Lynda Ellis, Ph.D.
Narrator

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Interviewer

INSTITUTE FOR HEALTH INFORMATICS
HISTORY PROJECT

UNIVERSITY OF MINNESOTA

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In 2015, the Institute for Health Informatics (IHI) celebrates the 50th anniversary of health informatics at the University of Minnesota. Early institutional markers serve as the formal beginnings of the emergent discipline of health informatics at the University of Minnesota, designating the University of Minnesota as one of the first academic institutions to support and subsequently anchor the development of the new discipline. In 1965, the National Institute of Health (NIH) Division of Research Resources awarded the University of Minnesota's College of Medical Sciences a grant to establish a Biomedical Data Processing Unit at the University. Two years later, the Hill Family Foundation awarded a ten-year grant to Professor Eugene Ackerman to initiate a graduate research and training program in Biomedical Computing. In 1968, the College of Medical Sciences established the Division of Health Computer Sciences, which would serve as the administrative home for the NIH research resources grant, housed within the Department of Laboratory Medicine. The Division provided interdisciplinary training to pre-doctoral and post-doctoral students applying health computer sciences technology to health services research. In 1974, the University of Minnesota was awarded the prestigious National Library of Medicine Grant for Training in Health Computer Sciences, which formally established the Graduate Program in Health Informatics at the University of Minnesota. The Division and its institutional successor, the Institute for Health Informatics (created in 2006), received continuous training grants from the National Library of Medicine until 2009. For fifty years, the University of Minnesota has been one of the preeminent health informatics institutions in the United States.

The Institute for Health Informatics History Project captures, analyzes, and records the history of health informatics at the University of Minnesota. Through oral history interviews, the Project preserves the personal stories of faculty members and National Library of Medicine administrators who were involved in the early history of the field and have keen insights into the history of health informatics at the University of Minnesota.

Biographical Sketch

Lynda Ellis was born in Los Angeles, California. She received her BS in Chemistry from the University of Southern California in 1965 and her PhD in Biochemistry from Brandeis University in 1971. Upon receiving her PhD, Dr. Ellis moved to the University of Minnesota to complete a post-doctoral fellowship with Dr. Clare Woodward in the Department of Biochemistry and the Department of Laboratory Medicine. In 1973, Dr. Ellis was hired as an assistant professor in the Department of Laboratory Medicine and Pathology, where she joined the Division of Health Computer Sciences. The following year, she was appointed Director of Health Information Systems Instruction within the Division, a position she held until 1979. From 1975 to 1984, Dr. Ellis served as coordinator of the National Library of Medicine trainees within the Division, and beginning in the late 1970s, she was supervisor of the Health Sciences Instructional Computing Laboratory. During her tenure at the University, Dr. Ellis has taken two sabbaticals; the first was spent as an Information Systems Analyst at 3M (1985) and the second as a visiting professor in the Department of Biochemistry (1993-1994). It was during this second sabbatical, while working with biochemist Lawrence Wackett, that Ellis and Wackett developed an innovative microbial biotechnology database on the World Wide Web: the University of Minnesota Biocatalysis/Biodegradation Database. Dr. Ellis's other research has focused on computer-based patient education and computational biology.

Interview Abstract

Lynda Ellis begins by discussing her educational background and her arrival at the University of Minnesota. She describes her first years in the Division of Health Computer Sciences, the atmosphere of the Department of Laboratory Medicine and Pathology, and her colleagues in the Department. She then discusses her initial research in computer-based patient education; the graduate program in Biometry and Health Information Systems; and her year of leave at 3M. Dr. Ellis next describes her collaborative work with Larry Wackett and the development of the University of Minnesota Biocatalysis/Biodegradation Database, and then returns to the subject of her work on computer-based patient education. She discusses the National Library of Medicine Training Grant program; the development of the Health Sciences Instructional Computing Laboratory; the important role of the Biomedical Library in the history of health informatics at the University; the leadership styles of Eugene Ackerman and Laël Gatewood; and the number of women in health informatics.

Interview with Doctor Lynda Ellis

Interviewed by Dominique Tobbell, Oral Historian

Interviewed for the Academic Health Center, University of Minnesota
Oral History Project

Interviewed in Doctor Ellis' Office, Mayo Memorial Building
University of Minnesota Campus, Saint Paul, Minnesota

Interviewed on July 9, 2014

Lynda Ellis   - LE
Dominique Tobbell   - DT

DT: This is Dominique Tobbell. I'm here with Lynda Ellis. It is July 9, 2014, and we're in Doctor Ellis' office in the Mayo Memorial Building on campus.

Thank you for meeting with me today.

LE: Yes.

DT: To get us started, can you tell me a little about your educational background?

LE: All right. I was born in Los Angeles [California] in Boyle Heights, which is a neighborhood there. I grew up in City Terrace [California], went to Harrison Street School, Belvedere Junior High, and Roosevelt High School. When Roosevelt High School was built, it was the third high school in Los Angeles. There wasn't a question as to whether it was Theodore or Franklin. It was Theodore.

DT: Okay. [chuckles]

Then, I went to USC [University of Southern California] and got a bachelor's degree in chemistry. I went to graduate school at Brandeis [University] in Boston [Massachusetts] and nearly died. It was quite colder than I was used to.

DT: [laughter]

LE: I adapted.

I was married during my first year of graduate school. I had gotten engaged in L.A. My husband [John E. Ellis] went to MIT [Massachusetts Institute of Technology] graduate school, and we lived in Watertown [Massachusetts], which is sort of halfway between both places, Cambridge and Waltham where Brandeis is. We both defended our dissertations in the same month and moved to Minnesota, where he had an assistant professorship, and I did a post doc [doctorate], first, in biochemistry on the Saint Paul campus and, then, in Laboratory Medicine on the Minneapolis campus with the same person. She moved from there. That was Clare Woodward who was an assistant professor, at that time. My thesis advisor as a graduate student was Robert Ables. He has died, and Clare has retired now.

DT: What led you to get your bachelor's degree in chemistry?

