

# **A SECONDARY SCHOOL COMPUTER LAB IN RURAL BRONG AHAFO:**

A Case–Study Reflection on the Future of Secondary School Computer  
Literacy and Computer–Based Distance Education in Ghana

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## **1. Introduction**

The Technology Training Centre at Wenchi Secondary School (WESS) opened its doors in March 1999 using 20 donated 80286–processor computers. The director general of Ghana Education Service gave the inaugural address. By September of that year students were participating in email exchanges with schools in Springfield, Vermont, and Buffalo, New York. A grant from a California–based organization The Alpha Group has allowed the purchase in recent months of two new computers, a laser printer and other materials. A further grant from the US Agency for International Development (USAID) will network the lab on a full multi–user operating system, as well as expand Internet access.

So far computer literacy education in Ghana (and the corresponding investment of money and resources) has concentrated on major urban areas. Better schools in outlying areas have attempted to "catch up" with their urban counterparts by contracting with private companies to provide computer education; but the fees are high--as much as ¢35,000 per student per term--and it is rarely if ever the case that all

students have access.<sup>1</sup> Other schools have taken part in a GES-sponsored scheme where for every hundred textbooks they purchase from a private firm, they receive one computer system. But it is unclear whether the scheme is offering good value for money.

Wenchi Secondary School has opted for a third alternative, which is to organize a computer lab on its own. The former headmaster organized the donation of the original 286s; the previous Peace Corps volunteer initiated the literacy program; and the current volunteer established the lab. The hope is that not only will this provide better education at a lower cost--the lab is currently charging ₺8,000 per student per term--it will also work to ensure the lab's long-term sustainability, after the final Peace Corps volunteer departs.

The quotations through the rest of the paper are from student thank-you letters written to the project sponsors at The Alpha Group.

## 2. Underlying Philosophy

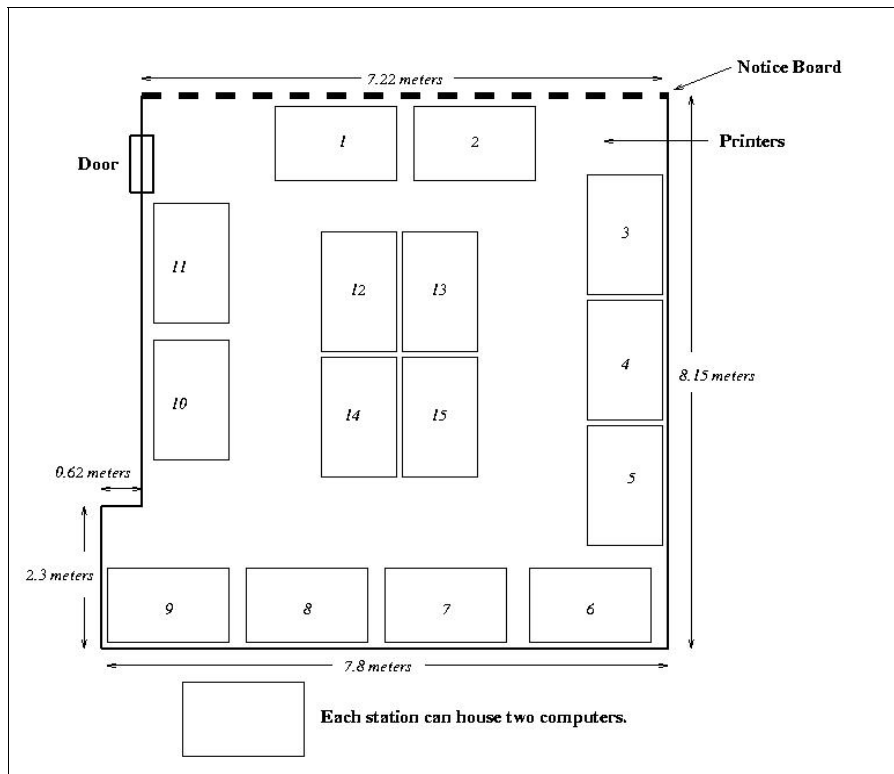
*Earnestly, these computers are helping us a lot during our practical studies. There are many games on the computer that actually help us during our leisure time.--George Osei Kuffour*

The computer lab at WESS is established upon the following principles. No empirical evidence is offered for their validity.

