Integrating Information and Communication Technology into Education: A Study of the iSchools Project in Camarines Sur, Philippines

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The need for sustainable development arose from overexploitation of natural resources. One of the significant roles of humanity is to ensure proper utilization of such resources, and fulfillment of this role requires an understanding of the global consequences of local actions. An integration of instruction about the consequences of exploitation into educational curricula will be an advantage to make people aware of the need for humanity as stewards of the environment.

The second United Nations Millennium Development Goal is “Achieve universal primary education.” Increased use of information and communication technology (ICT) in schools can be expected to attain progress towards this goal and to prepare students for participation in the information society. The use of ICT as an innovative approach to teaching sustainable development is a challenge, especially in the primary education sector, where the foundation for human development is being laid.

I surveyed 10 public high schools in the Philippines (Camarines Sur Province) that served as participants in the Commission on Information and Communications Technology - Human Capital Development Group (CICT-HCDG) iSchools Project in 2009, and I found that the project made major contributions toward the integration of ICT into the educational programs of these schools. For example, before project intervention, 1 desktop computer served 256 students, and 1 desktop computer served 7 teachers; after intervention, 1 desktop computer served 1 or 2 teachers, and 1 desktop computer served 19 students.

After the implementation, almost half (42.3%) of the teachers became regular, confident computer users. Many (40.6%) regularly and confidently used word processing software, and some occasionally used spreadsheet software (33.9%), presentation software (30.8%), and the internet (33.8%) for classroom instruction, communication, and research. All the surveyed schools were able to establish computer laboratories. The schools had partnered with state universities and colleges and deployed student-teachers on practicum to help teachers integrate ICT into basic subject teaching. After the implementation, they started to develop institutional websites and were preparing for the adoption of computer-enabled library management systems.

Key words: ICT, Education, iSchools Project, Philippines

I. Introduction

The concept of sustainable development arose essentially from concerns about the overexploitation of natural resources. One role of humanity is to ensure the proper utilization of such natural resources, and people must be made aware of this critical role early in their formal education. As stated by the United Nations Development Programme (1990) in its Human Development Report,

Received: October 28, 2010, Accepted: January 12, 2011
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“People are the real wealth of a nation.” Because people are the recipients of development, understanding its impact, together with information about how ecosystems work and understanding of the global consequences of local actions, must therefore be integrated in basic educational curricula.

Access to high-quality basic education is a major concern of all leaders of nations and international organizations. The second Millennium Development Goal of the United Nations is to “Achieve universal primary education.” Greater use of information and communication technology (ICT) in schools can accelerate the attainment of this goal and help to prepare students for active participation in the information society. OECD Report states that, “Technology is a key driver of educational innovation, and a variety of programs focusing on investment in infrastructure, equipment, in-service training, and digital learning resources have been established to promote its usage in primary and secondary schools.” (2009). Robert Kozma identified four important reasons for investing in ICT for education, such as, advancing education reform, supporting educational management and accountability, supporting economic growth, and promoting social development. All of these are aimed towards meeting human capital needs and digitalization. (Kozma’s work is cited by Øystein Johannessen, 2009).

The broader benefits of ICT were also highlighted by John Houghton (2009): the internet and the ICT can help communities to “tackle environmental challenges in developing countries through more environmentally sustainable models of economic development,” and his paper “examines the status of current and emerging environmentally friendly technologies, equipment and applications in supporting programs aimed at addressing climate change and improving energy efficiency.”

One major limitation on the integration of ICT in education is that the large majority of the instructional staff in education systems (both formal and informal) in least developed countries have little or no ICT literacy. Worth-noting here are statements from Wagner et al. and Unwin: “Capacity building... is at the heart of the renewal of effective and high quality work in ICT and education” (Wagner et al., 2005).

With the goal of ameliorating this limitation, the Commission on Information and Communications Technology (CICT) of the Philippines, in partnership with various state university and colleges (SUCs) and with the Department of Education as its beneficiary, initiated the iSchools Project. This project is a development initiative that aims to broaden the access of students, faculties, and their communities to ICT facilities with the goals of building human capital for sustainable development and contributing to the Philippine government’s commitment to achieving the Millennium Development Goals. The project aims to integrate ICT into basic education by making ICT equipment immediately available in schools and by improving the capabilities of teachers and students to effectively utilize ICT in teaching and learning. The project also aims to increase opportunities for other members of the community to learn appropriate digital technologies that are useful for the people’s attainment of better jobs and increasing support for sustainable development at the community level.

