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Cultural Organization

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Asia-Pacific Programme of
Educational Innovation for Development



In Search of
Innovative
ICT in Education
Practices

Innovation in the Connected Classroom, India

Case Studies from the Asia-Pacific Region

Innovation in the Connected Classroom, India

Suryaveer Singh

Singh, Suryaveer

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Preface

A wise person once said, *"If students do not learn the way we teach, then let us teach the way they learn."*

That is what educators have been trying to do through the use of information and communication technologies (ICT).

UNESCO believes that integrating ICT into education can help to bring quality education to everyone, everywhere – a key goal of the Education for All initiative. The citizens of the future must be equipped with sufficient knowledge to keep up with technological advances and demands of the 21st Century.

UNESCO also believes that recognizing innovative ICT in education practices can encourage and enhance even more educational innovations. With the support of the Japanese Funds-in-Trust, the Asia-Pacific Programme of Educational Innovation for Development (APEID) of UNESCO Bangkok implemented a project on Innovative Practices in ICT in Education to identify, document, share and multiply ICT in education innovations.

As part of the project, the UNESCO ICT in Education Innovation Awards was launched in 2007 to recognize outstanding work by (i) teacher and teacher educators, (ii) educational planners and administrators, and (iii) non-formal educators. Another component of the project was the documentation of innovative practices to increase the awareness and knowledge of teachers, educators, principals, administrators and policy makers to the potential of ICT in helping them achieve their educational goals.

Our search for excellence, showcased in this series of case studies, is a testament to the innovative spirit of educators. The case study in this booklet presents the experience of Suryaveer Singh, a geography teacher in India, in using ICT to teach his students. Mr. Suryaveer Singh received a Certificate of Commendation in the 2007-2008 UNESCO ICT in Education Innovation Awards for his efforts.

Without doubt, these innovators will be very pleased that their projects are recognized and appreciated. Still, we believe that they will feel more gratified when their efforts are adopted and put into good use by others. That is the ultimate reward they, and UNESCO, seek.



Molly Lee
Coordinator
APEID, UNESCO Bangkok

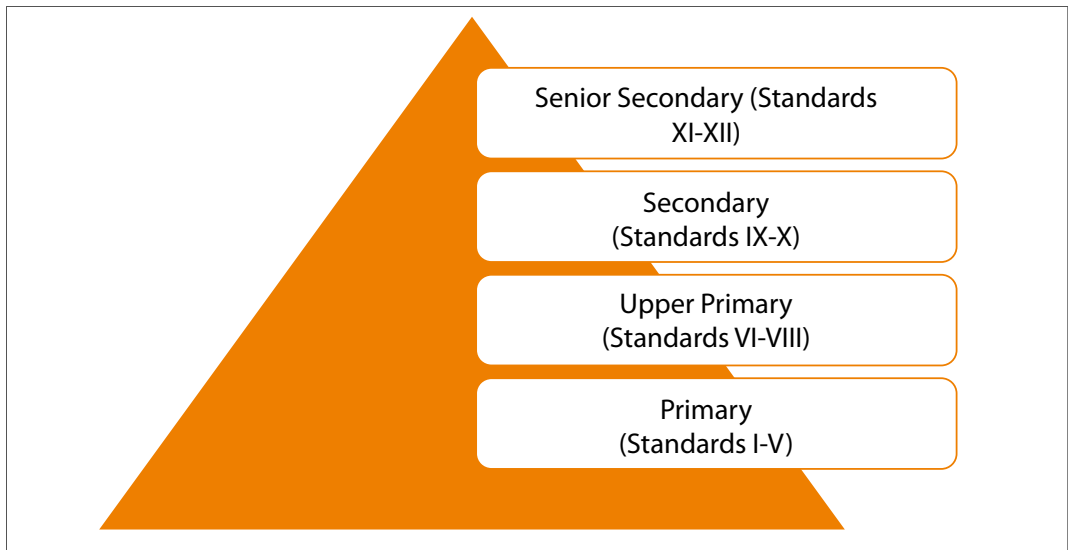
Acronyms

APEID	Asia-Pacific Programme of Educational Innovation for Development
CBSE	Central Board of Secondary Education
eXe	e-learning XHTML editor
ICT	Information and communication technology
UNESCO	United Nations Educational, Scientific and Cultural Organization

Introduction

India, with about 1,027 million people, has the second largest education system in the world after China. The structure of school education in India follows a 10+2 pattern, the first ten years covering general education followed by two years of senior secondary education.

