

HCLE Virtual Museum – the blog

History of Computing in Learning and Education – when computers entered the classroom

Interview with Bob Albrecht by Jon Cappetta

🕒 2015/07/09 📁 Stories 🔖 aerospace, Analog Computer, Bendix, Billy Basic, Bob Albrecht, Bob Kahn, Burroughs, CDC, DEC, Dennis Allison, Doug Engelbart, Dragonsmoke, DYMAX, Electrodata, Flight Simulator, Fortran, FORTRAN Man, Fred Riss, Gerald Brown, Honeywell, HP, IBM, Jane Woods, Judie Wilson, LeRoy Finkel, Mark Labrun, NSF, People's Computer Company, Portola, Ramon Zamora, Randy Levine, Simulations, SRI, Stanford, UCLA, University of Colorado, Wang, Whole Earth Catalog 👤 Liza Loop on Wordpress

Jon Cappetta: What do you think sparked your interest in computers?

Bob Albrecht: My interest in computers? Well, let's see; it began in 1955. After going to college for quite a few years, I finally quit halfway through a masters degree and went to work at Minneapolis Honeywell Aeronautical Division in Minneapolis. This was one of those places where almost as far as you can see in this huge room were rows and columns of desks and engineers; sitting at them doing things. At first, I worked on analog computers there- REAC analog computers. It was a room about let's see two-thirds the size of this room (20 yards by 20 yards) full of these components and analog computers. You would use wires to hook components together and then you can simulate differential equations. We were working on flight control systems for high-speed jet aircraft. There were other ways at that time to analyze control systems, several mechanisms' feedback control systems. Then upstairs they got an IBM650 computer, the upstairs where I hung out and worked at my desk. One day my boss called me in, I have only been there for three or four months, and he said that he would like me to go upstairs and learn how to use that computer. Once I learned how to use it he then wanted me to spread the word down where we were. So that was my introduction to computers, an IBM650 drum computer. The memory was a drum that would spin. We used punch cards for input and such. So that was my introduction to computing.

Jon: How did this introduction affect you?

Bob: I liked that so much better than the stuff I was doing before, and after about a year I started looking around for a job in the computer industry. And, at the time, I especially wanted to go live in Denver because I loved skiing. I got married during this time and also had a child.

I went to a conference, a computer conference at UCLA and then on the way back there was another computer conference in Denver. So I stopped in Denver and I met these guys from a company – from Burroughs Corporation. Burroughs had just acquired a computer company called Electrodata which was based in Pasadena CA. The Oakland office was recruiting, I interviewed and I ended up being Burroughs' first person in Denver. They had a couple computer installations there. My title was called sales technical rep where I did sales support and also programming. So I stayed in Denver for a while, left Burroughs, did a little consulting, went to work in the aerospace industry at Martin Denver in a math think tank that had various kinds of computer stuff along the way — many different computers in fact. At that time the small computers were all drum memory. This is so much more powerful (picks up iPhone)

than those computers were back in those days. The Burroughs205, used when I first went to work for Burroughs, is iconic. In old episodes of Batman you will see the console because they had lots of blinking lights and so it was the Bat-puter in those early Batman episodes. After that I joined Control Data in Denver — back when Control Data was pretty small. I then transferred to Minneapolis and worked at Control Data in Minneapolis for a while. Around the early 1960s or so I quit, dropped out and began doing a little consulting — and by that time I was traveling all over the country to teachers' conferences giving papers and running workshops. When BASIC came along in 1964, by that time I was already running a course for high school students. So I started teaching high school students Fortran Programming in 1962.

Jon: Can you further elaborate on your experience of teaching and computing in the early 1960s?