I studied one of the iSchools Project sites, Camarines Sur Province, to determine the extent to which the project has contributed toward achievement of these goals, in the hope that the findings can be used to accelerate ICT-related efforts in the near future, especially in rural areas.

II. Objectives

The objectives of this research study were as follows:

1. Determine what ICT equipment was available in the 10 surveyed public secondary schools in Camarines Sur Province.
2. Determine the competency of the teachers with regard to effective utilization of ICT facilities to improve teaching in the schools.
3. Determine the initiatives undertaken by schools to integrate and expand ICT in education and school governance.

III. Materials and Methods

The study focused on 10 public secondary schools in the Philippine province of Camarines Sur. The schools are managed by the Department of Education of the Philippine government and participated in the iSchools Project of the Commission on Information and Communications Technology - Human
Capital Development Group (CICT-HCDG) in 2009 with the assistance of the Information and Communications Technology Office of Central Bicol State University of Agriculture.

A survey questionnaire for key informants was developed and then tested and improved so that precise answers to the survey questions could be obtained. Indicators developed by the National Computing Center of the CICT to determine competency were used to gauge the teachers’ ICT competency. At each school, the head of the school and the ICT coordinator, who in most cases managed the school’s computer laboratory, served as informants.

A descriptive method was used to analyze the collected information. Frequencies of responses were counted and averages were computed to analyze the collated data.

IV. The iSchools Project

Project Components. “The iSchools Project is a flagship project of the CICT, which was established by executive order in January 2004 to support the efforts of the Philippine government and the Department of Education to integrate ICT into public high schools” (iSchools website) (CICT 2009). The two major components of the project are as follows:

Basic iSchools Package. The basic iSchools package includes the following subcomponents: (1) social preparation to ensure that participating schools are familiar with the project, are ready with a counterpart fund, and are committed to attaining the project’s goal; (2) hardware, software, and one year of broadband internet access; (3) five training programs; and (4) progress monitoring.

The hardware package to be delivered to the participating schools comprises 19 desktop computers each with a multimedia headset; 1 server computer with a web camera; 1 laptop computer; 1 liquid crystal display projector; 1 color printer-scanner; 1 wireless router; 1 internet protocol (IP) camera; and 6 uninterruptible power supply devices. This ICT equipment is to be used to set up a computer laboratory (referred to as a iSchools wireless internet learning laboratory, or iWILL).

Continuing iSchools Initiative. The project also provides advance training programs for the participating schools in the iSchools Project. The content of the training programs is based on the participants’ needs to integrate ICT into education and to sustain the iSchool project. Monitoring and evaluation are requirements of this initiative. The project needs to monitor and evaluate the recipients’ use of ICT and whether the objectives for the project have been fully attained.

Goal and Objectives. The iSchools Project aims to help establish an ICT-enabled educational system by (1) improving teaching and learning through the use of ICT in secondary schools and (2) improving school governance. The project is targeted at 1000 public high schools in the Philippines. It focuses on strengthening classroom learning and instruction by expanding access to various sources of information. Its aim is to enhance the ability of public high school students to compete for jobs, continuing education, and other growth opportunities.

The project is not solely about distributing ICT equipment but rather about building ICT skills and getting public high school teachers interested in integrating ICT into the educational system. The CICT-HCDG believes that the lack of teachers and educational resources can be addressed by means of the numerous freeware programs, educational materials, and open-source applications available over the internet.

The distribution of the basic package of computer laboratory equipment and the conduct of basic ICT literacy training are designed to become the foundation for basic resource requirements to attain the goals and objectives of the project. As is the case for other development projects, strong cooperation between the project partners and beneficiaries is critical to the success of the project and the attainment of its objectives.

Strategies for Implementation. Through its eQuality Program for SUCs, CICT-HCDG, a nationwide educational alliance between the CICT and selected SUCs in the Philippines, has joined forces with the state universities and colleges in implementing the iSchools Project.

For implementation of the project, the services of SUCs have been monitored with their expression of interest in being part of the project. The following project activities are implemented through the partnership: (1) social mobilization, which entails a series of visits to evaluate the readiness of the
candidate schools in terms of counterpart funds and capabilities; (2) assistance with hardware and software installation and with internet connections; (3) training, monitoring, and evaluation; and (4) coordination and provision of technical assistance.