- Computer literacy is not an optional luxury but a fundamental part of the development needs of the school and of the country as a whole. It is key to the goal of improving performance on the West African Examination Council (WAEC) exams, notably in math and English. It can be a useful educational tool for all areas of the syllabus.
- Computer literacy advances best not by copying what others have done elsewhere but in finding solutions appropriate to local circumstances. This guides not only the acquisition of new equipment but the design of the curriculum as well. So for example, instead of training students on one particular word processor such as Microsoft Word®, the goal is to give them a broad-based understanding of word processors and the graphical user interfaces (GUIs) behind them.
- Computer literacy should be a hands-on activity. The students' primary focus of attention should be on the computers, not on the instructor. There is no "front" of the room in the computer lab; the computers are arranged in a circular fashion. There is a noticeboard but no chalkboard. There are no written notes, and there is no textbook. Exams are conducted entirely on the computer.

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<sup>1</sup> Indeed the current headmaster, Mr. Samuel Bannerman-Mensah, who comes to WESS from Mfantipim School in Cape Coast, notes that the students of WESS have greater access to their computer lab than do the students of Mfantipim. Also, they have one part-time staff person. WESS has two full-time



The computer lab layout

- Games are often an effective way of advancing computer literacy. They should not be discouraged, but rather directed. In particular, text-based adventure games can be an excellent way of improving reading skills and Scrabble® a good way of improving vocabulary.
- No equipment is too old or nonstandard to be usable. Although the lab is seeking to phase out its 286s, probably by moving them to other locations around the campus, they have served the lab faithfully for over a year now. The 80386 and 486-processor computers would be perfectly suited to the lab network, as would Macintoshes.
- The emphasis in software acquisition has been on free software ("freeware") or shareware, even though bootleg copies of most commercial software packages are freely available in Ghana. Ethical questions aside, the freeware and shareware clones of popular commercial products are quite adequately suited to the students' educational needs. This philosophy extends to the choice of Linux as the operating system for the networked lab. Free software is over the long term more sustainable.
- Long-term sustainability requires training of local people in systems administration and basic repair. Ninety-five percent of all repairs--whether it be swapping out a hard drive, cleaning a dirty floppy drive or adding an expansion card--can and should be done locally. By the time the present Peace Corps volunteer leaves, the lab should be able to meet its own systems administration needs, although instructional support will be needed for an additional period.

### 3. Major Accomplishments

*Since the beginning, we have gotten no computers and I wasn't knowing a machine called a computer and because of your kindness, I have known what a computer is.--Rebecca Attaa Pokua*

The computer literacy program began as a secondary project, with one computer<sup>2</sup> in the corner of the Peace Corps volunteer's living room and perhaps half a dozen students. This term has seen approximately 600 students use the lab facilities; 322 are enrolled in classes.

Currently 67 students have personal email addresses, and the capacity exists to add as many as are needed. (A core of about half-a-dozen students use email regularly.) Indeed, when the network is fully set up, every student will have an email address by virtue of enrolling in the school.

A year ago the lab had no operating budget to speak of; this past quarter income (excluding grants) came to ¢4,259,151. There are the makings of a successful desktop publishing business. The lab has two full-time staff and is looking to add a part-time person next term. By any measure, the Technology Training Centre at WESS is a rapidly expanding business.

The path to this point has not been without its pitfalls: aging computers with temperamental hard-drive controllers; 5 ¼-inch floppy drives that fail, and irreplaceable 5 ¼-inch floppy disks that mildew; fans and air conditioners that break down and take months to repair; students who do not always take the best care of the equipment<sup>3</sup>, and who get up to other mischief; and school schedules--early term closures and special activities--that get in the way.

The computer lab owes its present success to a number of factors:

- The support of the PTA, whose members have required some explanation of the importance of computer fees and computer education. Student fees of ¢5,000 per student per term were approved in December 1999 and raised to ¢8,000 per student in May 2000.
- The strong support of both the previous and current headmaster, both in terms of resources and personal involvement. They have clearly seen the computer lab as central to the future of the school and the improvement of its student base.
- The support of students who sink much of their free time into the computer lab, and whose enthusiasm has measurably increased from term to term. The support of masters has, unfortunately, lagged somewhat behind, although the lab is exploring various ways to lure them in, such as requiring them to do their end-of-term reports on the computer.
- The interest of the community. Each week the lab receives requests for community classes which it is not yet, unfortunately, able to meet. The

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2 A 286 computer with VGA color monitor and 640K RAM, running MSDOS 3.0.

