KENNESAW STATE UNIVERSITY ORAL HISTORY PROJECT

INTERVIEW WITH MEGHAN A. BURKE

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TS: Meghan, why don't we just begin by you talking about where you grew up and where you went to school and such as that?

MB: I grew up in a suburb of Chicago, Mount Prospect, Illinois, and I went to a Catholic school, St. Raymond [School], until sixth grade.

TS: I didn't even know there was a St. Raymond.

DY: I didn't either!

MB: Well, I know quite a bit about him now! I went to school there in Mount Prospect until sixth grade, and then I switched to a public school. I did sixth grade in Forest View Elementary, I did seventh and eighth in Holmes Junior High in Arlington Heights, Illinois, and I did my high school at Forest View High School, which later closed, also in Arlington Heights, Illinois. I graduated in 1983.

TS: That's what I kind of figured because you graduated from college four years later! So '83, that puts you back, let's see born about mid-'60s, probably.

MB: I was born January 24, 1966.

TS: Right in the middle of all the civil rights and protests in the country and everything else.

MB: That's right. My parents were pretty active, well, at least pretty aware—I think they were active before they had kids—which was pretty different from the other suburban kids that I went to school with.

TS: Yes, not as conservative as a lot of the parents?

MB: Right. I remember watching TV when I was in sixth grade. We watched the election. It must have been the day after the election, the election results, and I was the only person in the room happy that Jimmy Carter had won the election!

TS: What did your parents do?

MB: My dad is a doctor, my dad's a psychiatrist, and my mom's a psychiatric nurse.

DY: I wonder where they met!

MB: They met at Cook County Hospital in Chicago.

TS: What are their names?

MB: My dad is Edward Burke and my mom is Nancy Burke.

TS: That may explain why, with your mathematics, you have an interest in medicine also, I guess.

MB: Partly, yes, because I was brought up around that and did seem to have a natural tendency toward understanding things medical because it was just around the house a lot. When I went to college and was interested in mathematics, it just seemed like the other science that I was really interested in was biology, and not very many people combine that. Although at Brown [University], where I went, they did have a pretty unusual program at that point, an undergraduate major in applied math and biology. So I decided to do that. Most people interested in math were also interested in physics or engineering or chemistry.

TS: When we used to give students a choice of which science they wanted to take all the non-science majors would take biology because of the lack of math.

MB: That's right. When I was in grad school I taught a course. I was spending some time up in York, in the north of England, and I taught a course for the biology department. In England, the way their degree programs go—if you're a biology major you take nothing but biology courses. You take no other sciences let alone social sciences or anything else. This is all you do for three years.

TS: Very professional oriented?

MB: It's not professional oriented so much as it is very intense. In some ways it's maybe grad school oriented. It's changed to some extent now, but at that time so few people went to college or university that they were very focused on continuing their studies. In secondary school when you took your exams for college entrance you would focus on three or four or five subjects. So in the last two years of high school they had already narrowed it down to the sciences. So the biology department asked me to come in and teach this calculus course because they said, "Our students just don't know the math, and we have no facility for sending them to the Math department to take a class because they just aren't set up that way." So they asked me to come in and teach calculus to these students for a semester; and, oh, my gosh, these students just wanted nothing to do with it! They just said, "The reason we're doing biology is because it had the least amount of math." But more and more people need math in biology. It's getting more and more quantitative, so you need to understand that stuff.

TS: Let me ask you, first, how did you get interested in math as a field?

MB: I think I just never got disinterested in it.

TS: Was it your favorite subject in high school?

MB: Yes. I should say that I transferred in sixth grade because I was doing very poorly in school. I was going into sixth grade, and my younger sister was going into second grade, and we were both in the Catholic school. My two brothers were in the public schools. The reason I was not enrolled in the public schools was because my birthday fell after the deadline. I had been to Montessori school for three years and the Montessori teacher said, "She's ready for school," but the public schools wouldn't take me at that age. So they enrolled me in a local Catholic school—we're Catholic. Then when my sister was ready to go to school I sort of insisted, "She has to come with me. I can't be the only one here and all three of them go to the other school." So they sent her with me. She had some trouble with the teachers. They couldn't get her name straight, and they really felt like she was not being treated on a personal basis. She goes by her middle name, and they just could not seem to get that. So when she entered second grade and she had to start all over—her name is Mary Caitlin and she goes by Katy—she came home the first day of second grade and said, "You know what, I'm just going to have to change my name to Mary because the nuns just can't get it right." So then my parents said, "No, you know what, I think that that's not the way it works." So they disenrolled us from the Catholic school and sent us to public school.

In the meantime, I, in fifth grade, was failing a couple of subjects, and the teachers met with my parents and said, "Your expectations are too high. This is a person who is a slow learner, and she's never going to go to college, and you just need to stop putting so much pressure on her." Now, I never felt pressured, I mean, we never talked about college around the house, but they sort of accepted that assessment when they sent me to the public school. The Catholic school that I was in was very individual work oriented. You had a list of work, and you went away and you did it, and you came and signed up for a discussion with the teacher. I was very shy, and I never signed up for discussions with the teacher, and that's why I was never passing anything. So in the public school it was much more whole group stuff, and that just seemed to work better for me, which is why to this day I still get frustrated when people say, "This is one method that's going to work for everybody," because I really feel like everybody's different. So, anyway, I went to the public school and just started doing well in everything, and I never really thought that much about it because despite my parents being told that you're putting too much pressure on her, they never really did. I started excelling in a lot of things, especially math, and I just didn't really think that much of it. In the meantime, my parents were kind of like, "Wow." So I most enjoyed the sciences and especially math, and I just kept liking it. I kept getting placed in the advanced math classes and enjoyed the challenge. Very unusually, my high school was a middle class, suburban high school, but it was big and we had advanced placement classes. Our advanced placement calculus class had more than half girls in it, which apparently was very unusual, but I think part of the good side of it was at the time we didn't even realize there was anything odd about it. So I never felt any kind of inhibition about mathematics until I got to college, and by then I was just too interested to be deterred for long.

DY: Was it different in college in terms of gender?

MB: Absolutely. The thing about it was that it was very subtle, and because I had come from a nurturing environment I didn't recognize it for what it was. For example, my advisor in the Applied Math department was very intimidating to me. Again, I said I was kind of shy. I was easily subject to that. But I would go to his office because we were required to see our advisor every semester and have him sign our registration card, and he would say, "Well, what did you take?" I said, "I took these four science and math courses." He'd say, "What'd you make on them?" I said, "Well, I made all "A's." He said, "Okay, where do I sign?"

DY: Oh, real mentoring.

