SHARING YOUR COMPUTER HOBBY WITH THE KIDS

author: Liza Loop

Abstract

This presentation is a discussion of several practical suggestions on preparing and delivering demonstrations of home computer systems to groups of children. Topics include: How to contact a school or kids' group, the composition and character of various groups, material I have found appropriate to each group, on-going projects you may want to set up after your initial presentation, and a few hints on how to insure a successful presentation.

SHARING YOUR COMPUTER HOBBY WITH THE KIDS

Computer hobbyists are accomplished learners. We have bootstrapped ourselves into a position of expertise in the field of electronic computers. We have technical know-how and we have equipment.

Many of us share our enthusiasm with our own kids and a few neighbors. But what about the rest of the kids whose parents aren't computer freaks? Many of them would get a kick out of hobby computing too. As you probably know, kids of all ages take to keyboards and controllers like the proverbial ducks take to water. They seem to know instinctively that it is their job at this point in their lives to master the tools of their society. The way things are going, every home, office and plant will make use of these electronic tools in the near future.

Unfortunately, few schoolteachers or scout leaders have either the know-how or the equipment to allow their charges to access computers. Many teachers can't even allow access to the most exciting kind of learning – that which grows out of our own curiosity, searching, reading, experimenting, building, and sharing. You and your homebrew computers are the key for hundreds of kids to discover the same joys (and agonies) that you yourself have gained from your involvement with your hobby.

Imagine yourself at the front of a classroom of twenty-five sixth graders. You have just spent the last fifteen minutes setting up and booting your system amid questions about how it works, whether this is the computer that sent that nasty note from the phone company, and where is the robot. The teacher has gotten the kids all seated and reasonably quiet. It is your turn to speak. What should you say? How much can they understand? What information do they want or need? I'd like to share with you some of the things I have discovered in two years of presenting small computers to groups of children between five and fifteen years old.

Many of you know more about electronics, programming, data processing, and automated control than I do. But teaching children (and many adults), especially in groups, is very different from studying technical material on your own. I hope I can encourage those of you who hesitate to share your hobby with the kids by giving you enough pointers on teaching to get you going. For those of you who have already started to demonstrate your systems to children's groups, I hope you can use some of my ideas to make your presentations more successful for both yourselves and the kids.

How to Contact a School or Kids' Group

The most difficult thing about finding groups to talk to is that it involves several "cold" telephone calls to strangers at strange institutions. Most adults find the world of schools and children's organizations very remote from their present day experience. Even

seasoned parents are often intimidated by these institutions. Just finding a local school to contact can be a frustrating chore. Try the phone book under Mycity schools in the white pages for a start. If you are directed to look under the name of the individual school, don't give up – most cities have a Mycity High and the nice lady in the office there can give you the names of the other high, junior high, and elementary schools in your vicinity. Explain to that lady that you have a presentation on computers and you would like to contact the President of the P.T.A, as well as the math, science, electronics, business, and vocational education departments to see if any of their teachers would be interested in inviting you to talk to their classes. Assure her that you are a public-spirited citizen with nothing to sell. You just want to share your fascinating hobby with the kids and teachers. If possible, get the names and numbers of all these individuals and try to contact them by phone. Teachers may not be able to take a call during school hours so be prepared to leave word for them to call you back between 2:30 and 3:30pm. When your reach the teacher or P.T.A. Mom, tell them without ONE WORD OF COMPUTER JARGON that you have built your own small computer and you would like to bring it to school to show the kids. Briefly describe your presentation (we'll talk about that in a few minutes) and when they sound confused say that it will make more sense when they see it. If the person is hesitant about turning you loose on their kids, it helps to offer a pre-session for the faculty or parents. This will also pay off because you can then keep the grownups from hogging the terminal during the kids' presentation. (An intriguing computer game can make the most conscientious teacher forget his role!) Finally, set up a date and time. Be sure to get exact directions to the classroom you will be visiting including access from parking lot and number of stairs to be negotiated. Also warn the teacher of your needs for tables and electrical outlets.