LE: I liked the subject. I actually started as a math major, but the freshman chemistry course was quite interesting, and I did well in that.

DT: Were there many women in your degree program?

LE: No, very much the minority. In fact, in organic chemistry class, there were 100 people in the class—the room held 100 and every seat was filled—and there were five women. Four of us were friends and sat in the front row and the four of us got A's.

DT: Fantastic. [chuckles]

When you went to Brandeis, your Ph.D. was in biochemistry?

LE: Yes. It was still predominantly male, but there were more women in the program.

DT: Why the shift from chemistry to biochemistry?

LE: When I was a chemistry major, I took a course in biochemistry and had as an informal advisor, Paul Saltman, who was a faculty member in the biochemistry department. When I was thinking of graduate school, he suggested different graduate schools. My husband also was at USC. That's where we met. There was a time when he was accepted at MIT, and I was accepted at Stanford [University], and we talked about living in Kansas and commuting.

DT: [laughter]

LE: Then, I got into Brandeis and that worked out.

DT: That's much better than living in Kansas and commuting.

At Brandeis was there anything resembling health informatics there?

LE: No. I was very definitely a biochemist, and I came here, and I was a biochemist and did my post doc with a biochemist, but she was doing computational things. Remember, back in that time, 1971, computational was punch cards. She was doing that, and I did well. Actually, even as an undergraduate, I did some but never really got into it. This gave me some time. I took some courses in the Computer Science Department, evening courses, courses that are no longer offered. It was a first-year sequence, three quarters of a graduate level programming class. I did well in that. I attended lectures in what was then the Division of Health Computer Sciences and gave some seminars of my own. Then, a faculty position opened up there. So after two years of post doc, I started as a faculty member. It was about 1973.

DT: What was your research on at that time?

LE: That was biochemical simulation. That was my proposal, anyway. But, soon after, I got interested in computer-based patient education and did some of that early work in that field—not well funded…

DT: [chuckles]

LE: …but of interest. I worked with a person in Family Practice, Christopher Kough.

I don't know if you remember the PLATO [Programmed Logic for Automatic Teaching Operations] system. Did you ever hear of that?

DT: No.

LE: That was one of the first graphical interfaces. It was a terminal to a CDC [Control Data Corporation] computer, actually, but the PLATO system could do graphics. It was phenomenal. There was a program called ROSE [Representation of Spatial Experience] where theses graphics just appeared and morphed into one another. No color. This was just black and white, but you could stand there and look at it forever.

DT: [chuckles]

LE: When I was hired… Let's backtrack a bit to the Division of Health Computer Sciences. I wasn't there when it happened but… You'll be interviewing Laël [Gatewood] and maybe [Eugene] Gene Ackerman.

DT: Yes.

LE: At the time I was hired, the head of the Laboratory Medicine and Pathology Department was Ellis Benson. Several years earlier, he had recruited Gene Ackerman to come from the Mayo Clinic [Rochester, Minnesota] and become head of this division in Health Computer Sciences. Gene Ackerman brought his graduate student, Laël Gatewood. They two were the beginning nucleus there. At that time, then Gene and Laël

had a graduate student on the Minneapolis campus, [Donald P.] Don Connelly. Are you going to interview him?

DT: I'm waiting to hear back from him. I emailed him at the same time that I emailed you.

LE: He was their graduate student, but he was a physician and had some clinical responsibilities in Laboratory Medicine so was sort of an upper level graduate student.

I was hired as an assistant professor and at about that same time, another assistant professor, Claus Liedtke. We had offices adjoining each other and became good friends. He was German.

At that time, Doctor Benson's philosophy on building the department—this was not Laboratory Medicine and Pathology; it was Laboratory Medicine—was this is what people in my department do. So it wasn't that he was hiring clinical pathologists or whatever. The people he hired, he just grew the field. So the fact that we were doing computational things in our division did not bother him at all. This was also the time when Laboratory Medicine was a profit center in the Medical School and there was money to support these kinds of things. If I wanted, as an assistant professor, to travel to a meeting, I made an appointment to see Doctor Benson, told him what the meeting was, and he'd say, "Oh, sure, go. There's funds. We'll pay for it." Very interesting.

Claus got a very good offer, after a few years, to go back to Germany. His wife was German, and they had a child, and they left. The line items, the faculty lines, in Health Computer Sciences were filled by Gene Ackerman. Yes. [Stephen S.] Steve Rich was brought in as a replacement. There was also Myra Chern, who was a biostatistician and she was another faculty member there. Maybe this was the golden age. I don't know how you'd put it. There were some other people. At that time, Health Computer Sciences ran a computer service that was in the Masonic, actually in the basement of what is now the Masonic Cancer Center. There were systems people, and programmers, and such working for that service. It was a very bustling place.

Many things…I'm probably not getting them in the right order. First, the service center went off to a different heading. The academic part stayed in Laboratory Medicine with Robert Good, who was the chair of Pathology, and he left in some disgrace. The two departments were combined and Ellis Benson became head of Laboratory Medicine and Pathology. Then, actually, Ellis Benson retired. The economic climate shifted to managed care and the departments became rather than profit centers, cost centers.

It was when Gene Ackerman retired. I can't remember the exact year, but that's just a point of things. There was a post doc there, Michael Altmann. Michael Altmann had been told by Gene and Laël that when that line item opened up, he would be hired. That was when the transition came, because the then head of the department, Leo [T.] Furcht, who is the present head now, said, "No longer will division heads be able to fill their faculty positions. The head of the department will assign where those positions are." and

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he took that position away from Health Computer Sciences. So anyone who had twenty-twenty foresight could say, "That was the beginning of the end of the division." When you weren't willing to maintain it or grow it, you are letting it die.

DT: Yes.

LE: No more faculty, with one exception, joined that division. At that point, there were many assistant professors who became associate professors, who became full professors, but there were no younger people following beneath them. That was interesting. We were young. We were busy. We were doing things. We had other young colleagues in other departments, but no junior colleagues in our own division.

