Computing Educators Oral History Project
An Interview with *John Impagliazzo*

Conducted Wednesday, June 28, 2006
In Bologna, Italy
Interview conducted by Alison Young

[0:00]

Alison Young: This is an interview with John Impagliazzo in Bologna in Italy on June the 28th 2006 as part of the [Computing Educators] Oral History Project. John, could you just say your name into the machine so that we have got it correct.

John Impagliazzo: John Impagliazzo.

A: Right, John, as part of our Oral History Project, we'd actually like to take you way back to the beginning …

J: Uh oh!

A: … and talk to you about your parents. Did your parents have college degrees?

J: No, they did not. My Dad came to the States when he was … well, he came in 1929 and I don't recall exactly how old he was at that time, probably around 25 years old. He was an officer in the military. In fact, he was the personal bodyguard of King Victor Emmanuel III [who was King of Italy from 29 July 1900 to 9 May 1946] and so he appreciated education. In fact, his uncle was the Chief Justice of the Supreme Court in Lucca, Italy.

A: And your mom?

J: My mom was born in Providence, Rhode Island, and she was the first born of my grandparents in the United States. At that time things were difficult and there was a tremendous amount of time devoted to keeping the family together financially because my grandfather died at a very young age, right after they came to the United States. There were five sisters in the family and what they did was that they all worked to try to make one of the sisters become educated. And she was, in fact, the only one who graduated high school.

A: OK! So neither of them were in any math or science or engineering fields?

J: Oh no, no, no.

A: Do you have any siblings?

J: Yes, one sister. She went to college, but then she went to business school and was quite a good bookkeeper/accountant. Her name is Serafina. And we call her "Chicky" because when she was young, born, she looked like a little chicken. So that name stuck with her. She is now the school district registrar for the County of Newton in Georgia.

A: OK! Were you a good student at school?

J: I was always a good student. I always enjoyed learning.

A: And you took courses in math and science?

J: Always in high school, yes. And in college I gravitated to engineering right away. I had two loves: one was music, one was engineering. The question was: could I make a living writing music and composing music and conducting orchestras? The answer was no; the probability of that was nil given the rate of success for artists at the time. So I went to my avocation at that time, which was electronics. I was very, very good at electronics. And I pursued my first degree in electronics.

A: Were you and your sister given the same encouragement to go to college?

J: Oh, yes. My father highly valued education; so did my mother. They felt that [education] was the one thing that no one could ever take from you. I can still hear them tell me, “They can steal everything from you, but never your education.”

A: Oh! Was there anybody else in those early years that inspired you or was a mentor to you, that helped you pursue your career in engineering, physics, math, science?

J: No, not really. I just fell in love with it. I did quite a few things, when I was a teenager, with radios. It sounds silly now, but I used to go to the town dump and fetch out all the old radios that were discarded. Then I would disassemble them, save all the good parts, and reconstruct

them into other parts. My friend and I, I think we built the first stereo system ever on the planet. It was probably in 1956 or 1957 that we did that. In fact, at that time, they had binaural sound, which was mixed sounds with two speakers, but was never stereo. We built a pre-amplifier that would actually split sounds into separate components and therefore could channel it in a mixed way, into what we know today as stereo. It was very fascinating to listen to this in the late 1950s, because it was really was a startling sound at that time. Unfortunately, I never had the foresight, and neither did my friend, to patent it, so … but that's the way life is.

[5:47]

A: So you finished high school and then you went to college. Why did you choose the college that you went to?

J: I went to SUNY [State University of New York] Farmingdale, which was a technical college. And I went there first of all because it was close to home. It didn't feel like going away from home and spending money in dorms for useless reasons. And besides, I used to play music on weekends to make ends meet. I had a band, so that helped out on the financial side to keep things going. And from there I went to …

A: So you went to college knowing what you wanted to major in?

J: I really liked electronics then. I majored in electronics and I graduated 5th in my class (a class of about 300).

A: And you went from there to …

J: St. John's.