My class presentations are always short, and, from a hobbyist's point of view, totally without real details on computer hardware or programming. No matter how simple or entertaining you try to be some kids will get bored. Forty-five minutes is about as long as you can ask a class o sit down and pay attention. Fifteen minutes of talk with unlimited hands-on is usually very successful.

If at all possible, arrange with the teacher to move your system to an unused room after your formal presentation. The hall, the nurse's room, or the principal's office might be available. There you can entertain the enthusiastic kids sent to you by the teacher in groups of three or four without the hecklers who were bored earlier. If you are a beginner at working with kids you don't need to try to learn to control a class of thirty-five active children right away!

Try to leave yourself plenty of time after your presentation just in case someone gets really hooked right away and wants to stay after school. Be sure they call home for permission to stay if you don't want their parents to oppose their new interest from the start. Also it's nice to reserve some faculty time without kids around so that the teachers may let their ignorance show without blowing their image in front of their students. That will happen soon enough anyway.

Other children's groups are similar to schools. Try Boy and Girl Scouts, the YM/WCA, Mycity recreation department, Teen Clubs, Ham radio clubs, etc. It may take some

perseverance to locate the names of the leaders of these groups but ask your friends, work colleagues and neighbors. When you contact the schools ask about what special interest clubs there are on campus. Also, ask to be put on the speakers list for each school. When the other teachers hear what a hit you are they will want to invite you to their classes too!

Composition and Character of Various Groups

What you can present to any given group of children is very much a function of who the people in the group are. I would like to refer to groups of kids by approximate age but that can be very misleading. An eight year old Model Rocket Club member may follow you into the rudiments of assembly language programming in an hour and a half. A high school class called Introduction to Business Machines, on the other hand, can be bewildered each time they must push the carriage return. Therefore, please consider my references to age groups as developmental stages and remember -- physically adult bodies often hold minds with five year old skills when it comes to computing. Also, don't expect most groups to be preselected on the basis of interest in computers. After all, it was the teacher, not the kids who invited you. Occasionally you'll be lucky and get a class full of interested and intelligent people but a wide spectrum of attitude and ability is more common. Success is three or four enthusiasts, not all thirty.

Let's take a look at kids by age groups – starting with the youngest, five and six year olds. (Kids younger than five love computers too but they are awfully difficult to work with in groups.) Most fives can count to ten but are hazy on what "greater than" and "less than" mean. They can probably type their names, very slowly. Don't expect them to be able to read. Fives like noise and pictures, joy sticks (1) and turtles (2). They often come up with original interpretations of your instructions and it may be difficult to dissuade them from experimentation. In other words, if there is an exposed switch on your system, they'll push it. They will not be very good at watching other kids but if you have prepared some tasks which are truly at their level they may demand a thirty minute turn each. In short, five year olds bear a strong resemblance to several computer hobbyists of my acquaintance.

I have found that chaos can be avoided by asking the teacher to start some favorite activity on the other side of the room after you have let everyone see the inside of the computer and printed "Bunny." The teacher can then send you kids two at a time. Let each one play one short game and write one story. Take the names of those who don't want to stop and let them come to the nurse's room later for another, longer turn.

Seven, eight, and nine year olds (2nd and 3rd grades) are into reading short texts and can handle four function arithmetic using whole numbers. Occasionally I am appalled at their total lack of logical ability. This has nothing to do with the intelligence of the children themselves. Rather it reflects whether or not thinking is considered a valuable skill in their school or home environment. You may be the first person who has

ever suggested that these children reason for themselves. Of course, you may find you have stumbled onto a lively group of reasoners whom you are hard-pressed to keep up with.

