Barbara Boucher Owens: Okay, let me start this interview by saying that this is an interview for the Computing Educators Oral History Project. Being interviewed today is Harold (Hal) Abelson of MIT. This is March 1, 2012. We are in Raleigh, North Carolina. Did I get all that information correct?

Harold (Hal) Abelson: That sounds all right, Barbara.

B: All right!

H: Pleased to be here. Pleased to be interviewed.

B: Good. This project is pathways. And so we’re going to start way, way back when and I’m going to ask you about your parents’ education. Did your parents have college degrees?

H: My parents did not have college degrees. None of my … my father had two brothers. Neither of them had college degrees. My mother had, I think, three brothers, one of whom went to college, and she couldn’t go to college because — even though she was probably, I think, the smartest and certainly did the best in high school — but, of course, since the family could only send one person to the college they were going to send the boy to college. And so she
didn’t have a college background but was very, very educated. Both of my parents were very, very firmly committed to education but didn’t actually have college degrees.

B: Were …

H: I suppose in the words of Rick Santorum they were not snobs, right? Am I allowed to say that in this interview?

B: [laughs] Yes, of course! It may need a little bit of explanation in a few years but …

H: Okay.

B: Were either of them particularly good in areas that you might consider — looking back — as would be good as computer-related things, like math or science that you …?

H: Mmm. My mother was good at math. My mother was very methodical, very kind of methodical, organized mind. At one point, she was a legal secretary and was very good at that. And I think I picked up a lot of those habits of precision from her.

B: Hmm.

H: My father, back in the old days — in World War II — worked in the naval depot in Hoboken [New Jersey]. I don’t think he had … he wasn’t quite the same sense of organization that my mother is, but very, very solid. He was very … very, very responsible person and cared a lot. Was a very good manager later. Later in life he worked as a supervisor in the post office.

B: What did he do when he was at the naval yard in Hoboken?

H: I think mostly just working in the shipping yard doing support and doing supplies and things. But most of his career he actually spent as a postal supervisor. And again ran a lot of things and was very … mostly things about being very responsible and very organized.

B: What were your parents’ attitude — you said that your mother believed in education …

H: Well, they both did, very, very much.

B: … very, very strong. How did they manifest that?

H: Mostly supporting me and my sisters in that. Caring a lot about it. Doing the normal things of taking you to classes. Enrolling you in things and caring about stuff. Letting you know that they were very proud of you. Caring a lot about the things that were of interest to you.

Always giving the message that you should do extremely well.

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1 Reference to a statement by Republican presidential hopeful Rick Santorum in February 2012. In a speech at the Americans for Prosperity forum in Michigan, Santorum said “President Obama once said he wants everybody in America to go to college. What a snob.”
B: Well, did your sisters go on to college?

H: Oh yes. Both of my sisters went to college.

B: What kinds of things did they do?

H: One of my sisters is a professional musician. She went to Hart College of Music in Hartford and is a violinist still. She plays in various orchestras, mostly backing up Broadway shows and things. She got to travel with the Rat Pack\(^2\), which is one of the … does that need a reference too?

B: We’ll put it in if needed!

H: We’ll put it in.

B: [laughs] Probably the younger generation is going to say “huh”?

H: Yeah, right. My other sister was an English major and she went to Rutgers University. And she’s now … owns a real estate agency.

B: I would say they’re varied except that I know that you’re musical as well.

H: I’m … yeah, I’d say I used to be. Right.

B: How did it become a “used to be”?

H: Well, I made this mistake of saying I was too busy to practice because I was doing other quote “more important things” like trying to teach classes and write my thesis and things like that. So I was a pretty good clarinetist but I’ve let that lapse a lot. Keep telling myself that someday I’ll get back to it.

[5:12]

B: I’ll tell you a story some day. Were you given the same educational training options as your sisters by your parents? The same aspirations? Did they treat the sisters differently from you? It’s not a gender thing, it’s just you’re the oldest … ?

H: Well, there might have been a little bit because I’m the oldest. But I think it was much more of looking at aspirations. I was much more the one who was interested in math and science. But I wouldn’t have said that my parents supported my sisters any less than that. Because my second sister went on to a music career and again got tremendously supported through that. And my third sister was doing English and was very organized and always making things happen. So I think we all got supported. But of course, I think you’re right. It’s always a little different with the oldest.

\(^2\) The Rat Pack was the name used during the mid-1960s by the press and the general public to refer a group of actor friends that included Frank Sinatra, Dean Martin, Sammy Davis, Jr., Peter Lawford, and Joey Bishop.
B: Can you think of any ... you think you said your mother was quite methodical and that shaped you, you believe. Were there any other shaping influences? Can you think about a school teacher? Or can you remember back through that elementary, secondary education? People that made a difference or things that made a difference?

H: Oh dear. I mean elementary education, I can’t think of ... other than teachers were good and influential, I can’t think of what was very special in that. I had a high school geometry teacher who I think was very, very special. Cared a tremendous amount about teaching mathematics. Was a friend of my father’s, in fact. That was later, after I’d gotten out of high school. But those things shaped a lot. The school also. I went to a regular public school which didn’t have any advanced math courses or things like that. They did a special thing where they got a tutor to come and help me go through calculus, when I was, I think, in eleventh grade. So that was pretty important.

B: When you said “they”, was it the school?

H: The school. But I think that one geometry teacher had a whole lot to do with that.

B: That must have made you feel engaged to have them help you. Did you ask or did the teacher suggest? Or ...

H: No, no. I mean, you’re a kid, you don’t ... you take that stuff for granted when you’re a kid. “Well, they’re doing this for me.” You don’t actually think about what it takes in the back end to make that stuff happen.

B: Yeah. Cool. Did you know anything about computing during these high school days? Were there ... ?

H: Yeah. I got a job — I want to say with an IBM 709 ...

So I lived near the Lakehurst Naval Air Base, which is the place that held the blimps and hangars and things. And they had a computer and I got a job programming it, programming the paper tape computer stuff. So it would have been ...

B: How?