A: St. John's.

J: Yes, I went to St. John's University because I started to enjoy the science of electronics more than just the electronics. And I really wanted to know why things work the way they work. So I started studying physics and became fascinated with physics and tried to pursue that area. But I realized, even after I … actually, I was a double major in college. I'm one of the few people who graduated, I think, with a baccalaureate degree of — I don't know how many credits, probably near 250 to 300 credits. Because I transferred credits from one school to another and switched majors. So I lost about 90% of my credits, so I had to redo that. But I did a physics and mathematics double major at St. John's and I finished that in three years.

A: OK. And then you stayed on and did a Master's degree?

J: Yes. I won a National Science Foundation fellowship to SUNY Stony Brook, which was an upcoming university at that time. I went there and pursued engineering, which was at that time engineering analysis, which was the mathematical side of engineering. And that was basically a very applied engineering/math pursuit.

A: So when you finished the first Master's degree, and there is a gap to your second

Master's degree, what did you do then? Did you go straight into teaching?

J: Yes, I was planning to go into industry, but I did enjoy teaching. I guess it had to do with the music, because since I was 16 years old I was always teaching young students music, the guitar or piano. And I just enjoyed seeing these youngsters accomplish things. Probably one of the pinnacle areas was when I organized a piano recital. All of my students got together and we did a piano recital for their parents and relatives; it was very, very nice. It was so grand to see youngsters learn and accomplish something. From there, I thought that maybe teaching would be acceptable. And I tried it and I have been with it ever since. I've also worked in industry in the summers.

A: But you started out teaching math? [beep of a recorder; break before resuming] John, you were telling us about teaching music and how you enjoyed it. So you went on to teach math after your Master's degrees.

J: I started out teaching math, yes. I was always good at mathematics.

A: You started teaching first of all at Adelphi University as an adjunct professor?

J: No, actually I started teaching at SUNY Farmingdale, which was my alma mater from my first degree. It was a little strange going back to the place where you studied, because your teachers were now your colleagues and you got to know the inner politics of the things you didn't really know all the time as a student. It was a good experience and I taught mostly engineering calculus through differential equations …

[10:30]

A: And how did you get into computer science?

J: Well, when I was studying physics (this is like, I guess, the early 1960s), I used some of my electronic parts to build an analog/digital converter, to convert digital numbers into binary. And that seemed to be fun. I also had taken — I guess audited — an on-line course through television (on-line was television in those days) at MIT on the theory of computing and how computers worked.

When I was at Stony Brook, Aaron Finerman — who was well known in the early days and was one of the pioneers of computing — he became the computer person at SUNY Stony Brook. I had sat in on a class of Aaron's, which was rather interesting. It kept perking my interest in that area.

But later on, when I was doing mathematics — and I started writing my first book at that time — I began to try to express engineering themes in a graphic way. And I got involved with Fourier series and Fourier transforms, which are very akin to engineering. I showed, at least graphically, how to generate these series, how to create analog waves with digital … with other analog waves. You can create all kinds of things, such as square waves, using analog methods, and sine and cosine waves. So that was very challenging to be able to do this [with computers]. I also started building tutorials in the early 1970s on computers so students could learn mathematics doing tutorials. At that time, we started programming with

BASIC. I built tutorials in BASIC to teach mathematical principles and to teach BASIC programming to students. It seems like yesteryear — really yesteryear, a time warp — when that was going on. But it was very interesting, because things like that hadn't really been done before.

A: So you were like a professor then in computer science?

J: No, I was in mathematics at that time. And then I started really enjoying mathematics. I was fascinated by some of the theories in mathematics and how they related to computing in some ways. And then pursued my Master's in mathematics. And then my fifth degree was my Ph.D. in mathematics.