Ten, eleven, and twelve year olds (4th, 5th, and 6th graders) begin to show definite differentiation into intellectual versus non-thinking patterns of behavior. This is an exciting age to introduce to computers because a bright ten has all the mental apparatus needed to understand electronics and programming. Furthermore, he usually hasn't discovered the distractions of puberty yet. The non-thinking kids of this age are often still open to learning techniques of problem solving and logic. Computer games may be the spark they need to reawaken the excitement of learning and exploring. Average kids at this age may not do anything beyond blink lights. The bright ones will be bored because they want you to go faster and show them more. The non-learners will continue to sit in the back row and throw spitballs. Be especially alert for the child who seems painfully slow at reading or responding but who shows a lot of interest or perseverance. I keep hearing successful engineers mutter, "My God, where would I be now if I hadn't discovered electronics when I was eleven?"

By junior or senior high school age the division between thinking and non-thinking students has become more entrenched and more subtle. The thinkers may be divided into math, verbal, artistic, and human relations specialists. The non-thinkers may have areas of mastery such as playing a musical instrument, but they conceive of themselves as basically unable to understand what you are saying to them. Many people pretend to fit these classifications throughout adolescence and adulthood. Don't buy their line. The smart ones are rarely the geniuses they would have you believe. Some of the others are merely disinterested so they play dumb. The rest are likely to appreciate it if you start at their level and let them proceed at their own place. Don't judge them by your own standards. Everyone can learn under favorable circumstances.

High schools are already full of computer freaks waiting to be discovered and welcomed into the fold of computer hobbyists. If you tap into one of these goldmines in a math or electronics class you can really go to town. Show him or her every bell and whistle your system can muster. These kids will stay up all night trying to figure out what you said. Let them know that you are willing to share what you know with them and you can count on them to show you how you how to teach. Non-computer high school students can be viewed either as younger kids or as adults depending on their social maturity. Remember, they deserve just as much care as the ten year olds even though you may not find them as rewarding to work with.

I usually have my "little kiddy" material available when approaching adults. Adults think they ought to know something about computers but most often their knowledge is full of gaps and misconceptions. On top of this, adults are often just plain afraid of machines. If you tell them you are going to start with your kindergarten presentation they will probably giggle about what a good idea that is and relax a little. Later they will come up with thoughtful questions about real world applications of the systems like yours and their effect on economic and social conditions.

The reason I dwell on the characteristics of the audiences you are likely to be working with is that I believe they are all made up of potentially intelligent and enthusiastic people. My negative descriptions reflect only their degree of "turned-off-ness" not their mental capacity. Because "computing" is a new field in which most of us are beginners, every kid has a chance to grow and explore within it. You may turn someone on with your presentation and serve as a model of the kind of person he or she would like to become. In this new and unexplored field, everyone is a little bit stupid so no one needs to feel inadequate.

Material I have found Appropriate to each Group

The specific content of your presentation can be largely the same for any group except the high school computer freaks. How you present that material, how much you can cover, and what reaction you expect from each group changes immensely. Of course, your hardware capabilities have great bearing on what you can show.

If you have just a computer on a board with no games, I would stick to those groups that have expressed interest in computer hardware. If you have a terminal and three or four games you can access you can probably prepare a demonstration for anyone.

I always take the cover off the computer and show everyone the chips and PC boards. Little ones just look. From about eight years old on up I explain IN OUTLINE ONLY how chips and boards are made. Putting in IC under a microscope is fun too. Then I spend a few minutes with the concept of a system – here's the terminal, the CPU with arithmetic, logic, and control, and the core memory. This is the computer's magnetic note pad (we call it a tape recorder) where it writes down the rules to each of the games it can play. If you have lots of time you may want to bring along some useless boards and some soldering irons. Taking boards apart and randomly reassembling them is a good manipulative task for upper elementary and junior high kids.

If you have rigged your machine with a speaker and music program (3) this is a good time to show it. Most people do not have a clear idea of how a speaker works so you will have to explain the whole thing. Watch out for incomprehensible words like "square waves" and "frequency".