Figure 1: Indian Educational System



Public examinations are held at the end of standards X and XII either by individual states or by Central Boards. They lead to the award of the Senior Secondary School Certificate. After finishing their higher secondary school, students pursue three years of graduation studies in college and then two years of post graduation studies.


The S.D. Public School, BU Block, Pitampura, New Delhi was established in 1991 (<http://www.sdpublicschool.org/>). Spread over two acres of land, the school buildings house classrooms, activity rooms, laboratories, two computer centres, an audio-visual room and a digital library offering 45,000 books, talking dictionary and broadband internet. Catering to over 1,500 students, it aims to impart value-based education along the principles and philosophy of Vedanta that is rooted in India's cultural heritage¹. Through years of dedication, diligence and perseverance, the school has obtained permanent recognition up to senior secondary level (+2 stage) from the Directorate of Education. It is affiliated to the Central Board of Secondary Education (CBSE), New Delhi under its All-India Scheme. At the +2 level, the school has three streams: science, commerce and humanities.

¹ Vedanta is a spiritual tradition that believes human nature is divine. It emphasizes self effort, encouraging each individual to realize God, or Brahman, within each of us.

Objectives of the School

The S.D. Public School Pitampura recognizes the challenge in preparing its students not only for the community they belong to, but also for the one they are likely to interact with in the future. To meet this challenge the school emphasizes the need to train teaching staff on the applications of new and emerging technologies and to change their mindset to increase receptivity. More specifically, the school has set the following objectives:

- Establish a learning community of motivated students and engage the teachers to impart meaningful learning through the best use of modern technology.
- Equip young minds with 21st century skills through a project-based approach to increase their understanding of responsible global citizenship.
- Plan and teach lessons so that students are challenged to think and not simply to repeat what is told to them.
- Enable staff and students to learn new technologies and techniques.
- Integrate and use these technologies and techniques in the classrooms.
- Evaluate existing techniques and explore new ones.




“The use of technology in the classroom by the teacher not only reduces the ‘generation-gap’ between teacher and students but also instils pride and confidence in the students that their teacher is moving with the times and is well equipped to prepare them for 21st century skills.”

Anita Sharma
School Principal

Updating the Knowledge and Skills of Teachers

Even though teachers may have mastered the traditional pedagogies in teaching their students, the rapidly changing world dictates that these are no longer sufficient. The teachers must acquire new knowledge and skills themselves before they can prepare their students to meet the demands and challenges of the 21st century. Opportunities to do so are increasing through both formal and non-formal channels. For example, Shiksha India, a non-profit organization initiated by the Confederation of Indian Industry (CII), works with schools and institutions across India to help promote the use of technology for making teaching-learning more effective (<http://www.shikshaindia.org/>). Shiksha India has several



“E-teaching is nothing but teaching simplified through technology. E-teacher is a teacher who uses e- (electronic) components to good advantage in his/her teaching-learning process. I have always believed that for a teacher/educator to become an e-teacher/e-educator, there is a need to understand the process of learning to ensure children learn better and secondly, there is a definite need to know about technologies that can facilitate the learning process.”

Narinder Bhatia
Shiksha India Trust
Confederation of Indian Industry (CII)

projects which offer a broad range of workshops to focus on content and coaching, for example:²


Project E-learning through Open Source: A range of open source tools (e.g., Learning Management System, Animation Tools, Image Editing Tool) are introduced in the schools to start them off on the e-learning platform. Regular workshops are conducted for teachers to empower them with knowledge and give them hands-on practice to make them comfortable in using the tools.

Thin Client Solution: This project delivers an effective technology solution for low-end, old/obsolete machines owned by the institutions. The project provides ready-made solutions to establish a Unix-based client-server setup where a host of different applications can be installed on the server and various diskless nodes (clients) can access it. A large number of open source applications and tools can be installed easily on the thin-client. This solution is very useful for institutions that use donated computers and have supporting software/applications to run.

Web-enabled education: Teachers are exposed to some of the latest web technologies like blogs and wikis. These technologies help teachers understand the potential of the World Wide Web as a teaching-learning tool. One day workshops familiarize the teachers with using blogs and wikis, help them to use the Shiksha portal effectively, and maximize the web as a tool for their teaching-learning processes.