3 Most-heard expression in the computer lab: "Don't hit the keys so hard! Press *gently*!"

involvement of the community is certainly essential to the long-term financial health of the lab.

- The support of the US Peace Corps and the various funding agencies, who recognized the commitment already being made by the school.

<i><b>Date</b></i>	<i><b>Activity</b></i>
Late 1997	Original donation of 286s received and placed in storage.
Early 1998	Computer literacy program begins in volunteer's living room.
May 1998	Previous Peace Corps volunteer leaves and current volunteer arrives.
November 1998	HP Apollo 433 fileserver and two diskless clients donated by Academic Computing Centre, Accra.
1 March 1999	Computer lab officially opened by director general Ghana Education Service, who sends the first email message; email service begins.
1 September 1999	Peace Corps volunteer becomes fulltime with computer lab.
October 1999	Funding proposal submitted to Peace Corps Partnership office, USAID and the Canada Fund.
January 2000	Technology Training Centre receives notice of Alpha Group and USAID funding. Lab joins regular class timetable.
12 April 2000	Alpha Group funding received and initial purchases made.
19 April 2000	School purchases one additional Pentium III computer with its own resources.

Development of the computer lab has been driven by three major goals: universal compulsory education; daily lab access; and free email for all students current on their school fees.

### **3.1. Universal compulsory education**

*Without a computer knowledge your education is somehow not well enough.--Simon Bae*

As of the first academic term of 2000, all students of Wenchi Secondary School are required to attend computer classes as part of their regular class timetable. Because of the limited resources, both hardware and personnel, and because of the size of the student body (which has been growing significantly over the past two years), only one form can be taught each term: Form Three students are taught in Term One, Form Two students in Term Two and Form One students in Term Three. Still, every student is guaranteed a minimum of eight weeks instruction per year.

This has led, naturally, to a huge growth in student numbers. In Term Three 1999, when classes were still optional, a dozen students were enrolled. In Term One of this year, 176 students were enrolled. In Term Two 322 students were enrolled. Enrollment next term is expected to be close to 400. Over the course of the year close to 900 students will pass through the lab.

With as yet no network and only two of the new machines installed, instruction has been limited to un-networked 286s running MSDOS 5.0 (the most recent version of MSDOS that will load on the machines). This is not altogether bad, as the greatest need of the students entering the classes is basic computer awareness--the computer will break if you do *this* or *that*; basic typing skills--students who learned to type on a manual typewriter probably have a harder time than students who never learned to type at all; and basic mouse skills--one can spend hours patiently explaining to someone the finer points of how to hold a mouse: Grasp it firmly. Don't lift it up from the pad. Don't run it off the pad. Take care not to get the trackball dirty.

### 3.2. Daily lab access

*Because of this computer I now know how to type some different kinds of papers such as examination papers, writing reports.--Cecilia Kyere*

All students regardless of form are entitled to use the computer lab between the hours of 8 a.m. and 4 p.m., whenever computer classes are not in session. Form One students are required to attend in the company of a Form Two or Form Three student, who is responsible for them. Students are free to use the computers for games, although homework assignments and typing practice take precedence.

Students have made the computer lab a central gathering place on campus. They come whenever their masters have traveled or they otherwise have a free period. At any given time on any typical day during term, a half-dozen to a dozen or more students can be found in the lab, answering email, using the typing tutor or playing a game of Nibbles or Gorilla (two old MSDOS games written in Basic); not infrequently the room becomes filled to capacity, and students need to be driven away. The provision of lab hours assists with identifying the brighter computer students, who can then be culled as possible lab assistants for after they complete Form Three.

Student use of the lab is limited only by the number of functioning computers (the lab is down to 15 of the original 20 286s) and the lack of staff for evening hours. At the moment the lab is open in the evenings only when the Peace Corps volunteer is engaged in other work there. Plans are to hire a part-time lab assistant for Term Three 2000 to permit a regular timetable of evening hours.