At that time, there was a graduate program. The Division of Health Computer Sciences ran, with the Division of Biometry in the School of Public Health, a graduate program in biometry and health information systems. There was a training grant which was headed by Laël Gatewood. Over the years—these were five-year training grants—there were several of them, and Laël will tell you all about those.

The graduate program…at some point, there was a move to split. The Health Information System program had fewer requirements than the Biometry program and students tended to want that, not only the weaker students. There was a new head in Biometry who wanted a different style of things, so there became a graduate program in biometry, which is now biostatistics, and the graduate program in what was called health informatics. Then, the division became the Division of Health Informatics instead of Health Computer Science. The word informatics had been adopted first in Europe. It was a little strange in the U.S. [United States], at that time. It's become much more common now. So we had our own graduate program, and secretaries, and the director of graduate studies, and things like that, and I taught.

When I was first hired, at the same time as Claus Liedtke, I was given most of the teaching responsibilities, the low level ones. Claus taught a graduate level course and was shopped around by Laël and Gene to various researchers who might make use of his talents to work on research projects. It seemed quite clear to Claus and me that I was going to be the teacher, and I taught the entire first year Biomedical Computing I, Biomedical Computing II, Biomedical Computing III. As I say, Claus taught the graduate level course. That's how it went for a number of years.

I was, and most junior faculty actually in the Medical School were, non-tenure track. Does the term capitation mean something to you?

DT: Yes.

LE: We were hired under capitation. At the time I was hired, I said, "Tenure, *smenure*. I want to do the work I like, and it doesn't make any difference." After I'd been doing it for ten years, it *did* make a difference.

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[chuckles]

DT: Yes.

LE: At that time, capitation was going, and I was looking, also, for my options. Every year as a temporary employee, I got a nice letter from the president of the University saying, "We deeply value your work, but you are temporary. We are renewing you for one more year."

[laughter]

LE: "But, remember, this can be terminated at any time." P.A.s [Professional/Administrative] now, I think, can get three- or five-year contracts, but we had the single year.

DT: Sure.

LE: I wasn't eligible for sabbatical but I took a leave of absence and spent a year at 3M [Minnesota Mining and Manufacturing Company], the idea being…well, my husband was employed by the University and probably wasn't going to move anywhere. There's no other graduate program in health informatics, but let's see if I can do something at 3M. They offered me a position. I worked for their Information Systems System Services, ISSS, which was part of their library. I actually got a paper out of that.

DT: Oh, good.

LE: Yes. That was interesting. I was happy to go there and happy to come back, actually. By the end of that year, they had regularized the temporary thing. Some people were let go; some people were put on, I guess the predecessor to the P.A. appointments. A group of us, myself included, were put on the tenure track. So, then, I was promoted to associate professor, stayed there a fair amount, and, then, was promoted to full professor.

DT: Great.

What type of work were you doing at 3M?

LE: Information Systems System Services is part of the library, so I developed some software to ease the library processing of things. This was during the time when still we didn't have many computers, but we had COMPAQ. Do you remember the COMPAQ?

DT: Yes.

LE: It wasn't really portable. It was luggable.

DT: [laughter]

LE: It weighed about forty pounds. We used that as the terminal to make a computer-based cover letter. That was one of the projects. I did another one to nicely format literature searchers, the predecessor of PubMed which was MEDLINE. Those were the main two projects…and to become familiar with the 3M way to do things. But since I was a consultant rather than an employee, there were seminars that I wasn't allowed to go to, certain things.

DT: Secret things. [chuckles]

LE: Yes.

DT: If we could go back a little bit to those early years when you were first here… How would you describe the culture of the department when you arrived?

LE: Well, it was quite small. For example, we would have seminars in people's homes, evening seminars. I lived in a townhouse near the University, at Seventh Street and Third Avenue Southeast. It was within walking distance to the University; although, I usually drove. It was a small group of people, and you knew their children, and you knew everything. There were the training grants, so there was funding for trainees who were often very interesting people. They got some graduate degrees or such. I taught a programming course in Biomedical Computing I. I remember one year, there were eighty students. In fact, that year there were eighty, the room was too small. It was a nine o'clock class. You know, a nine o'clock class in the health sciences, there weren't any larger rooms. So it became an eight o'clock class.

DT: Oh. [whispered]

LE: And they came.

DT: Wow.

LE: Yes. [chuckles]

DT: That's amazing. Computers were the hot thing, even then.

LE: Yes. So I was teaching a subject that people wanted. Computer Science didn't mind us, because we were teaching a group of people that wouldn't be comfortable in a computer science course.

DT: Yes, I was wondering about that, how those relations were.

LE: Laël was a member of the Computer Science faculty and a member of the faculty in quite a few different departments.

DT: You talked about the Biometry and Health Information Systems teaching. I was curious how relationships were between the Division of Health Computer Sciences and the School of Public Health, and, particularly, the Division of Biometry.

LE: Well, we served on committees together: Anne [I.] Goldman, Eugene [A.] Johnson, [Richard B.] Dick McHugh. Many of those people were quite friendly and such. It turned out, then, after the two split, they'd get younger faculty, and I wouldn't know them, so things drifted apart. But we were very collegial and, as far as I was concerned, worked together well.

DT: I know when you were doing your post doc, you were working, initially, in biochemistry and, then, when you were in the department here, you were still doing biochemistry. I know you were still in the Department of Lab Medicine, but when you focused within the Division of Health Computer Sciences, did you maintain connections with the Department of Biochemistry?

LE: In an interesting way. As I said, I did computer-based patient education and, then, I got my tenure track appointment, and, then, I was eligible for a sabbatical, but couldn't leave the area. So I decided to work with [David M.] Dave Ferguson, who was in Medicinal Chemistry and was doing work on molecular simulation. After a while, I decided I didn't like that group, the work was interesting but the culture or the way things were organized in his lab… I was looking around for another place to go. I didn't want to give up my sabbatical early. [Lawrence P.] Larry Wackett in the Biochemistry Department was a new faculty member there. He was actually at the Freshwater Biological Institute [located in Lafayette Bay of Lake Minnetonka]. Then, he moved to the Saint Paul campus. We just kept in touch, and I moved over to his lab to help him with some computational-based things.