After this short hardware orientation I plunge right into computer games. Most kids will spend between twenty and forty hours playing games if given free access to a library like 101 Basic Games (4). During this time they will greatly improve their reading and interpretive skills (if they can't con someone else into doing all the reading for them). Their logic will acquire a new degree of sophistication. In a group setting where they must take turns at the terminal and explain games to their peers their social skills grow

rapidly. Even during a short school visit you can see the seeds of these changes begin to germinate.

I start everybody out on “Guess My Number” (5) because how they approach the game gives me a clue to the level of the group. If no one discovers the binary search, I can forget about introducing programming in this first session.

Fives will enjoy Guess between 1 and 9. Show them the numbers on the keyboard and make sure that they see that “too high” means choose a number farther left and “too low” means choose a number to the right. A six to ten line “Story” program (6), which asks for their name, favorite food, color and playmate, then types out a short story will be a hit, especially if you have hard copies to let them take home. Snoopy’s and Bunnies (7) are good too but print out one for each child before you arrive at the school and just use the teacher’s copy in class. Very low-skill real-time games may work for fives too. Pong is too difficult for many of them but Race Track (8) used as a maze instead of a race is fine. Sharp fives may also be able to play Diddle (10) on an Altair front panel. Of course if you have graphics you can keep anyone amused by generating patterns for a while.

If you have an ASR33 Teletype you may find that this is more interesting to your younger groups than the computer itself. They love the noise and rarely have had much chance even to type on an electric typewriter. The paper tape will introduce the idea of coding and the kids will love to punch secret message tapes and read them back on local.

By the way, many schools have closed circuit T.V. If your CRT is small or you are using a TTY for output it’s nice to hook up a simultaneous display on the school’s large monitor. This eliminates a great deal of pushing.

The same material is equally good for seven to nine year olds. If you have time you can introduce another game or two to them. Unless your group is used to playing competitive games, they may have trouble comprehending that they are supposed to be developing skill at solving the puzzle presented by the game. Many of my students find it sufficiently satisfying to get the answer at all. I sometimes have a hard time convincing them to play the game again, trying for a better score. They seem to view the computer as a competitor rather than as a game board on which they play against the programmer. If you have two-person games available you can make this point a little more easily.

I like to introduce programming to these kids by talking about giving instructions. A neat demonstration is to have the kids tell you how to make a peanut butter and jelly sandwich while you are blindfolded. Have all the ingredients ready on a table in front of the class. You start by choosing an instruction set with the kids. Try: move arm up, down, right, left, forward, back; grasp object touched; rotate hand, palm up, palm down. Then let the kids call out instructions to you until you get the sandwich made. The final test is to write down the instructions on the blackboard, then bring in a new person and see if he can accomplish the task blindfolded if you read only the words on the board. If you are lucky the kids will begin to see how much pre-programming they bring to a task and how “simple-minded” the computer is.

Some of these kids may be interested in going on to simple Basic Language programming. Print, input, and if-then will let them write math quizzes, using impressively large numbers. However, unless you are working with a special interest

group or “gifted” students you are not likely to get past the game playing stage. I’ve seen a kid play Tic-Tac-Toe (11) for an hour a day for four days. He didn’t even want to change games until he had this one mastered. You see, he wasn’t just playing Tic-Tac-Toe. He was reading, typing, learning to operate the computer, and manipulating the social situation which provided the computer access all at the same time.

Intermediate grades (ages ten to twelve) are likely to begin to show an interest in computer applications and simulation games. Any of them will thrive on logic games like Bagels(12). They can also handle real time games with considerable skill. Running out of time is my biggest problem with these kids. I have enough projects lined up in my computer awareness curriculum to visit a classroom at this level once a week for the whole school year. In the first visit, though, it is show the hardware, play two or three games, talk about what a program is and mention some real world applications like banks, point of sale, and school registration.