### 3.3. Free email

*I am very much delighted to write to you, thereby thereby thanking you for your complex computers donated to be used by our school Wenchi.--Kwasi Nelson Baffoe*

Currently all students requesting an email address and showing some evidence that they will make good use of it are provided one. Students are free to send and receive all the emails they wish, except for very large messages, which incur a surcharge.<sup>4</sup> The lesson on email begins with a discussion of economics: An ordinary letter to the

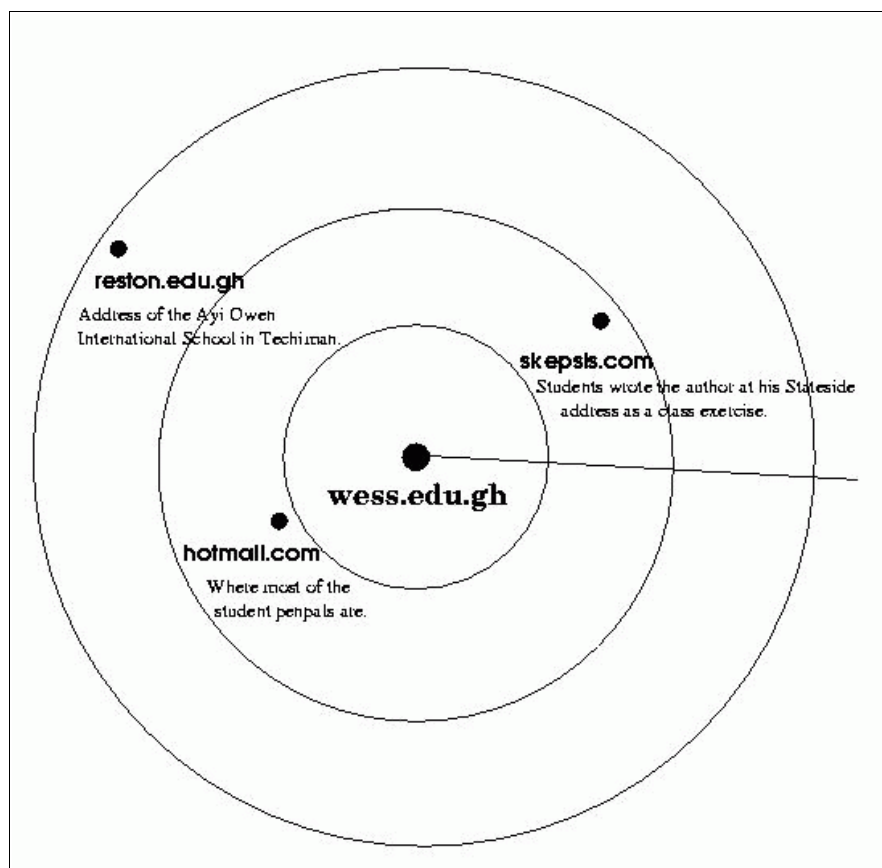
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4 One student sent a request to an overseas long-distance company requesting a free phone. They were uncertain what to make of his message and so sent their entire catalog of services, which came to over 400 kilobytes and took half an hour to download. Unfortunately the current software configuration does not permit refusal of large messages from the Accra server.

United States starts at ¢1,800 and takes approximately two weeks from Wenchi to be delivered. An email message can be delivered in a matter of minutes. The cost of the average email to the lab is minimal--a 1,000 byte message costs approximately ¢15–20 to send, in terms of phone charges--and is well worth subsidizing from the general fund of student fees.

An email exchange between the masters of WESS and Seventh Grade students from school in Buffalo, New York, floundered for lack of sufficient support from the masters and some confusion from them over what exactly was expected.<sup>5</sup> There has, however, been a fair amount of penpal email exchanged between the Buffalo students and the students of WESS (although no one has yet established a consistent, ongoing correspondence). A smaller amount of email has been exchanged with students of Springfield High School in Springfield, Vermont (WESS' partner school through the WorldWide Schools program of the US Peace Corps).

As part of their coursework in the second term of the 2000 academic year, students seeking penpals assembled 48 letters of introduction. These have been compiled and will be forwarded to all secondary educators in the US with whom the Peace Corps volunteer is in correspondence.