H: I don’t remember how I got that. I wonder if my father knew someone, who made a link or something. But I was one of the people who fed these paper tapes through the computer and there was this mysterious language called Fortran and I did a little ... a little bit of that. I don’t even remember what project I was working on. I just remember sort of playing around, running tapes through the computer. And writing these ... what in those days seemed impressive, but now seems like a tiny, tiny, tiny little program. And of course it was one of the first ones that was around. So it was kind of mysterious and fun and you pretty much didn’t have any idea what you were doing.
B: Can you remember how you got there? Did your parents drive you there? Did you take public transportation? Do you remember, was it an effort?

H: Well, sometimes my parents drove me there. It was about ten, twelve miles.

B: That’s a lot!

H: Then occasionally the guy who I worked for drove me home because he kind of drove very close to my house on the way back. So, I remember doing that.

B: Was it a summer job or after school?

H: It was a summer. God, I don’t remember. I think part of it was a summer job. Must have been a summer job because we had pretty long hours.

B: Wow! Little did you know, huh?

H: Little did I know. Right.

[9:58]

B: Little did you know … Were there other science or math things at that early part that you remember?

H: Well, yes, my parents … So my mother’s brother — the one who went to college — he actually ended up being very successful. He worked for what these days is called Exxon but in those days was called Esso, and he was a vice-president. He was always the one who was held up as “the scientist.” So, that was somebody to sort of respect and emulate and see that you could be successful in a scientific career.

B: Well, you graduated from high school. Is there anything that you remember, even about the graduation. What were you … Do you remember that?

H: Now that you are asking, I don’t remember anything special. I think I was valedictorian or something. And I just remember doing really well. But as usual, you have different impressions of that when you’re in high school. It all seems pretty misty now. And, let’s see. I mean, mostly I remember high school as a place I wanted to get out of.

B: Did you have any good friends that were in math or science at the time?

H: I had a lot of good friends, not especially around math or science or anything. Just … I don’t know, that seems like a different era. You didn’t specialize that much. You just kind of had good friends and you hung out. And, of course, you took various courses together.

B: Well, if you were playing the clarinet were you in a band at that time?

H: Yes. I was in a band.
B: Marching band or concert or … ?

H: It was all the same in high school. There are various state competitions. There were state bands that you got into, all-state band and things like that.

B: And did you have ribbons from your individual level …

H: I don’t remember if I had ribbons.

B: Or you got a [rating of] 1 or 2. We used to get … You don’t remember any of that.

H: I don’t remember getting any ribbons.

B: Well, during this period of time you were thinking about college, obviously. How did you go about that thinking and making the decisions that you did?

H: Well, the usual way. You ask somebody you think you know. I think the guy who was tutoring me in calculus. And you say things like, “Well, what sounds like a good school?” And they say, “Well, I don’t know. Princeton sounds like a good school.” So I figured I’d apply to Princeton. Applied to a bunch of places.

But mostly again, you don’t know. It’s very … the thing that people need to understand is that this is all very random and you don’t plot things out. Most things that happen in life happen for pretty random reasons. So I don’t know that there was a very deliberate thing. So I mean the reason I went to Princeton eventually was I got a good scholarship there. Because my parents really couldn’t afford this very much. In those days, I think there were better scholarships also.

B: Yeah, fewer loans.

H: Yeah.

B: So tell me about when you were at Princeton. You knew you loved math. How did you … did you choose it as a major? What did you choose as a major? What are some of the courses and professors that you remember the most about? Good and bad.

H: Well, I went to Princeton knowing that I was going to major in math. I don’t remember when I decided I was going to major in math. I remember when I was, I don’t know, 13 or 14 [years old], I was quite sure that physics was cool and I was going to be a physicist. I ended up never taking any physics in college.

When I went to Princeton, Princeton had a program which they … which was a very 1960s kind of program, which was called the University Scholar Program. And it is something that more universities should do. Even Princeton stopped. The University Scholar Program. You got in and you sort of had no requirements. They said, “Gee, you’re in. You’re smart. Go learn what you can from around here!” You had departmental requirements, but you had no
university requirements. So that you sort of had a lot of fun at Princeton getting deeply into mathematics because I didn’t have to worry about much else. And that was tremendous fun. So you get to hang out mostly with the graduate students, in those days, in the math department. I thought that was a great system. But I think Princeton dropped it about 10 years later.

B: So you didn’t take any of the other liberal arts?

H: Well, I actually took way more of those! What I didn’t take is a lot of other science. So I took … I don’t know, the standard array of interesting courses that you would take, like Russian cultural history and Zen Buddhism and courses in the writings of Joyce and sort of interesting things. Not all those boring intro science courses.

B: [laughs] You seemed to have learned a lot of science along the way.

H: Mmm, you pick it up. After a while, you pick it up.

B: Can you talk about any particularly influential professors? You talked about the graduate students.

H: There was an enormously … is an enormously influential professor, a guy named Ralph Abraham, who was sort of … I guess in those days you would have said a kind of “hippie” professor. A little too much for Princeton. But he had a tremendous personal influence on a bunch of us because he, to me, showed that it really is not about the content of what you teach. It’s about the personal style that you set as a faculty member and the role model that you choose and the notion that you can be dedicated to the intellectual life.

He actually organized a group of undergraduates … He convinced McGraw-Hill ³ that he was going to write a whole sequence of mathematics textbooks and it was going to be written by him and his students — undergraduates and graduate students. And he arranged, for example, that we went to France one summer and hung out in some farmhouse in southern France and wrote a calculus book. That was actually my … that was actually the first book I wrote. I did it with two people in that group. And it was called the Eagle Mathematics Series. And so I wrote a calculus book, which, as I look back on it, was just a terrible, terrible book. But it was tremendous fun. Tremendous fun doing that. There’s a whole series of Eagle Mathematics, of which a couple of the books are good; not the ones that we wrote.

B: Are any of them still in print?

H: I doubt it. This is in … would have been — gosh — 1966 or something. But…

B: What an opportunity.

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From their website: “Founded in 1888, The McGraw-Hill Companies is a leading global financial information and education company that helps professionals and students succeed in the Knowledge Economy.”
H: Yeah. It was tremendously good.

B: How did this professor justify dragging you off to France to write this book when you could …

H: Because it was fun!

B: … have written it in New Jersey?

H: Well, because one of the other … there was another professor in that group; he had a farmhouse that he bought in southern France. And why not?

B: Wow!! [laughs]

H: So that was one summer. We actually … it was actually planned for two summers. And the second summer was — must have been in 1968 — where we did the same thing. We lived in Berkeley. And 1968 in Berkeley … 1968 summer in Berkeley was just a wonderful, wonderful time, because that was when the police were tear-gassing the students.