V. Camarines Sur—The Research Site

Camarines Sur is a predominantly agricultural province located in the center of the Bicol Peninsula, which forms the southeastern part of the island of Luzon. The province is about 450 km from Manila (between 14° 10' and 13° 15' N; between 124° 10' and 122° 40' E). Camarines Sur, which is the largest of the six provinces of the Bicol region, has a land area of 526,682 ha (29.87% of the total regional area; 1.75% of the total area of the Philippines). Its landscape is still predominantly agricultural. It has a population of 1,551,549 with a projected population growth rate of 1.07%. Its simple literacy rate is 95.4%, and the functional literacy rate is 86.0%. The province has 35 municipalities, 2 cities, and 1063 barangays in which various public high schools are situated. The public high schools are supervised by the SUCs and by the Department of Education (DepEd).

The DepEd-supervised high schools are managed by three division offices of the Department: the Naga City Division Office, the Iriga City Division Office, and the Camarines Sur Division Office. The research sites fall under the Camarines Sur Division Office. In the third quarter of 2009, each school received ICT equipment for setting up an iWILL, and the teachers at the schools attended ICT-related training sessions from the fourth quarter of 2008 to the fourth quarter of 2009.

I compared the enrollments of the 10 schools for the 2009–2010 and 2010–2011 school years (Table 1). The average increase in enrollment between 2010–2011 and 2009–2010 was 4.32%, and 7 of the 10 schools experienced an increase in their student populations. The smallest increase was 0.49% (Justo Imperial Memorial High School), and the two largest increases were observed for Nonito Paz Arroyo Memorial High School and Coguit High School (19.18% and 16.21%, respectively).

Although proving that the growth in student enrollment was due to implementation of the project is difficult, the school administrators acknowledge that the recent improvement of the schools’ ICT facilities was a major factor contributing to the increased enrollment.

VI. Results and Discussion

ICT Equipment in Public High Schools

I inventoried common ICT equipment present in the schools to determine the types of equipment that were available for teachers and students to use in educational activities. The inventories revealed

<table>
<thead>
<tr>
<th>Name of school</th>
<th>Municipality</th>
<th>Congressional</th>
<th>No. of students enrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>district</td>
<td>2009–2010</td>
</tr>
<tr>
<td>1. Sacred Heart High School</td>
<td>Sipocot</td>
<td>1</td>
<td>409</td>
</tr>
<tr>
<td>3. Northern Plain High School</td>
<td>Libmanan</td>
<td>2</td>
<td>206</td>
</tr>
<tr>
<td>4. West Coast High School</td>
<td>Calabanga</td>
<td>3</td>
<td>239</td>
</tr>
<tr>
<td>5. Victor Bagacina Memorial High School</td>
<td>Pili</td>
<td>3</td>
<td>655</td>
</tr>
<tr>
<td>6. Dona Basilla Memorial High School</td>
<td>Pili</td>
<td>3</td>
<td>322</td>
</tr>
<tr>
<td>7. Nonito Paz Arroyo Memorial High School</td>
<td>Bao</td>
<td>5</td>
<td>219</td>
</tr>
<tr>
<td>8. Justo Imperial High School</td>
<td>Bao</td>
<td>5</td>
<td>1,015</td>
</tr>
<tr>
<td>9. Balaogan High School</td>
<td>Bula</td>
<td>5</td>
<td>362</td>
</tr>
<tr>
<td>10. Coguit High School</td>
<td>Balatan</td>
<td>5</td>
<td>327</td>
</tr>
</tbody>
</table>
that some of the ICT equipment available in the schools was nonfunctional, that is, either in need of repair or broken beyond repair (nonserviceable). The main reasons for the presence of nonfunctional equipment were the schools' limited financial resources for repair and maintenance of equipment and facilities and the unavailability of replacement parts for older models of equipment.

For data interpretation and analysis, the inventoried equipment was categorized either as “highly available” (all units fully operational) or “partly available” (some units were functional, but others needed repair). Equipment that was classified by the respondents as nonserviceable was excluded from the data analysis.

The ICT equipment at the 10 schools was inventoried before and after the delivery of the iSchools package for installation of the iWILL (Table 2).

As can be observed from the data in the table, delivery of the ICT equipment to the schools increased the equipment/teacher and equipment/student ratios for all types of ICT equipment, indicating the better availability of ICT equipment for educational activities. The increased availability of ICT equipment offers more opportunities for teachers and students to develop their ICT competencies and to utilize the equipment for educational purposes and administrative purposes.

