

KENNESAW STATE UNIVERSITY ORAL HISTORY PROJECT

INTERVIEW WITH CHRISTOPHER B. SCHAUFELE

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Location: Telephone interview from Pilcher Building, KSU

- TS: Chris, why don't we begin by asking you when and where you were born?
- CS: I was born in 1939 in Dublin, Georgia.
- TS: Nice town, Dublin. I go through there every now and then.
- CS: Do you? I haven't been back there in a long time.
- TS: Is that right? So did you grow up in Dublin before you went off—I know you went to the University of Florida to go to college?
- CS: Right. I grew up and went to high school in Dublin, Georgia, and then went to get my bachelor's degree from University of Florida and then masters and Ph.D. from Florida State [University].
- TS: So I guess 1961 is when you finished your bachelor's degree. So you were very much a traditional student at that time it looks like, going through at the time that everybody went through college back in those days.
- CS: Exactly, that's right, the four-year plan. I guess that was fortunate. I know many people have to work their way through school now, so I consider myself fortunate.
- TS: Did you major in mathematics as an undergraduate?
- CS: I did.
- TS: So how did you get interested in mathematics?
- CS: My sophomore year I decided that I really liked mathematics when I started taking calculus courses. I was majoring in engineering at the time. That was what I at least registered as my major. I guess you don't really have a major when you're a sophomore in college. You can claim that you want to do something, but you don't know yet. Then I decided after taking calculus that I'd rather do mathematics. So, I stuck with it.
- TS: Then I tell you what, I never heard of anybody who went through school as fast you did. I've got that you got your master's from Florida State in '63 and your doctorate in '64, so that was just three years after you finished your bachelor's degree. You must have been all of twenty-four or twenty-five years old when you graduated.

- CS: Yes, I was twenty-four. I just lucked out. It was just luck. I hooked up with a good major professor at the time. He was working on some material in algebraic topology, doing research, and he got me started working on that. I just lucked up on a good problem, solved it, and wrote my dissertation and checked out.
- TS: Well, one of the things that we've been asking people about is mentors. Did you have any mentors along the way that stand out that were particularly helpful or influential in your career?
- CS: Probably my major professor, his name was Jim Andrews [James J. Andrews]. Jim was a topologist and had several papers that his name is attached to that are rather famous in that area of mathematics. He and I got along really well, and he really made a big difference in my life. That was great. He died about ten years ago, maybe. I really miss him.
- TS: Can you talk specifically about any of the ways that he did have an influence on you?
- CS: He just gave me lots and lots of good advice, which I followed. He was just very helpful as far as helping me get my degree. He was just a real character also. I remember the first time I saw him was my first year in graduate school and I was taking a first course in topology. This guy walked in the room, and first of all, it was eight o'clock in the morning and his tie was undone and his suit—he had on a white shirt, but his tie was undone and it was unbuttoned at the collar. His suit was about two sizes too big for him and he was bare-footed. This may be one of the major influences he had on me. Of course, this is my first experience in graduate school. It was like, “Who is this guy [laughter]?”
- TS: Well, you know that's pre-hippy day, but it's not pre-beatnik day.
- CS: That's right. He came in the room, and he wrote some axioms, and then he wrote three theorems on the board, and all of this took about fifteen minutes. He said, “Go home and prove these theorems.” And he walked out of the room, and the class was over [laughter].
- TS: At least he made you do some work on your own, I guess, to figure it all out. Could you explain exactly just what topology is?
- CS: I don't know, it's described popularly as sort of geometry where things are not rigid as they are in Euclidian geometry, but can be deformed, and as long as objects aren't torn or broken in any way then they're equivalent. For example, you can take a donut and mold it into a coffee cup thing and those two objects are equivalent. So it's a study of spaces, which under these continuous transformations, as they're called, that's a deformation without tearing or breaking.
- TS: Okay.

- CS: Actually, it's interesting, since this past year I've gotten interested in cosmology, and I've taken a course in cosmology and astrophysics at a local college here. All these things, a lot of the things that I studied back in graduate school regarding topology; some of it is being applied to the shape of the universe. I'm really fascinated and taken by this. I never thought that the stuff that I worked on in graduate school had any application whatsoever.
- TS: I was wondering about that and I was going to ask about that, but it does look like for the space program and things of that sort that it was probably pretty significant.
- CS: Indeed it is. I'm just having fun going back and relearning some of the stuff that I'd forgotten over the years.
- TS: Do you think you might use some of the stuff that you're getting out of your astrophysics course in your mathematical textbooks in the future?
- CS: I'm not writing any more textbooks, but I am working on a couple of grants at Arizona State University and another grant at San Juan College [Farmington, New Mexico], and I've incorporate some of the material into that. These are curriculum development grants from middle school up through college. I've written a few modules, kind of like we did in Earth Algebra.
- TS: Maybe we can get back to that and talk about that in a little more detail in a few minutes, but in the meantime, to kind of stick to the chronology, by the time you got threw in '64 had you done any teaching along the way in graduate school?
- CS: I did, yes, I was a graduate assistant for a couple of years.
- TS: And then what did you do after you graduated?
- CS: I took a job at Louisiana State University [Baton Rouge, Louisiana] and was there for only one year. I was trying to do research then and I thought that there were people there that were working in the area that I was working in. But after I got there I discovered that that was not the case, and so I moved from there to the University of Georgia which, at the time, was a kind of a hotbed of algebraic topology research.
- TS: So you go to Georgia in '65 and how long did you stay there?
- CS: It must have been nine years. I believe it was nine years, and, I don't know, the politics got bad there; you said you didn't want to talk about politics, so I won't go into that. Things changed there. I was tenured there, but then I decided I wanted to go to a small school and just kind of do my own thing. That's when I moved to Kennesaw. That was in '74, I believe.

TS: Okay. I know you were at Kennesaw for a while, and then you left for a while, and then came back in '80, I believe it was. How many years did you stay the first time at Kennesaw?