**The expanding student email map of the world...  
Which may bear little resemblance to the physical world!**

<sup>5</sup> The masters were to write parables for the students and set questions for them. One of the masters chose to write about female circumcision.

Use of email is limited by the students' command of English--currently over 90% of students fail the WAEC English exams; this author estimates average reading comprehension to be at a grade school level by international standards. Many of the Form One students come to WESS with only a minimal understanding of spoken English. Poor English skills lead to other problems: students sending a dozen copies of the same message or using badly formed email addresses.<sup>6</sup> US penpals may receive messages in barely comprehensible English and so be less motivated to respond.

Students find email addresses and write to people (who often have no idea who the students are or why they're writing) asking for books and Bibles and other gifts.<sup>7</sup> Clearly a basic lesson in email etiquette will become an urgent necessity no later than the coming term. But these are minor teething problems on the whole.

#### **4. Looking Ahead**

*I will try my best to learn hard so that I will become somebody in future.--Lydia Twumasi*

The USAID grant, originally expected for May, should be arriving by August. In addition to providing four more Pentium II–III computers, it will include memory upgrades for the existing computers, network cards, network cable, and uninterrupted power supplies (UPSs), as well as funding for a telephone line extension to the computer lab. The additional computers are to enable the long–delayed initiation of community classes; the telephone extension will allow online Internet access (current access is limited to offline email) when trunk lines are permitting. The hope is for a couple hours web browsing in the evenings.

Once that grant is received, the lab staff will be busy setting up the network, wiring the 286s as dummy terminals and doing the inevitable network debugging. That should leave one term to develop some kind of suitable curriculum for the new network before the current Peace Corps volunteer leaves.

By September the school will be submitting a new funding proposal to install a network in the administration block and transfer student records and billing onto computer. Like some other schools, WESS has had difficulty knowing exactly how much money it has; besides streamlining the accounting process, the network will add much needed checks and balances. The proposal may also include provision for rehabilitating the Science Resource Centre machines.

There exist enough students with the necessary language skills and computer aptitude to justify programming classes,<sup>8</sup> which should begin once the network is wired. The

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6 ...Including Worldwide Web addresses. This is mainly a problem of the current software and should be resolved once the lab is fully networked.

7 Of course the same phenomenon can be observed with "snail mail" addresses. The author received an email message from a friend in Massachusetts wondering why he was receiving a letter from a 16–year–old boy in Wenchu, and how he should break the news that they had nothing in common.

8 One bright student has already expressed interest in learning Java<sup>®</sup>, which will require the author learning the language himself.

current plan is to install a freeware version of the Poplog<sup>®</sup> programming environment from the University of Sussex, UK, which includes an excellent set of simply worded modular programming exercises.

## **5. Conclusions**

*May almighty God bless you with extra knowledge, for you to invent more complicated machines in addition to the computers.--Joseph Lierdong  
Nuonabour*

One of the most frequently used buzzwords in development work today is "sustainability", an understandable reaction against the many unsustainable projects of the past. It frames many of the questions raised about the Technology Training Centre at WESS in particular and about computer literacy in general. When the author was circulating funding proposals nine months ago, several donor agencies expressed concern that computer literacy projects were inherently unsustainable, because of the level of technology involved: the machines would inevitably break down; the local collaborating agency would not know how to repair them and would not have the money to send them to Kumasi or Accra for repair; and that would be the end of it.<sup>9</sup>

Whatever the precautions taken, there remains a possibility that the computer lab will fall apart once the last volunteer has left or external support is ended. Thefts happen; and the future staff of the lab and leadership of the school may not have the same commitment or sense of mission. Various circumstances may change. But compared to the range of development projects past and present in Ghana, the Technology Training Centre at WESS holds its own in its likelihood for sustainability.

There are no guarantees in this line of work. But at least, when the present Peace Corps volunteer has moved on, he should be able to log back onto the computer lab network through the Internet from anywhere in the world and know at a few moments' glance how the project is faring.<sup>10</sup>

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9 One donor agency went so far as to say that computer literacy projects were beyond the current level of technological development in Ghana.

10 The author gratefully acknowledges the support of the headmaster, Samuel Bannerman-Mensah; the lab assistant and systems-administrator-in-training, Solomon Sakra; and the former US Peace Corps volunteer at WESS, Narendra Sheth.