MB: And he'd say, "What are you going to take next semester?" And I'd say, "Well, I'm going to take these four sciences." And he'd say, "Well, that's too hard!" So I'd say, "Okay, well, I'll take something less." I'd come and I'd take two math classes and a science class and a liberal arts class. He'd say, "That's too easy!" "Ok." You know, I only have this one conversation every semester, and last semester you said that schedule was too hard and I don't really understand. So I'd come home from these advising sessions crying, and I'd say [to my roommates], "I don't know what I'm doing wrong. I thought I was doing what he told me to do last semester, and I don't get it, and I'm getting "A's," so why is he treating me like this as if I'm not working hard enough? What more can I show him?" The first semester of my senior year I sat next to a guy who had the same major as me in an upper level class, and we had the same advisor, and I said, "How do you like this guy?" "Oh, I love him! He's great! We sit and talk baseball for hours! He's just so easy to approach." I was like, "Wait, there's something wrong here." I said, "It's not that his grades are higher than mine, so what else is different between the two of us that he could know from us spending five minutes in his office, which is all I ever get from him?" I walked into the building one time to do some photocopying because I was a grader—I worked for the department—and he saw me in the hall, and he said, "What are you doing here? I told my secretary that I wasn't going to meet with any students today!" I said, "I'm not here to see you" [laughter]! So that was the kind of response I got from him, and only when I talked to this other student and realized, wait a minute, it's a gender thing, that I realized it's not me, I'm not bad at this, I don't deserve this.

TS: Or else you needed a Chicago Cubs jacket to wear around or something.

MB: He never asked me if I was interested in baseball; it never even got that far.

DY: He just assumed you weren't.

MB: I'm a huge Cubs fan! It never even got that far. So that's when I first realized, I'm a strong enough person that if I had realized something like that was wrong from the

beginning I never would have taken it personally. But it was insidious and so subtle that that's why I'm very careful when people say, "Oh no, I don't face any of that stuff."

TS: So they assigned you an advisor and you couldn't change advisors?

MB: It was this very specialized program, and there was only one advisor in the overlap of the biology and math.

DY: So you had to live with this man through your undergraduate career?

MB: No, I only had to meet with him once a semester. Then once I realized what was going on I was okay. I said, "I'm not going to let him determine—I know how this works." Okay, I need a letter for grad school, and I e-mailed this person that I wanted to work with in mathematical biology, an extremely well known person in the field. And I didn't say, "This advisor at my university who is quite well known will recommend me highly." What I said is, "I worked with this guy. He's my advisor." So this guy wrote back and said, "Well, I'll accept you into the program if you can get a letter from this guy." So I go back to him [my advisor] and said, "You know what, he'll accept me in the program if you write a letter for me." His letter was something like, "We have a very tough program, and she's survived it." But because I had made the contact—once I was hip to what was going on I was able to work the system.

DY: Yes, you initiated it.

MB: So I talked one into [accepting me by] saying this guy will recommend me, and I talked the other guy into [recommending me by] saying, well, he's going to accept me if you just give the nod.

DY: Meghan, did you get any mentoring as an undergraduate? Did you have any kind of modeling or anything?

MB: I did much more from the biology side of things, and I almost went into grad school in biology, but I had this naïve thought. I was a teaching assistant in the biology department and got to know the faculty over there and some of the grad students over there, and they were much more nurturing. I almost went to grad school in biology, but it seemed at that time that what was in the headlines in the scientific community was the struggle in discovering the HIV virus, and the struggle between the French and the Americans, and it just seemed very nasty science, bad science and bad ethics. I thought I'm not going to go into that. I'm going to go into math where there isn't any politics or ethics! No, because they just don't talk to each other! And there are issues, but we don't talk to each other, so we don't know about it! So I think it was in consultation with biology people that I really worked out, yes, I do want to go to grad school, this is what I want to do, and I do want to stay associated with biology and medicine, but I don't want to do a degree in biology. It seems my strengths were unique enough that it seemed worth pursuing. At that time very few people were pursuing the intersection between biology and math. So there was that sense of I have strengths and this is valuable to do.

TS: Was it the applied mathematics program that attracted you to Brown or did you decide to go to Brown and then find out they had it?

MB: Absolutely the latter. I was sure that I was going to go to Princeton [University]. I toured around colleges with my dad and read all the catalogs ahead of time and thought about which one, and it seemed like Princeton was a really good match for me. My uncle came to visit, my dad's brother-in-law, and he had gone to Brown. "Oh, Meghan, you'll have to go visit Brown." I was like, "Oh sure, Uncle Bob. We'll go visit Brown." So we set up a visit to Brown as well, but I just didn't really know that much about it. I went to visit Princeton, and I just couldn't stand the place. They were just so, "Well, *if* you're good enough to get in here, then we'll talk." I thought that wasn't for me, and Brown was a much more nurturing environment toward their undergraduates. They were so competitive that they couldn't even fit me in their interview schedule.

TS: At Princeton?

MB: At Brown. I had an interview at Princeton, but not at Brown—but still they were very welcoming and they had set up this tour and it was much more oriented towards, "We want you." And I thought that this is where I want to be is in the nurturing place.

TS: Uncle Bob, what's his last name?

MB: Bob Case. Yes, and he couldn't be more different from me, and I think Brown is not the same place it was when he attended, but he was just pleased as punch that, that's where I went.

TS: So once you get into Brown they're very nurturing except for this one mentor.

MB: Except for this one guy, which is maybe why it snuck up on me. But in general I think their early approach to incoming students before you specialize into a major was very welcoming. They have what I think they still call the "New Curriculum," although it was instituted in the '60s. They actually have no required courses, and they have no distribution requirements, no core curriculum at all. You just have to take and pass twenty-eight courses and have a major and follow the major requirements.

DY: Did they do the SAT because they don't require GRE scores?

MB: You mean to enter?

DY: At Brown.

MB: Yes, they did.

DY: I wonder if they're still doing that.

MB: I don't know, but when I was an undergraduate they did. And being from Illinois, I took the ACT's as well. In fact, I had to go to a different school to take the SAT's because there was just not that many people taking it.

DY: So how did things change when you got to grad school in terms of relationships?

MB: It was a very different system in Britain because, like I said, their undergraduates specialized completely, so the grad students that I entered with had three years of nothing but math. They had the background coming in of what we would have as a master's degree here in course work. They spent their third year and their last year in undergraduate doing the courses that we would do as a master's. Especially since I was a double major, they had more background than I did. Their Ph.D. programs there are three years, and they are basically the three research years that we see in the American universities. You jump right into research. So you're kind of on your own in terms of that. The supervisor that I had was very nurturing, extremely nurturing. He just makes that a very important priority to him. He would meet with us every day. He never was interested in face time and punching a clock, but you had to be there for coffee break!

TS: What is his name?

MB: Jim [James D.] Murray. At 10:30 in the morning everybody had a cup of tea in the common room, and you had to be there for that. It was just a chance for him to check in with everybody, and he'd go around the circle, "How are you doing? What are you doing?" It was to some extent pressured, but it was to some extent nurturing. He's not going to let anybody . . . .