CS: Well, maybe three?

TS: That makes sense because Nancy [E. Zumoff] came in '78 and she said you weren't there when she got there.

CS: Right. I believe it was three years.

TS: Then what did you do between '77 and '80?

CS: I was really hot into running then, and I guess you were too, and I bought a running store for three or four years, and then decided that that was too much work, so I sold that. Herb Davis [Herbert L. Davis] showed up at my door one day, and said, "Why don't you come back to work?" I said, "Okay."

TS: Great.

CS: So I came back to Kennesaw at that time.

TS: Why don't you describe what you perceive the intellectual life to be like at Kennesaw when you came in '74, and you said you wanted a smaller college—just talk a little bit about what it was about Kennesaw that attracted you back then.

CS: It was small and I knew a couple of people there. I knew Herb Davis, and actually I knew Tom Gooch [Thomas L. Gooch]. Tom Gooch was a student of mine at the University of Georgia, but he left to go to Kennesaw. Don Sparks [Donald J. Sparks] went over there too. Don was my student for a while. Don went over there for awhile, and I was just getting really good reports about how relaxed things were and how good the students were at Kennesaw. That was the main thing that attracted me. It seemed like a much more relaxed life, and the students were good. It was a good faculty-student ratio and a good rapport between the students and faculty. That was one of the main attractions, and so that's why I moved, and Herb hired me then. As a matter fact, Herb hired me twice.

TS: How did you know Herb before then?

CS: I think I met him through either Tom Gooch or Don Sparks.

TS: So you describe the students as good. How would you say they compared to a University of Georgia student in the '70s?

CS: I would say generally that they were better. It may be because the classes at the University of Georgia were large at that time, and you really didn't get a chance to spend

the time with students at that level. Kennesaw was just a junior college then, as you know, and you didn't get the chance to spend the time with the University of Georgia freshman/sophomore students that you did at Kennesaw. I thought the students were much better, and perhaps it was because the faculty engaged them more, but it was a more pleasant situation.

TS: What were your class sizes at Georgia compared to Kennesaw? How big were they there and how small were they here?

CS: Well, interestingly enough, the classes at University of Georgia—what you thought were large—were twenty-five or thirty students, and of course that doesn't exist any more, I know.

TS: What was the size here at Kennesaw?

CS: Ten to twelve.

TS: Really, like in an algebra course?

CS: A calculus class—algebra was a little bit bigger, but I'm thinking mainly of the calculus students.

TS: That makes sense with the calculus classes. I was thinking just in terms of the general education courses that everybody had to take.

CS: Yes, they were larger. I don't remember exactly how large they were, but they weren't as large as University of Georgia's.

TS: Right. So you were happy being at Kennesaw in terms of the students that we had then.

CS: Absolutely.

TS: What about the faculty? How would you describe the intellectual life on campus when you got here?

CS: Well, it certainly has evolved over the years. I'm not sure how to say this. Everybody was pretty much doing their own thing, and I wouldn't say it was really terribly intellectual. Most of the attention was devoted to the students, I believe, and to teaching. I guess when I say intellectual, I'm referring to research or writing or things of that nature. I don't think there was much of that going on.

TS: So nobody's really doing any pure research, I guess.

CS: Yes, pure research, or nobody was doing much writing on their own. Like I say, I think most of the attention was devoted to the students and to teaching at that time. Classes would start at eight in the morning or maybe even earlier. As you remember, the parking

lot would empty by 2:30 in the afternoon, and then students would come in at night at 6:00 o'clock. All the faculty, most of them, would seem to me to just sort of disappear. I know I used to go run every afternoon, sometimes twice a day. Other people seemed to disappear or do their own thing on campus. Those of us who taught night classes would return in the evening.

TS: Yes, you could actually run on the roads around campus, back then, without getting run over.

CS: That's right, exactly. I had lots of favorite routes, which I'm sure are virtually impossible to run anymore.

TS: I imagine, unless there's a sidewalk there. Okay, so you stayed a few years and then you had your running store for a while. I guess that's really, as I recall—I ran in the '60s—and there weren't a whole lot of people beyond college age out running in those days. Then by the '70s, I guess, that's when it really takes off, isn't it?

CS: Yes, I believe that's true.

TS: So that would have been a good time to have a running store. But you came back in 1980, and by that time we had junior and senior level classes. Of course, '80 had been the last year for Horace [W.] Sturgis, I guess. In fact, by the time you came back, Gene Huck [Eugene R. Huck] was probably acting president, wasn't he?

CS: No he wasn't. Horace was still there when I came back. I remember when he retired, and I also remember when the college got its four-year status. You know, Horace may have retired a year or so, maybe, after I got there, but he was still there when I came.

TS: Actually, you're right, because he actually stayed through the end of 1980 and then, I think, he retired on December 31 of 1980, and that's when Gene Huck comes in. Then, Betty [L.] Siegel came in the summer of '81, so Dr. Sturgis would certainly have still been here when you came back. But things are different because you've got the upper level courses by this time, so you've got more preparations to make at this point. Would that sound right?

CS: That's right, yes. But then with the upper division courses, it made it a little more interesting as far as teaching goes. You've got a little more variety instead of just the basic.

TS: Right. It's '83 that we went to the department system. Up until that time everybody would have been under Herb Davis in your Division of Science and Math, back then. And then you became the first department chair, I believe in '83, didn't you?

CS: I did.

TS: Could you talk a little bit about how that came about and how you got chosen to be department chair, and so on?

CS: I think I was chosen, particularly, because I was the senior member of the department. I'd had more experience, and I guess I kind of wanted to do that for a while. I kind of worked a lot with Herb on that.

TS: Right. So how many years did you remain as department chair?

CS: I think it was three. Was it '83?

TS: Yes, '83 was when we did that conversion to departments as opposed to divisions.