B: Right.

H: And you got to go out and yell, “Disarm the pigs!!” with everybody else. So we did that at night and in the daytime, we sat around and wrote a — I think a linear algebra book or something like that.

B: [laughs] Wow! Repeat that professor’s name again.

H: Ralph Abraham⁴. He’s retired now, but he’s still around. He left MIT and went to University of [California at] Santa Cruz. He was a pretty famous …

B: Wait! You were at Princeton.


B: And so he went to Santa Cruz.

H: Yeah. So he left Princeton — maybe my senior year or something — and then went to University of Santa Cruz. Got a … sort of a distinguished professor position there because he’s very, very renowned in differential geometry and topology and things. And about a year after he got there, they saw his true radical colors. He did these things that you just didn’t do as a faculty member at the University of California. Like going to a rally wearing an American flag shirt. So you might remember in those days, you weren’t allowed to desecrate the American flag by putting it on your clothes.

⁴http://www.ralph-abraham.org/
B: Mmm hmm.

H: What I heard is that they tried to get … that having given him tenure, they tried to get rid of him almost from the year after he started. They never did get rid of him. Again, I’m sure he did wonderful things at Santa Cruz. He wrote a column for the student newspaper called “Dr. Clear-quill,” where I’m sure he said all sorts of things that the administration didn’t like.

But for me he was … he really stood out as an example of how as a teacher you have to show people who you are. You have to have a personal life; it’s just not … it’s not just about standing up in a classroom and explaining the material or even explaining it very well. It’s about really being a person and showing people that that matters. And that had an enormous influence on me.

B: So, you finished Princeton after — what a career! I mean, France and Berkeley as an undergraduate and you’re choosing a graduate school. How did MIT get into the … you did go to MIT for graduate school, is that correct?

H: I went to MIT.

B: How did you … how was that path and were there choices that you were making between MIT and something else?

H: Yeah, I guess. Maybe MIT and Berkeley or something. Again, in those days, if you remember the environment, right, of the late 1960s, and you think about, “Well, where are the places you want to be?” Right? So the ones that stand out in that are you want to be in Cambridge or you’d like to be in Berkeley and you’re vaguely aware that maybe there are some other places. But the reality is, first of all, MIT gave me one of those 3A things that were good for a draft deferment — because the draft was a very big thing. And plus my wife — well, we weren’t married then — but my wife-to-be got into BU School of Social Work. So on top of this we had a two-body problem. So MIT seemed like the only place.

B: I’ll back up. We didn’t … I didn’t hear about the wife. I heard about the other graduate students that you were working with.

H: Well, she was my girlfriend in college.

B: So you met her at Princeton?

H: I met her when the Princeton band went on tour to Wilson College, where she was.

B: Where’s Wilson College?

H: Wilson College is in central Pennsylvania.

5 Boston University School of Social Work, http://www.bu.edu/ssw/
B: OK.

H: So … it’s a women’s … it still is a women’s college.

B: Was she a mathematician or a musician or both?

H: None of that. She was very interested in social welfare and she went to social work school. So she got into the School of Social Work at BU. Went through the program there. And we both stayed in Cambridge [Massachusetts] and studied.

B: Did she go to Berkeley or to France or she was …?

H: No, she actually … the summer I went to France, she was volunteering at a school for autistic kids in Saratoga.

B: California?

H: In Saratoga, right. We wrote each other letters and I was writing them from France.

B: And the summer you were in Berkeley, she was …?

H: I don’t remember where she was the summer I was in Berkeley.

B: Probably the other coast!

H: I think so.

B: Oh, OK! That’s interesting. So … back up just a bit. Computers were just starting to be used in university during the period you were in college. Were you … did you use them in any of your course work or …?

H: Yeah and I’m trying to remember why. Well not … in course work. Well, there was very little course work that involved computers. I took a course in — let’s see if I can remember what the name of the course was. I don’t remember what the course was about. It was taught by Hale Trotter, who was a pretty famous applied mathematician at the beginning of computing in those days. And we used this strange book that just came out called

*Fundamental Algorithms* by this guy named Knuth and we all thought that was really cool.

And I remember we were doing a project that had to do with writing a symbol table. We said we wanted to learn something about compilers. And Knuth was actually visiting on campus once — I don’t remember if he was there for the whole year — and we heard … because, when you picked up *Fundamental Algorithms*, there was a whole outline of — what, was there going to be 8 volumes or something…

B: Mmm hmm.
H: And he had the whole thing laid out. And this was probably 1967 or 1966 or something. And so we found this guy who was visiting and we said, “Professor Knuth, could you show us the manuscript for volume …” — I forget what it was — “… 5 or 6?” or something, which was supposed to be about compilers. And he said something like, “Well, it’s not quite ready yet.”

B: [laughs]

H: And of course, when did it come out, if ever? 25 years later or something? So I remember that. So I took this computing course.

But what I really did, I worked in the computer center. So that’s probably because I had some background from when I was in high school — not that it was relevant at all — and I learned this language, I don’t know if you remember there was a language that IBM came out with that was going to change the world and revolutionize computing.

[25:34]

B: PL/I.6

H: It was PL/I, right, because — remember? — it could do everything. And I got a job — they called me “The PL/I Kid” because my job was to go consult with the faculty members who were translating their programs from Fortran or whatever it is and showing them how this new arcane language worked. We sort of did that and I hung out around the computer center doing that.

I also got a job writing a records input program for the Dean of Graduate School, who had this idea that you could computerize the graduate school records. Looking back on it, I just did a totally horrible job. I can’t believe what a bad program I wrote and inflicted it on the poor person who had to input that information all on punch cards7 at first.

B: And that might need a footnote sometime.

H: Punch cards?

B: Yeah.

H: Yeah, right. Right. Sort of amazing.

And then IBM was … it was a 7094 at Princeton that we used. But they also had this newfangled machine called a 360. And they were doing this … again, outlandish stuff with a system called HASP. Or it was ASP and there was a thing called Half-ASP. And they were doing these experiments with time-sharing on it.