DY: Slip through the cracks.

MB: Yes, yes. And I also felt comfortable that the requirement was not that you had to be at some formal event. You had to be there for coffee break, at the very least there's coffee!

DY: Meghan, where are the women? Did you have any women?

MB: There were a lot of women. That was another thing was that Jim had a lot of women students. It's interesting because as an undergraduate I saw a lot of women peter away from my applied math courses and my math courses. There were fewer and fewer women in my math courses. But in the mathematical biology program, once I went to grad school, among math programs it was very popular with women. So the way the classes worked out—there were three years there, so the seniors—there was one woman when I arrived who was a third-year grad student. She was such a wonderful mentor. She explained how it all worked. "You do have to be here for coffee break, and we call our supervisor—don't call him professor—but we don't call him Jim, we call him JDM. We just call him JDM around here until he says to you after you graduate—he will say to you, 'You can now call me Jim.'" For somebody coming from another country where we have different conventions—so, for example, over there if you call someone "professor" who's a doctor, or worse, you call someone "doctor" who's a professor, it's very much

frowned upon. You have to know what everybody's title is and you have to use them. Surgeons are called "Mister," and I found out the wrong way! They go to med school and become doctors and then they go to surgical residency and then they are called "Mister" or "Miss," as the one who operated on me was called. So there are all of these conventions the British rely upon—and yet they're not very forthcoming with. So it was really wonderful to have a mentor who was a woman who understood how these things go. So our third year, enter Mary [R.] Myerscough—I visited her two years ago in Australia—was a wonderful mentor to us. And the next year there were two students, male and female, and the entering class with me was four students, two women and two men, so we were very evenly split and that felt very comfortable.

TS: How did you decide to go to Oxford [University] for grad school?

MB: Back to the nurturing thing—by my sophomore year at Brown I got a letter from a dean at the institution who was recruiting people to apply for fellowships—apply for Rhodes and Marshall and those kinds of fellowships and scholarships. Here I am a sophomore, just getting my feet under me, and I get this letter from the administration saying, "We think you're good enough. Come to this workshop, come to this meeting." I thought, "Okay, I'll go!" So they nurtured that group of people, and so senior year there was a bunch of us that applied for these scholarships. Brown had been under-represented in the Rhodes and Marshall for a while, and they were really trying to get us in. I think it worked. My class was the first one in about five years to get a Rhodes scholar from them. It wasn't me, but because of that I was doing a lot of research on programs in Britain for the Rhodes and Marshal Scholarships. I got really interested in the one at University of Oxford at the Center for Mathematical Biology. I was thinking about this just the other day. At Brown we had a program in our residences where a faculty member lived in the residence hall, and he would have a study break once a month and have all the students over for food and stuff. He was a biology professor, although I didn't know him through the biology department, I had never taken a class from him. I don't know why, but at one of these study breaks I just started having a conversation with him. I didn't really know him very well, and I said, "I'm going to try to apply for these scholarships, and I understand that it's better if I go into it with a letter from the professor in England saying, "I will accept this person." So I'm going to start writing to these people." He said to me, "Here's what you do. You look up what these people do, and you write to them and you say, "I am interested in what you do." You don't write to them and say, "Hey, what do you do?" because they're not interested. As a naïve undergraduate I thought, okay, that's what I'll do then. So I went to the library, and I learned a lot about people in a couple of different universities in England and I made some choices. I wrote to Jim—as he said I can call him now—Jim Murray, and he wrote a wonderful letter back to me. He said, "Oh you must come to Oxford, and you will love it here!" It was a two-page letter! And it was so warm and welcoming that I said, "Okay, this is the place for me." Then, although I didn't get a Rhodes or a Marshall, I got an NSF Scholarship [in Science, Technology, Engineering, and Mathematics], which that year, for the first year, you could take outside the U.S., and so that's what I did.

TS: Oh, really, that's the first time ever?

MB: That was the first year. Before that you had to use it in the USA.

TS: Wow. Let's see, it took you five years to get through that three-year program over there. Was it because you didn't have the background when you got there?

MB: Partly, partly. Also, I was there for one year, and then Jim decided to take a year at the University of Washington, Seattle, so he took all of his grad students with him. It's not much of a sabbatical, right? He took all of his grad students with him. So we all moved to Seattle for one year, and then all the British students were then relying on me to show them the ropes [laughter]! We got a six-bedroom apartment for all of us. They wouldn't live away. They had to live with me.

TS: I didn't know there was such a thing as a six-bedroom apartment.

MB: I didn't either! Anyway, so then we moved back to England, and then Jim moved back to Seattle permanently. So I think between the back and forth I also was set back a bit. It wasn't unexpected to me that it would take quite a bit longer than the three years.

TS: Still going through pretty fast.

MB: Yes. And what I had to do in essence was I'd be working on a problem, and I'd realize that I need this whole branch of mathematics that I really don't know. Then I would go and take that class. They had three terms, so it was a little more frequently than semesters, but I was sort of learning things one at a time, as I needed them. That slowed things down a little bit as well. It wasn't like I was two years delayed because I took two years of classes. I had to take them as I needed them.

TS: Right. What did you do your dissertation on?

MB: My dissertation was on an enzyme kinetics problem called suicide substrates. [Meghan A. Burke, "Suicide Substrates: An Analysis of the Enzyme Reaction and Reaction-Diffusion Equations" (Ph.D. diss., University of Oxford, 1992)] Normally an enzyme catalyzes a reaction, so it takes a substrate "X" on it, and it releases a product and the enzyme is the same. This is a kind that attaches to a substrate.

TS: What exactly is a substrate?

MB: It's the beginning thing. Say, in your digestive system, it takes something that comes into your digestive system, and it's just called a substrate because it's something that the enzyme operates on. So the enzyme operates on it and turns it into something else, but the enzyme is regenerated in its original form, so it can keep doing this operation. So it keeps digesting this stuff and changing its form.

DY: In a healthy organism, it does that.

MB: Right. And a suicide substrate is something that attaches to the enzyme and then turns into something that inactivates the enzyme. It's a suicide substrate because a substrate isn't released. It's sort of stuck there. It's sort of like the knife and it's just stuck in the enzyme and the two of them together become inactive. For example, the difference between penicillin and Augmentin, another antibiotic, is that Augmentin is augmented—it's penicillin plus a suicide substrate because things become resistant to penicillin by developing an enzyme. So added to it is a suicide substrate that takes care of that resistant enzyme.

DY: I know Augmentin from baby ear infections.

MB: Yes, so do I!

DY: Bubble gum medicine. I think they've changed it now, but it was that pink, sweet stuff.

MB: Yes, I have a kid that's allergic to penicillin so he can't take Augmentin either. But, yes, they get serious if you can't take the penicillin.

TS: So what was your thesis?