Bob: So, in 1962 I began to teach high school students. Some of whom are well known now such as Randy Levine and Bob Kahn, both of whom were in the first group of students that I taught Fortran to in the Control Data office. I talked the University of Colorado Denver Center into going for a National Science Foundation grant. Control Data then provided a 160A, which would run Fortran paper tape, punch a paper tape on flexi readers and feed it in. So we ran that. My students were the teachers; so, they taught students and teachers in the evening classes under this NSF grant. I wrote about these kids in Datamation magazine in about 1964 and the article I wrote was called a Modern Day Medicine Show. We picked up the 160A moved it into George Washington High school and for an entire day my students ran demonstrations for different classes that were brought in. Similar to an old fashion medicine show of some guy standing up there trying to sell phony medicine, it struck with me, that this was like this with my students as the barkers. (Students including Levine and Kahn, and Fred Riss whom, I believe, eventually became a vice-president of Research at IBM.)

Jon: Let's talk about your campaigning for BASIC.

Bob: Well, this was in the day of time-sharing systems, so the only access to BASIC at that time was by a time sharing system. BASIC was created by Kemeny & Kurtz at Dartmouth, as an open lab tool for any student on campus at Dartmouth. Kemeny is a famous mathematician and I believe he was the President of Dartmouth at the time, so they created this language called BASIC. They wanted to enable students in fields other than science and mathematics to use computers. At the time, nearly all use of computers required writing custom software, which was something only scientists and mathematicians tended to learn. I said that's it! No more Fortran, so I started traveling all over the country crusading for BASIC.

In Minneapolis I worked for a while towards a PhD in behavioral psychology; and I just wasn't PHD type, I think. But during that time I taught the teachers at the University of Minnesota High school, which was on campus at UoM. At this time, BASIC had come along and I was sort of touring the country with the National Counsel of Teachers of Mathematics Group called the Computer Oriented Mathematics Committee. The Committee had six members. So we would meet every so often at educational conferences and we wrote a couple of booklets published by NCTM. We decided to write an introductory booklet, a little thin booklet about computer languages suitable for the teaching of mathematics.

Some people in the NCTM lobbied the booklet to incorporate Fortran, and I lobbied, ranted, and raved for BASIC. By that time I had made big buttons that said SHAFT (Society to Help Abolish Fortran Teaching), also I made SHAFT business cards, so I was crusading all over the country for BASIC. We voted and it was 5 and 1 in favor of BASIC. We wrote a little booklet, we wrote most of that booklet in a

conference in Miami — wrote a booklet called Introduction to an Algorithmic Language — BASIC, so that was my first BASIC effort.

One day, a member of Addison Wesley Publishing Company tapped me at one of the conferences and gave me a contract to write a book for teachers and high school students on BASIC. So I worked for a while on that book. Although I grew up in Iowa, went to Iowa State for a couple years than UoM — as you may know, Minnesota is kind of cold. My publisher was in Palo Alto [California]. And then one December, 23 days of below zero weather, I said to myself: “Why am I writing this book here in Minneapolis for a publisher in Palo Alto? Why don’t I move to California?” So I did. I moved to California, to San Francisco, and continued to write the book. Took me about three years to write a book I could write in six months now. That was my first big book, it was called Computer Methods in Mathematics. It was mostly about BASIC but they required me to throw a little Fortran in at the end of the book.

Jon: What discoveries and adventures came next?

Bob: Well I piled everything I owned at the time — I was single now — in my Volkswagen bus and drove to San Francisco. Lived in San Francisco for a while, wrote the book (Computer Methods in Mathematics) with lots of programs and some pretty complex programs and I mostly did not have access to BASIC — to a time sharing terminal. So I sat down and hand executed them, and fortunately almost every program worked later on when they were checked. I lived on Lombard, the most crooked street in the world, in the house on the east side at the top of a street. It was several stories and I was in a two story flat with a friend of mine. Every Thursday evening I would run computer programming, wine tasting, and Greek dancing parties. A guy named Dick Raymond came to one of these. Dick told us how he had an idle, non-profit corporation that isn’t doing anything right now, and this looks like something that might be fun to do. So I moved to Menlo Park.