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6 PL/I is pronounced “pee ell one”. For a brief description and a pair of sample programs, see http://groups.engin.umd.umich.edu/CIS/course.des/cis400/pl1/pl1.html

7 For a history of punched cards with illustrations, see the series that begins at http://www.computerhistory.org/revolution/punched-cards/2
And then along about our senior year what a bunch of us did is we did this complete waste of computer time. Which is we were typing ... we were doing text inputting on this computer. I remember writing my senior thesis and using — I guess it was typeset and run off or something — to actually print this stuff. And of course many of the science faculty were just totally upset by this, that the computer center was taking these computers, which, of course, were meant for solving Einstein’s equations and doing serious kind of work, and they were doing this utter complete useless waste of computing, which involved getting people to do text processing on that. So I remember that being the subject of a lot of complaints, about how could we be wasting these computer resources on this useless thing that had to do with text processing! So that was a lot of fun.

B: So, when you graduated from Princeton you had a lot of experience with computers. Math was your, it sounds like, was your love.

H: At that point, I had a lot of experience.

B: So you applied to MIT. And did you apply to Berkeley as well, or just MIT?

H: I don’t seem to remember. I don’t remember, it’s just ...

B: But you were interested in math; I mean, you were applying for the math program.

H: Right. I got into MIT for math and I got a sort of nice TAship for math.

B: And then talk about ... talk about MIT and your graduate ...

H: Graduate ...

B: Yeah, your graduate program and ... did you go in knowing you were going to get a Ph.D.? Or did you think a Master’s and then a Ph.D.? Or what was your ...

H: I was thinking ... I didn’t get a Master’s. So ... yeah, actually, the math department at MIT — and it may still be true — that you don’t get a Master’s; you go directly into the Ph.D. program. Some of the science-y parts of MIT sort of, I think, pride themselves on they don’t merely give a Master’s program, you go straight into a Ph.D. program and you’re a “serious” student.

[29:29]

I don’t know. MIT’s a very big place. I mean, I think I finally figured out MIT after about 30 years there. But when you first go there, it’s just overwhelming. You end up in one building in one hall and you see a small number of people and eventually you do some activities, which are meant to get you out. But it takes a tremendously long time before you can get a sense of the place as a whole.

I mean, I remember just coming up to MIT and there’s sort of these green automatic doors that opened when you stepped on the carpet in front of them. And I just sort of cracked up
because I was coming from Princeton, which is the ivy-covered halls and things. And here was this place you walk in and the first thing you see are these automatic doors leading down this long, long corridor. Those same … those doors are still there, by the way. It’s sort of the pride of MIT to have these Krufe doors, which they had to adjust because they now stay too open and cause a large heating bill. But that actually happened two years ago. But I just remember just thinking it was funny. And it was so not anything like a university. Those were my first impressions of MIT.

**B: So talk to me a bit about the Ph.D. experience.**

**H:** Oh wow! So, again, I was in the math department. And the math I did was algebraic topology for a very outstanding, outstanding professor named Dennis Sullivan. And I did a pretty straight Ph.D. in topology. Nothing academic around computers then. The computing was all in the job I did as a research assistant in an area that had almost nothing to do with my thesis.

**B: So talk about that.**

**H:** Well … so the nice thing that was happening at MIT those days is that the students were demonstrating against … what in those days were called the Institute Labs, which was doing government-sponsored research. So those were the days of the Students for a Democratic Society, when a lot of the SDS organizations were protesting on campus and occupying stuff on campus. And so it was sort of fun to, again as a new graduate student, to smell the tear gas that was being lobbed. That was a very atypical era in MIT, but even MIT was part of it.

But one of the things that students did is they occupied the president’s office. And they had fun in those days putting the old tapes from the IBM Selectric typewriters in so that they could replay the correspondence that was written by the president’s office. So I walked by there and I said, “Gee, you know, here I am a new graduate student. I mean, when am I ever going to get the chance to go see the president’s office? I’ll never be in the office of the president of MIT.” So the folks who were sitting in held an open house and I said, “Gee, I’ll go to the open house in the president’s office!” And walked in and there were all sorts of people sitting around on the floor. And one of the guys sitting on the floor was a guy I went to high school with and hadn’t seen at all when I was an undergraduate. I knew he’d gone to MIT. And I came up to him and I said, “Hi! Having fun at MIT? That’s good.” He said “What are you doing here?” And I said, “Well, I’m looking for a job.” And he said, “Oh! You ought to go … there’s people over in the Artificial Intelligence Laboratory. I hear that’s a nice place to work.” And so I kind of wandered around there.

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8 The Magic Eye doors of Building 7 at MIT, [http://museum.mit.edu/nom150/entries/1494](http://museum.mit.edu/nom150/entries/1494)

9 [http://www-history.mcs.st-and.ac.uk/history/Biographies/Sullivan.html](http://www-history.mcs.st-and.ac.uk/history/Biographies/Sullivan.html)

10 Students for a Democratic Society (SDS), [http://www.sds-1960s.org/](http://www.sds-1960s.org/)

B: So this … you learned about the job at a sit-in. The guy’s sitting in the president’s office.

H: Yeah, right. Well, I think people need to understand that that’s how things happen.

B: Usually not a sit-in but … [laughs]

H: Not any more, but equally random things. I mean, these days I like to remind students … I get students who come in now and want to have their whole career planned out. I was just judging some projects by students this year. And one, he’d made a course planner where you could come in and consult the catalog, plan out your entire career when you’re a freshman for four years. And I always have a very funny attitude towards that. Students have this very definite idea that things are definite and are very upset by things that are random.

But in any case, I wandered over to the Artificial Intelligence Laboratory and heard there was going to be a presentation on this thing called Logo by a guy named Seymour Papert. So I went to this talk and it just blew my mind about what an incredible wonderful thing it was. And I went off thinking about that. And I was wandering more about the Artificial Intelligence Laboratory and got into the elevator of the building. And the door sort of opened two floors higher and in walks Papert. And I said, “Gee, hi! I’m a new graduate student at MIT, you know, looking around for a job.” And he said, “Oh, do you know who you’re working for?” And I said, “Well, can I work for you?” And he said, “Yes, you can work for me.”

So that’s how this whole thing started, as a very sequence of random events. And I think it’s worth really appreciating the importance of randomness. So that’s pretty much how my work that became my actual career started.

B: But you bifurcated and you did work in the AI lab for your sustenance.