MB: My thesis was developing some mathematical equations to show how the quantities of the substrate and the enzyme and the product change. Previously the math they had done didn't represent the data very well. So I used a math technique called asymptotic analysis to look at what was happening in a very short time. We knew a lot about what was happening in later time. It's easy to get data for later on, but we didn't know what was going on in the very beginning of those reactions. So the math that I did using asymptotic analysis matched up the short time and the long time.

DY: And then when did you do your post doc at Emory [University]? Did you do post doc some place before Emory?

MB: Yes. I arrived in Oxford in '87; '87-'88 I was in Oxford; '88-'89 I was in Seattle; '89-'90, '90-'91 I was back in Oxford for those two years. Then I got married in 1991 to my husband who was also at Oxford, but had moved to the University of York in the north of England. After we got married in '91, I moved with him to the University of York and lived there for a year while I was writing my Ph.D. dissertation.

TS: What's his name?

MB: Gregory [D.] Abowd. He's a computer science professor right now at Georgia Tech [Institute of Technology].

TS: Is he from England?

MB: No. He's from Detroit. But I say it's only natural because we were the only ones who could understand each other [laughter]! So we met in Oxford. He moved and lived in York for a year or two, and then we got married in '91, and I moved up there with him.

TS: And you were talking earlier, you were teaching at York also?

MB: Yes. While I lived there the biology department approached me and said, "Could you teach this course? We really need you to do that." And then in '92 I finished my dissertation, defended it and moved back to the U.S. At that time, in the early '90s the job market for mathematicians was very, very difficult, and for computer science it was wide open, so I followed him for several years because he was getting the job offers.

TS: His field is computer science?

MB: Yes. So in '92 he got a post doc at Carnegie Mellon [University] in Pittsburgh, so we moved to Pittsburgh, and I got a post doc at the University of Pittsburgh Medical Center and worked there for two years on immunology stuff. Then in '94 my husband Gregory got a job at Georgia Tech, because he was only a post doc in Pittsburgh, so he was looking for a tenured track job, and he got that offer at Georgia Tech. So we moved here and I got a post doc at Emory School of Public Health for one year. Then in '95 I got the job here at Kennesaw State.

TS: So that explains why you wanted to come to Kennesaw State.

MB: Right. When we first got here, and I had this post doc—but I knew again that it was very temporary—I just started applying for every job in the state of Georgia. In fact, on November 13 I saw an ad, and the application was due on November 14, so I immediately updated my resume as much as I could and stuffed it in a Fed Ex envelope and sent it off and [then] said to somebody, "Now where is Valdosta?" [laughter]

TS: That would have been a little commute.

MB: I realized I should have just saved the money on the FedEx envelope because there was no way I could commute to Valdosta. But, yes, I applied to pretty much everything in Georgia at that point. I got interviews at Clayton State [University], here, and Emory. Actually, I was short-listed at Emory, and I was the second option. If the first person they offered the job to didn't accept it, they would have offered it to me. I really struggled with that whether I wanted to come here or Emory. Emory was quite close. Considering that my husband had to commute to Georgia Tech it would have been conveniently located, but I really thought hard about whether we could make it work with two research-oriented jobs and the insecurity associated with that. In my post docs I found how difficult it is to live basically on grant money and the whims of the government. The whims change and suddenly we don't support that kind of research anymore. You know, small pox is out, avian flu is in, and that's a hard life to live.

TS: Your husband came to a tenured track position though, didn't he?

MB: Yes. In ’94 he went into a tenure-track position, so that was stable in that sense, but it’s a very high-pressure research-oriented environment there.

TS: You don’t need two people in the same family in a high-pressure research environment.

MB: When it’s so uncertain. The thing that I’ve loved about Kennesaw is that I have always felt that if I do the job that I know I can do, I will be rewarded for that. I’ve never felt like I’m subject to the whims of who’s funding what and whether or not I can get this or that grant. I’ve always felt like if I do my job well, it’ll all work out okay. And the Math department here has been amazingly nurturing. Again, we’re more than 50 percent women, and I’ve never felt like I didn’t belong.

DY: Who interviewed you?

MB: Well, Tom [Thomas R.] Thomson was head of the search committee that hired me, and he was very nurturing, very positive. Sean [F.] Ellermeyer was also on that committee. Sean is a mathematical biologist, so he was very interested in hiring me. He was only a couple of years ahead of me, so he could really explain to me how the ropes worked. Then the chair of the department at that time, interim chair, was Ron [Ronald C.] Biggers, and by the time I arrived he’d been made permanent chair. Ron was a very warm, very good mentor, again, in that he talked about how it all worked. This is what you need to do, and he was very straight about it, and I really appreciated that. In England I had a good mentoring environment, but there was always the sense of, there are these rules and you have used your fork with your right hand and you don’t do that here, and instead of saying anything everybody just sort of looks around, and that’s a very uncomfortable situation. Ron would never let those kinds of things happen. He would just say how it worked, and I appreciated that.

TS: What was the position that you applied for here?

MB: Funny story. When we came here in ’94, when Georgia Tech was recruiting my husband, I said, “Oh, well, there’s a job at Kennesaw State, I’ll apply for that,” and so I did. They were really pushing Gregory for an answer, and so I e-mailed over here, and they said, “Oh, you’re application came in too late; we didn’t even look at it.” I said, “Okay,” so I wasn’t hired the first year I applied. It was the tenure track assistant professorship that I was hired into in ’95. They say something like 530 people applied for that job.

TS: So it wasn’t applied mathematics or any particular position?

MB: I don’t remember, but I think they were looking for applied mathematics as far as that kind of thing goes. I think we specialize more now, but it’s still about getting our classes covered. They needed somebody to teach differential equations, and that’s something that quite a lot of people can do, not just mathematical biologists. But there again, Sean Ellermeyer is a mathematical biologist, and I think that‘s one of the reasons why he was

interested in interviewing me, but I don't think they were necessarily looking to build a mathematical biology program at that point.

TS: So they just advertised that we want somebody to teach math, and 500 and something people applied?

MB: I think they probably did say applied math, but at the same time Gregory's dean was trying to talk to the Math department down at Georgia Tech, and they said they got 1,200 applicants for their job, so like I said, it was a very, very competitive time for mathematicians. And they [the KSU Department of Mathematics] interviewed four people. They usually interview three people, and they interviewed four, and I think that was because I was free because I was just coming from the other side of town, and they probably thought, we'll just invite her because we don't have to pay for a plane ticket or anything for the interview.

TS: That's something if 500 people applied and you got the job.

MB: I certainly knew how lucky I was to get a job at that point, especially at a place that seemed like such a good fit for me.

DY: It's interesting that you would say that because Kennesaw is, of course, so different from Emory, and it's a public access university. So that's the kind of environment you wanted to work in?