Portola is a very important part of this story. Dick and I started cranking up Portola Institute. Now I was still going around to a lot of educational conferences, especially California math counsel teacher conferences, at the time. I was being quite successful in talking some of the early makers of programmable calculators into loaning me equipment. So I would load up my Volkswagen bus with equipment I borrowed from various places — now I was also able to borrow equipment from DEC [Digital Equipment Corporation] as well as Hewlett-Packard. I would borrow mini-computers and I could carry one, but it was fairly large. I would load up my VW bus with equipment and go to University of California campuses and teach a weekend course on BASIC, and Bob Kahn went with me a couple of times.

Leroy Finkel was one of the most influential people in the early days of computers in education. At Portola our little group was called DYMAX, which came from dymaxian world of Buckminster Fuller. This was in the heyday of the counter culture movement. All kinds of interesting things were going on in Menlo Park, including the Mid-peninsula Free University 2848. There were a thousand or eleven hundred people either giving or taking free classes through the MFU. This is when **Doug Englebart** was doing his magic at SRI, so we quickly accumulated a few, somewhere between bright and brilliant, high school students that started coming in to use all of this equipment that I got on loan. They were amongst the early hackers — hackers in a good sense. We then caught a contract from Hewlett-Packard which had come out with its first programmable calculator. I think it was called the 9600 and it was about the size of a typewriter and programmed in Reverse Polish notation and it was the forerunner of, eventually, the hand-held HP calculators. At the same time there were several other programmable calculators that were coming available. One interesting programmable calculators was the Wang, which had a box about, oh, so big

(6 in. by 12 in.), four hardwired calculator terminals, so it was programmable. Of course they had all the scientific operations that you might see on today's calculators. So this money provided enough income for Portola to begin to expand a little bit.

Jon: What were some things that came out of Portola?

Bob: One of the things that happened was — is — Stewart Brand came to Portola and set up his group which eventually produced the Whole Earth Catalog. So Portola is best known for Stewart's work. My little group eventually split off. We went and found a cheap warehouse in Redwood City and set up there. We had a couple of PDP-8 computers on loan. The PDP-8 ran four terminals with BASIC using high-speed paper tape input, 10 characters a second and high-speed printer output — Teletype model 33. So various people came drifting in to use this equipment: Mark LaBrun, Tovar, Jane Woods, and others. That's when I wrote My Computer Likes Me. I wrote it. But people like Gerald Brown and Mary Jo did such a beautiful job of pasting it up, laying it out, that they contributed tonnes to this, *tonnes* — that is t-o-n-n-e metric, I'm sort of a metric evangelist. Then, one day, wandered in to our place in Redwood City, DYMAX, was Judie Wilson from John Wiley & Son's. She asked us if we would like to write a self-teaching guide. Now Wiley was just beginning to start these self-teaching guides that were initially linear Skinner programs. Linear Skinner programming is a system of self teaching developed by B.F. Skinner, the behavioral psychologist. Other people began behavioral psychology but B.F. Skinner was the great popularize. A linear Skinner program is a book consisting of frames. A frame might be informative and then immediately followed by a question or an exercise or something for you to do to write in the book, which is then immediately followed by the answer. So you go down, frame by frame by frame, with constant reinforcement. Then, at the end of the chapter, there is a self-test with answers. So we started writing self-teaching guides for Wiley and that continued for a long time, for years. So Leroy Finkel and several other people eventually fit in to DYMAX as co-authors of books of this type.

Around 1970, we moved to Menlo Park on Doyle St. Me and Dennis Allison started doing things initially as DYMAX, there on Doyle St., and I got a great urge, inspired by the Whole Earth Catalog, to do a periodical. In 1972 Leroy said we could do it if we can do it cheap. So that is why we did the tabloid newspaper — the cheapest way to publish a lot of stuff. So I decided to call it “**People's Computer Company**” in the same spirit as “Big Brother and the Holding Company”. See Big Brother and the Holding Company was not actually a holding company. People's Computer Company was not a company at the time.