When you face your first junior high class you are going to have to decide whether your objective is to “teach something” about computers during your first visit or just let the kids have fun. I tend to choose the latter since I know that they will search out “hard” information once they are hooked on computers. I flesh out my games with Hamurabi (13), or Hunt the Wumpus (14) and bide my time until someone asks about programming. Often you will get inquiries about building home systems like yours. These kids don’t usually have much money so one graphic demonstration is to have your system configured so that you can tear it down to a bare bones kit in front of them. This is what you can get for $500. This is what you can do with it. Add this $200 board and you can do this. Continue adding parts and money until you are back to playing Hamurabi. This can be a discouraging demonstration but it is realistic. Hopefully, we can save them some of the heartaches we experiences in our naïve beginnings.

And now on to high school. Many older teenagers already know some electronics and/or computing. Those who are interested will benefit from elementary discussions of hardware and software configuration. The non-computer kids will need the same soft introduction you gave their younger siblings. If you are interested in on-going projects with kids and computers, get the high school kids on your team right away. The can serve as assistant leaders for younger groups and can often manage the organization of their own clubs with you as a consultant. Discuss your project ideas with them during your first visit and let them know that there will be plenty of time for playing computer games later.

On-going Projects

One forty-five minute show-and-tell session on homebrew computing is likely to yield two or three candidates for some form of continued contact with the machine. The younger kids will be basically interested in a chance to play more games. Remember that twenty to forty hours I mentioned earlier? Their teachers may see the potential for computer-aided instruction or a continuing class in computer literacy. Unless this is a field pf particular interest to you, you will probably want to serve only as an advisor to a

teacher or parents group to help bring those about. The advisor role is crucial to the success of such a project. However, the leader of this endeavor is going to have to dedicate many hours a week to make it happen. An on-going, in-school project will involve obtaining space in the school to house the system or terminal, supervision in the computer room during and after school (if you don't have after school hours the kids will break in and use the machine anyway…), planning a "curriculum" which sounds convincing to "educators", arranging for financing the whole package. It takes a coordinated effort on the part of one or two teachers, a few students, a sympathetic administrator, and someone who knows quite a lot about computers and programming – maybe you.

Perhaps you would be happier tackling a slightly smaller project? Scout troops offer a merit badge in computer science. If you are willing to be their resource person you can help a lot of kids get a foot in the door without making a major commitment of time and energy.

You may find you have the makings of a computer games club or an after school class in programming, which could meet at school or at your house. (Moving your system can get to be a drag after a while.) Since the equipment is yours, you get to call the shots on how often the club can meet, where, and whether there will be dues to maintain or expand the system. If this is to be a school-sponsored group, be sure to check with the principal about rules, regulations and use of school property. You will probably need a faculty member to co-sponsor the group although that person may not have to attend every meeting. If you form a non-school related club – make sure you contact the parents and explain your plans to them. Be clear about what you are willing to offer so that the club is fun for you and not just a pain in the neck. You need not institute a formal organization with constitution and by-laws, but a one pager explaining your purpose, who is invited to join, and what members responsibilities are will avoid confusion and possible hard feelings later.

Those of you who love hardware will get a kick out of getting together with the kids who want to build their own systems. You can teach them as much as you know and then serve as a liaison person to set up sessions with "experts" you meet through your larger area computer clubs. Of course your services as chauffeur to meetings, computer stores, and conferences will be invaluable. Many parents are ready to provide money to get a kid started on his own kit but they don't know how to help him or her find the people and resources needed to successfully build and use the system. Your willingness to become a group leader (maybe not leader, just resident responsible adult) will earn you the respect and gratitude of the kids and their parents as well.

A few words to the wise about entertaining sizeable groups of people in your home. Check with your insurance agents to make sure you have the proper liability coverage. Also don't tempt fate by leaving money around or calculators unaccounted for.

<u>Hints on Successful Presentation</u>

I'd like to finish out this discussion with a few suggestions to keep in mind while you are preparing your first visits to kids groups.