Which was also another nice thing, because I chose an applied area of math, which dealt with biomathematics or computational biology (as they would probably call it today). I modelled population dynamics using different methods of mathematics. Springer-Verlag learned about my thesis, which hadn't even been completed yet, and they immediately offered me a contract to publish my thesis, which they did right away. It was really a breaking thing, because I solved one of the unsolved problems in mathematical demography at the time; it was a particular method of doing solutions.

A: So why did you choose Adelphi University to do your last two degrees?

J: Adelphi was close to home and where I worked. I also was adjunct there and taught courses. They had, actually, an outstanding department. Courant Institute of Mathematical Sciences from NYU — New York University — a good group of that faculty left Courant and they opened up the math department, a special research department, at Adelphi. So, [my degree was similar to one from Courant because,] basically, it was the same teachers. And so it was very, very rigorous. It was not an easy thing. You really had to know your math very well to get through it.

[15:25]

A: Was there anybody in those early years when you were beginning teaching and still studying that was like a mentor to you? Or somebody that shaped your future career?

J: No, not really. I was guided by my thesis advisor, obviously, and my dissertation work. I basically did it on my own. I wasn't very fortunate in the sense that my daughter was handicapped and took a tremendous amount of time from one's life to take care of her and to do things and earn a living. The medical bills were outlandish and almost any time you earned a dollar it disappeared. We don't have a social medical system in the States, everything is private, and it could wipe you out right away. So I did quite a bit of teaching, sometimes at four universities at the same time in the same semester. One time I counted, I was teaching seven different courses from elementary math and computing to advanced differential equations at these places. Sometimes it's just the way the dice roll and, you know, you have to do these things. You do what you have to do.

A: OK. Are you happy to share your teaching philosophy with us?

J: Well, I think students need to become engaged. They need to try to understand what they are doing, why they are doing the things that they do. It's okay to show them tricks and how you can take shortcuts to do things. But … I was always the type that, whenever a student had a question, I would go back and do it from foundation up so they understood where the result came from. Particularly in mathematics, where most of the time, at least in calculus, solutions are concrete and you actually get a definitive answer; you don't have to hypothesise too much about it, especially if they're engineering-type problems.

A: Do you think your teaching style has changed over the years?

J: Yes, it's changed from kindergarten right through the universities …

A: Your own teaching style.

J: Pardon?

A: Your own teaching style.

J: Oh, my own teaching style? I would say, I don't think too much; I don't think so. Obviously you have to teach differently if you're teaching computer courses versus math-type courses.

A: Can you explain that a wee bit further?

J: Well, in math-type courses, you begin with concrete premises that you assume to be true and then you can build something from there in a very logical way. Sometimes computing can become a little bit "hit and miss" — you know, try this and recompile, try that and recompile — and the students constantly do that and they spend endless hours in labs doing that. Probably, the good old days were better with the punched cards, because you had to think five times before you submitted the punched cards because you didn't want to wait for the 24 or 48 hours for the turnaround. But I think my style generally is still the same, to engage students.

A: OK. I just want to change direction now for a while. You have a very impressive record on your CV of professional organizations. Could you tell us what types of professional organizations you have belonged to?

J: Well, several. I guess I started with the [IEEE] Computer Society and ACM back in the … Well, way back I started with the Institute of Radio Engineers (IRE), which doesn't exist anymore. That organization merged with the American Institute of Electrical Engineers (AIEE) and then became the IEEE. So I was one of the early members of IEEE. Then I dropped out of that for a while because of things on the home front with my daughter. My first publication was with IEEE and there I discovered multimodal propagation and antenna propagation waves; it became the lead article of the journal for that year. But I didn't pursue the organizational stuff in those early days.
[20:26]
But in the 1980s, things began to change and I started to be more involved with

organizations. I began with ACM, the Computer Society. And recently (in the last 10 years) I have been active with IFIP, chairing their 9.7 committee [on the History of Computing]. I ran the SIGCSE conference in 1996 when that was the kick-off of the 50th Anniversary of ACM, with Big Blue and Kasparov waging battle at chess. It was also the 50th Anniversary of the ENIAC, so it was a busy time for me in Philadelphia then. Hence, I became involved that way.