Jon: Tell me more about People's Computer Company. What were the main objectives?

Bob: We didn't really think about objectives, we just did things as they occurred to us.

October 1972, first issue of PCC: by that time we were doing all kinds of fun things — like Wednesday night potlucks where we would make our computers available to anyone who came, and I tried to teach Greek dancing and stuff like that. So that was the first issue of PCC which became a six times a year periodical. It's frequently referred to as a quarterly in some of the current online stuff, but it was six times a year. First issue October 1972 was, what, about 16 pages, tabloid. Mark Labrun drew the cover and I put the stuff at the top about computers being used against people. So that was the beginning of PCC, the newspaper, the periodical. Then Dennis and I, Leroy, and some others decided to start a non-profit corporation called People's Computer Company. Now we had PCC the periodical, and PCC the non-profit educational corporation. So this was in the early 1970s and during this time and a few years there after, Leroy and I, Bob Kahn and others continued to load up all of the computers and go to educational confer-

ences where they would give us a space. The California math counsel conference was held at a [Asilomar](#) every year and Asilomar has all of these wonderful little buildings. They put us in a little octagonal building and we just ran open workshops all day. If the conference doors were open we were open. We would — when we would be doing a presentation [this] allowed us to talk about this or that. And, of course, what we were showing was BASIC and programmable calculators like the Hewlett-Packard and the Wang [calculators] or whatever else we could borrow and take to this thing. We started writing lots of material so that people could teach themselves how to use all of this equipment and of course most of our work was done on the context of the teaching of mathematics.

Jon: What came next?

Bob: Now it was about 1972 or 1973 and I stayed on as editor of PCC, the periodical for the first five years. I then created Dragonsmoke — it was my page or sometimes two pages in PCC. Basically this page was whatever I felt like putting in, so that's why I called it Dragonsmoke. This was an 8 1/2 by 11 thin periodical consisting of a mish mash of computer and computing related information.

During that time I began the move to create the Community Computer Center. We rented the space next door. My group eventually moved downtown in Menlo Park. PCC, the periodical, was produced by PCC, the non-profit corporation, and Community Computer Center set up its very own non-profit corporation that remained on Doyle St. Of course during all of this time we were writing books. From 1969 when Computer Methods of Mathematics was first published until 1996, I was author or co-author of about 33 books. Most of the books about some form of BASIC, up to and including visual BASIC, but also other things like Ramon Zamora and I wrote a shareware book. The shareware book was 768 pages, a big thick book on shareware word processor and spreadsheet and, I think, a drawing program. Ramon and I wrote a book, a little tiny book, on Excel. So we kept on writing books and brought in other authors. I think something like 10 or 11 people wrote their first book as my co-author and then they would branch out and write their own books. Jerry Brown wrote a beautiful book. Jerry started as a co-author on our first Wiley book called BASIC a Self Teaching Guide. Then he wrote a beautiful book later on his own called Instant BASIC. Jerry was a graphic artist and video artist; he had a huge collection of talents and skills. I have no idea of how many of his copies sold but I hope a lot of Instant Basic. He would do the whole thing — he wrote it, did all the graphics, laid it out, pasted it up and everything, and sent it off to a publisher, and it got published

Jon: What was it that made you see the potential in the concept of education through computing?

Bob: What got me into that was when I taught Fortran to those high school kids. I said, “Wow this is so much more fun than anything I have ever done.” So because of that — and word started getting out — I was then invited to lots of teachers conferences, mostly math teachers. There were also a few beginning conferences about data processing and computing which eventually led to the huge conferences that exist today, but these were smaller conferences. So I was still with Control Data at the time and Control Data acquired Bendix Computer Division. Bendix had a computer called the G-15. The G-15 is about the size of a Coke machine with a typewriter input and output paper tape — input and output. Later on they had some [magnetic] tape drives for the G-15. Well, Control Data wanted to sell these G-15s to schools, very cheap at the time, although it was kind of a trap because you needed access in the same town to an engineer in case it broke down. So I got involved with G-15s. I would travel around to an educational conference, computer conference. I would go in two days early and Control Data would ship a G-15 in and I would teach 10 or 12 kids and help these kids teach themselves on the G-15, the language called Telecom. So I traveled around the country with a G-15 and then these kids would put on a show. They