Case Study: Use of ICT in Teaching Geography

Teachers in the S.D. Public School Pitampura acknowledge that the Shiksha e-learning workshops have changed the way they teach and interact with their students, moving them to a student-centred approach and incorporating real world issues into the lessons to make learning more meaningful. They are now able to use ICT tools such as the wiki, blog and offline eXe learning materials to supplement classroom teaching. These tools have also proven useful in increasing the efficiency and effectiveness of their teaching during class time. Complemented by training courses provided by the private sector, such as Intel's Beginner and Master Training courses, these teachers became confident enough to put their new skills to good use resulting in many innovative and creative projects and activities.



"Over the course of last few years, before I came to know about the role of ICT in education, I spent many late nights developing lessons and trying my hand at drawing 3D visuals for the students. During the day, I spent most of my time in class and after school, repeating the concepts which I had delivered in the classroom. During those nights and days I realized that I did not get time to study or re-learn. I was just spending my energies in re-explaining."

Suryaveer Singh
Geography Teacher

2 Shiksha India website, Current Projects, <http://www.shikshaindia.org/current-projects.html> (accessed 25 February 2009).

This section describes the use of ICT in teaching geography to illustrate how a blended approach of mixing traditional classroom pedagogies with the latest technologies and techniques can make a difference to teaching and learning.

Geography is a subject that requires a capacity for keen observation, visualization and analysis. Generally, students who do poorly in geography lack the skills to analyze and visualize abstract information, thus leading to a huge gap between the teaching and learning processes. To transform such students from being passive receivers of information to active investigators of knowledge, the teachers have to change the way they deliver lessons. They must use other means of teaching to engage their students in the first instance, and then provide them the necessary tools and skills to understand and investigate the issues.

The geography classroom is well equipped with all the facilities to result in a quality education. It has a minor stereoscope which is used for mapping the earth's features with the help of aerial photographs and computer-aided equipment to show animations and videos of natural features and processes. It also has a hot and wet bulb thermometer for measuring humidity levels.³

The target groups in this case study were secondary and senior secondary level students aged 14-17 years who had varying degrees of learning difficulties and needed special attention from the geography teacher.

Examples of Resources Used

Confucius said, "Tell me and I will forget, Show me and I will remember, Involve me and I will understand."

Wiki-centric Extended Classroom

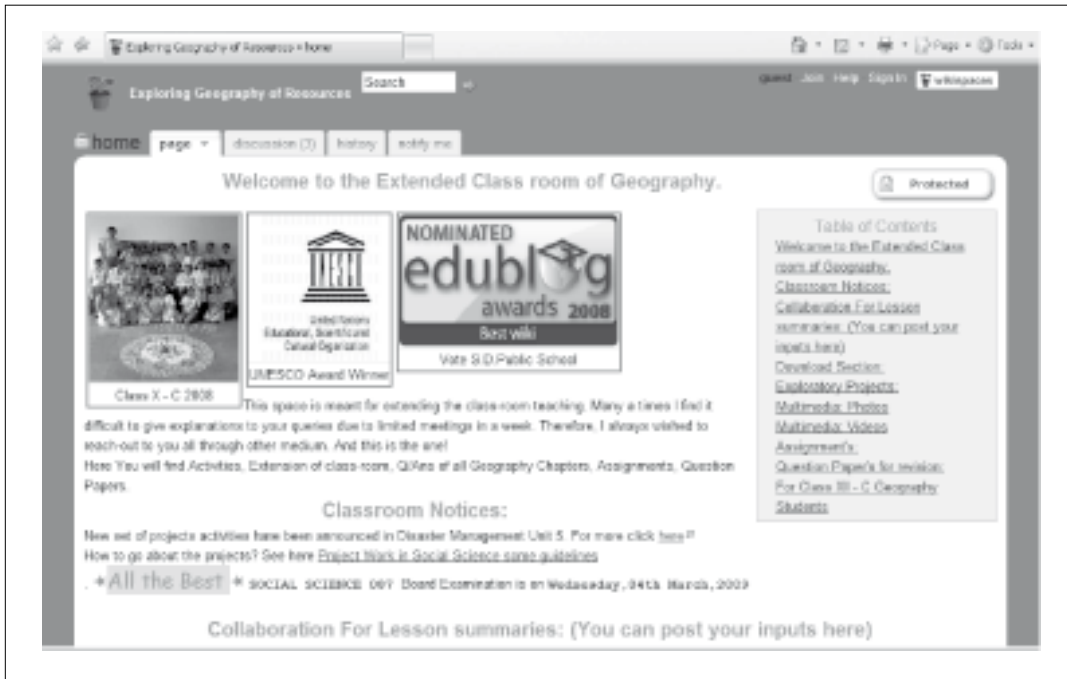
Students of Class X were keen to share their knowledge with the teacher but numerous constraints, such as time, number of students and assignments, have limited the depth and quality of the interactions between students and teacher. As a result, a wiki (<http://exploringgeography.wikispaces.com>) was created to address this issue. This provided extra opportunities for the students to post and edit their work - lessons, links, handouts, presentations, videos, games - and collaborate online, thus allowing the teacher and fellow students to provide comments and feedback. The students were divided into four groups:

- Q for asking questions;
- A for answering questions;
- E for enhancing/adding to A's group answer; and
- P for paraphrasing and summing up E's group.

3 S.D. Public School Pitampura website, <http://www.sdpublicschool.org/GeographyRoom.aspx> (accessed 25 February 2009).

The groupings were changed for each activity to ensure that the students had a chance to take on a different role. The wiki was also used to share day-to-day information and instructions, including a variety of resources provided by both the students and teacher. Replacing the time needed for traditional homework and writing, the wiki enabled the students to concentrate on exploring and learning new concepts.

Figure 2: Homepage of Geography Wiki



Offline eXe Learning Materials

Since most of the students had no internet connectivity at home, the use of an offline tool became critical. Using an open source e-learning XHTML editor (eXe), a stand-alone folder on "Landforms and their Evolution" for Class XI students was generated and distributed. The course materials had .swf animations,⁴ images, panorama views, online articles and videos from Teachertube, audio, interactivities, quizzes, multiple choice questions for self assessment, and assignments and summaries through mind maps. These materials were useful in delivering a time consuming component of the lessons effectively. The materials were also uploaded to the school's network which can be accessed easily at any time.

4 The file format SWF stands for "Shockwave Flash", pronounced swiff. Under the control of Adobe, it is a partially open repository for multimedia and especially for vector graphics. Intended to be small enough for publication on the web, SWF files can contain animations or applets (usually small stand-alone applications) of varying degrees of interactivity and function. SWF currently functions as the dominant format for displaying "animated" vector graphics on the Web. Source: Wikipedia, <http://en.wikipedia.org/wiki/SWF> (accessed 25 February 2009).

Blog

The blog (<http://mygeographylearning.blogspot.com>) supplemented the wiki collaboration. It contained visual resources such as slide shows, animations, podcasts and photostories. Through Google Earth, the students were able to visualize the dimensions of distance; through Google documents and spreadsheets, they could print assignments, assessments and lesson summaries; and through the audio notice board, they could communicate with each other after school. Quizzes and puzzles included in the blog also kept the students up-to-date about key dates and events and enabled them to have fun as they learned.

Figure 3: Item Showing the “Smiley Face” Configuration on the Blog



Source: <http://mygeographylearning.blogspot.com/>, accessed 25 February 2009

Webcam Wall

The Webcam Wall stemmed from an idea to demonstrate how students can create a slide with multiple live streaming webcams. The visuals were stunning on the projector screen, and the students were duly impressed and excited. This was a simple and effective method to introduce the concepts of climate, day and night, landscapes, and so on, to the students.

Podcast

Class lectures or summaries were also delivered through an audio file distributed online or offline in the form of a podcast. This helped the students who wished to revise and understand the concepts at their own pace and time, both in the school and at home. One

such podcast, sourced from a BBC Hindi radio broadcast, was featured in the blog and wiki to provide important tips to help the students prepare for their CBSE Board exams.

Panorama View in Teaching Geography

Geography is a very visual subject and a 360o panorama (*all-round view*) is a powerful way to enhance the students' sense of space and time, particularly when viewed using a projector onto a large screen or whiteboard. The list of panoramas below is available from the blog website: <http://mygeographylearning.blogspot.com>

- Aerial photo of NW Upper Middle: Vadret Pers, flowing from upper right to lower left: Vadret da morteratsch
- Eruption of Old Faithful Geyser, Yellowstone National Park, Wyoming, USA
- Great Falls National Park in Potomac, Maryland, USA
- San Andreas Fault in California, USA
- Main Volcano on Piton de la Fournaise

In summary, the online resources used included:

- Wikispaces (wikispaces.com)
- Blog (blogger.com)
- Teachertube and Youtube (for videos)
- Podcasts
- Educational games (classtool.com)
- Google Maps
- Google Docs and Spreadsheets
- Quizzes and tests
- Cluster maps
- Total hits
- National Geographic photos
- Slide shows
- Inspirational quotes of the day
- Panorama views of nature
- Daylight map
- Geographic game
- Time
- Links to other blogs
- Today's phase of the moon
- Astronomical view
- Recent earthquake map

Offline tools used were:

- eXe XHTML editor
- Irfanview (for editing pictures and making slides)
- Free Mind (for making mind maps for revision)
- Virtual dub (for editing videos)
- Audacity (for recording voice)
- Flash slide show maker
- Cam Studio (for recording screen)
- Microsoft Office OneNote (for organizing the blackboard)
- Microsoft Paintbrush (used as a blackboard)
- Open Office
- iSpring (for converting powerpoint to flash)

Outcomes and Impact

An important objective for incorporating the use of ICT into teaching geography was to complement and update the mode of teaching in the classrooms to enable the students to develop skills for the 21st century. Secondly, it was hoped that these tools and technologies would transform the students from passive learners into investigative learners by maintaining their attendance, attention, curiosity and achievements. A third expectation was for students to have easy access to multiple sources of information anytime and anywhere. A fourth intention was to encourage students to work in teams, to do and think collectively. Alerting the students to the risks and dangers connected to the borderless flow of information and misinformation, and to the multitudes of faceless but real predators looking for innocent victims on the internet, was also an unspoken but important purpose.

In reflection, all these objectives were met to varying degrees of success. The blended approach to the teaching-learning process proved to be successful in catching and maintaining the students' attention, curiosity and desire to learn more. The students were able to access various sources of information and complete their assignments, working on their own and in groups. At the same time, it increased interaction between high and low achievers, thus reducing the "intellectual gap". There was a positive change in the students' attitudes to the subject, increased levels of attendance and achievement, and reduced disciplinary problems.

More specifically, the outcomes from the perspective of the teachers were:

- Teachers were persuaded that teaching can be more effective through the use of ICT tools and technologies, and that such practices can be easily adopted in the classrooms.
- Interactive media does not only complement traditional pedagogies; it can also substitute for regular chalk and blackboard teaching.
- These tools and technologies are helpful to teachers for striking a balance between what to teach (content) and how to teach it (form).

- ICT tools can provide individualized support to learners through individualized interactive materials.
- Online and offline tools offer multiple methods of delivering lesson plans.
- Through research and finding materials for the wiki and blogs, teachers are able to increase their own knowledge and understanding of the subject matter.
- The tools are useful in developing and delivering high-quality concepts, lessons and materials in a variety of languages (in this case Hindi and English) to suit the diversity of students coming from different backgrounds.
- Teachers found that they had improved professionally and individually.

The outcomes from the students' perspective were:

- Students are able to access the materials and resources at their own pace anytime and anywhere.
- They can review previous lessons and reinforce their understanding if they had difficulties in understanding the concepts in the first place.
- The tools enable interaction and involvement between high and low achievers through team work and peer review.
- The interventions improve students' responses and bring positive attitudinal changes towards the subject.
- Students with low reading skills show marked improvements in their tests.
- Students' attendance increases and there are fewer disciplinary problems.
- Students' average weekly progress in class tests improved. When web-based materials are actively used, the weekly results improve by 7.2 percent compared to 1.32 to 0 percent when web-based materials are excluded.
- The students feel responsible for their own learning.

"This blog must be called a 'reservoir of knowledge'. It is very helpful for us and for every other viewer as it not only contains geography but also comprises general knowledge. This is a complete booklet of geography for everyone. I think in this way, it has made geography more interesting and easy."



Shubhra Singh

Former student of S.D. Public School Currently 3rd Year B.A. Honours in Geography, Delhi University

Now, Teaching on the Blogboard

Suryaveer Singh, a geography teacher at S.D. Public School, was at his wits end trying to get his students excited about his subject. But ever since he started his blog (<http://mygeographylearningblogspot.com>) in April 2007, not only are students enjoying his classes, they are also performing better.

"I was not doing well in geography but after Sir started his blog, I'm coping with it well. The video links are most interesting," says Chirag Singal, a class XI student. From videos on whale watching in Kaikoura, New Zealand, to slideshows on volcanoes and natural wonders, the blog is full of interesting visual tours. Singh says: "Students can talk to me by simply posting their queries or comments on the blog."