Does the word Mosaic mean anything to you? At that time, Mosaic first started. I got introduced to the World Wide Web. Ohhh! I said, "Larry, look! Look! Look at this! Look at that!" Of course, at Minnesota, we had Gopher [protocol]. That was sort of the predecessor of that. "Look at this!" "Look at that!"

So at the end of my sabbatical, he said to me, "Has anyone done a database of biodegradation and biocatalysis?" We didn't have anything like Google. But I looked around, and I said, "No, there doesn't seem to be that." "Why don't we do one?" It was like these old movies where, you know, let's put on a show in the barn! Yes, how hard could it be? Let's do that. So I came back to the Division of Health Computer Sciences. They had a systems analyst there. They were running an email server. They didn't have a service. That had been taken away, but some PDPs [programmed data processor] and such. Their systems person wanted to find out about this World Wide Web, too. Gee, it doesn't look hard. We should be able to set up a web server, and they did. That started the University of Minnesota Biocatalysis/Biodegradation Database.

DT: Wow.

LE: That grew and grew and grew. For awhile there, until maybe a three years ago, or more like two years ago, you could do a search on biocatalysis and find it up there. You could do a search on biodegradation and find it up there. Why? Because it had started out, got connected—it was a small thing, to PubMed, to KEGG [Kyoto Encyclopedia of Genes and Genomes], which is a database in Japan which came out *after* we did, and to other very reputable sources of information. That's how Google's rankings go, so we were there.

Then, we got grants. We got a National Science Foundation [NSF] grant. We got a year's grant from the Graduate School to get it started. Health Computer Sciences gave us some to get a prototype. Then, we got a one-year grant from the Graduate School and, then, applied for a second year. We had submitted an NSF grant but hadn't heard about it. They turned it down [saying], "You have done what you said you would do in the first year, gotten something, and submitted it now, and the proposal wouldn't be that much better if you add another year of funding." You know, sink or swim. We got that funding [meaning from the NSF]. So that was very nice. Then, we got other funding from NIH [National Institutes of Health] and got some funding from DOE [Department of Energy], and got some NSF funding again. That's how these things were built.

Ever since that first NSF grant, which was three years, I asked my program officer, "What happens after the end of the three years?" There was no funding at NSF or anyplace for the maintenance of a database. There was money to build it. Then, you put a different slant on it and you put it to the NIH and you got another grant, and a different slant on it to the DOE and you got another grant. Then, you could go back to the NSF, *but* at some point, you couldn't.

DT: Yes.

LE: So just as the Department went from a profit center to a cost center, we no longer could find any support for it.

By this time, we had mirrors in a couple different places. One: a woman named Kathrin Fenner had done a post doc with Larry Wackett. She was a faculty at Eawag [Swiss Federal Institute of Aquatic Science and Technology], a freshwater institute in Switzerland. She hosted a mirror of our database for several years. Then, when we lost funding, they continued to be that and did that with mostly pathways that we had already done for them. That was two years ago.

By that time, I was already looking at retirement. Larry and I had worked closely as a team. I was doing a lot of the nuts and bolts things. He was doing sort of the higher-level things, and there was nobody to take that over here. So when our granting left, it moved over to them [Eawag]. The way they were willing to take it was that they would continue the name for two years with a different URL [uniform resource locator]. Also, we were no longer housed in Laboratory Medicine. We had moved over to the Supercomputing Institute. There were several different homes for it. Then, the last years were at the Supercomputing Institute, who decided, after wanting us very much, that

hosting a production system was not what they should be doing, and were very happy when we left. They wanted us gone before we actually left. The only way that the contract could be negotiated between the University of Minnesota and Eawag—this was at the request of Kathrin Fenner—was that it contained the name of the University of Minnesota name for two years. Then, all rights would revert to Eawag. So if you go there now… [pause as Doctor Ellis displays the Eawag web site on her computer] I can go to the web archive and see what it used to look like, but, now, it is no longer University of Minnesota…

DT: Yes.

LE: …even though this is exactly the same. They haven't changed anything. If you look at contributors, you'll see that Larry is still there, but I've asked to be moved to here. There you see the former staff…University of Minnesota, University of Minnesota. I don't think there's anybody…no, no, nobody yet that are former staff there.

[pause]

DT: That's great. Is that like a kind of form of bioinformatics?

LE: Oh, yes.

[pause]

LE: The Graduate School—[Victor A.] Vic Bloomfield was the head of the Graduate School at that time—wanted a graduate program in bioinformatics, or at least a graduate minor. There were several faculty who were interested, myself included. I was put on the committee with the head of that committee. We had one organizational meeting and, then, a year past, and I asked Vic Bloomfield, "When is this going to go? I know how these things should work. This is not working." Finally, he said, "Well, Lynda, would you like the job?" [chuckles] So I was put in as the new head of that. I *met, at least*, and I looked at the Graduate School requirements. Laboratory Medicine and Pathology was willing to give me some support to start up this new graduate program, at that time. We were a graduate faculty in—this was about ten years ago—the graduate program in bioinformatics. We can go to the web archive machine. You work with Erik Moore.

DT: Yes.

LE: You can talk with him. We were the first electronically archived graduate program.

DT: Hmmm.

LE: He does these archives and since we were on the web with a website and had everything like that, he arranged to park everything electronically, because it died.

Why did it die? Claudia Neuhauser developed Biomedical Informatics and Computational Biology, BICB, based in Rochester [University of Minnesota-Rochester]. There was a reason for that. It was like the tail wagging the dog, since there wasn't much at Rochester. She became vice provost and director of graduate studies and everything ran from there. I was as active in that as I was allowed to be, but the handwriting was on the wall. The graduate minor, standalone minor, there was nobody that wanted to take it over. Again, when I was considering retirement, what would happen to it? It seemed like the thing to do was it was my time to close it. I did talk to Claudia about merging the two, but that didn't work out. So in about a ten-year span, it grew, flourished, and, then, died.