CS: Well, it was '83 maybe to '85, because I remember I did resign the department chairmanship there, and then I took off that summer. That was the summer of '85, and I spent the whole summer basically living in the Wind River Mountains in Wyoming. I camped out up there. That was '85, so I guess it was only two, two and a half years.

TS: So you only took a summer off to go to the mountains?

CS: That's exactly right. But then I had resigned [as] department head before then.

TS: Did you decide that administration just wasn't for you, or did you not like the direction the department was going? What happened in '85?

CS: Well, I kind of think I didn't like the way the direction of the department was going, and so it's kind of interesting because that led Nancy and me to our grants and our Earth Math career.

TS: Yes, why don't you talk about that? You were talking earlier about how good the students were; yet if I remember correctly, there was always a high flunkout rate in college algebra. I gathered from our interview that we did with Nancy, that by the '80s you were getting real upset about, particularly, the college algebra course and whether anybody was teaching anything in that, and whether anybody was learning anything.

CS: That was actually later than that. That was after I resigned as department chair. We still had some good students then and I guess Betty Siegel was demanding something that I thought was unrealistic, and it turns out later I thought she was probably right.

TS: Okay. You mean, she was demanding something in terms of let's get more students through this course?

CS: Exactly. And it meant looking at mathematics in an entirely different way, and I disagreed with that at the time.

TS: Seems like I vaguely remember a period where the math department or the mathematicians, at least—we may have still had a division system—but there are people like Steve Scherer [Stephen E. Scherer], and so on, [who] were up in arms and just about to go to the barricades because of perceived pressures to pass more people in college algebra. Do you remember that?

CS: Yes, I do. I guess that's about the time I resigned because I decided I wasn't going to be caught between the administration and the faculty and forcing them to do something that they did not want to do and I thought, in particular, was wrong.

TS: You mean the pressure on the faculty is what you considered to be wrong?

CS: Yes.

TS: So as I understood it, the people in math were afraid that they were going to have to water down the course in order to pass more people.

CS: That's right. That's basically the gist of it.

TS: And that's what you felt, too, that it would be wrong to force them to water it down?

CS: Yes, forcing them to water it down or to create a totally different course, so that it was possible to get these students through.

TS: Yes. There was a point where we changed the number of the math class, wasn't it, from 101 to 105, or something like that? Did that have to do with trying to develop a new course to get more people through? Do you remember that?

CS: We did put in some new courses. I believe 105 was a kind of different course. That was one trick that we used to try—is just change the numbers and put a new course description in the catalog. That caught up with us, I think, after awhile.

TS: Wasn't it called "mathematical modeling" at one point or something like that?

CS: I can't remember, Tom, what it was called right at that time, or not. I know that when Nancy and I developed the Earth Algebra course it was described as a mathematical modeling course.

TS: Okay. Why don't we get into the development of Earth Algebra, because I think that led into you getting the Distinguished Scholarship Award and, of course, some other things too, but that was the first, I believe. Why don't you talk a little bit about how that came about and how you got the idea to do Earth Algebra?

CS: This is more into what you were asking before, I believe. It was continued pressure from the administration to do something about the course, because so many people were flunking the algebra course. Tina [H.] Straley was department chair at that time.

Actually, Nancy Zumoff and I were doing research in algebraic topology. I had kind of taken that up again. Nancy came to Kennesaw—well, she was there when I came back, as you point out, and I found out she had a degree from a famous mathematician. His name was [Wilhelm] Magnus, and he did a lot of work in group theory, which is very pertinent to algebraic topology.

TS: That's right. I had forgotten that you all were doing some pure research before the Earth Algebra idea came around.

CS: Actually I had just gotten back from a quarter at Berkeley at the mathematical institute [Mathematical Sciences Research Institute]. That was in 1989. Then I came back, and Nancy and I wrote a paper together and got that published in algebraic topology. Then, Tina had a faculty meeting, which was the result of pressure from the administration about students failing, and so forth, and I'm sure Nancy told you this too.

TS: Yes, she did. I am looking at the notes from that interview right now, as a matter of fact.

CS: I think I got up and I said I felt like I was wasting my time teaching college algebra, wasting my time and the students' time, and I didn't ever want to teach it again. That's when Tina appointed Nancy and me chairs of a committee to do something about college algebra. We both hem-hawed around about that, didn't want to do it. We finally agreed to do it, as long as it did not interfere with our research into algebraic topology. I think that's the last time we ever did any research in algebraic topology [laughter]!

TS: So it did interfere, I guess.

CS: It did. So we started thinking what we could do about this course. We were still trying to do our research, but nothing much was happening. So we were trying to find out exactly what we could do about college algebra. We went to a mathematical association meeting in North Carolina. An old friend of mine, Harvey Carruth, gave a talk there on a new course he had developed in beginning level mathematics. But it had to do with retirement funds and annuities and stuff like that, and of course—well, here I am retired now—but we were thinking he, basically, had a good idea here, but the students wouldn't be interested in annuities. You know, nineteen-year-old students don't think about retirement.

TS: So he had this idea of making algebra dealing with real world problems, but his real world problems were for people in their sixties and not people in their teens.

CS: That's what we felt. So we decided on the way back from that trip, why don't we put a mathematics course in the context of environmental issues. That's what started the whole thing. We went back and wrote up a few problems, just to see how things would go and if we could really do what we thought we could do. The first time we taught it—well actually it was a course of mine. It was a summer course, which was six weeks in college algebra, beginning level. The first four weeks I spent teaching just in a traditional manner, just lecturing, and they took notes, and the students took exams and that sort of

thing. So I said, “Nancy, let’s try some of this stuff in my class for the last two weeks.” The way I like to describe it is the first four weeks the students looked like their faces were painted on the backs of their chairs. We put this material in and got the students working in groups and trying to solve problems by themselves, and the class just became really alive. It was really exciting, and it was fun again. So we went to Tina with this and told her about it, and she said, “Well, you guys ought to get a grant.” So we wrote a grant proposal to the National Science Foundation, and Tina helped us with that a lot, and it was funded. Actually Jackie [L.] Givens was there then, and she said, “You ought to send this proposal to the Department of Ed—FIPSE [Fund for the Improvement of Postsecondary Education]. Nancy and I both said we didn’t want to do that. It just seemed like too much trouble.

