A NEW AGE

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A Model High School Computer Lab

George Washington High School

Denver, Colorado

Dr. Irwin J. Hoffman: In the last 4-5 years, society is waking up to a new age, the information age, it's based on the technology of the microchip and the laser beam and fiberoptics and it's going to change the way we live. And if our students don't get involved in this new technology, they'll be lost. The information age will produce jobs in this technology. Even now if you want to be a typist, you have to use word processing, depending on the microchip. There's going to be cottage industries, where we'll have interviews through fiberoptic telephone lines so that people won't have to travel to conventions. You'll do your shopping through a TV screen and get your books through the TV screen and the microchip technology. And if our students don't understand this, they won't be able to enjoy our society.

Long before the Information Age burst upon us, I was in charge of the math club here, the year this school opened in 1960, and my neighbor was an early programmer for Martin-Marietta. And he came and spoke to my math club about Fortran, which I had never heard of and about computers and what you could do with them. And my students became so excited that we contracted with Control Data Corporation to give us free instruction on Wed evenings and Sat mornings. And so we became, according to the NSF anyway, the first school in the country to offer computer programming and we did it on donated equipment from the Control Data Corp.

Our program at GWHS developed national recognition in several ways. There was an early NSF study by Dr. Gwire from the University of Pittsburgh, where he tried to show what my students were learning to the math convention. He was told that no HS student could learn what we were learning and it would turn off other teachers and he had to abandon his film. He nominated us to the NSF as an outstanding school and subsequent to that nomination we were asked to submit a form showing what we do. The result of this form was natl recognition by the human resources assoc which indicated that we were one of the outstanding HS in the US in terms of what we offer. In fact, our curriculum was published.

One of the major things that gave us natl recognition was a carpool programming, in the early 1970s when the gas shortage became obvious. Our computer program became to popular, the natl dept of transportation distributed it around the country as one of the most portable programs made.

Today all of the high schools in the DPS teach computer programming and most of the jr high schools and elementary schools are getting their own computer. In our school here we're still maintaining the lead we initially had in the country. We have a very extensive laboratory here. We have 20 Atari computers, 6 Apple computers and 6 Vector computers. And we have an assortment of programmable calculators.

The variety of use of the computers in this laboratory is astounding. Naturally, there's the normal work of the 4 semesters in computer mathematics. In these courses, the students learn how to program in Fortran, Basic, and Pascal, they learn extensive mathematics and they learn how to do Random disc access programming. Through the business department, they learn to do their Accts Receivable and Accts Payable and so forth on the computer, and they learn how to type, using the machine as a word processor.

The genl student population comes in to use the laboratory to do their calculus problems. The calculus teacher has his own comp at home and they turn into him instead of homework papers, discs that he examines at home. The electronics students come in and use the computer and the art students and music students come in to use the computer freely. We're endeavoring to find a way to design curriculum units in these fields.

Along with the functions of the lab in the curriculum, we're doing several exciting things. We won a research grant to develop bilingual or ESL lessons, where we bring up translations of the lessons for the students on the computer. The bilingual grant hires our students outside of the normal school day to produce lessons to teach English as a second language. Curt Neufeld is demonstration, using the graphics tablet, how we put the pictures into the lessons.

This is the Apple graphics table. It's a board that allows you to draw pictures on it like you were drawing on paper. Whatever you draw appears on the same time on the TV screen. This is a picture we're using in the project, it's supposed to give students an idea of the word "flew" —this is for people who don't speak English yet. So when we say the world "flew," they'll have a picture to accompany it and they will have a better idea of what we're talking about. The pictures just help the students get along with the computer, rather than thinking of it as a mechanical sort of monster. They can think of it as an electronic textbook.

The graphics tablet is very useful and very flexible. You can see you've got a cursor which shows you were you are, since your picture doesn't' show up on the table. You've got a wide variety of options up here that help you draw, and you have a menu here. This menu will allow you to draw in various colors. Unfortunately, it's only a b&w screen, so we only have b&w. And graphics make the computer more fun. There's software out so you could make something like this that will move around on the screen and it just helps get the point across in programming.