It always used other courses. It never taught, except a Journal Club, which was not required, and a seminar. The Journal Club, I think I stopped a year before we terminated the program. We had an organizational meeting and people picked weeks and such. Alright. Usually, once a quarter somebody would say, "Oops, I can't make mine," and we couldn't fit anybody else in, and I would give one of those seminars. Fine. When I had to give two, then I said, "Hey!" Most of the people were no longer going for the whole thing, but just giving their talk and, then, not coming. So it was very hard to keep up the motivation if you only had two or three people listening to the Journal Club. So we stopped that. Still, people say, "What happened to that?" "Well, it's just not there anymore." "Oh, I always enjoyed it." "Yes, but you didn't go very often, did you?"

DT: [chuckles] Yes, people miss it when it's no longer there, and they take it for granted when it is.

LE: Yes. You know yourself that when you have something that runs a seminar, there's a nucleus of people that go to it. If it grows and if it's interesting, other people will come. But when you're not something, like a department… Sometimes, Computer Science would come. Sometimes, other people would come. It was very hard when there are other departments pulling at them. It had run its course. It was *sad*.

DT: When you were setting up the graduate minor and it had its short career, was it within the Division of Health Computer Sciences or it was separate from…?

LE: Its home, as was the Division, was in Laboratory Medicine. For a brief period when Laboratory Medicine didn't want it, it was in the Biochemistry Department. They weren't willing to support it, really. They just gave it a home. That was probably in its last two or three years. Every graduate program has to have an academic home, and that's where that went.

DT: I find it interesting. When I was first met with Connie [W. Delaney] about this history project, one of the questions I asked her was just in kind of talking about the relationship between Health Informatics and Bioinformatics, because I know Bioinformatics gets a lot of attention and, sometimes, that's a more known entity than Health Informatics. It seems that there was some interesting kind of tensions there between the two fields. I didn't know if you have any thoughts on that.

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LE: Well… [sigh] It was interesting. Laboratory Medicine wanted to divest itself of the graduate program in health informatics. Frank Cerra, as the v.p. there, set up this Institute for Health Informatics in the Academic Health Center [AHC], and that took over. There were committees, whatever, and there were contracts, *et cetera*, for the graduate program in Health Informatics. I assumed, because I was told early on, that the minor in bioinformatics would move over there, too. Until quite shortly before the actual move, I was told in no uncertain terms that the Academic Health Center *did not want* the graduate minor bioinformatics. That's why, very quickly, I had to find another academic home for it. That was the Department of Biochemistry. So I don't know who killed it in the Academic Health Center. They could have had it, but they didn't want it.

DT: Interesting.

LE: Yes, that was interesting.

DT: Going back to when you were enjoying your sabbatical and you started working with Larry Wackett, what kind of time period was that?

LE: Do you have my CV [curriculum vitae]?

DT: I forgot to print it out and bring it with me. I printed out everything else.

LE: I'll find that.

DT: I remember your 3M one was in 1985, I think.

[pause as Doctor Ellis looks for dates]

LE: Yes, that was 1985. It was the summer of 1994 that we got the idea for the database and it probably saw the light of day in 1995. Yes.

DT: That's good. I wanted to make sure so we have the date on the record.

I want to go back to your earlier research on computer-assisted education.

LE: Yes.

DT: You had talked about graphics. I wonder if you could explain in a bit more detail about…

LE: Oh! Yes. I started off with PLATO, and I was going to go somewhere with that.

[laughter]

LE: Don Connelly had gotten his degree and said something to me like, "At least Laël won't nag me anymore." I said, "At least she won't nag you anymore about that."

DT: [chuckles]

LE: So he got his degree and became a faculty member. There is a way to get a degree at a place you're already at, but it is a little more cumbersome than just coming from the outside.

He and I created a lesson on the PLATO system together with [G.] Mary Bradley, who was a faculty member in Laboratory Medicine, and one of her technicians. So she had the content, and I did half of it, and Don did half of it. We joked that the programmers had more degrees than the content experts.

DT: [chuckles]

LE: We did that. It was for Laboratory Medicine, and it was on PLATO. We were quite proud of it.

Then, I got put on a committee.   There were several committees on educational technology that the predecessor of the Office of Information Technology was setting up for faculty members to review different things that might help the University move forward. I was put on the Apple Committee. I said, "What's this?"…the sample thing. "Why didn't they put me on the PLATO one?" At least that was something I knew. Then, they had us in this little room, this little committee. One of the programmers came with this Apple II and he put a 5¼ inch diskette into it, and *AppleTalk* played. Did you ever see that?

DT: No.

LE: It was a little animation. First, it drew a little screen and, then, it drew a little stick figure and, then, it played music, and the *little stick figure danced*!

DT: [laughter]

LE: We *stared* at that. We said, "Is the code for that on that little 5¼…?" And he said, "Yup." Wow! [laughter]

I and one of the trainees on the training grant, John Raines, who, later on, became head of adult medicine at CUHCC, Community-University Health Care [Center] system, we and Mary Gillespie was another M.D. trainee…   With her, I developed a program called, "Why Do You Smoke?"—it was an anti-smoking thing—on the Apple II. John Raines, for his master's project… He was already an M.D. The Centers for Disease Control had put out a mainframe-based health risk appraisal. He said, "I'm going to put that on the Apple II." I said, "That's too hard." [chuckles] With all my support, you know, *he did it*! First he did it on a 48K [kilobytes] Apple II. He had to do overlays, so we upped it to

the 64K Apple II, and the health risk appraisal was sold. We actually got money for it. We had health awareness games, also. "Why Do You Smoke" was one of them and there were several others. So I was a commercial author. Even a couple years ago, I got a request for that. It was on the Apple II. Then it was on the TRS [Tandy Radio Shack] 80. Then, I think it was on an Atari. Then, the IBM PC [International Business Machines personal computer] came out. We imported it to that. Then, all upgrades went on the IBM PC.