TS: I was wondering, Nancy did say in her interview that you all weren’t interested in FIPSE, and I guess I was just wondering why you weren’t interested. Did you figure you already had a grant, and you didn’t need to worry about another one?

CS: Well, we didn’t even have that grant at the time. We didn’t hear about the NSF [National Science Foundation] until later. I guess the reason we weren’t interested, we just heard that FIPSE was a very exclusive granting agency, and it would be kind of a waste of time for us to try to put something together to actually get it into FIPSE.

TS: You didn’t think basically a teaching institution like Kennesaw would be able to get one?

CS: Well, that’s another thing, being a small institution and what we perceived as a very exclusive granting agency. But Jackie Givens, I believe it was, just doctored all that up and changed NSF to FIPSE everywhere in the proposal and sent it to FIPSE [laughter]. Darned if we didn’t get that too, and that launched us onto about a fifteen-year project there. We were funded—I believe it was, four or five times—by both of these agencies, FIPSE and NSF.

TS: I’m trying to think back to this would have been about 1990 or ’91 that you got your grant.

CS: We got it in ’90, and I believe we started it in late ’90 or early ’91.

TS: At that point I don’t think there was a lot of grant money on our campus. This was about the first really big grant that anybody on the faculty got, wasn’t it?

CS: I think that’s true, Tom, yes.

TS: How did you get interested in making it “earth algebra?” Did you have a long-standing interest in environmental issues or was that a cause of yours? How did it come about?

CS: It was. Nancy and I both were pretty—I guess you would say—strong environmentalists. I had done some work down at the Earth Day that year, which I believe was the twentieth anniversary of Earth Day.

TS: Yes, that would be right.

CS: I had done some work downtown for that. We both believed pretty strongly in that.

TS: Were you involved with the Sierra Club and all those kinds of things?

CS: I wasn't truly involved, I guess, but I was a member.

TS: But this was really, would you call this your number one political or social kind of concern?

CS: Well, yes, that and politics.

TS: Okay. I guess I'm just kind of interested in how the idea came about.

CS: I think it was a result, probably, of the twentieth anniversary of Earth Day, and I had been working really hard on some things downtown, some of the events that some agency was doing down there. So that's kind of what brought the idea along.

TS: So you got your grant and had to go to work on it. I believe Nancy said maybe it was a two-year grant the first time? I can't recall.

CS: Actually, the first grant was a one-year grant. That was with National Science Foundation. We figured we could do everything we needed to do in one year. Of course, we realized after a few months into it that we couldn't do that, so we got another year extension from the National Science Foundation, so it turned into a two-year grant. We got a one-year extension and, I believe, we got some supplemental funds from them also.

TS: So you're spending that time developing a course, and are you writing a textbook at that time as well or how did that come about?

CS: No, we were just developing this course. That was another thing. Everyone thought Nancy and I were kind of crazy. Book publishers found out about the grant. Of course, they have access to this of information—who has grants and what it's for. So these book publishers start knocking at our door, and we used to run them away. We'd be either in my office or Nancy's office working, and we would just tell them we were busy [laughter]. Then, finally, a couple of people came from HarperCollins [Publishers]. Ann Kelly—she was the editor for HarperCollins for the math section, and Jack Prichett. They came from HarperCollins, and I don't know, we just liked them. They invited us to go out and drink some wine with them, and we did that and kind of just liked these people. By this time we were testing it in the classroom, and Jack asked, "Can we come sit in on your classroom one day?" And I said, "Okay, sure." So they came, I think, to my class, and then afterwards they met us that evening [over] other glasses of wine—Jack was quite a wine connoisseur, he ordered good wine—and they presented us with a contract, and we signed it. Actually he said, "The reason we came down here is we heard about

this course, and we just wanted to come down and see if you were insane. We decided that you're not insane, but that you both are crazy!"

TS: Why did he say that, do you think?

CS: I think it was the nature of the course because no one thought a mathematics course would fly, or nothing like that, I believe. There wasn't a mathematics course like that anywhere in the curriculum that we knew about.

TS: Right. Well, HarperCollins must have been impressed, and thought the idea of an environmental type course must have appealed to them, too, and they obviously thought it was going to appeal to other people.

CS: Yes. And they were very helpful in the success of that first grant and the book. Ann Kelly in particular was really, really helpful. She got lots of reviewers of our material that were critical in a good way and very helpful in the development of the course. We owe a lot to her. I have to give credit to both Ann Kelly and Tina. Tina was very supportive, also, during all of this.

TS: Okay. So when you say Tina was supportive, she was enthusiastic about it and she helps you write grants. Did she give you any release time to work on the project?

CS: She did. And of course, that was something that was pretty much unheard of back at that time.

TS: Sure. So you sign a contract, and I think Nancy was talking about maybe one of the things that made you all crazy is that you didn't really play the field on contracts, but took the one with the people that you really liked to work with. Does that sound about right?

CS: That's right.

TS: So you sign the contract, and they say they're going to publish your book once you get it done, and you have all these external reviewers. Nancy talked also about how those reviewers were helpful to you all in the project. Could you elaborate a little bit on that?

CS: Well, actually there were two or three sets of reviewers, and one set in particular was totally closed to this whole idea, and they were not very helpful at all, because they basically did not believe in the whole concept that we were trying to develop. Then Ann sought out other people that were sympathetic, and those were the ones that were quite helpful. I do remember one in particular, I'm sure probably Nancy told you about this too, but there was one reviewer—this was after we'd gone through one set of reviews that the people thought the course should be more traditional, so we kind of bent a little bit and changed some of the stuff back to some of the traditional ways of explaining algebra.

TS: But that's getting away from the whole purpose of it wasn't it?