A year later, Jim Miller announced that he was not going to continue as editor of the *SIGCSE Bulletin* anymore. He was giving it up. And I said, "Gee! That might be something I might be interested in doing." So, I started doing that in 1997 and I'm still its editor. So, right now I am involved with that. In addition, I have been affiliated with the Education Board of ACM since 1986. Twenty years! Where did they go? I was involved in the Ed Board in one capacity or another, particularly chairing its accreditation committee for twelve years. I don't do too much with the Computer Society. They ask me to do tasks from time to time, but I'm involved …

A: That's the IEEE Computer Society?

J: IEEE Computer Society. But I am involved with IEEE. I am the Treasurer of the IEEE History Committee and I chair the financial aub-committee for that committee. So I am very involved with the IEEE people in different ways. So basically those are the organisations I am involved with now.

A: How do you think your involvement with these organisations has shaped your career?

J: Well, it has certainly made it a lot busier! I don't know if it has shaped my career. My career is in its limelight at this time. Although I still feel like I have fifty more years, but in reality I only have a number of years. But the … I don't think it has changed my career at all in terms of working. Hofstra doesn't recognise the hours that people who volunteer for organisations do and the time they spend.

However, I guess professionally, on the world front, it has affected me professionally. What it has done (and what I have done) is to try to expose computing history worldwide. I have organized several conferences already through IFIP on computing history, one for the Nordic countries, one on history of computing in education in France. Later, in August of this year, I will be doing another IFIP conference on computing history in Santiago, Chile. But I guess the feather in the cap is the SoRuCom conference that I'm doing in a couple of days. This is a very high profile, week-long conference on perspectives on Soviet and Russian computing. It is a … I don't know how it happened, but I was able to reconstruct the former Soviet Union historically, including the Russian Academy of Sciences. In fact, I am doing a presentation next Tuesday, which will involve comparative computing education, east versus west. The Eastern perspective will be given by the director of the Russian Academy of Sciences and also the chief industrial representative for Microsoft Research Russia. For the Western part I will be doing the comparative history, the US perspective. And the president of IFIP will be doing the European perspective. The conference has gained so much acclaim so far. They plan to have a plenary session at the conference and they are going to do a mass media

broadcast. I have no idea who will be watching this, but I guess I should be wearing a jacket and tie. [both laugh]

[25:25]

A: Of all the things that you have done for these professional organizations, outside of your normal duties, is this the one that you'd be most proud of?

J: Do you mean the event?

A: Yes, the conference next week.

J: I would say this is perhaps the greatest achievement. This would never have happened without me, because of the politics within Russia. To get the Ukranian camps [of computing] talking with the Siberian camps of computing — confrontational, perhaps — philosophies of computing. To actually get them all together in the same place and make presentations. The quality of the people who are coming [is paramount]. These people are some of the most outstanding pioneers and scientists from the former Soviet Union. It really is an accomplishment. I can't take full credit for myself, because without other support within Russia, it would be impossible to do these things. But, for this event to happen is surely an accomplishment.

A: John, you have also spent some time on your sabbaticals working outside of the USA. Can you just tell us a little bit about that?

J: Well, I enjoy doing international things. As you well know, I helped out at Unitec [New Zealand] with their Master's and doctoral programmes. There are other … I guess people are starting to know me as someone they should call. The Chilean government, through one of their grants and consortium of universities, has invited me to look at their computing curriculum and to revamp much of the computing curricula within Chile. Or at least make recommendations for that. To be asked to do that is sort of honorary.

A: And Estonia?

J: Well, Estonia, yes. Estonia … I don't know how that happened, but I think I know where it started. I was invited by Tony Clear to speak in New Zealand and I gave a talk at the New Zealand Computer Society. And then after that I gave a talk at the NACCQ Conference. And in the audience there was a person from Sweden who heard me speak about accreditation and things of that sort. I believe it was she who, through other circles, suggested that the Estonian government should call me and invite me to help [the government with accreditation. The country already had an] accreditation system set up, but they had yet to do one [computing] accreditation process in Estonia at that time.