H: Research assistant.

B: … and you did math …

H: I was doing algebraic topology.

B: … and your thesis was in algebraic topology and you …

H: Right, I had very little, essentially nothing to do … other than some of the ideas in computing were related to topological ideas.

B: Again, how much time … what was the time span that you were…

H: You mean how much time …
B: Yeah, how much time did it take with the degree? So, how much time working … how many years did you work in the AI Lab?


B: So it was rather short in terms of Ph.D. time.

H: It was kind of short for MIT … well, it was short by the terms of MIT computer science. There’s a joke which says, “How many MIT computer science graduate students does it take to change a light bulb?” And the answer is, “Only one but it takes seven years!”

B: OK.

H: MIT’s been worried about that and its Ph.D. program for a while now. We’ve compressed the time some, but it still takes an awfully long time for some people.

B: So, you were married at the time. You’ve … so you … were there children or just you and your wife?

H: Well, we have one daughter now, but she wasn’t born until long after. She wasn’t born until 1976.

B: So, you got your degree in 1972, 1973, you said?

H: Yes, I think it was 1972 or something.

B: Mmm hmm. And did you stay then at MIT? Did you go off …

H: Yeah. Yeah, we stayed. I stayed. I got a job as an instructor in the math department, again doing topology. And she … when did she graduate? She got her … even before that. She got her Master’s in Social Work. I don’t remember what year, but I think it was before 1972. Must have been 1971; it was probably a two-year program. And then she got a job at a … what in those days was the Worcester Youth Guidance Center doing social work. And we just stayed.

B: You’re in the math department. But I know you’re not in the math department now.

H: Right.

B: So how did this career move? How did … ?

H: So there are two things that kind of happened simultaneously. Because MIT started something called the Division for Study and Research in Education, which lasted … oh, I want to say five years, but maybe not even that. And one … it was kind of built around three senior faculty members, each with a research program. One was Seymour Papert and Logo. The other was a guy named Benson Snyder who was a psychiatrist and wrote a famous book.
about MIT called *The Hidden Curriculum*, which basically said what students needed to learn
at MIT and the main thing they learned was how to do triage when they had over-
commitment. And the third person was Don Schön, whom Fred Brooks actually mentioned
this morning in his talk [during the 2012 SIGCSE Technical Symposium], who had these
whole theories of what he called practice and espoused reasons, endowed reasons or
something. So that was this division that came together to study that. And I started working
there … I got a part-time appointment when I was in math, working in that doing Logo,
because at that time the Logo stuff had become very serious. And then … so eventually what
happened is I moved into the Division out of the math department. And then the Division got
closed and I moved into the Electrical Engineering / Computer Science department from that.
So that’s how I ended up in EECS, sorry, Electrical Engineering and Computer Science.

**B:** Were you still an instructor or did you get into a tenure track line … ?

**H:** I was an instructor and then I was a lecturer. But then I think I was not an assistant professor.
I think the assistant professor came with the education division appointment, or the original
computer science appointment. And again there was a transition there, because some of the
earliest stuff I did, like in real computer science, had to do with parallel computing and some
of that was related to the algebraic topology.

**B:** So, did you have … at that point, were there particular students that you remember?
Do you remember … how much time did you spend in the classroom?

**H:** Well, in those original days, I was doing pretty standard teaching. I was teaching, gosh, linear
algebra. I was teaching calculus. Doing the standard stuff you do as an assistant professor in
math. And then we did seminars in the education division thing for a few research students.

**B:** What kind of seminars were you…?

**H:** Well, mostly things about Logo and doing projects and talking about them. I don’t remember
exactly who was involved in those days, but there were a lot of people who were involved,
you know, pretty early on.

**B:** Were you supervising graduate students?

**H:** Umm …

**B:** As you moved into that assistant professor … ?

**H:** Yeah, a little bit. Not on the math side, but on the Logo side doing stuff. One of them was a
guy named Mitch Resnick, who was doing an interesting Master’s thesis on things like
putting together the Logo language with Lego stuff. And thinking about languages where
kids could go make model ferris wheels. So that was one of the early-on things that was
happening.

**B:** So was he your student for his … ?
H: He ended up being more Seymour’s student, but I supervised his Master’s. And then there
was a whole…

B: Wait! You said MIT wasn’t big on Master’s.

H: Oh, sorry, I’m being confused. He got that in electrical engineering, I’m pretty sure. It’s not
MIT as a whole that’s not big on Master’s …

B: Oh.

H: … it’s places like the math department tend not to do that.

B: Oh, OK.

H: I don’t remember what Mitch got his Master’s in. He might have got it in computer science,
I’m not sure.  

B: But, he was working with you, so …

H: Well, he was kind of working with everybody, but I think I was doing that. We were building
pieces of Logo and thinking about stuff.

B: And having fun.

H: Oh, having lots and lots of fun.

B: Can you think about any other students at that time or … that you had. What were
your fondest memories, I guess, in that?

H: Oh, there were some spectacular students who were … I don’t remember exactly what year it
was, but there was a guy named Gregor Kiczales who’s gotten pretty famous. He invented
what’s called Aspect Oriented Programming. He’s now a senior faculty member in
University of British Columbia, but he started doing things at MIT. We were doing a
language that was kind of like Logo called Boxer.

My very, very good friend and forever colleague was a guy named Andy diSessa, who is now
a senior faculty member at Berkeley Graduate School of Education. But we did a lot of …
not quite the earliest Logo stuff, but the educational stuff that came after that. So the first real
book I wrote after the calculus thing was a book with Andy called Turtle Geometry, which
people actually still use. It’s kind of amazing. But that was a long, long, long term
collaboration.

[45:02]

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12 Mitch Resnick earned a Master’s in Computer Science degree in 1988 at MIT.
And that’s why … we were both … Andy and I were both undergraduates at Princeton. So our friendship went back almost to like the first day we showed up as freshmen. I remember when I was sitting there as a freshman, the guy across … there was this sound came across the hall, with somebody whistling Appalachian Spring. And I said, “Gosh, that’s somebody I want to know!” That turned out to be Andy. So even from our very first day in college we’ve been friends. And we’ve just had a long, long, long collaboration.