About 36 teachers from six schools including Darbari Lal DAV Model School, Pitampura, Kulachi Hansraj Model School and Ved Vyasa DAV Public School, Vikaspuri – have started such blogs. The idea and technical training came from a voluntary group CII-Shiksha, an initiative by the Confederation of Indian Industry (CII).

The blogs have slide shows, animation, great visuals, puzzles, interactive message boards, links to the latest happenings in the world and more. Students can read assignments online, download notes and update themselves on what happened in class.

Rashmi Kathuria, a maths teacher at Kulachi Hansraj Model School, says: "Students wait for my post. Sharing comments encourages even shy students to express themselves." She has eight blogs on her subject.

Source: <http://padmasrinivas.blogspot.com/2008/01/now-teaching-on-blogboard.html>

Constraints and Challenges

Despite such positive results, there were still some constraints and challenges. According to Anita Sharma, the Principal of S.D. Public School, "integrating technology in the classroom is a big challenge in India as the mindset about the traditional '*guru-shishya*' *parampara* (teacher-student traditions) is very strong and many a time teachers feel that technology is a threat to the bond of respect and affection between a teacher and student. There is a strong need to dissolve this myth and to help the teachers realize that the use of the latest technology and teaching methodology will develop more respect and more affection amongst students towards teachers".

She further noted that "unguided or misguided internet exposure takes the children very early to the adult world and snatches away their childhood and innocence. But guided use may help them to explore and develop knowledge about the world, process this knowledge to understand the needs of society, and assist them to develop better perceptions. It will also give them a platform to express themselves freely, mobilize good thoughts, help them to

identify their place on the planet and feel oneness with the universe (which is the ultimate goal of life according to 'Vedanta').

From the students' perspective, joining the wiki intrinsically means that the students wish to connect, collaborate and tap into the wider community's expertise to help and support their learning. However, results may not be immediate but need time and patience before they reach their full value. If new users are not "followed" by others, their voices will not be heard, and their questions will go unanswered, echoing into an empty space. The importance of "I follow you - you follow me" behaviour cannot be underestimated; and building a supportive collaborative network is a major challenge.


Another constraint for many students was the lack of computers and internet connectivity at home. Although offline eXe learning materials were provided, they could not match the wealth of information available instantly on the internet. Students who have no access are disadvantaged. However, the challenge to ensure that each child has access to a computer and to the World Wide Web lies beyond the means and capacity of the teachers and the school, necessitating policies and resources at the highest level of government.

Conclusions

ICT tools and technologies have proven to be effective in teaching geography – both in and out of the classroom. Collaborative networking is gaining more interest and support, especially with the advanced tools and technologies available today. Teachers who hesitate to adopt ICT into their teaching and learning processes because of a lack of technical capacity, have many opportunities to upgrade their knowledge and skills by enrolling in the ICT training programmes provided by both public and private sector institutions.

Sufficiently equipped with the appropriate knowledge and skills, these teachers will be able to develop and implement innovative projects and activities with and for their students. One example is tele-collaboration with schools in other countries, as seen from a project with an 8th grade social studies class in Connecticut, USA (<http://collaborationnation.wikispaces.com/>).

Another potential project is to develop an extensive library of creative, finely-tuned, engaging, exciting lessons contributed by students as a channel for them to share their knowledge and contribute to classroom activities. Students from other schools can also be



"Mr. Suryaveer's creative initiatives in using technology in the classroom are exemplary. He is not only able to enhance the student's interest in geography and hence their class performance, his efforts had channelled the time, energy and money available to his students for using the net in the right direction. His efforts have motivated other teachers too to use open sources like blogs and wikis. As a result, about fifteen blogs for various subjects have been developed, and students and teachers from primary to senior secondary are collaborating through them."

Anita Sharma
School Principal

invited to contribute their work to extend the collaborative networking concept beyond the boundaries of the school.

In conclusion, it is clear that ICT can enhance teaching and learning processes even if resources are limited, as long as some of the necessary conditions are satisfied, for example, support from the school; professional development for teachers; and willingness of the teachers to learn, innovate and adapt.



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Asia and Pacific Regional Bureau for Education

Asia-Pacific Programme of Educational Innovation for Development (APEID)

Mom Luang Pin Malakul Centenary Building

920 Sukhumvit Road, Prakanong, Klongtoey

Bangkok 10110, Thailand

• E-mail: apeid@unesco-bkk.org

Website: www.unescobkk.org/education/apeid

Tel: +66-2-3910577 Fax: +66-2-3910866