**Desktop Computers.** Before the project was implemented in 2009, the 10 schools had only 16 fully operational desktop computers (excluding units that needed repair) to be used by 111 teachers and 4094 students. On average, each desktop computer served 256 students, and a desktop computer was used by 7 teachers.

### Table 2. Inventory of ICT equipment before and after the delivery of the iSchools package.

<table>
<thead>
<tr>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Ave$^a$</td>
</tr>
<tr>
<td>Number of schools ($n$)</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Number of teachers</td>
<td>94</td>
<td>11</td>
</tr>
<tr>
<td>Number of students</td>
<td>4,094</td>
<td>410</td>
</tr>
<tr>
<td>Number of highly available desktop computers</td>
<td>16</td>
<td>2</td>
</tr>
<tr>
<td>Ratio of no. of highly available desktops to no. of students$^b$</td>
<td>1 : 256</td>
<td>1 : 22</td>
</tr>
<tr>
<td>Number of partly available desktop computers$^c$</td>
<td>33</td>
<td>3</td>
</tr>
<tr>
<td>Ratio of no of partly available desktops to no. of students</td>
<td>1 : 124</td>
<td>1 : 21</td>
</tr>
<tr>
<td>Number of LCDs</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Ratio of no. of LCDs to no. of teachers</td>
<td>1 : 45</td>
<td>1 : 13</td>
</tr>
<tr>
<td>Number of laptops or other mobile computers</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ratio of no. of laptops to no. of teachers</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of printers (mostly inkJet and dot-matrix printers)</td>
<td>16</td>
<td>1.78</td>
</tr>
<tr>
<td>Number of televisions</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Number of CD/DVD players</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Number of sound systems</td>
<td>3</td>
<td>0.22</td>
</tr>
<tr>
<td>Number of cameras (film or digital)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Number of schools with at least 1 phone (land/cellular phone)</td>
<td>7</td>
<td>7</td>
</tr>
</tbody>
</table>

Notes: $^a$ Averages were computed on a per-school basis.

$^b$ “Highly available” refers to equipment that was currently operational.

$^c$ “Partly available” refers to equipment that was functional or in need of repair. This category included equipment that was not operational at the time of the inventory but was highly likely to be repaired, for one of the following reasons: funds would be budgeted soon, technical expertise was available (either from outside sources or within the school), or the parts required for repair were available in the marketplace (either new or used).
After the project was implemented, the statistics improved substantially. On average, one desktop computer served 1 or 2 teachers; there was one desktop computer used by 22 students. A desktop could serve 2 students at a time; an average class of 40 students could be accommodated in the laboratory.

These data clearly show that the access of teachers and students to computers was far better after delivery than before. Computers were available for administrative and instructional tasks, such as preparing lectures and calculating grades.

**Laptop Computers.** In 2008, each of the 10 schools received a laptop, which was made available to all the teachers at the school (average of 14 teachers per school). Mobile computers provided more flexibility for classroom teaching and for conducting computer-related lectures, even outside the computer laboratory.

**LCD-DLP Projectors.** LCD projection systems are used for various applications, such as making educational presentations and watching movies in the classroom.

Nine of the 10 schools had no projector before implementation of the project; 1 school had purchased an LCD projector with the assistance of the Parent-Teacher Association, and the teachers at that school found that the LCD projector was a great tool for visual presentation of topics in the classroom.

Through the iSchools project, each of the 10 schools was provided with an LCD projector. Thus, 1 LCD projector served an average of 14 teachers and 432 students per school, providing more opportunities for teachers, students, and the community to view a variety of films, including films on environmental regeneration and protection and on sustainable development.

**Television, CD/DVD Player, and Sound System.** These devices were the most common devices available in all the schools, and they were used to show films. Nine of the 10 schools had a television and CD/DVD player, whereas only 3 schools had a sound system. Provision of desktop and laptop computers provided an alternative method for viewing still pictures, videos, and other presentation materials as part of the educational process.

**Camera.** The integration of images in teaching is a good creative approach for the students to learn various topics in any of their subjects, such as, English, Mathematics, and Science. For example, using images of development projects in the community and pictures of local environments makes it easier for students to relate the topic to their own experiences. Unfortunately, not all of the surveyed schools had a camera, either film-based or digital, that could be utilized by teachers or students in their classroom activities. The availability of a camera can be expected to permit consistent collection of pictures that can be useful in relating socio-cultural issues to lessons (e.g., environmental initiatives, science, social studies).