- CS: Yes, it was, and this one guy had written back after—this is after Ann found a good reviewer, and one of those good reviewers—I don't remember his name—but at the end of it he says, "You have a good concept here. I don't know why you're putting in this traditional material." And then he wrote in big red letters on his review, "If you're going to be radical, be radical." Nancy and I laughed and laughed about that, and we thought, okay, this is a sign, so we need to pay attention to that. So we did.
- TS: When did your *Earth Algebra* [*Earth Algebra, College Algebra with Applications to Environmental Issues*] book come out? Do you remember?
- CS: I think the preliminary edition came out in '92.
- TS: Okay. So that's pretty fast then.
- CS: I'm not sure about that date, Tom, but I think that's it.
- TS: At any rate, you had already been trying all this stuff out on your own classes, hadn't you?
- CS: Yes, indeed, with great success.
- TS: Nancy has a story in her interview when I guess you were up in 202 and 205 in the Social Science building, where she talked about a curtain between your two classes. You could stick your head on the other side of the curtain every now and then, saying, "Don't do it that way, it didn't work."
- CS: That's right. It was pretty hectic. But it was a lot of fun, and the students got into it. The students were helpful, also. They'd make suggestions, which we paid attention to. Nancy and I both felt—it was also, before these graphing calculators came out that they use in the math classes now; I think all students are required to have these—it was before that—well, the problems in traditional courses, they all had pretty nice numbers, like integers 0, 1, 2, 3. That was the extent of the numbers they used in their problems. And of course, our problems being real, we'd get real data and present that to the students to analyze, and they were nasty numbers. I mean you jumped three or four decimal places. So we had the students solving major matrices and equations and things like that with these horrendous numbers.
- TS: So you needed a calculator!
- CS: The calculator was really handy and the students were really happy to see a calculator. Even after the calculators came out, we'd make them solve one by hand first and then say, "Okay, now you've got this calculator here that does it."
- TS: I didn't realize, I guess, that the graphing calculators were that new that they weren't there at the beginning of your project.

- CS: No, they weren't. They had just come out at that time, and there was a lot of controversy about using those in the classroom among some mathematicians. Most of the traditionalists said absolutely not. But we decided to, as the guy advised, be as radical as possible. So we did use them.
- TS: People thought absolutely not because they thought the students needed as much practice as possible doing all those calculations.
- CS: Yes.
- TS: So, let's see, '92 or thereabouts, you came out with your textbook with HarperCollins publishing it, and, of course, it was used at Kennesaw. I know it was used it all over the country. Could you say a little bit about that? I know you must have had some good royalties coming in off of that book. Do you have any idea how many colleges actually adopted earth algebra?
- CS: At the beginning, the first year or so the book was out, I think there were over 100 schools that were using it. But, as far as royalties, everyone thought we were getting rich off this project. But you know, the royalties—you don't make a lot of money off textbooks, especially when you've only got 100 schools, and most of them were small.
- TS: Right. I was interested in how many schools were actually adopting this system because if it's a radical system, it had to be controversial everywhere, or else it wouldn't be radical.
- CS: It was indeed. We got some pretty nasty letters from time to time. We got one letter from some religious fanatic, I guess, saying we were all going to hell and that kind of thing. But we only got one of those. A few mathematicians actually had written the National Science Foundation telling them that they should not fund a project like this. Nancy got upset about that.
- TS: I guess she should.
- CS: Well, no, I thought it was really good. I was pleased, personally, because I think if you just do the same old thing, if you don't stir up dust somewhere, you really haven't done anything. That was my feeling about that.
- TS: That makes sense too. If you're going to have an intellectual life on a college campus, you're going to have to expect people to disagree with you every now and then.
- CS: Right. I was actually pleased with that when I heard it. It wasn't a great outcry. It was just one or two people that wrote NSF.
- TS: Right. I sometimes wonder about the way we teach all of our courses. I wonder sometimes in history classes where people just get up and lecture, students have no real

concept of how history is actually created with primary documents and the intellectual debates that take place over what interpretation is true and so on. When you think about mathematics, it just seems so logical that you would want to make what you're doing in an algebra class as close to practical, everyday problems as you could do. I guess in a way, it just makes you wonder why it was so radical to come up with a concept like Earth Algebra, where you're actually dealing with real world problems. What other purposes—I know there are purposes in, I guess, just a pure sense of mathematics whether it has any practical application or not, but mathematics wouldn't have been developed if people weren't trying to solve real world problems, would it?

CS: That's right, that's true. That's where it all stems from, and that was our thought too. I often thought of this course that we developed; and, in going back to Betty Siegel, I think this is what Betty Siegel was looking for. It was something, as I said earlier, was something I disagreed with, but then later came around to actually doing it. I thought of this course, and I thought of a music course, for example—there were, I don't know if there are now, music appreciation courses back then.

TS: We still have them. So I guess, in effect, what Betty Siegel wanted was for you all to come up with something that might actually be interesting to students and grab their attention, so they're more likely to pass the classes.

CS: Exactly. Going back to the music appreciation, you think that students who take music appreciation don't learn how to play an instrument, but they can learn an appreciation for music. So, I'm thinking, most students hated mathematics back then and probably still do to a certain extent, but if you can just teach them what mathematics is all about and what its purpose in life is, I think that would be successful.

TS: Yes, and this is really not a course for the majors anyway, because they're not even going to start with algebra, are they?

CS: Well, generally not. It depends on the student, but generally not. So that was another thought that I had, like the appreciation type of thing. Students that were taking math back then, they had no idea what mathematics could ever be used for, because you just give them these stupid problems. Solve this equation, or that equation, which has no meaning whatsoever, so that's what we were trying to do was we were trying to give these equations some meaning and what significance they might have, and so on.

TS: You mentioned the controversy nationwide about the course, what about here on our campus? Did everybody immediately adopt Earth Algebra?

CS: Oh no, no [laughter].