DT: Did it make a substantial amount of money and did that go to you and John Raines, or it had to go back to the University?

LE: It went to the University. This was the old copyright. It was copyrighted by the University of Minnesota. We got a portion of it. It was never a substantial sort of income, but it was something. I think a third came to us and was split equally, and a third to our department, and a third to Technology Transfer.

DT: That's great. That's really neat.

LE: Yes, that was kind of fun.

[pause as Doctor Ellis displays diskettes]

DT: This is what went along with the program, the disk?

LE: Yes.

DT: Oh, wow.

LE: This was the first edition. It went to the 3 ½ [inch diskette].

DT: Nineteen eighty-four was the first version, then?

LE: Yes.

DT: That's great. Do you still have anything to play it on? [laughter]

LE: Nooo. I do have the files on this thing.

DT: That's neat.

LE: You know how things move pretty quickly. After a while, it wasn't running on the current machines. But there were always these old machines that were not doing anything, and they were fine for running patient education.

DT: Sure.

LE: We piloted a lot of this stuff in John Raines' clinic. One of the interesting anecdotes there was… They did an in-service for the staff first before they put it in the clinic, but it was right in the waiting room for patients to play with while they were waiting. During the first week, after the clinic was closed, one of the staff members came by saying, "I didn't get a chance to see that." The receptionist who was there said, "Ohhh, it's turned off." The receptionist's four-year-old daughter came out, turned on the computer, and started it up for her.

DT: Wow.

[laughter]

DT: Even then, kids were showing their parents…

LE: John thought that was pretty remarkable that the four-year-old showed a staff member.

DT: That's great. That's really interesting.

Did this end up in hospitals or was it mostly clinics?

LE: Well, we got several publications on it. Pat Greenwood, an MD in a small town near Rochester, did a trial at his clinic using it… It was primarily in waiting rooms. I don't know who all got it. I think some people bought it. I'm not sure why.

We ran it in health fairs a lot and got data out of that. It was interesting. At the beginning, you'd put in your name but it didn't store it anywhere. It just used it in the printout, "This is your health risk appraisal," with your name on it. If you go to a health fair or such, there are lots of things handed out everywhere and there are lots of things littering the floor around everywhere, because people will pick things up. "Uhhh, nah." They'll walk a few paces and toss it. They didn't do that with that health risk appraisal. It wasn't shiny or flashy. It was just a dot matrix printer, just one piece of paper that had your name on it. It was your numbers. They folded it carefully and put it in their pocket or put it in their wallet. This was theirs, so they valued it.

DT: Yes. That must have been very gratifying to see.

LE: We did various things, like when the mouse came in and the touch screen…what user interfaces were best. Everybody thought the mouse was so wonderful…not at the senior fair. They were better at the keyboard, especially if you have a little bit of tremble in your hand.

DT: Sure.

LE: Maybe you can't type, but you can poke numbers in easier than you can control a mouse.

DT: How about the touch screen? I wonder how that was being received.

LE: Mimic using a touch screen. Mimic how you would do it.

DT: So it's like a keyboard.

LE: Well, it turns out if you have hand tremor—I wouldn't have thought of that—you plant your hand against the side of the screen and you touch it with your thumb.

DT: Oh, interesting.

LE: Luckily, we had, just by chance, put all our choices on the right side. When I saw people doing that, that was quite... Now, if you have ever used a touch screen for any length of time, your hand gets awfully tired.

DT: Yes.

LE: So keyboard or mouse or trackpad is the way to go rather than… But we got a lot of good data with the touch screens.

DT: That's great.

You mentioned the fact that, obviously, Computer Health Sciences got a number of substantial NLM [National Library of Medicine] grants. I haven't interviewed Laël yet, but we had a meeting last week. She mentioned the fact that the grant 7041, research training in medical informatics, was quite a significant change because of it emphasizing the training of researchers rather than instructors and the fact that the emphasis was on, then, research clusters. I wonder if you could talk about your perspective on the change that made.

LE: That didn't have much effect on me, since my big thing was being an instructor. My research project, the biodegradation/biocatalysis database, while it supported graduate students as research associates, generally, they were not trainees. I had other projects where trainees got involved, more medically relevant things like that but not really that database. My people—we can look at their names—a lot of them were foreign students. [Doctor Ellis brings the names up on her computer screen]. Can you see that?

DT: Yes.

LE: They were not eligible for the training grant.

DT: Okay. I'm glad you brought that up. I know that the Division attracted a lot of foreign students. I had not appreciated that they would not be eligible for the training grants. Why do you think the Division attracted so many international students?

LE: They valued the degree. It was a value. Many of our U.S. students were looking for easier things.

[Stanley M.] Stan Finkelstein, whom you'll interview in a while, was the director of graduate studies in Bioengineering, and I guess he was director of graduate studies in Health Informatics, too, for a while. He remembers one foreign student who had been rejected by the program and came to talk to him and find out why he was rejected and such. As the interview continued, it became obvious, at least to Stan, that what the student wanted was, "What other graduate programs have easier requirements… that would accept me?"

[laughter]

LE: This being a mathematical… For example, at that time, it required calculus. That was a stumbling block for many current students interested in the health sciences. When I was doing the bioinformatics minor, we had a requirement for computer science course and biological courses, as well. The then director of the Cancer Center—I was serving on the Cancer Center Committee for a while—was interested in bioinformatics. I said, "Here's the curriculum." He read it, and said, "Oh. It's sort of a computer science bioinformatics." In the back of my head I was saying, "Well, yes!"

DT: That's what it is.

[laughter]

LE: He was a little disappointed. He wanted his people to be able to do all this stuff, but not have to learn all *that* stuff. Yes.

Computer Science, at that time, for their incoming students, they could have two rooms, one for the Indian students and one for the Chinese students and pretty much everybody would fit in those things. There weren't very many U.S. students. Perhaps, those U.S. students who were of the same caliber had more choices.

DT: Was there something about the status of the field of health informatics nationally and internationally, at that time?