**Telephone.** The schools use telephones (landlines and cell phones) to communicate with the division office and other agencies, and parents can use telephones to communicate with the schools about their children and teachers and to inquire about various school concerns.

Only 7 of the 10 schools had phone lines that could be used for common school concerns; 3 of the phones were landlines, and 4 was a mobile phone.

### Developing Teacher Competency

Unwin (2005) reported that a major limitation on the use of ICT for education is that a large majority of the instructional staff in the education systems (both formal and informal) have little or no ICT literacy. According to Unwin, “Increasing the proportion of well-trained ICT-literacy teachers and/or full-time ICT instructors is an essential element of enhanced human capacity development,” and “capacity building and management go hand in hand; everyone needs to be trained appropriately, and the processes require careful management.”

CICT (2009) elaborates that the “iSchools Project understands that even the most sophisticated technology will be useless without the knowledge to use it. The project therefore conducted comprehensive capacity development programs to help teachers master the use of ICT in education. With expert resource persons, the project holds workshops and training sessions such as the Computer and Internet Literacy Course, Laboratory Management Training, Web Development Trainings, and Sustainability Planning Workshop.” The 10 schools covered by this research benefited from these ac-
Teacher Competency in Using Computers and the Internet. The data gathered on this component indicated that the most common places where teachers learned how to use computers were the home, the school, and the internet café. After the project implementation, 25.6% of the teachers used computers and the internet in school almost every day, 19.5% of the teachers used their computers at home almost every day, and fewer than 9.4% of the teachers went to an internet café every day to use a computer or access the internet (Table 3). Preference of teachers to places where they can easily use computers and access internet helped to facilitate the development of their basic competencies.

The results of my post project-implementation survey showed that almost half (42.3%) of the teachers were competent users of computers and confidently explain it to others. Only 13.3% used regular and confident users, 37.5% occasionally used computers and needed further practice, 3.9% were aware of the potentials of computers, and the remaining 2.9% had no or very limited knowledge of how to use computers.

Teacher Competency in Using Basic Productivity Tools. To develop the basic competency of teachers in using computers and productivity tools, the CBSUA-ICT Office conducted the Computer Internet Literacy Course with the support of the CICT from third to fourth quarter of 2009. This 5-day course was conducted at each school by Internationally Certified resource persons by using the computers and other ICT equipment provided by the iSchools Project that were installed in the schools’ computer rooms. At least 20 participants from the participating schools were oriented as regards the need for integrating ICT in basic education. The participants were exposed to the basic functions of computers and instructed on the application of various productivity tools, such as word

Table 3. Locations where teachers use computers and access the internet (%).

<table>
<thead>
<tr>
<th>Place</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home</td>
<td>45.6</td>
<td>16.0</td>
<td>12.0</td>
<td>6.9</td>
<td>19.5</td>
</tr>
<tr>
<td>School (workplace)</td>
<td>26.1</td>
<td>14.6</td>
<td>13.4</td>
<td>20.3</td>
<td>25.6</td>
</tr>
<tr>
<td>Internet café</td>
<td>52.3</td>
<td>23.7</td>
<td>11.2</td>
<td>3.3</td>
<td>9.4</td>
</tr>
<tr>
<td>Average</td>
<td>41.3</td>
<td>18.1</td>
<td>12.2</td>
<td>10.2</td>
<td>18.2</td>
</tr>
</tbody>
</table>

Note: A—NEVER  
B—Once or twice a month  
C—Once or twice a week  
D—More than twice a week  
E—Almost every day

Table 4. Competency of teachers in using various productivity tools (%).

<table>
<thead>
<tr>
<th>Productivity tool</th>
<th>Software application (Microsoft Office or Open Office)</th>
<th>Competency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Word processor</td>
<td>Word or Writer</td>
<td>1.7</td>
</tr>
<tr>
<td>Spreadsheet software</td>
<td>Excel or Calc</td>
<td>3.9</td>
</tr>
<tr>
<td>Presentation software</td>
<td>PowerPoint/Impress</td>
<td>3.9</td>
</tr>
<tr>
<td>Internet</td>
<td>Internet Explorer or Mozilla Firefox</td>
<td>10.3</td>
</tr>
</tbody>
</table>

Note: A—Unaware and have never tried this tool  
B—Aware of the tool but have not used it  
C—Occasionally used the tool but needed additional practice to become confident  
D—Regularly and confidently used this tool  
E—Fully competent and could confidently explain the tool to others
processors, spreadsheet software, presentation software, and the internet. Participants practiced the skills extensively to gain basic competency so that the tools could be used in teaching and school governance. In some cases, representatives of other iSchools Project stakeholders, such as members of the Barangay Council and leaders of the Parents and Teacher Association, also took part in the training.

