "include scope for self-critical analysis by all stakeholders; [to] include reflective methods and cooperative learning; with the curriculum focusing on local needs. In addition, teaching second languages; sensitization of multi-cultural issues; and multi-grade teaching skills should be emphasized."[5] The findings and recommendations of this study should provide some clear ideas of how video in teacher training can address these recommendations for the pre-service level, particularly when the current Teacher Education Project initiative to train all serving, but as-yet untrained, teachers will have been completed.

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[3] Cadiz, J., A. Balachandran, E. Sanocki, A. Gupta, J. Grudin, and G. Jancke. 2000. *Distance Learning Through Distributed Collaborative Video Viewing.* Microsoft Research Technical Report MSR-TR-2000-42. Redmond.

[4] Zhang, D., L. Zhou, R. Briggs, and J. Nunamaker. 2006. *Instructional Video in E-Learning: Assessing the Impact of Interactive Video on Learning Effectiveness. Information and Management.* Vol. 43. 15–27.

[5] Bista, M.B. 2006. *Status of Female Teachers in Nepal.* UNESCO. Kathmandu. 203.