MB: I knew I wanted it to be teaching oriented. I had a vague notion that has evolved much more over time, but has still been consistent—I didn't want to be the teacher who taught people who didn't really need me, who could learn it from the book anyway. That's not what I wanted to do. I wanted to teach people, especially people who felt in the past, "I can't do this," especially women who felt like, "I can't do this. I can't do math. Math is hard for me, I'm scared of it." I wanted to show them, "You know what? You really can." So that's what I wanted to do, and I knew that that would be available to me here and probably not at Emory. Emory's Math department was also kind of weird back then. There were some really weird politics, and it was run like a dictatorship. Everybody seemed very cold, and I was past the point of, "I'm intimidated, I couldn't hack it here," and I was more to the point of, "I don't care for this. I don't want to be a part of it. I have a choice, and I'll be happier at the other."

DY: What do you think you have enjoyed about Kennesaw having come here: the students, the environment, the collaboration with colleagues?

MB: All of that. I've enjoyed my interaction with students. I have found it very rewarding to help these students who really thought that they couldn't do it. And I've found that that's valued, and therefore that makes the whole environment more enjoyable because I contrast that with my husband, who is also a fantastic teacher who finds at Georgia Tech that that's sort of treated as "Fine, but don't let it interfere with your research." And I don't get that here at all. It's very valued, so I feel very validated because of that.

DY: Have you participated in, and I'm sure you have, program building in your department?

MB: To some extent. I've kind of switched around what I've done. I think I'm just getting to the point where I've been here long enough to see things go full circle. We've gone from, "This isn't working, we have to go a different direction," to "No, that direction didn't work, let's go to this direction," to, "No, we already did that." So to some extent I'm backing away from that because I'm thinking, oh, we're just going around again, and I'm not sure I can find different things to be involved with. For example, when we went to semesters in '98, I was very involved with looking at the math major and how it was going to work and developing a very flexible program. Because I thought it was important to work with people who were going to do double majors and maybe do minors in other areas, even though we weren't calling them minors very much, to do a significant amount of study in another area to see how math applied to all these other areas. That seems to be less popular in the Math department right now, so we're changing things in the other direction. I haven't really been involved in that because I don't see that as being what I think is important. I've been working more with the first-year courses and advising students to get in the right ones and developing a placement test and trying to make that work in ways that other placement tests have had weaknesses. That's where I've been focusing myself.

DY: Is that the math advanced placement test that you've been working on?

MB: The Math Advisement and Placement Test, yes, the MAPT.

DY: The MAPT, yes I knew that.

MB: I've been MAPT'd!

TS: I just finished editing the interview with Chris [Christopher B.] Schaufele, and he was talking about the division in the Math department over *Earth Algebra*. Was that a hot issue when you arrived?

MB: When I arrived it was a very hot issue. It was very hot in a lot of ways. Arriving in the middle of that and being very junior and untenured and a lot of people involved being very senior was a kind of confusing time. A lot of stuff was very new to me. The thing about *Earth Algebra* is that it's so non-traditional that all of us who came through traditional Ph.D. programs are like, "What's that and what's the need for it?" We hadn't been around long enough to teach these students to realize that they need a non-traditional approach, so I was interested, and I got involved early on in the *Earth Algebra* stuff. I represented the project at a conference my first or second year. So that's a course for non-math and non-science majors. I moved more into courses for the science majors, and just never really had a lot to do with *Earth Algebra* after that. But it certainly led to some tensions in the department. I think part of that was just the personalities involved, and not really Chris actually, but some other people who just dealt with things in a not very public, constructive way, and sort of a secretive way. There was this sort of

conspiracy theory, and then I was like, "There's no need for any of this," but I was too junior at that point to have done anything about it. By the time I was tenured and promoted to associate professor by then a couple of people had retired and the personality part of it just seemed to be easier. There were still a lot of professional discussions and disagreements and heat, and yet I am, and have been, on a variety of things ever since then in the department, but it's all been very respectful, and we have these professional disagreements.

DY: As opposed to personalizing it.

MB: Yes. And both sides have validity, and I think that's the thing that I've liked about the Math department most is that for most of my time here there's been this sense of, "You reach students differently and maybe a different group of students from the ones I reach, but that's all okay." There isn't this underlying sense of, "I'm better than you, and you're not doing your job," and stuff like that. I think that that's just not constructive, so I've been much happier.

TS: What's your assessment of *Earth Algebra* as a technique for teaching non-math majors?

MB: Well, *Earth Algebra* isn't a technique, it's a book, and the idea behind it was multi-fold. There was the idea of applications, which I think is a great idea. I'm an applied mathematician. The idea of using them to get students who might not be interested directly in the math hooked in is a great one. There are a lot of students who are not good at what we call symbolic manipulation, that is just give them an equation and do the addition, subtraction, multiplication and division that will solve it for "X." That is still a frustrating part of what we do in math. What I do dealing with the first year of math—because some students—some people act in the Math department as if they've never had this stuff. Well, they've been having it since they were in sixth grade. And now, Cobb County brings algebra down to seventh grade, and they're so proud of that, but for six years they've been taught this stuff, and for six years they haven't learned it. Something else is going on, and that's what *Earth Algebra* tried to reach is those students who are just not learning it from the symbols. Get them hooked in in an application kind of way, and they get interested enough and they understand it in a different side of their brain—that's wonderful. That's really good at what they do. So I think that is a really very important way of approaching things as well. I think some of the complication has come with turning it back around, and those students then aren't great at symbolic manipulation. Well, they never were, and it's not because they haven't had it, it's because it wasn't working for them, so maybe we have to accept that we understand things differently and that's okay.

TS: I think that's probably a process that all of our general education disciplines ought to go through because they certainly have plenty of history classes along the line, yet we treat them in the survey classes as though they've never had a history course because they really don't seem to know very much. I think what you're saying is maybe it's because of the way that we've taught it that they don't know very much, and if we continue to teach it the same way it's always been taught, they're still not going to know it.

MB: They're going to continue to succeed just about as much as they always have, which is not very much.

DY: That's obviously true with composition.

TS: One of the critiques I've heard is that there wasn't enough math in the *Earth Algebra* math.

MB: But I think that's consistent with what I just said. People who want the students to come out of that class with the symbolic manipulations skills that they didn't enter with, might be disappointed because they're not, and the class doesn't emphasize symbolic manipulation skills. And yet the point is that it doesn't emphasize symbolic manipulation skills because the students aren't getting that. So if what we're trying to get out of that class is symbolic manipulation skills, it's not going to work. If what we're trying to get out of that class is more quantitative literacy from these students, so that they can read a graph in the *USA Today*, we are succeeding at that. That class does succeed at that.

TS: Is anybody still teaching *Earth Algebra* in the Math department?

MB: Yes, although we are looking at making changes in that class. To some extent—sorry Chris—it's getting a bit outdated. During the Reagan years, showing how big the deficit is, we're going to have to say well, okay, the curve just went down and it went up again. It's not the same as it used to be. And also, Chris and Nancy [E. Zumoff] were quite novel at the time; it was quite a breakthrough at the time. A lot of people have done a lot of work in the same vein since then and improved the whole approach. So we have to look at the big picture to see if what we're doing is still consistent with national methods.