TS: So you had some controversies within the department?

CS: A few people didn't like that and what we were doing. They thought it was wrong. These were—I call them traditionalists—people who thought that every student that took

an algebra course should learn everything that a math major should know, and that type of thing. We kind of split the department, I think, which was unfortunate, but that's what happens.

TS: Did everybody have to use the same textbook or did each professor choose his own book?

CS: Everybody had to use the same textbook, but I think a lot of the people, even though they were using the *Earth Algebra* textbook, still taught it in a traditional manner of the intent.

TS: So it kind of defeated the purpose of it then, didn't it, at least from your perspective? Let me ask you—you developed *Earth Algebra* first, but I think you produced three textbooks altogether, didn't you?

CS: We did, yes.

TS: So what did you go to, what was the logical progression from *Earth Algebra*?

CS: Trigonometry was the next thing to do, and that was our second grant. We had a contract with HarperCollins for this trig book, and then HarperCollins sold their math component to Addison-Wesley, and the book was in direct conflict with one of their books, and it kind of got buried. It came out in a preliminary edition, and there were a few schools that were using it around, but we didn't have the support at Addison-Wesley that we had at HarperCollins. That book just kind of phased out.

TS: What was your third book?

CS: It was a calculus book, and we published that with Kendall/Hunt [Publishing Company, Dubuque, Iowa]. It was more of a workbook style kind of thing. Still, it was focused on environmental problems, but each section was devoted to a particular issue, and it was kind of written as something that could supplement another. Actually, it could have been a main course, we had enough expository stuff in there that it could have been a main course, but a lot of people were using it as supplementary project for students. I felt good about that book. I was disappointed in the trig book, but I kind of think that wasn't our fault. But the calculus book I felt real good about.

TS: Did you get a lot of adoptions across the country on the calculus book?

CS: I really don't know how many people were using that, but there were enough that I felt it was successful.

TS: Right. Then you started developing stuff that you put on the Internet. How did that come about?

CS: We found out that people were Xeroxing—it's kind of like the calculus thing, the calculus thing I told you people were using as supplementary projects for their students—

it was the same we found out about the *Earth Algebra* and the trig book—people were Xeroxing stuff out of it and giving it to their students as supplementary exercises. That was fine with us. That was the point of this whole thing to get the material out even though we weren't getting adoptions, but it was being used. So that was good, so we just wrote the proposals and that was what we were going to do. We just put all of our books and all of our materials up into modules and made a website so students and teachers can access it for free and do what they want with it.

TS: So you created your own website, in other words?

CS: We did, right.

TS: Do you still have it up? I know it was still up when we interviewed Nancy a year or so ago. Is it all still on the Internet?

CS: It is indeed. We're actually still using it. As I said earlier, I'm working on a project with San Juan College over here in Farmington, New Mexico, which is only about fifty miles from me. We're using the website there in some of their curriculum development, and also it's being used by the Navajo Nation. When I first retired I worked for the Navajo out here for, oh, it was just part-time.

TS: Yes, you've got a lot of Navajo stuff on the website, don't you?

CS: That's right. We do, and all of that I developed that after I got out here. I adopted a lot of stuff that Nancy and I had done. I was managing a grant at the Navajo College that Shiprock had.

TS: That who had?

CS: The Navajo Community College.

TS: But you used a term, "Shiprock?"

CS: Yes, that's a little Indian town in northwest New Mexico.

TS: Anyway, I'm sorry I interrupted what you were saying. It sounded like fascinating work with the Navajo Nation, so why don't you go back and just elaborate on that just a little bit more about what you were doing?

CS: Sure. I had friends out here. I had been doing work with the Navajo for some five or six years before that during summers. Then I had some friends at the college there, and when I came out here I went to see my friend, who was actually head of the department of science and mathematics there. He said, "Why don't you just take over this grant because no one out here seems to be paying attention to it." I said, "Okay, sure." So I did, and it was curriculum development for high school and college courses on the Navajo reservation. So I took a lot of material that Nancy and I developed and adapted it.

With the grant money I hired some Navajo people to work with me and to write a Navajo perspective on some of the problems. We put in a lot of local problems that were specific to Navajo on the reservation, in attempt to get the interest of the Navajo students and an interest in mathematics. It was really pretty exciting.

TS: So all of this is on the web now?

CS: Yes. It's on the Earth Math site [http://earthmath.kennesaw.edu/main_site/index.htm]. There's a button there you can click that says Navajo Nation Studies. So the Navajo people are still using it in the classrooms, I understand.

TS: Great. And then you are also working with a community college on the reservation. Is that what you were saying a little bit earlier?

CS: No, that was the Navajo college that I was referring to, The Navajo Community College.

TS: Okay. So you're doing it for college students, but you're also doing it for public school students as well?

CS: Yes, that's what I was doing. I'm no longer associated with them, but that's what we were doing for high schools and colleges.

TS: What is it that you're doing with Arizona State?

CS: The grant—actually Nancy is working with me on this, also. It's a grant that we got. Steve Semken [Steven C. Semken] was at the Navajo college when I was working there. He and I wrote a proposal to put mathematics in beginning level geology courses and concentrate the issues, the geological interests, to the Navajo Nation. It was funded by NSF and we worked Nancy in as a consultant, also. He has since gotten a job at Arizona State University [Tempe, Arizona], and he's there now, so the grant moved with him. I'm continuing to work on that. He's also involved in another curriculum project there, which is the development of math and science courses for primarily minority students, particularly Hispanic and Native American in the area around Phoenix and Tempe. I'm working with that, also, as a consultant. It doesn't sound like I'm retired does it?

TS: No, it doesn't. It sounds like you're staying pretty busy. Have you found that there are some unique challenges when you're dealing with Hispanic and Native American students?

CS: Definitely.

TS: That they don't have the background for it, or what?