The training focused on four major productivity tools: word processors, spreadsheet software, presentation software, and the internet. Within the study, I surveyed the competency of teachers in using these tools. The survey revealed that it was word processing software that teachers were most familiar with. Many teachers (40.6%) were fully competent users of this software for various academic functions and could confidently explain use of the software to other teachers, as well as to students. A smaller proportion of teachers (27.1%) occasionally used the software and needed further practice to be confident, and 4.4% were just aware of the software’s existence.

Teachers occasionally used spreadsheet software (33.9%), presentation software (30.8%), and the internet (33.8%) to perform work-related and personal tasks. However, they needed further practice to build their confidence with these tools and maximize their possible utilization for instruction and other school-related tasks.

**Common Applications of Computers and Productivity Tools.** As an indication that teachers had started to adopt the use of computers and utilize various application software programs and productivity tools (word processors, spreadsheet software, presentation software, and the internet) for their academic functions, teachers mentioned the following activities that they regularly did:

1. Preparing lesson plans
2. Preparing presentations materials and other visual aids
3. Preparing lecture notes
4. Teaching various specific subjects
5. Recording and computing grades
6. Completing required office reports
7. Producing ICT materials for instruction, school administration, and research purposes
8. Accessing the internet

**Teachers’ Access to, and Utilization of, the Internet.** The internet is gaining a significant role in education. It allows greater flexibility in instructional activities and communication, as well as in research work. In addition, new cell phones (smart phones) and other mobile or wireless devices can now be used to connect to the internet and for advanced instructional purposes.

Through the internet, students can download diverse educational materials applicable to various purposes. Examples of such purposes include viewing of school websites, accessing literature, downloading images that will help students to complete homework and other assignments, and self-guided learning. The internet makes uploading and accessing educational information easier at any level, at any time, and from anywhere. The internet in general and the World Wide Web in particular are important facilitators of both formal and informal education. The various internet activities that the teachers engaged in are presented in Table 5.

Table 5 clearly indicates that, on average, almost 25% of the teachers had started begun to use the internet for various purposes such as communication, research, instruction, and electronic commerce. Though many teachers are still unfamiliar with the varied benefits of internet use, it is worth mentioning that teachers in the secondary education program have started to appreciate the use of the internet for educational purposes, either as a source of instructional materials or at least as a means to communicate with students.

Connecting a school to the internet will allow more teachers to more fully explore the potential uses of the internet for their tasks as educators. Only 4 of the 10 surveyed iSchools Project sites currently have broadband internet services. The distance of the remaining 6 schools from the antennae of internet service providers is the main factor preventing them from availing themselves of broadband services provided by Smart and Globe. Hopefully, in the near future, the internet service providers will upgrade their hardware and other systems to cover the remaining high schools.

**Other School Initiatives toward Integrating and Sustaining ICT in Education and School Governance**

**Establishment of iWILLs.** As of this writing, all 10 of the surveyed schools have newly established
iWILLs, where computer-related instruction is conducted. Each iWILL has the following equipment provided by the iSchools Project: 19 desktop computers each with a multimedia headset; 1 server computer with a web camera; 1 laptop computer; 1 LCD-DLP projector; 1 color printer-scanner; 1 wireless router; 1 IP camera; and 6 uninterruptible power supply devices. Two teachers were trained for 5 days on efficient management of the laboratory.

**Deployment of Student Teachers on Practicum-to Hasten Integration of ICT into Basic Subjects.** In 2009–2010, the CBSUA, through its Information and Communications Technology Office and the Institute of Development Education, deployed student-teachers on practicum to the 6 surveyed schools for 1 semester. The objective was to help the teachers integrate ICT in their teaching of basic subjects, such as science, math, and English. This year another batch of student teachers will be deployed to sustain this effort.

**Development of School Websites.** The ten recipient schools can use the internet to publicize their development initiatives and disseminate to the electronic world their organization accomplishments. Through the internet, communications with other
groups are facilitated and future collaborations made possible.