Brian is one of the people involved in writing the bilingual lessons. He is showing you lesson #2. You'll notice the picture on the bottom right, when you answer the question right it smiles, if you answer incorrectly, the face frowns and gives you the right answer. The students who are writing the bilingual lessons are using extensively random disc access and high resolution graphics techniques. They are writing in Applesoft. We do not teach Applesoft Basic. They had to learn that on their own. The Bilingual project has required us to translate, upon request, all of our lessons and their instructions in Spanish, Hmong, Vietnamese and Laotian. Eventually, we will translate the lessons into every language used in the DPS.

The development of the characters of alphabets of these languages proved impossible with the commercial software available. Our two lab assistants, Mr. Branch, an electrical engineer, and Mr. Anderson , a computer scientist, during this summer actually developed the software necessary to develop the character sets in these languages.

Russell Anderson, software specialist: On the screen, in the upper right hand corner, we have the normal alphabet, or those letters we're working on. In the lower right hand corner, we have the Tibetan characters we're building, to correspond to those normal letters. On the left hand side of the screen, we have a grid where we are building and modifying those Tibetan characters. The ones that show up in the lower right hand corner are their normal size. But they're expanded on the grid, so that we can see detail.

Jim Branch, hardware specialist: What we have done is added the ability to a program that normally would draw characters 8 dots by 7 dots. Now we have the ability to convert that to 16 dots by 7 dots.

The bilingual grant for the year 1982-83 is asking us to try to put speech synthesis into our bilingual lessons. That means we are going to try to make the Engl lessons and the translated lessons verbal. To do this, we are going to have to investigate technologies that are just coming on the market in speech synthesis. The present availability of speech synthesis is Engl only and it is not Engl the way we want the students to hear Engl. It is the old Engl you hear on Star Trek, of a computer talking in a monotone voice. And we're going to try to use the new technologies which are coming on the market this year .

Music is a natural for a math lab using computers. Music is determined mathematically. By using mathematical envelopes, you can modulate sounds to sound like certain instrument like a flute or a piano. So students who come in to do music on the computer, see the relationship between math and music . I think it's very fruitful, educationally, to do something like this. Presently students are composing their own tunes, they are investigating musical sounds and changing the timing of music. They're playing with it. And I can't think of anything more useful in learning a field.

Joe Mucker, student: Right now I'm playing a program called Keyboard Organ, and what it does is it allows me to create music by means of a keyboard on the screen. I press the notes on the keyboard; it acts exactly like a real piano. Right now I'm going to play a little selection that I had programmed earlier, called "Twinkle, twinkle, little star." Now that I've shown you that, I'm going to insert this cartridge. This is the Atari music editor, which is known as the music composer. The main screen tells me the subprograms I have to use in order to arrange and compose my own pieces. Right now I'm going to retrieve a song called "My bonnie lies over the ocean."

Hoffman: One of the problems all computer teachers in this country are having — I'm sure the problems these teachers are having involve kids wanting to play games. The arcade games can spill over to these computer laboratories where they can have games. I do

not allow game playing. I do allow game authorship and then I let them play the game a little bit after they've authored the game. The authorship teaches quite a bit.

Curt Neufeld is using the authorship of a game to learn Forth. The Forth language, which is the language we propose to investigate under the Atari grant, I believe is in the vanguard of a group of new languages. It is certainly different than any other language we have studied here.

Neufeld: I started the creative curriculum at GWHS at the beginning of my jr year, and after 6 weeks of reading books on Fortran to introduce you to computing, Doc turns you loose on the computers and you learn at your own rate. I learn pretty quickly, I learned Basic and then went straight into Pascal. After learning Pascal for the rest of my junior year, in my senior year I started some projects for Doc which included the Forth project. Forth is a language which is different from any other language. It allows you to define your own syntax, your own words, it's a language where you build from everything you've done before. You build larger and larger words up to whatever application you want.