CS: A lot of them do not. I'm just now starting on this Hispanic population curriculum—but I'll speak to what I know about the Navajo. Many of the Navajo don't have any running water or electricity. They still live out in the desert on the reservation. It's very difficult

for them to get into school. They have many problems. I taught a few courses there at the college during the summers. They bring their little kids to class, so you've got a class of six or eight adult Navajo students, and you've got little kids crawling around the classroom. So it's very difficult for them to do any kind of learning. Well, basically you have to teach them in the classroom because they have no way outside to study, no time to study, [and] no privacy or anything of that nature. Sometimes students would disappear from the classroom for a week or two, and then they'd come back and they'd say, "Well, my grandmother died"—so-and-so in some small community way back in Arizona, back in some canyon—"and we have to go to the ceremonies for a couple of weeks for Grandma." So you've just got to work with people like that. They have particular problems, and you have to be aware of that. But it was fun.

TS: Yes. It sounds like a very worthwhile type of teaching to be doing.

CS: I think so. I'm not teaching anything there any more. I did teach a few courses.

TS: You retired from Kennesaw about 2000 or 2001. Do you remember which year it was that you left Kennesaw?

CS: In 2000. It was in I guess May of 2000.

TS: So you just retired at that point? Let's see, I guess you'd be old enough to retire by then, weren't you?

CS: Yes, I was sixty then. I had thirty-something years in the system.

TS: Okay, so you didn't intend to get a job anywhere else other than part-time after that. I guess we can call that retirement, even though you are staying busy. So maybe as a kind of concluding-type of a question, could you talk a little bit about where you think Kennesaw was by the time that you left here in 2000? Obviously, a different place from when you came in 1974. How would you see the intellectual life of Kennesaw when you left, either for the better or for the worse? How would you describe it in 2000?

CS: I think things had really changed, as you know. There was a lot of grant activity, and, of course, there were a lot of graduate courses that were developed there. I guess I'd say it's better than it was. I guess I think of that as research or writing, and that type of thing. Of course, there are so many more students now than there were then. I think there were only 2000 students when I came there, maybe 2500.

TS: Probably so.

CS: When I left I think there were about 11,000. I don't know what it is now.

TS: Well, it's somewhere over 18,000 now. There's a lot more technology in the class now.

CS: There's more technology, and the classes, I guess, are a lot bigger, aren't they?

- TS: A lot of them are on campus. I'm not sure in math what the sizes are now. We've been able to hold our history surveys to about the same that it's been for a long time, around 45 to 47 in the survey classes. But I know in some colleges and departments the enrollments are just unbelievably high, so I don't know in math what it is now.
- CS: I guess I'm thinking about student-teacher ratio there.
- TS: We've got a pretty high student teacher ratio. Lynn Black [Lendley C. Black] was making a speech the other day where he was saying we had the highest in the system, and that's one of our problems is to try to bring it down.
- CS: I think that's unfortunate that you can't have the close contact with students that we used to have. As far as research and writing go, I think that's much improved. I think Betty Siegel and some of her people really did a good thing there even though the change was difficult for a lot of people. I think a lot of people came in with certain expectations and those expectations changed over the years, but I think it's for the good.
- TS: So when you left Kennesaw in 2000, you were pretty happy with the math department and the institution in general would you say, or not?
- CS: I don't know. I wouldn't go so far as to say I was real happy with the math department. It was okay. Like I told you, the department was kind of split, and I think a lot of it was over Nancy and I and what we did. A lot of people were really unhappy with what we did. I understand now that a lot of it has gone back to traditional teaching. I get my information from Nancy.
- TS: That's kind of my impression too. I think Nancy said that she had hope for the new hires. It was those that had been there a few years beyond the new hires that she seems to be alienated from, maybe.
- CS: True.
- TS: I just wonder in terms of you leaving in 2000—I did an interview with Dan Williams [Daniel J. Williams] recently, and he said, "Well, if I'd wanted to go to a Research One institution back in the '70s, I would have." And so he's kind of thinking about retiring from Kennesaw and finding a small, private school to teach in, to go back to where we were in terms of class sizes, and so on.
- CS: Well, the ideal situation would be to have very small classes and be able to be creative in a certain way for the faculty, but that may be difficult to achieve.
- TS: I'm thinking than maybe in some ways by 2000, Kennesaw was kind of where University of Georgia was when you left there in the '70s.

- CS: Yes, it pretty much was; maybe not quite as research oriented, I don't know. Do you think it was?
- TS: No, probably not. There are a lot of people talking about wanting to be a Research One institution at Kennesaw, but I don't think that's where we are, and I don't think that's what our mission is.
- CS: Well, I hope not. I think it's good that some creativity is expected of faculty because I think it keeps you alive, and I think it makes your classes more interesting. I don't know to what extent, but I think that's important, and I think that it was certainly a lot more that way at Kennesaw than it was when I went there. I was resistant also, as I told you earlier, but I think what we did was a really good thing, and I'm glad we did it.
- TS: So what took you out to Colorado? Just being near the mountains? Since you grew up in Georgia I just wonder why you decided to go out to Colorado when you retired?
- CS: When I grew up, my family didn't have any money. Dad had a little grocery store in town, and we never traveled anywhere. So the furthest I ever got was Savannah or somewhere like that. Then I went to college, and that was back in the '50s, and we still didn't travel, didn't go anywhere. After moving around the country some, as I got older, I figured if I'd known about this country out here as a young man, I would have been long gone. I love the mountains. We're right in the Four Corners area [of Utah, Colorado, Arizona, and New Mexico] and we've got the Rockies here. We can be up hiking at 10,000 or 11,000 feet in a half hour, and in an hour we can be in canyon lands over in Utah, over near Moab.
- TS: It sounds like a great place to be to me.
- CS: It's great most of the time. Of course, it's a different climate here. Like I said, the mountains got new snow yesterday, but that's okay.
- TS: What's the elevation where you are? You were talking about the mountains being there, but what about where you live. What's your elevation?
- CS: Seven thousand feet.
- TS: Oh, 7000! So you've got thin air; you're more than a mile high there.
- CS: Yes, but it's beautiful, and I love this country, so I was real happy to get out here. I came out here before my wife. She was back in Georgia. She had a business; she was working. I came out here, and I saw this property. I called her up one day, and I said, "I just put a down payment on ten acres."
- TS: What did she say?
- CS: Well, she kind of went into a panic.