They made me the leader, the team chair as it was, and they asked me to conduct this process at three universities for baccalaureate, Master's, and doctoral-level programmes. So, in just one shot, in one week, we had to do nine programmes with a committee of three. It was very exciting. In fact, the problem was that they didn't have any … hardly any documentation for guidance, though they had some crude standards. So I had to reconstruct the standards for

them. I also set up the model by which reports were to be done. And I also created the forms to help them do their visits. They are still using my forms today, so it was a very good experience.

[29:52]

A: You have been involved with accreditation visits within the USA.

J: Oh, yes.

A: Do you want to share some of that with us?

J: Yes, I have been doing that since 1987. I have been involved with CSAB and then ABET. I don't recall how many programmes I have done, but it's close to 40, maybe 35, accreditation programmes worldwide. Of those, maybe 10 or 15 are within the United States. Maybe more, there should be more than 15, because I have been doing [accreditation visits] for about 18 years.

A: Have you spent much time supervising post-graduate students?

J: No, at Hofstra we only have a Master's programme. So we don't have post-graduate work. So that, I guess, is not something I've been familiar with. That would be exciting to do.

A: Have you faced any particular challenges in your work environment? Challenges that have … for example, juggling commitments at home and at work?

J: Commitments between home and work? I don't quite understand.

A: Any particular challenges that you have faced that have made your work more difficult.

J: Yes. Probably the log-headedness of some of my fellow faculty members [presented challenges]. When I was department chair, I took a "no nonsense" attitude. And I know I probably released more people than I hired, because I didn't want any dead wood around. So whenever it came time for reappointments, they didn't get them, they didn't get tenure. And I tried to build a high quality faculty, which I did.

In fact, I was proud that back in the middle 1990s or late 1990s, my department achieved 50% women and 50% men in our full-time teaching faculty. Although that has now subsided again to women not being in the majority or equal. I do have sensitivity to that. I don't think that … well, women in computing, as you well know, we have done the 2002 [SIGCSE Bulletin] inroads issue on "Women and Computing" (which has taken a few years off my life). And last year we produced the CD called "Pathways: Women in Computing." And so there is always an interest in trying to obtain a more diverse presence in the classroom. The real challenge is trying to get faculty members, not necessarily within my own faculty, to come around and see the light on some things. But some people are just stubborn. In terms of other challenges, I just take them the way they come.

A: OK, that's a good point! What about compromises? What compromises have you had

to make …

J: Compromises?

A: … in the course of your career?

J: Sometimes you always have to compromise what you are doing with your time. I don't think I've compromised any ideals for the sake of one thing or another. I just feel that … I just do what I do, and until somebody doesn't like what I'm doing anymore, fine. My current challenge is, [once] the next week or two passes with this Russian conference and [in Augus]t with the Chilean Conference, [I need to focus on the encyclopedia]. I am associate editor of the Encyclopedia for Computing Science and Engineering. [Wiley is the publisher.] That work is probably going to be the "opus magnum" of all encyclopedias on the subject. It will be six volumes (minimum) in print and with online access. To get all those components in place to produce this encyclopedia is a lot of work. I'm one of several associate editors.

A: Do you have any strong outside interests that would enable us to understand you better?

J: Outside interests?

A: Or any outside interests that have had a shaping effect on your career?

J: No, just music. I always liked music. If I had to … if there were a second chance around, I might try music again. I always wanted to be a composer and a conductor. I guess since I was a teenager, around 15 [years old], my ambition was to go to the Julliard School of Music and do that. I started doing orchestrations when I was around 16, 17, 18 [years old]. But I realised that [career] wasn't for me. Music has become a way of relaxation or a mental transport to … I guess some of the aesthetical things of art, as opposed to just science. So to me it's a healthy balance.

[35:27]

A: That's good. If you could change one decision that you've made along your career path, what would it be?