got out of school for this. They loved it and every kid would produce an interesting program, typically related to mathematics. They would then demonstrate that program to everybody who wanted to see it at the Conference. Later on, at the Association for Computing Machinery meeting in Denver, my high school students: Bob Kahn and Randy Levine, those guys were set up by Control Data on the exhibit floor and they spent the entire conference demonstrating what they had learned about Fortran. ACM at that time did not like this. They castigated me. They dissed me for having the audacity to teach computer programming to high school students. At the time they thought they should teach computer programming only. Also, they felt it should be taught only at the college level. A couple of guys would get on my case because I was using BASIC instead of something like APL (a computer language that uses Reverse Polish notation).

Jon: How did Fortran Man come about?

Bob: Fortran Man was done by two guys. They were classic nerds or geeks if you will. They were so clever it was terrific. One lived in Chicago and one lived Milwaukee. On one of my trips I made it a point to visit them and talk to them. They were just classic nerds and I wonder where they are today or if they are even still alive. As Fortran Man grew it became graphically better. I think Ann, Mia, or somebody on the PCC staff started re-doing their work and it really looked beautiful. Not only Fortran Man but Billy Basic too. Billy Basic came in later and it was sort of like the dynamic duo so it was Fortran Man and Billy Basic. The best thing to do about Fortran Man is just for you to sit down and read all of the episodes of Fortran Man. It is beyond me to describe, it was so much fun.

Jon: What was your favorite experience in People's Computer Company?

Bob: We became a focus for a lot of activity during these early days of computers in education. Then, of course, I loved traveling all over California and teaching weekend courses. We typically get around 30 teachers to attend the courses. These courses were called "Computers in the Classroom 1 and 2". Two different courses two credits from the University of California extension. Teachers could use these credits to lobby for pay raises, and the other courses were called "Games Computers Play 1 and 2". Whenever we went to teach somewhere we ran all four concurrently, so if you have taken Computers in the Classroom 1, you can sign up for 2. If you have taken Games Computers Play 1, then you can sign up for Games Computers Play 2. There was virtually no structure, the instructors, usually two of us, would wander around and help people play games or if they wanted to learn to program we would give them teach yourself set up materials so they can start teaching themselves how to program. Sometimes we would wander around and say: "For all of you people who crave structure we will be in the lunchroom at 1:00 for an hour to have a seminar if you want to come." And a few people would come and some wouldn't. Some would just continue working away. We also asked these teachers to grade themselves because I was not a classroom teacher in a normal sense. A lot of teachers intensely resisted grading themselves and practically begged us to give them a grade. So I have no idea of how many of these we did, but it was a lot of them. We taught a few at Lawrence Hall of Science (UC Berkeley), UC San Diego, UC Riverside, UC Santa Barbara, UC Davis, and we even ran one course at the airport in San Mateo. We traveled to almost all of the campuses of the University of California extension and ran these courses.

Well, all of this happened because I began teaching kids how to program, and I liked doing that so much that it sort of just took over my life. Almost everything that was going on was related in some way to helping kids teach themselves. I don't like to say that we are teaching, I like to set up environments in which people can teach themselves with a little help. That is why I write 'teach yourself' instruction materials. I wrote teach yourself books so that people who did not have access to a computer teacher could

use these books as an alternative; so all they need is access to a computer that ran BASIC and they could teach themselves how to program. It was really fun. I loved Wednesday evenings because all of these interesting people would come in and they would play computer games; especially when the computer center was set up next door. So, we had these two places; we had so many things going on at the same time.

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