TS: I guess so!

CS: No, she flew out here. Her son was working for Northwest Airlines, at the time so she got a ticket from him and came out here for a couple of days. She loved it, so we finalized that and built a house two or three years later. That's where we are.

TS: Now that you've mentioned her, I guess we ought to put her name in the interview. What's your wife's name?

CS: Her name's Nancy too, which makes it real easy since my research partner and my wife are both named Nancy.

TS: That's all right. Well, we miss you at Kennesaw.

CS: Thank you. I think about you guys a lot, and there are a lot of people I miss, a lot of old friends that are back there too. Thank you for saying that.

TS: Well, I'm just about out of questions. Is there anything you think we should have put in this interview that I haven't asked you about?

CS: Not that I can think of, Tom. Thank you. When are you retiring?

TS: Well, not any time soon. I hadn't really thought about it too seriously yet, but I'm 62 now so I guess it's time to start thinking about it a little bit. But I'm going to hang in here as long as I can.

CS: That's good. It sounds like you're doing good things there. This project sounds really worthwhile.

TS: This is probably more fun than anything I've ever done in terms of scholarship.

CS: Sure. Well, that's great. And this is going to be a book?

TS: Well, the oral histories themselves are going up on our campus website, both through CETL and through the archives, and then we're putting bound copies in the library. But they're primary source material for the book that we want to write. The book is not going to be just oral histories, but they will certainly be included in it.

CS: Okay. That will be interesting. I'd love to see the book. I'll check out the website. I saw that you have Nancy's interview up there already.

TS: Yes, it's already up.

CS: I haven't looked at it yet, but I intend to. I figured it would be best if I didn't look at it before I talked to you.

TS: Well, maybe so. But what you said pretty much goes along with what she told us. At least you all have your stories together. They're not in conflict with each other. We've enjoyed talking to both of you. Dede [Yow] was involved in that interview with Nancy, as well as I, and that was fun to talk to her, and it's certainly been fun talking to you today too.

CS: I've enjoyed talking to you today, Tom, and thanks for including me in this. I'll check out the website.

TS: Great. Well, I really appreciate it Chris. It's been fun talking to you today.

CS: Good talking to you, Tom.

INDEX

- Addison-Wesley, 16
Andrews, James J. (Florida State University), 2
Arizona State University (Tempe, AZ), 3, 18
- Black, Lendley C., 20
- Carruth, Harvey, 9
- Davis, Herbert L., 4, 6-7
Distinguished Scholarship Award, 8
- Earth Algebra, (*Earth Algebra, College Algebra with Applications to Environmental Issues*), 7-10, 12-17
Earth Math Website, 18
- FIPSE (Fund for the Improvement of Postsecondary Education, Dept. of Education), 10
Florida State University, 1-2
- Givens, Jackie L., 10
Gooch, Thomas L., 4
- HarperCollins Publishers (Ann Kelly, Jack Prichett), 11-12, 14, 16
Huck, Eugene R., 6
- Kelly, Ann (HarperCollins Publishers), 11-13
Kendall/Hunt Publishing Company, 16
Kennesaw State University
 Intellectual Climate, 4-9, 14-16, 19-21
 Changes at KSU, 6-9, 14-16, 19-21
 Earth Algebra (*Earth Algebra, College Algebra with Applications to Environmental Issues, HarperCollins Publishers, 1992*), 7-10, 12-16
 Scholarship, 8
 Distinguished Scholarship Award, 8
 Grants, 10-11
 Earth Math Website, 18
- Louisiana State University (Baton Rouge, LA), 3
- Magnus, Wilhelm, 9
Mathematical Sciences Research Institute (Berkeley), 9
- National Science Foundation (grants), 10-11, 14, 18
Navajo Community College (Shiprock, NM), 17-18
Navajo Nation, 17-19
- Prichett, Jack (HarperCollins Publishers), 11
- San Juan College (Farmington, NM), 3, 17

Schaufele, Christopher B.

- Birth and childhood, 1, 21
- Undergraduate education, 1
- Educational track, 1-3
- Ph.D., 1-2
- Mentors, 2
- Dissertation, 2
- On scholarship, 2-3, 8-9, 14, 16
- On writing and publishing, 3, 9, 11-14, 16-17
- On grants (proposals and execution), 3, 10-12, 14, 16-18
- Arizona State University, 3
- San Juan College, 3, 17
- On curriculum development, 3, 7-18
- Early career, 3
- Career track, 3-4, 6-9, 17-19
- University of Georgia, 3
- On tenure, 3
- Coming to KSU, 3-4
- On intellectual climate at KSU, 4-9, 14-16, 19-21
- On KSU, 5-9, 14-16, 19-21
- On students, 5
- On research, 5
- On running, 6
- On teaching, 6-10, 13, 15, 19-20
- Earth Algebra, (*Earth Algebra, College Algebra with Applications to Environmental Issues*, HarperCollins Publisher, 1992), 7-10, 12-17
- Awards and recognition, 8
- On environment, 10-11
- Earth Math Website, 18
- On retirement, 18, 21
- Wife, 21-22
- Stepson, 22

Schaufele, Nancy (wife), 21-22

Scherer, Stephen E., 8

Semken, Steven C. (Navajo College, Arizona State University), 18

Siegel, Betty L., 6-7, 15, 20

Sparks, Donald J., 4

Straley, Tina H., 8-10, 12

Sturgis, Horace W., 6

University of Florida, 1

University of Georgia (UGA), 3-5

Williams, Daniel J., 20

Zumoff, Nancy E., 4, 7-14, 17-18, 20