J: Gee, that's a tough one, I don't know! Sometimes you don't make decisions, sometimes decisions tend to be made for you, because that's the way life goes. So I don't know if there's any one big thing that would have made a big difference. I would probably do it again. I can't think of any one thing.

A: That's fine!

J: If I think of something, I'll let you know.

A: OK! Do you have any advice to young people starting out today, thinking about a career in computer science, what would it be?

J: Well, I think they should get away from being a geek. I realize computer science can be very technical, but it's just as technical as, let's say, chemistry, or physics, or biology — of course, in different ways. And having done physics and math and engineering, and even having degrees in them, the thing I think students should have is an open mind. That they should do what they love, first of all. Very often, computer science is viewed as something that you do to get a job. You don't see people going into physics or biology or chemistry because they're going to get a job. Now naturally, they would all like employment. But they don't study these topics for that reason. However, people seem to study computer science because there is going to be some miraculous job at the end the road. Of course, reality has hit.

So I think the attitude should be to do what you love and have an open mind about it and be diverse in your thinking. And you should always do the best you can do. The motto for the State University of New York is "become all you're capable of being." If a student chooses to go into computing — notice I said "computing," not necessarily computer science — that it is important for them to see computing in its full context, as well as some of the social and legal issues. (I teach the ethics and professionalism course at Hofstra.) So it's important that students see computing in its full picture as opposed to just lines of code.

I think some of the people in computer science have really butchered that area, to where the total focus of computing is on programming at the expense of everything else. And when you think about all the things that are done in computer science, programming is always a part of it, but it's not necessarily the major part of it. And many of our students who graduate don't even do programming. They were involved in other things; programming is a vehicle for doing these things. I think what they've done is to portray the image of geeks, people who work in front of inanimate objects staring at a screen, and working at hacking out code. It has really turned off a good part of society against computing. I think computer science itself is in a lot of trouble.

A: I see. John, if there's one story that you want to tell that will be remembered, what would it be?

J: Gee, that's a tough one. A story. I don't know. Probably going back to my youth and my parents, sort of where we started out this discussion. [The story would be] that education is important, repeating — people can steal everything from you, but they can never steal your education. I still can hear the voice of my mother and father: "Learn as much as you can and put it in your pocket; you never know when you might need it." Some of the things that we learn, we think we'll never need or use and then — Voila! we realize we need it. So, I think the story from childhood is very simple, and that is to value education, not necessarily for a job, but because education is important for life.

[40:50]

Perhaps one of the more moving things is [as follows]. I've been asked to go to the United Arab Emirates many times to evaluate their universities. I think I've been there eight times over the last four years or so. There you see a culture where the people are ingrained in a traditional custom that they've had for centuries. And particularly the women, who are basically subservient in their customal ways, do not necessarily have aspirations for a

professional future. But it's marvellous to see what's going on there. The women outnumber the men 2-to-1 in engineering, in computer science, and in all kinds of technical areas. Because of their traditions, you know that [these young women] themselves will probably not enter the professional world because the custom is that families arrange marriages and they are supposed to have children and raise families. But I could see that their children, which will be the new generation, will value education because their mothers and fathers value education. That they will, in effect, be at least spiritually and mentally liberated. They can then convey in a more natural way that feeling and then actually become, in some ways, part of the professional societies. You know that it is there; you know they will be working in managerial positions in business and industry.

So stories like that are good. So I have to thank my parents for instilling that germ in me. I did it on my own, nobody paid for anything. I just worked and I paid my tuition and things of that sort. You just do right where life takes you.

A: Thank you John. Is there anything else you would like to add while we're recording?

J: No, there are probably a few other things I could, and probably will, think about tonight and tomorrow. And I may add to it and we could probably have another discussion another time on some other things, but … I think it's clear.

A: Thank you, John, it's been an absolute pleasure to be able to conduct this interview. Thank you.

J: Thank you, Alison.

[43:53]