Recognizing the importance of school websites and the need for ICT skills to maintain websites, the CICT sponsored a 5-day website development and management training session, which was attended by the laboratory manager and an English teacher, who are expected to attend to the technical aspects of the website and the writing of content, respectively. The training focused on teaching skills in the use of Joomla, which is a commendable portal engine selected by the iSchool Project because of its wide use and extensibility.

The CBSUA, in cooperation with the ICT Office of the Department of Education-Camarines Sur Division, initiated a 2-day refresher course on web development to build on the basic web management skills gained by the teachers in the initial training session.

As part of their training, the participants were required to build their respective schools’ websites. Almost a year after the training, the status of the websites was assessed in terms of content, features, and design. Each criterion was given a rating level from 1 (lowest) to 5 (highest), for a total of 15 points. The criteria were as follows:

1. **Content**: How many quality-based articles are on the website? Does the website include school information (vision, mission, and goals), the school seal, a map of the school location, an organizational chart (administrators, faculty, and staff), news articles, feature articles, special sections, trivia, among others.

2. **Features**: Are there features that enhance user interactivity within the website? Does the website have a visitor counter, news flashes, and photo galleries.

### Design: Are the colors and arrangement appropriate and generally attractive? Are the color schemes, layouts, and graphics well designed?

All 10 schools have established a school website. As a start, they adopted a static website format or a brochure-type website that provides viewers with basic information about the school; however, the end-goal is to improve the sites in a way that depends on the requirements of the school.

The websites’ ratings indicated that schools are generally in the development stage of their institutional websites (30% and 36.7% of the schools had ratings of 1 and 2, respectively, for at least one criterion). The teachers who were assigned to provide website content and maintain the site are still becoming familiar with the software.

Note however that 23.3% and 10% of the schools gained ratings of 3 and 4, respectively, for at least one criterion, which indicates that some of the schools have taken a more pro-active stance on website management. Teachers designated to maintain the websites periodically update the contents with an appropriate number of news articles or articles about school-based development initiatives, upgrade website features, and improve website design or layout by adding graphics.

Note that the 4 schools with an internet connection developed better websites than did the other schools. The teachers assigned to website management have real-time access to the internet, which makes updating websites during vacant periods more convenient and provides more opportunities to practice technical skills.

According to the schools’ administrators and ICT-trained teachers, establishing a school website

<table>
<thead>
<tr>
<th>Rating level</th>
<th>Content</th>
<th>Features</th>
<th>Design</th>
<th>Total</th>
<th>% (n=10)</th>
</tr>
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<tbody>
<tr>
<td>Level 5</td>
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<td>0</td>
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<td>0</td>
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<tr>
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<td>1</td>
<td>3</td>
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<td>3</td>
<td>2</td>
<td>2</td>
<td>7</td>
<td>23.3</td>
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<tr>
<td>Level 2</td>
<td>3</td>
<td>5</td>
<td>3</td>
<td>11</td>
<td>36.7</td>
</tr>
<tr>
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<td>3</td>
<td>4</td>
<td>9</td>
<td>30.0</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
<td><strong>10</strong></td>
<td><strong>10</strong></td>
<td><strong>30</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>
affords them many advantages. The website reconnects the school to alumni in other provinces and outside the country and serves as a venue for publishing and sharing the various development projects and accomplishments of the school. A website can also facilitate collaboration with other institutions, because school facts and statistics can be posted there. The existence of a website encourages students to browse the internet, because they can visit their own school’s website. Lastly, a website engenders pride among students, teachers, administrators, and alumni.

Adoption of Library Management System. A 5-day library management training session was conducted by CICT through its partner SUCs to help participating schools to systematize their library by using ANILAG software, which was developed by Laguna University and adopted by the iSchools Project for participating schools. The training was attended by the school librarian and a laboratory manager, who will provide technical support to the librarian during the installation and maintenance of the system.

To date, the library management system has been installed in a computer of each school, although full adoption is yet to be attained. The school librarians are preparing lists of existing resources in their respective libraries for encoding in the system. A refresher course will be offered by CBSUA once librarians have completely inventoried library resources.

VII. Conclusion

The CICT-CBSUA iSchools Project in Camarines Sur Province contributed substantially to the integration of ICT into the educational programs of selected DepEd-administered high schools. The project improved teacher and student access to ICT equipment. After delivery of the equipment, 1 desktop computer served 1 or 2 teachers (provided that desktop computers in the laboratory would be used); 1 desktop computer served 22 students (an average class of 40 could be accommodated in the iWILL, with 2 students per desktop computer); 1 LCD projector served 13 teachers; and 1 laptop served 14 teachers.