But one piece of that was making this Boxer computer language, which was taken off from Logo in kind of a structured form. Andy took that project with him off to Berkeley when he left. Because he got a very attractive offer from Berkeley based on the stuff he was doing and how kids think about physics, or in general how kids think about representation. And so he kind of … I pushed more on the implementation side of the world and the computer science-y side and Andy pushed a little bit more on the educational side and, you know, has had a long, distinguished, and just outstanding career in that.

B: Do you have a classroom teaching philosophy? Certainly Fred Brooks this morning shared with us his teaching philosophy. Could you articulate yours? Or has it changed? And if so how?

H: Gosh, it’s been a long, long, long career. Um …

B: Well, I’ll coach you, as I can remember having sheets and sheets of notes on yellow-lined paper and writing a lot on the board. Early …

H: Oh. I …

B: And then … can you think about … ?

H: Well, of course, when you first start, you’re not very self-conscious about what you’re really doing. Right? It’s … you kind of teach because that’s how you’re supposed to teach. And occasionally you have good ideas. I think probably I did the very first almost computer exercise when I taught my linear algebra class. I used the … what at MIT was at that time was the Multix system and did a computer exercise in linear algebra on condition of a matrix or something. That was kind of fun. But of course in those days nobody used computers in the actual classroom teaching very much. Um … although there were some.

I remember going back to my Princeton time, I was sitting in the theater, listening to some play. And there were some students in the row behind me. One of them said to the other, “We did this great thing in class in today, in our political science class. We had this role model thing where each of us got to run a country. And what would happen is we would make our decisions about what happened in the country. And then after every round the computer would print out the world newspaper about what happened. And it was just really so cool.” And he said, “I was running China and we did this thing where something happened and somebody invaded me or something and I just said, ‘What the hell, I’m going to launch all my nuclear missiles against the neighboring country’ and then everybody caught that up.
and the US launched against some other place and finally the entire world was destroyed. I
destroyed the entire world …”

B: [laughs]

H: “… in my … in class today!” And then he said, “But it was okay, I was taking the class
pass/fail.”

B: [laughs]

H: So that was actually the first … I think that was the first I’d heard of actually using
computers in classrooms. But going back to my own teaching, I tried some I thought were
fairly interesting experimental things.

Like one year when I was teaching linear algebra I asked the class as a final assignment to
make up what they thought would be a good final exam for the course and had all the very
best educational reasons to do it and got tremendous pushback, saying, “Professor Abelson’s
making us do his job in the course.” I tried various interesting things like that.

Papert, of course, was fascinated by learning. And I think by working with him when I first
began to get a little bit more self-conscious about it. We’ve done a lot of the things that Fred
talked about in his class. Things like, you know, you’re not really imparting information,
you’re creating experiences.

[50:00]

I remember … I mean, one of the things in the way we run large MIT classes is they’re often
large lectures and then you split up into these smaller sections. And I just remember one year
we decided — Gerry Sussman and I decided — that we would do two of the … we would
each do a section and together with giving the lectures and … just to find out, to get a better
experience of the course. MIT’s pretty good like that, at least in our department. There is a
tradition that if you’re teaching sections of lectures, you go to the lectures. And all the
graduate students and TAs go to the lectures and go to the sections. But we basically decided
to teach sections. And I remember going into section, you know, after I’d been doing the
lectures that week, and saying, “I’ve got nothing more to say. I said all that stuff in lecture!”
So I developed a style where I basically wouldn’t … sort of like what Fred was saying. You
just don’t quote “do anything” in your section except have students work problems and
explain them to each other and do exactly he said, you wander around helping people. And
that turns out to be very effective.

But what I found really is as a teacher it’s effective to have a repertoire. And by that I mean
it’s effective to consciously know a couple of different styles. Some of them are … like Fred
was saying, you shut up and do problems and that’s very good. Some of them you really do
want to impart information. Because, despite the fact we are all on the Net right now and
everybody can get information, it is useful to have a personal experience with you and a
group of 25 students, where you feel you’re creating some kind of cohort that’s doing
something very, very special. And often in classes like that you say things that you
specifically would not want quoted outside the class, so there’s this feeling of intimacy. So
that’s another style. And, you know, there are other styles, which are really working problems. There are other styles, which are trying to have a real class discussion. And I found what’s important is to have that repertoire of styles, but to not be confused yourself about which style you’re going to do. So when you start a semester, you say, “I really am going to run the class in the following way.” And it’s very important to kind of set the style the first meeting, the first two meetings, because it’s almost impossible to change in midstream.

So in terms of teaching philosophy, I think it’s a little bit deliberate and it’s little bit getting a feel for what works where. I’ve done lots of courses that are project courses in the same way that Fred’s been talking about, where you … what he spoke about today, you know, where you do it for a real client. And you learn to say things like, when students come in halfway through semester, and say, “You know, we did all this work and we sat down with the client and they said they didn’t want that at all!” And you have to learn to say, “Well, you know, that’s one of the things you’re supposed to be learning! That sometimes it’s like that and you don’t want to allow yourself to get in that situation.” So there’s just lots and lots of ways to run things.

B: Can you think about which courses in computing were your favorite?

H: To take or to teach?

B: Well, I guess you could answer it either way. We were talking about teaching, but tell me about taking too!

H: Well, taking, as I said, I didn’t …

B: You didn’t take any, you said …

H: I didn’t take any because there weren’t any.

B: But you might have taken them … I’ve taken courses as a professor, just for fun. So it could be taking.

H: Yeah, it could be. The course … well …

B: It doesn’t really matter …

H: Well, the course I took for fun was actually quote “Physics for Poets,” which was taught by one of the incredible greats at MIT named Philip Morrison. One of the people who worked on the bomb. A real … just icon at MIT in those days. He ended up being the book reviewer for Scientific American. Wildly eclectic person. And he’d give these lectures where he’d start talking about … things about specific gravity and say things like, “This is why our rain drops are the size they are and they come out of clouds. And this is why they fall.” And somebody would say something like, “Well, does it have to do with the shipping lines have to plan for that?” And he would launch extemporaneously into a complete discussion of the economics
of the shipping lines across the Pacific and Japan, complete with facts and figures. And he would just pull those off the top of his head. And I would just sit there with my mouth open, amazed at how somebody could do that and know that. I don’t know if the students appreciated it at all. They probably said, “Here’s this guy who’s going off rambling and he’s supposed to be teaching us why raindrops are the size they are.”