TS: Right. Chris has worked with the Navajo in recent years and has put a lot of stuff online where you don't need a book, I gather. But you really moved out of teaching the non-majors toward introductory classes for the majors.

MB: Correct.

TS: Why don't you just talk about that? I gather you find that even the majors maybe need some nurturing.

MB: Absolutely. They need nurturing in a lot of ways. In a typical first-year pre-calculus or calculus class very few of those are actually math majors.

TS: They're science majors that have to have the math?

MB: They're science majors that have to have the math, and so then they reflect the general number of science majors we have, which means vast numbers of them are biology majors. More and more of them are chemistry majors as that program grows. A lot of them are computer science majors. There's a lot of attrition in the computer science

program. So maybe they started in computer science, but then changed to something else. Not that many of them are math majors, especially because the math major is the opposite of chemistry and computer science majors in that a lot of people come in and do not declare a math major. People come in and say, "I want to be chemistry," or "I want to be computer science," and then they can change their minds later. In the Math department what we find is very few freshmen come in and say, "I know I'm a math major." But they take a couple of math classes, and they decide they really like it, and then they become majors their sophomore or junior year. So the classes that I'm looking at are mostly biology and chemistry and a few CS majors and a very few math majors.

TS: So it's still a service program.

MB: To some extent, yes, in the sense that these students may have a decent math background, but math isn't what they love. So my challenge to them is get them interested enough to understand it because I don't believe you can just memorize your way through math the way it seemed like you could through organic chemistry [laughter]. Although Marina [C. Koether (CETL Faculty Fellow for Advancing Undergraduate Research and Associate Professor of Chemistry)] would say, "No, no!" But there is a barrier toward getting a real appreciation of the beauty and the harmony of what's going on in mathematics that maybe the people who start out knowing that they are math majors can appreciate, but the others don't. That I see as my job is getting them excited and interested in seeing the real attractive side of the mathematics. In the non-majors class we deal with, "I am afraid of math, I don't want to go anywhere near it," to "Okay, I know I have to take this class, just tell me what I need to do." I have to get past that to, "Boy, this is really interesting! It's hard, but it's really rewarding when I get the right answer." And there are certainly still quite a number, especially of the non-traditional students, who are intimidated by the math, and so I see them as kind of my special project to keep them nurtured and interested.

DY: Are they primarily women?

MB: They are, although I have a couple of very shy men, but, yes, primarily women. It was interesting because I got involved in the learning community and I had no non-traditional aged women.

DY: It is a different world isn't it?

MB: I really miss them because they really add to the dynamic of the class. There is definitely this sense of, "Look, I'm taking this seriously, so y'all better be quiet and listen to her" [laughter]! I lead my classes in kind of a discussion way, so I need to hear from different constituencies and when that non-traditional constituency was missing I really felt like there was a voice that wasn't at the table. So I kind of opted out of learning communities for a while because I want to keep those non-traditional students.

TS: The learning communities are those that are living in the residence halls?

MB: Right. So they are first time, first-year students that are all together and living in the residences, and so most of them are eighteen. I like having a more diverse mix of students.

TS: Sure. How do the math education majors fit into that? Do they take the same courses that the science majors take?

MB: The secondary ed. math majors do take calculus, and I find at this level they're right in there as much as the math majors are. I tend to talk to them a little bit about some more transcendental links. For the math majors, if they come talk to me, I will be real focused on, "This is the technique we're using." In the math ed. I will say, "This is the associative property, do you remember that? We're going to learn that." You see that at various levels of the mathematics, but the math ed. majors are definitely right in there. They'll get a little more interested in some of the non-lecture techniques that I use. I had a math ed. major say to me one time, "Now, I'm going to be a teacher, and I know that group work is a very effective way of learning, but I hate it! I always end up doing all the work, and everybody else gets the credit, and so I'll do it for you, but I don't like it. I just want you to know that. I know I'll have to do it when I'm a teacher too!" So it's a little bit more open to some non-traditional techniques, but certainly they're right in there like the math majors are.

TS: Do you use much technology in your classroom?

MB: I've gone round and round with some different kinds of technology. At the moment the only thing I really use very consistently is we have a projector and a computer program that emulates a calculator. So we use the TI-83/84 calculators in our classes, and I have one that I can just bring up on the computer. It used to be that we would have to use an overhead projection screen that would show what's on the screen of my computer. Now this is a computer projection, the whole computer, and I use the mouse to push the buttons on it, so they can see what buttons I'm pushing, and that's essential. I get something on the screen and they're like, "How did you get that?" So by being able to see the whole screen that's helpful. So that's the only technology I use at the moment. Although I have a visually impaired student in my class, and I use this mimio that captures my writing on the board for him to be able to reverse. He can see white on black, so he just reverses it on his computer, so that's been kind of cool. I'm going to see if I can do anything more with that to make it available to the other students in the class.

DY: It seems like you have a diversity of means to reach students, which is so positive.

MB: It's essential, and it drives me crazy, like I said, when people say, "Oh, well, students will all learn better if we switch to phonics." No, no! Everybody is different, and if you find a way that reaches half the students, then half the students you're not reaching, so I do try to do a variety of ways. I'll say something in class, and somebody will say, "Wait, will you say that again?" And I'll say it again, and if they still give me that look I'll say, "I know you don't get it, so somebody who does get it, you explain it in a way . . . let's keep trying." I think that's one of the reasons that I've been successful as a teacher is that I

don't give up on anybody. I don't go on, and it sometimes really holds the class back to some extent, but if I see two or three faces out there that are giving me that, "Huh?" or, "Do you get this?" and the answer is, "Sure." That's never—"Wait, back it up, let's try it again" because it's never about just covering material. What's the point of that? If you don't understand it, I've wasted the time that I did spend on it.

DY: So in fact, you've just stated your teaching philosophy.

MB: Absolutely.

DY: If half of them get it, half haven't.

MB: Half haven't.

TS: In some classes, if they don't get it, well, maybe they'll understand the next thing you're talking about it, but in math if they don't have this, they're lost the rest of the day.

DY: They're lost.

MB: They're lost. And most of these students are not going to go away and read it in the book because if they didn't understand it when I explained it, there's no way they're going to read it in the text and understand that because the most approachable textbooks are still very difficult to read, especially for our students today. Ten years ago students thought when you read a textbook it should read like a novel. You can read one sentence and go right on to the next sentence and you don't have to stop and say, "Wait, I need to write something down; I need to look to see if it's consistent with the previous sentence." Well, even more so now, when students don't even have the attention span to read a novel . . . so it has to have that interactive side of things in order for them to get it. And the other thing is I don't feel bad about that first half that got it because if I'm calling on them to explain it to somebody else, they always learn it much better.