The study revealed that almost half the teachers (42.3%) were regular and confident computer users but could not share their knowledge with others; only 13.3% of the teachers could confidently share their knowledge with others; 37.5% of the teachers occasionally used computers and thus needed additional practice to become confident; 3.9% of the teachers were aware of computers’ use and its benefits; and the remaining 2.9% of teachers has very limited awareness of basic computers’ know-how and their benefits.

Analysis of data on teacher competency in utilization of productivity tools indicated that word processing software was familiar to 40.6% of the teachers; 33.9% of the teachers occasionally used spreadsheet software; 30.8% used presentation software; and 33.8% used the internet.

The extent to which ICT has been integrated into the education system was also indicated by analysis of the use of computers and the internet (at home, in schools, and in internet cafés) for teaching and enhancing the learning environment. Public high school teachers utilized computers and the internet in preparing lesson plans and lecture notes, crafting presentations materials and other visual aids, teaching various subjects, recording and computing grades, completing required office reports, producing ICT-based instructional materials, completing administrative forms, and writing research papers. Almost 25% of the teachers had begun to utilize the internet for diverse purposes such as communications, research, instruction, and electronic commerce.

Several school initiatives were undertaken to utilize ICT in school governance. All 10 schools had static school websites that were under development, particularly those that gained website ratings of 1 (30%) and 2 (36.7%) for at least one of the rating criteria. However, 23.3% and 10% of the schools had ratings of 3 and 4, respectively, in at least once category, indicating that they had a more proactive approach toward managing their websites. These schools periodically updated their web content by posting news or articles about school activities, upgrading website features, and improving the design and layout of the website by incorporating graphics.

Development of digital libraries is in progress, and grades are computed and reports prepared by the teachers by using computer applications.
VIII. Recommendations

1. Strengthen Advocacy of ICT Policies in Support of Education
   a. In partnership with SUCs, continue the expansion of the iSchools Project to additional schools that do not have computer laboratories or that have nonfunctional and non-serviceable computers. Legislators can be tapped by the CICT to provide counterpart funds for internet connectivity and basic ICT training programs.
   b. Encourage internet service providers to extend services to rural and unserved communities with public high schools. Extension of such services—either free or at discounted rates, with preferential bandwidth allocation to public high schools—could be seen as fulfilling corporate responsibilities to society.

2. Build Capacity
   Continue to build the ICT capability of public school teachers. Monitor the influence of capability building on classroom instruction improvement, school governance efficiency, and student performance.

3. Maintain and Recycle Computer Equipment
   a. Continue to educate teachers on computer laboratory management, computer maintenance, and recycling.
   b. Recycle computer parts, either by reusing them in other computers or transforming them to some other useful purpose (e.g., use as instructional materials or for accessory or decorative purposes).
   c. Establish an accessible online depot of functional computer parts from various schools.
   d. Arrange for safe disposal of nonrecyclable ICT equipment.

4. Distribute Digital Instructional Materials
   Consolidate and distribute educational resources and digital instructional materials that can be used, even for offline learning in high schools. These materials should include learning modules developed in-house by teachers as well as materials already developed by various outside agencies.

5. Upgrade Institutional Websites
   Develop and enhance school websites to increase international visibility, enhance collaborative instruction, and encourage research and teacher training in partnership with other academic institutions and other countries.

6. Strengthen Private-Public Partnerships
   Encourage collaboration between private and public institutions to support ICT development initiatives in education. Important resources can be solicited or mobilized through public collaboration with the ICT industry (e.g., SMART Schools). The aggressive adoption of this approach to future ICT projects will increase the chances of ensuring a more efficient and more effective project implementation than the time without any project intervention.

7. Form an iSchools Network
   Establish a local network of iSchools Project members to enhance cooperation and encourage sharing of resources among members and thus increase the sustainability of the ICT initiatives initiated by the project. Develop a sustainability plan for the network and its activities.

8. Strengthen Partnerships between SUCs and Public High Schools
   Invigorate the cooperative relationships established by the iSchools Project during its implementation. The main motivation of such partnerships should be to enhance the investment and initial gain of the project beyond its actual time calendar of implementation.

References
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