B: [laughs]

[55:35]

H: That was the course I remember taking as a faculty member and just having a complete, complete blast. MIT actually has a program that … called Adler Scholarships in our department, where you can actually get supported to not teach for a semester. Instead you’re supposed take a course. Those are really good things.

It’s tremendously important to take a course as a faculty member. I should have mentioned before when we were talking about teaching. You lose, especially as you get older — and here older can be like 25 — you lose what it actually feels like to be a student sitting in a class. So one of the things that I did — gosh, now four years ago — I decided to take first-year Mandarin, of which I know nothing. And my hearing … on top of the fact that I’m not particularly good in languages, my hearing is actually pretty bad. So everything that the professor said in Mandarin sounds like “jjhh.” And this was being taught by an instructor — here I was a full professor at MIT — and I just remember even feeling intimidated, sitting in class, by this instructor who was way, way junior to me and in any kind of MIT formal thing I would be way the senior professor and he’s just the instructor. But I remember what it feels like, to be sitting in the class and be intimidated that the professor’s going to call on you. And you do all the things that you see students do. You know, you look at the floor and things. And I think it is really critical to continue to have that experience if you want to be a good classroom instructor.

B: The same time you were sitting in on Mandarin, I was sitting in and taking conversational French. I had the same …

H: Yeah, the same sort of thing. You know, it’s just wild. I remember sitting next to this student who actually was in one of my other classes and she’s got her notebook open. And on the left of her notebook are her notes from circuit theory, which has sort of … you know, which is full of RLC circuits and things. And on the right is Mandarin. And just being struck by the fact — and I looked at the thing and I said, “Oh my God, here’s this hard stuff over there, and this utterly trivial stuff on the left!” — and suddenly being struck to the fact that to her, both of those were new, both of those were the same level of difficulty. That was just sort of a moment when I said, “Gosh, it’s so important not to lose touch with the reality of what students do.”

The other thing that I learned from that is that I and everyone — all of us make the joke about students doing homework at 1:00 a.m. Somebody even said it … Fred even made it today. Well, you know, I went through a week of when I had to work for a week. And then every night you had homework in Mandarin. And I’m sitting there and I go through my stuff.
And suddenly it’s midnight and I say, “Oh gosh, I’ve got to study Chinese for tomorrow!” So just like everybody else, I’m doing it at 1:00 a.m. And I’ve learned to not be critical of that.

B: Mmm hmm.

H: So I think part of teaching is even when you get good at it is to do some stuff that consciously makes you confront what it’s like to be a student in a class like yours.

B: Well, thank you. Wow! I’m going to switch completely now to professional stuff.

H: Sure.

B: What types of professional organizations do you belong to?

H: Very few. ACM and IEEE.

B: Do you belong to any SIGs, any Special Interest Groups?

H: I’ve been very non-active in that. I’ve mostly been doing stuff in sort of other kinds of public service organizations.

B: OK. Talk about that!

H: So, I do. Well, gosh, it really goes back. I’m a founder of the Free Software Foundation, which was … there was this guy, Richard Stallman, who wanted to found this thing and needed some sort of MIT imprimatur or somebody to talk to him. So I’ve been on the board of the Free Software Foundation for a long time.

I’m a founder of Creative Commons, which is sort of very, very intentional. There was a period — I guess 1999, 2000 — where we consciously set up organizations like Creative Commons and started MIT Open Courseware and started a whole bunch of things. So I’ve been very active in that since then.

I’m on the board of the Center for Democracy and Technology, which is another sort of insider Washington kind of information policy place.

I was, until very recently, on the board of a place called Public Knowledge. I was a founding member of Public Knowledge, which again is a Washington organization that does advocacy around information technology policy. But about a year ago, I just was doing too much so I sort of drifted off of that, although I still stay in a lot of close touch with them.

So, I’ve been doing my effort in organizations like that rather than in the computer science professional organizations.

B: Sounds like your days in the president’s office and in Berkeley had some influence on your long-term thinking, didn’t it?
H: Oh yeah. Well, that one actually wasn’t … that one was really curiosity. It really was.

B: [laughs]

H: “Hell, I’m around here. I’m never going to get to see what the president’s office is like.”

B: [chuckling] Have you found times when you’ve been … you’ve talked how you’ve been mentored. You’ve talked a little bit about your mentoring. Other than, you know, direct mentoring, which you do with your graduate students, what other … and I watched you, actually, somehow, mentoring today, when you were talking with Shay [Shaileen Pokress]. And just …

H: Oh, about …

B: … your discussion. So can you tell me a bit about your role as a mentor?

H: Well, first of all, it’s an experience thing. So you didn’t ask me who mentored me as a faculty member.

B: OK, who mentored you?

H: I had the tremendous, tremendous good fortune to work — there’s a guy named Bob Fano. He was the guy who started Project MAC. He’s, again, an MIT icon and I … he taught the precursor to our 6001 [six-double-oh-one] course and I worked with him.

B: What’s the 6001?

H: Oh sorry, that’s the Structure and Interpretation of Computer Science course that Gerry [Sussman] and I taught for 15 years. But the precursor to that was taught by Bob Fano. And I taught sections in that class and watched the way he operated. And he became kind of a mentor to me. He’s …

Some people — I don’t know quite how to say it — there’s some people who are just wise. I’ve been fortunate enough to know a couple of people. Most people I think don’t ever meet anyone who’s wise. So I’ve maybe met three. And they’ve just had tremendous influence on me. People who … you remember the experience of the world just not making sense and you talk to somebody and they give you a perspective from which the world makes sense. And I think that’s kind of important to do. I think as a mentor that’s kind of what you have to do. It’s not quite … it’s not that you tell people what to do. It’s that you give them some sense of perspective. Let people make their own choices. So that’s kind of what I try to make guide me.

13 Robert Fano’s biographical page at the MIT Computer Science and Artificial Intelligence Laboratory: http://www.csail.mit.edu/user/688
14 Now the MIT Computer Science and Artificial Intelligence Laboratory.
B: So to whom do you think you’ve been the wise man?

H: I don’t know. I think you don’t know.

B: OK.

H: I think you really don’t know.