DY: Of course they do.

TS: Absolutely.

MB: To me, it's about understanding the big concepts. It's not understanding the little details. The learner-centered teaching approach would call this using content instead of just covering content. I don't have a problem with I'm covering 20 percent less content than somebody else because they're going to understand the content that I did cover way better than somebody who got really focused on some tiny detail that 90 percent of the class never got. I'd much rather focus on some bigger picture—how does this all connect together—and then I feel like the students have walked away with something that they can keep!

TS: Right.

MB: I'm getting all . . . [laughter]

DY: Passionate, it's wonderful!

TS: I think I know exactly what you're talking about. I haven't taken a math class since 1961, but I took two calculus classes in college and made "A's" in both of them and at the end of the second one I realized I had memorized all this stuff, but I don't really know it. I might have made an "A," but I don't really know it, and I don't know where I could go from here.

MB: Yes. I joke in class saying things like, "Okay, somebody came up to you at the bus stop and said, 'What's the derivative of the sine function?'" And they all laugh because nobody's going to do that. But on the other hand, I do talk about some of the *Earth Algebra* ideas about the temperature over the course of the year follows a sine curve. We can use this kind of stuff in thinking about, "All that complicated stuff that we made you memorize—we can use that in these really interesting ways that you never really would have guessed." If I've made that leap for my students, or helped them make that leap, then I've done them a service as opposed to saying, "Well, I've memorized it for the final exam, and now I can just forget everything."

TS: Right. How would you define a master teacher?

MB: A master teacher! To me a master teacher is somebody who is very accomplished and can impart that to others. I really struggle with that because I'm finding it very difficult to take what has worked for me and help other people make it work for them. I really like the Parker [J.] Palmer approach of you can't just pick up a book of ten tips on teaching and be a good teacher. You really have to find your own way, and I believe that. But, on the other hand, I've come to this—it's more than a conclusion, it's a discovery—and it is that very fundamentally underlying what I do is that, as you said, I care about the students, I care about whether they learn. I don't want to leave anybody behind. When I used to read my teaching evaluations and out of thirty students one or two were bad, I felt terrible, and I said to myself, "What can I do to make this different?" Every time somebody dropped my class, I thought, "Why did that student drop my class? I remember him. He came to class a couple of times. What was going on?" So I started gradually over time just taking that attitude and putting it into, "You haven't been to class last week and you came this week; are Tuesdays a problem? Do we need to work on this?" before it developed into dropping my class. I just somehow turned that, "I care," into doing something about it; not even saying this is what I did, this is what my policy is, but somehow it happened. So now pre-calculus in my department has an average of 50 percent non-success rate, "D", "F" and "W". Mine is less than 10 percent, 5 percent. I can't seem to say to other people, "Here's how it happened." I take attendance every day, and yes I do. Now everybody says, "Oh, take attendance, that's such a good idea." And yet underlying that is this attitude of, "I take attendance, and I care whether you're here, and I know how to pronounce your name, and I know you go by your middle name and not your first name." So there are all those things that go with it; it's not just a teaching tip. So back to your question—I feel like a master teacher is somebody who can

impart that on somebody else; and since I have come to the conclusion that it's the attitude, I'm finding it very hard to impart it on other people.

DY: Well, they may have to discover themselves just as you did.

MB: But that's too slow. How can we make a difference that way? That's why I'm a CETL faculty fellow because I've got to do it better than just casual conversations in the hall. And I can't change everybody's attitude, but at least I can take these people who are saying, "I care about how my students do," and putting it more into practice. If you really care, find out who you're students are.

DY: Apply it.

MB: Yes.

DY: It's that applied means.

MB: Yes! Because I feel like all this faculty on one side is saying, "Our students aren't learning, and I really care about whether they learn. Why aren't they learning?" And our students are all saying, "They don't care about us, we'll just not bother to do anything." I'm like, "Okay, just talk to each other!"

TS: Yes. You mentioned that you're a CETL fellow; we might talk about that a little bit. You're a faculty fellow for learning-centered teaching.

MB: *Learner-centered!* There are a lot of different approaches people use to this. Some people call it learning-centered, some people call it student-centered, but I believe my title and the way I'm going to approach it is learner-centered.

TS: Well, that's my mistake. I wrote it down wrong. I was thinking learning because I've heard Dan [Daniel S.] Papp talk about Kennesaw being a learning center—does he say learner-center or learning-center?

DY: He uses the gerund learning.[1]

TS: I guess that's what I was thinking.

MB: The idea is that, yes, we want to be focused on what our students learn, the learning that's going on rather than the teaching that's going on. I started my class last semester, and I spend a lot of time on the first day going through my syllabus. My class is long; it's an hour and forty minutes. So I spend about forty minutes going through the policy of the class and taking attendance and asking everybody what they want to be called and all of

[1] In his inaugural address (10/24/06) President Papp articulated a vision of Kennesaw being "among the best learning-centered state universities in the nation." http://www.kennesaw.edu/inauguration/address.shtml

this stuff, so finally I say, "Okay, we're going to get started here, and we're going to do some math." This kid said, "Oh, we're not going to learn anything today, are we?" I said, "I don't know if you're going to learn anything, but I'm going to try to teach you something" [laughter]! Because even the students don't really think about the difference, so we do want to focus on what's being learned rather than what's being taught. But, on the other hand, I like *learner*-centered teaching better.

DY: Because it focuses on the person.

MB: Yes. I think we have to focus on the person or else we're never going to get to any process. It's what I was just saying, if I don't care about the individual and whether or not he's present and engaged in the class, then it doesn't matter if I care about the learning; it's not going to happen.

DY: Do you feel like your philosophy of belief, attitude and commitment is reflected in the institutional philosophy now at Kennesaw?

MB: Well, the way you describe it makes it sound like there's some one consistent message that's coming out from some speaker over at Kennesaw Hall, and I don't think there is.

DY: Well, the statement that Dan Papp made as he stated the vision and mission statement is learning-centered and let's play from that if you will.

MB: I think that the new president is very interested in the same kinds of things that I'm talking about, and I'm very encouraged by that. I think the fact that there is a CETL faculty fellowship in learner-centered teaching, and there was before I applied for it, is very encouraging. I think that's a very exciting development. It's quite a diverse campus, and we've changed so much over the past thirty years, and we have a wide variety of faculty and attitudes here who perceive the reward system, accurately or inaccurately, as valuing teaching to varied extents. Some people really think that this is all just talk, but when it comes down to it you've got to get grants and publish papers in order to be tenured and promoted around here. The message has not been very consistent about that in terms of the reward structure for faculty. That is something that worries me. So that's what I mean when I say there's not been one consistent message that comes out. There have been some very encouraging parts of it, and there have been some parts that have not been consistent and that worry certain faculty about that. So I think we have some work to do, but I think it's going in a positive direction. It's certainly much more supportive than a lot of places here, but I'm the kind of person that I'm never going to be satisfied with being above average. I want us to be the premier learner-centered institution for our audience. That's what I want, and I'm not going to be satisfied until we get there, at which point I'll take some other goal on!