LE: Yes, that could very well be a point. Laël can speak to that quite well. For example, there was quite a cadre of Thai students, and Korean also, that came.

DT: For those students, you would help support them with the work on your database?

LE: Yes, and others would do it with theirs. The training grant could do the U.S. students. Then, when we weren't successful with the training grant thing, that was, again, another change.

DT: I think for the earlier training grant in Health Computer Sciences that you were coordinator of the trainees.

LE: Yes, and did most of the teaching, a lot of it.

DT: In addition to the teaching, what were your other responsibilities?

LE: I ran the seminar for a number of years. That was getting speakers and doing that.

DT: Not just limited to that grant, but I guess for the whole stretch, did you notice any changes in the students over your career?

LE: They became more knowledgeable of what the field was. That was quite important, actually. I think they became better trained. When I go through the years of the students that have worked on this… Often, I hired two students. One, I didn't pay as a graduate student; I paid as a lower level staff. They did, primarily, data entry. If they were a first year student, maybe they couldn't get any other jobs, and they were willing to do that. If they did well, then in their second year, I could hire them as a research assistant, at that higher level, get tuition benefits, and sort of, then, would have two students. Then, after two years, the senior one would graduate and the junior one would come up. Then, the students became less willing to do that lower level thing, and if I couldn't offer them a graduate assistantship, they'd go to someone else who could.

[chuckles]

DT: In terms of them being better trained, better prepared when they came in, what kinds of degrees were they getting before they came in?

LE: Initially, probably half of them had medical and half had computer science. Now, I think they're more medical training. Actually, now, we have dropped the requirement for calculus.

DT: So does that open things up for people?

LE: Yes.

[chuckles]

DT: What about the relationship with the Biomedical Library?

LE: That was very big at all levels. Early on, I would go to the library and was good friends with one of the librarians there. I saw her almost every day. Then, as PubMed came up, I was, perhaps, using the library more but going there less—you know, online everything.

DT: Sure, the same as the rest of us.

LE: Yes. Now, my PDFs [portable document format] are much more organized than my copies of papers were.

DT: I saw in 1981 that the library established the Health Sciences Instructional Computer Laboratory. I saw that you were supervisor of it.

LE: Yes.

DT: Can you talk about what that was and how it came about?

LE: Again, the predecessor of the Office of Information Technology was setting up these computer labs. They were setting them up in different places and they hadn't set one up in the health sciences. So we got some space, not in the library, initially. In fact, I can walk you over there, and you can see a sign that says, "Health Sciences Instructional Computer Lab" on a stairwell. That lab ceased to exist probably ten years or fifteen years ago. [chuckles] It had teletypes, and paper tape, and keypunches, and punch cards. That was in the basement of Moos Tower. One of the complaints was that it was hard to find. I knew it was going to move, so I wasn't pushing for more signs. But a student got that sign put up, like six months before we left—and that sign is still there!

[laughter]

LE: People put up signs; people don't take down signs. Probably it's changed to storage or something that no one would have a sign for, but the sign is still there. It, again, was hard to find there.

It turned out the space the library gave us was… There's a wall between Mayo [Memorial Building] and Diehl [Hall] and the library actually spans on the lower level between that space. It was on one side of that wall, and there weren't enough conduits for the Internet cables, or the Ethernet cables, to service the lab, and it was going to cost zillions…well, anyway, more money than we had to put it in, and I said, "Okay, it doesn't have enough conduits, and we need more, but it's *not* our fault." They found that money to upgrade that from somewhere else. It probably, when it started, still had the teletypes. I don't think it had the keypunches. Then, soon after, it had Apple IIs, you know that change. Oh, yes, and that was wonderful. And we had terminals.

We had the first theft of the Apple II.

DT: I'm sure.

LE: I got interviewed by TV news, the five-second sound bite, on that. We had insurance, and, gosh, we got better computers, because we couldn't get the exact same kind. That's one way to get an upgrade.

[chuckles]

DT: They stole all of them or just one?

LE: I think we only had a couple of Apple IIs and terminals for the others. They just stole the… Those little things—now, your smart phone does far more—were valuable enough that they were stealable.

DT: That lab was primarily where you did your instruction?

LE: Yes, because you couldn't assume students had access to computers, so they had them there. There would be talk about how many terminals would you need in the library and such and they had more and more. Then, it was, well, we'll have jacks for them to tie into their own computers. Now, you have to have Wi-Fi so that those smart phones or laptops can be used.

DT: It seems like that was really at least a good beginning of the relationship between the Biomedical Library and Health Informatics.

LE: Yes.

DT: It just continued to grow and, now, the IHI has that big space over there.

LE: Linda Watson was the head of the library then and helped that.

DT: Can you speak at all about the relationship that Health Computer Sciences had with the Mayo Clinic?

LE: Not much. Laël was the one there and [Christopher G.] Chris Chute was the person at Mayo that was the interface for most of it. He'll be coming up.

DT: Yes, I'm hoping to interview him. Do you know when he's coming?

LE: The sixteenth and seventeenth, and he's giving a seminar on the sixteenth.

DT: Oh, next week. I'm out of town, of course. Bad timing. But I'm happy to go down to Rochester.

LE: I think he's only here the sixteenth and the seventeenth.

DT: Okay. I need to send him an email to see about interviewing him.

We talked a little bit about Gene Ackerman, but I wonder if you could talk about him as director and his leadership.

LE: He was an interesting fellow. Laël, of course, knows him. I think he has problems with his memory now, but I think, perhaps, the older things will be still okay. [pause]

He was not charismatic; I'll put it that way. He was fine, wrote papers and such, but wasn't quite politically astute with a lot of the things around the health sciences. So, perhaps, that's one reason Health Informatics got sort of marginalized and didn't find a home. I couldn't have been any better. [chuckles] Don Connelly was head of it for some period between Gene and Laël, and I think Don for the last few years.

DT: How about Laël? What was her leadership style like?

LE: When she took over, she had more of a global reach but, still, times were against her in terms of the difficulty in getting grant funding and growing a division without people.