B: Until they get the award and then they talk about “Hal Abelson was the wise man that saw me through this …”

H: And there are people who’ve said that … you know, who have said very, very nice things about me. I don’t know if you know Elizabeth Bradley, who was a graduate student who worked for Gerry Sussman and me. She went off and became chair of the … electrical engineering? — either electrical engineering or computer science at UC Boulder — and I remember her sort of telling me that Gerry was doing a lot of technical stuff and helping her out with these technical things, but she sort of turned to me for kind of thinking about just making sense and decisions about what to do.

[65:01]

B: Mmm hmm.

H: And then, of course, she herself went on being department chair and becoming a very important figure and mentoring her own students at Boulder. So that's kind of … when you sort of have grand-students, that becomes kind of gratifying.

B: Can you tell me any particular challenges you might have faced in your work environment, like juggling commitments at home and at work, or your involvement in free software and work, or … what can you think about? Major challenges, health challenges, …

H: Well, thankfully, no. Thankfully, no health challenges.

B: That’s wonderful.

H: Challenges of too much work. I’m a terrible workaholic. My father … probably something I got from my father. Because he always … he ran two jobs, when he was working with the post office he was also doing a night job. So I just work a tremendous amount, probably way too much.

B: You said you had a daughter.

H: Yeah.

B: Tell me something about the relationship with your daughter. And were there any … you were working all the time; was that a challenge?
H: I don’t think so. I don’t know if my wife would think the same. My daughter is also a … my daughter is now a veterinary anesthesiologist and emergency critical care person who, you know, works … what makes my work seem trivial, you know, where you work a whole bunch of consecutive days of 14 and 18 hour shifts, so …

B: Hmm.

H: You probably know there have been all this crackdown on doctors working too long shifts. That basically hasn’t happened in veterinary medicine.

B: I didn’t know that there were … that they did that in veterinary medicine, that they worked such long hours.

H: Well, they model … in terms of the sensitivity about quality of care and working too hard, they’re about ten years behind the medical profession. So she still does these hours that I would consider insane.

B: Wow.

H: But I think part of … I don’t … maybe I’m just a bad role model for her.

B: [laughs]

H: Where you just say, “Gee, you’re supposed to work a lot.” But I don’t know about actual tensions and things. I mean, there’ve been challenges. I’ve sort of been a leader at MIT around open source and free software and things like that. And it’s not that it was particularly hard or has a lot of tension, but it takes a lot of work. We were creating open courseware at MIT. That took a lot of arguing and talking with people and getting people to understand that it was a big thing. And that’s a kind of challenge — it’s not a bad challenge, it’s a fun challenge.

B: Mmm hmm. Is your daughter in the Boston area?

H: No, she’s at University of Florida now.

B: Oh! Well, that’s not quite Boston. Not quite Boston. That’s cool.

You used to play the clarinet. And you’ve told us about your outside interests that deal around, say, essentially political issues about computing. The open software, I mean there. Politicized in that sense. Do you have any other outside interests like opera or golf or …?

H: No. Mostly sort of music and reading. And these days, I’ve got to say it’s mostly a lot of work. I have to do things.
B: If you were to choose a book that had nothing to do with computing or math or politics, what would you … what’s your favorite?

H: I don’t remember. I read a lot and I’m trying to think … they all get kind of mooshed together. Let’s see.

B: What genre do you like?

H: I mostly read fiction, I read science fiction. Occasionally read historical novels.

B: Do you ever watch television?

H: What?

B: Do you ever watch television?

H: Almost never.

B: Movies?

H: Yeah, movies a fair amount. These days I get them from Netflix. What have I been watching on television? We keep … my wife and I keep watching Inspector Lewis again, which we’ve become addicted to. We spent time at Oxford a couple of years ago. So it was just sort of wonderful to be in Oxford because it’s such a great antidote to being at MIT.

B: They don’t have those doors that you step on the green thing and they open.

H: Yeah, they don’t have those doors that you step on the green things that you open.

The big controversy when I was at Oxford was should Oxford allow wireless in the houses because — and obviously anyone realized that you shouldn’t. Because, I can’t quite tell, I think the usual answer seems to be something like, “Shelley didn’t have it when he was at Oxford, so why would you need it?”

B: [laughs]

H: I had been part of getting wireless put in at MIT. I did this work at MIT; I’m the head of something called the MIT Council on Educational Technology, which sets priorities. And one of the things we did early on was getting wireless at MIT — when would that have been? Probably 2001 — and making that original case. Now it’s taken for granted.

But at Oxford they, four years ago when I was there, they hadn’t put wireless in the houses and everyone just knew it was the wrong thing to do. And I offered, since I knew the head of the committee who was studying this, I had offered to talk before the committee about our experience at MIT, what we did and how we did it. And the answer was, “Well, why would we be interested in that? He’s not coming from a university.”
B: Ooh hoo hoo! Ouch!

H: So it’s just wonderful to have that perspective.

B: Well, I think we’re about done.

H: Okay.

B: And in wrapping up, if you could give advice to a young woman starting out in computing, what would it be?

H: It wouldn’t be any different than to a young man starting out in computing.

B: Okay.

H: I would say that computing has now in a real way become the environment in which we live. In which we live as individuals and in which we live as a society. In which we … we carry on what’s important to us and in which we do our interactions with other people. And once upon a time, computing was about numbers and it was about stacks and disk structure and it was all these boring things. But what computing is now is that it is architecture; it’s the architecture in which we live, the environment in which we live — not … I was going to say our intellectual lives, but our whole lives — and I think as someone going into computing, you have not only the opportunity to shape that, but the obligation to shape that in a way that preserves human values and, in particular, preserves values of freedom and self-expression and individual empowerment.

So as someone who is first going into computing, I would not lose those ideals. Computing was always very important. It was important in the 1950s, in the 1960s, in the 1970s. But I think it’s gotten to a place of importance where it really is critical to the future of how we are going to see ourselves as human beings. And I think, going into computing, you should not lose sight of that. It’s easy to lose sight of it because of the details. But at the end of the day the way you shape computing is going to be a reflection of your own humanity and you have an obligation to keep those human values.

B: [whispering] Thank you. One last question. If you could change one decision you made along the way; you said most of them were happenstances — met in the elevator and asked Papert for a job — if you could find one decision that you made that you could have changed …

H: Not give up the clarinet.

B: Ah, OK! Well, all right. I’m going to thank you for the interview and we’ll stop right here.

H: Okay.