1. Make sure your equipment works. Have a dress rehearsal, which includes disassembling your system, driving it a distance equal to the trip to the school, at equal temperatures. Set up and give your show for friends and neighbors. Arrange this at least two days before your school trip. If you have to debug your system you'll have twenty-four hours cancellation notice if you blow it.
2. Prepare your "lesion plan" carefully and specifically for the group you'll be addressing. Some people can wing it comfortably. Others find themselves tongue-tied in front of that bunch of expectant young strangers. Worst of all is to discover that your audience isn't understanding one word of what you are saying to them.
3. Therefore, DON'T USE COMPUTER WORDS even if you explain them first in your presentation. People don't learn a new language that fast. Computer vocabulary IS a better means of communication than ordinary English BUT ONLY FOR COMPUTER FREAKS. If necessary, write out the whole text of your talk and underline every instance of computer jargon. Think up synonyms now. Later you wont be able to come up with alterative words. If there are no non-computer words to express your thought, simplify your talk. You can introduce those computer concepts in your second visit with this group.
4. Try out your presentation on some non-computer, or better still, anti-computer person and encourage them to be painfully honest when you loose or confuse them. You will need some experience dealing with distracters. Also try it out on someone of the same age as the group you will visit just to be sure you have judged their skill level correctly.
5. Don't expect to get much information across on a first visit. If the kids see the computer, touch it, play one game, that's enough. Your objective is to help demystify the computer, not to snow them with how much you know.
6. Don't introduce Startrek or gambling games in class. You'll never get the kids' attention back.
7. Wait for questions to arise in your learner. When a question happens in someone you know there is a place for the answer. Otherwise, you may never know when the input buffer has overflowed.

That is a lot of what I know about sharing computers with kids. I'd be glad to talk or correspond further with any of you on this subject. It's fun. Seeing a face light up in front of a terminal is like giving a present to someone. It satisfies the evangelism that lurks within many of us. So, find a group to visit, learn as much as you can about them before you go, and prepare your presentation accordingly. You'll be hit with the 4-H Sewing Circle, the Co-op Preschool and the Advanced Placement Physics Seminar alike.

Footnotes:

(1) Joysticks – I am using this as a generic term for any device, which allows input through a lever or moveable tabletop instrument. Cromenco makes one for Altairs.

(2) Turtle – A turtle is a motorized device that moves around the floor under keyboard or program control. It looks something like a turtle and can carry a variety of sensors to provide feedback to the computer. See "Twenty Things to Do with a Computer" by Seymour Papert; in Educational Technology Magazine, Morristown, N.J. vol. 12, April 1972, page 9-18

(3) Music – see the following articles in People's Computer Company, P.O.Box 310, Menlo Park, Ca. 94025. Vol 3 #5 Steve Dompoer's Music Program
Vol 4 #3 Minuet in G Major by Cynthia Beyer
Vol 5 #1 A Musical Number Guessing Game by Kurt Inman

(4) For listings of games see –
101 Basic Games by David Ahl; Digital Equipment Corporation, Maynard, Mass. 1975
Creative Computing Magazine; P.O.Box 789-m Morristown, N.J. 07960
People's Computer Company; P.O.Box 310 Menlo Park, Ca 94025
What to Do After You Hit Return; People's computer Company, Menlo Park, Ca. 1975

(5) Number Guess – What to Do, page 116

(6) Story – listing from LO*OP Center, Cotati, Ca 94928

(7) Snoopy and Bunny – 101 Basic Games listing from LO*OP Center, Cotati, CA 94928

(8) Racetrack – I can't find a listing in time for publication. Ask your friends or LO*OP

(9) Oops! – I messed up my numbering system

(10) Diddle – see PCC Vol 4 #4 page 8

(11) Tic-Tac-Toe – 101 Basic Games, page 219

(12) Bagels – What to do, page 117

(13) Hamurabi – What to Do, page 140

(14) Hunt the Wumpus – PCC vol 3 #3 page 24