DT: Yes.

LE: Right now, we've had several candidates. We have an Institute for Health Informatics, and it's in the Academic Health Center, but it is not a tenure home. So any faculty associated with it have to have a tenure home somewhere else. So, perhaps, a new hire would come in with partial funding from the Institute of Health Informatics and partial funding from Nursing or the School of Public Health or the Medical School or something. Then, this person will get tenure in their tenure home. So they must fulfill their tenure home's requirements; otherwise, you won't get tenure. Now, you have tenure in your department. Does that mean you'll spend more time in Health Informatics? Well, no, you've got to grow your own department and help the junior faculty in their own department. The teaching now is done by temporary, contract people. We've had several, not a huge number but several, candidates—Connie Delaney is an acting director—for director. Us people on the sidelines always say, "Hmmm, this person looks good. What department would be their tenure home?" Perhaps, they would be given, as you might do to a new director, the ability to hire a couple of junior people. What department would be their tenure home?

DT: Yes.

LE: The last candidate before Chris Chute said that he would envision the future of this Institute to be as a division in a department. Being a department is not in the cards, but he thought people could have a tenure home as a division. Of course, that's what we were.

DT: Right.

LE: [laughter]

DT: That's going back to the model that you had.

LE: Yes. Fine. That works if you can do that, but would he have been able to…

DT: I guess the other advantage, aside from the intuitional limitations of like tenure and whatnot, of being within the Academic Health Center is your health informatics covers

all the different units that are within the AHC and that you have those collaborative relationships within the different units. So that's more representative rather than if you're a department in the Medical School.

LE: Right.

DT: There's nursing projects going on. There's epidemiological projects. There are intellectual reasons to be in the AHC.

Something that I was hoping we could talk about was… What's really interesting is the high number of high-ranking female faculty members in Health Computer Sciences throughout your career, yourself being one of them and Laël, obviously. There have clearly been a number of female faculty members, and I wonder if you could reflect on that, and whether you think there is something particularly hospitable about the field of health informatics or if it's the particular department.

LE: Actually, the main thing is that it's health. You have almost equality of females in the Medical School and in the Dental School and such, so there are more women in the health and biological fields than there are in the computer science fields or even today in the College of Science and Engineering. So if you have more women in the health fields, you will have more women who become interested in that computer part of it. Some of the computer science people will become interested in the biological or health part of that, too. Also, if you have a big grant, then *lots* of people become interested in you.

[chuckles]

LE: I think it's the health relevance.

DT: Do you think that's also the case, though, earlier in your career? There were relatively few women in medicine, at least when you were first training. I just read a statistic that only seven percent of physicians were women in 1970. So do you think that was still playing a role then?

LE: Well… In biology, there have always been a fair number of women. I became a post doc with a female, but she was the third female faculty member in the College of Biological Sciences, at that time. Then, she was in Lab Medicine and, then, moved to the Saint Paul campus. I think I had it backwards before. She did a lot. She was very supportive of the women faculty. Then, when I moved back to the Medical School, there were a fair number of important women in the field, not an overabundance.

There were several women-only groups, like the Faculty Women's Club. At a point in time, the Campus Club did not admit women. So there was a Faculty Women's Club that once a month were allowed to breach the Campus Club. Then, after the Campus Club *did* admit women, the Faculty Women's Club did continue for several years. When I was first here, I knew of it. They were not exactly consciousness raising, but there were some…Graduate Women in Science. That was an organization that I joined and, then,

went up through the ranks and was president for a while. I think I'm a life member, but I don't go to meetings now.

DT: Did the Rajender [Consent] Decree [August 1980] have much impact on you?

LE: Quite a bit. You see my husband was in the Chemistry Department.

DT: Okay.

LE: He was the person who was hired instead of Shyamala Rajender.

DT: Ohhh.

LE: He didn't know anything about it until he came here.

DT: Oh, goodness.

LE: Well, you know… She went out of her way to be pleasant to him and, in fact, invited us to her home after she had been let go the by the Chemistry Department and was suing them. She knew that it wasn't his fault. So, yes.

[chuckles]

LE: I was here. It did have quite a bit…

DT: Interesting.

LE: Yes.

DT: Goodness.

Is there anything else that I missed that you'd like to share about your time here?

LE: I was sort of going back to the early years and the things, and it seems like we've covered quite bit. Just the increase of technology from punch cards, to paper tape, to terminals, to microcomputers, to smart phones.

DT: I'm hoping that for the history project that maybe there's some of that old technology sitting around somewhere or that there's at least images of it.

LE: Laël has got a nice…

[pause]

LE: Do you know what this is?

DT: Weä, I should, shouldn't I?

LE: That is a slide rule.

DT: Ohhh.

LE: Do you want to borrow it and take a picture of it?

DT: Sure. Yes, I will.

LE: You can probably find somebody who knows how to use it.

DT: That's the trick, isn't it? I'll bring it back when I interview Stan.

LE: In the Institute for Health Informatics, there's a cabinet with some of the historical books and such.

DT: I've seen it, yes.

LE: I moved into this office and threw away lots of things. Is this of any…[Doctor Ellis refers to a small circuit board]?

DT: Yes, absolutely. Great.

LE: Give that back.

DT: Yes, I'll take some photos of that, too.

[pause]

DT: I've been reading the grant applications. When they get to the technical stuff, it just goes way over my head.

LE: This was *Minnesota* FORTRAN.

DT: Wow. I'll take a look at these.

LE: This was not the first manual. I thought I had saved…but when I moved things, I couldn't find… The first manual I had was about a third that size.

DT: Okay.

LE: It was FORTRAN II. This is a version of FORTRAN IV.

DT: The Charles Babbage Institute which is on the West Bank, they have a lot there, the History of Computing Center. I mentioned to them about this project, and they're

interested in it. They certainly have some of the older computer technology, so it will be interesting. They might even have the ability to play some of these disks.

[laughter]

DT: Excellent. Thank you.

LE: Yes.

DT: This has been really interesting.

LE: Yes.

[End of the Interview]