TS: So what's different about learner-centered teaching and just teaching as people have done it for years?

MB: Well, I think the idea is that the more traditional ways of teaching are, "I am standing up in front of you, and I will spout my knowledge, and you will try to catch it with buckets or something!" The learner-centered teaching approach is much more cooperative, and this idea is that the learner has to be receptive to—it's not even just the information because part of it is that I don't want to be just transmitting information. I want to be imparting on my students an appreciation for math. If they walk out and say, "I don't know any of the derivatives, but I know they're really cool and I know where to look them up if I need to," [then] I feel I've done my job. So it's an appreciation for it, it's an excitement about learning, and so that takes much more than just me saying the words. That has to be a conditioning, a back and forth approach, and to some extent that means students taking some responsibility for it—for receiving the education and earning the whole education, the attitude, the knowledge, and all of the appreciation that goes with that, and the skills that go with that.

TS: So what are you trying to do through CETL to promote learner-centered teaching?

MB: Well, at the moment I've been doing some book clubs and workshops. It's still very much evolving what I really want to do in the big picture. But I certainly want to, right now, try to find some interested faculty, get a core group of faculty, maybe multiple core groups in different colleges that are committed to this kind of approach that will then themselves maybe do some workshops just to get people interested in thinking about this. As I said, going from standing in a room with a bunch of faculty together saying, "Gee, I really want my students to learn, I really care about them learning," but the students don't know that, and putting that into action—helping them put what they already want to do into action.

DY: Is your target group junior faculty primarily or are you going for anybody?

MB: Any warm body! Right, I think we have to have all kinds of different mentors. We do have to have some junior faculty because junior faculty are the ones who are looking at this and saying, "I don't think I'm going to be rewarded for that." Yet, the senior faculty are the ones who have the experience to say, "What she's talking about really makes a lot of sense." So I think we need all kinds of people in the room.

DY: Like we need our non-traditional students in the class [laughter].

MB: Exactly.

TS: What kind of upper level classes do you teach in math?

MB: I teach differential equations, which has a pre-requisite of Calculus II. I've also taught a special topics course in mathematical biology, specifically, so applying those kinds of methods to mathematical biology. That was a fun class. I set it up so that biology majors and math majors could take it. But I learned a lot, and I would like to do it again to do it better.

DY: That's always true of special topics.

MB: Yes, except you don't get a chance—"Next semester I'll do it differently," the way it is with your lower levels.

TS: Do you think it will ever become a course in the curriculum?

MB: Well, we just hired a junior faculty member who wants nothing more, really is all excited and energetic about putting together some more formal mathematical biology stuff. So I'm trying to not be a cold blanket on that [laughter]! Sure you can teach the special topics course next time and sure and I'll tell you all the things that I wouldn't do again. We're going to write an NSF grant together to try to get some more resources.

TS: Oh, great. Who is that?

MB: Andrew Whittle. He's actually my academic nephew. His Ph.D. supervisor was also one of Jim Murray's students, so she's my academic sister, so he's my academic nephew! He's really embarrassed by this because I say it to everyone. But he's also very young looking. I walked into somebody's office to introduce him on this NSF grant effort and this guy was on the phone, and he said, "I've got to go. Meghan Burke is here with a student" [laughter]. About two months after he got here he said he was parking way away, and I said, "You know, you can park in that little lot. If you come here early you can park in the little lot right next to the Science building." And so the next time I saw him he said, "Yes, I parked in that lot. That's where the dean parks, and we got out of our cars at the same time, and he said, 'Students aren't allowed to park here'" [laughter]!

DY: That's real invitational [laughter].

TS: Faculty are looking younger and younger all the time. Not just the students. Well it sounds like you're doing some exciting scholarship, too. Do you want to talk about that and how you find time for it?

MB: I don't, I really don't and I haven't done a lot of scholarship in my discipline-based research area of mathematical biology. I've done a little bit of undergraduate research, but since the last two or three years I've been focusing on these first two years in the placement test, I haven't been doing that much scholarship. Although, I think the placement test itself is going to start leading to some publications. The approach that we've been using is unique. But my disciplined-based scholarship has kind of gone by the wayside, although I do keep up with my research colleagues. I'm on the board of the Society for Mathematical Biology [Boulder, Colorado] as an educator. I'm representing the education subcommittee of the board. So I'm seen on that side of things rather than somebody who's publishing a lot in mathematical biology itself. But because I've taught the course and I've developed some undergraduate materials in mathematical biology I'm seen on the education side of it. That's fine, that's been great. But, no, I don't have a lot of time. As I said when we started, I have three kids, and two of them have autism, and they demand an enormous amount of time from me. I've come to the conclusion that I

just have to emphasize different things at different times in my life. Right now it's going to be learner-centered teaching, and I'm going to support Andrew in what he does in the discipline. Two years down the road if we get this and he needs me on an undergraduate project, I'm there, but I can't do everything all the time. And that's okay.

TS: Right. I think maybe, let's see, you said the Society for Mathematical Biology is what you talked about, but you've been on the Mathematical Association of America Committee on Undergraduate Program [Washington, D.C.]—this is tongue twisting!

MB: Mathematics across the Disciplines, right.

TS: You are on a subcommittee of Mathematics across the Disciplines for the Mathematical Association of America. Can you talk about that a little bit?

MB: Yes. The Mathematical Association of America is—there are two major societies in mathematics.

TS: That's what Tina [H.] Straley is the director of.

MB: She's the executive director of the MAA, so actually the big meeting in January, what we call the Joint Mathematics Meeting—the "big math meeting"—when it comes to town, boy, it's so exciting! There are three major societies: the Society for Industrial and Applied Mathematics, SIAM [Philadelphia, Pennsylvania]; and there's the AMS, the American Mathematical Society [Providence, Rhode Island], which is very research-oriented; and then the MAA, which is very education-oriented, so it's for people who are focused on undergraduate math teaching. I got involved over there when I first arrived at Kennesaw State because the MAA has a program called [Project] NExT—New Experiences in Teaching. They take people in their first or second year of teaching, and we have a little cohort of new faculty that gets together at the two annual meetings a year and really do a lot of bonding and mentoring and networking. It's been a really great program. We're on an e-mail list. I still keep up with my cohort colleagues in that, so that kept me involved in the MAA. Then one of my mentors in mathematical biology in the last two years has signed me up for everything related to education of mathematical biology. One of them was he recommended me to be on the Mathematics across the Disciplines subcommittee. That's just a group of people who have different second interests. Mine is biology, but there are people there that have engineering, finance and all kind of other fields, and so we get together and say, "Okay, what's going on in those disciplines, and how are we bringing it together at meetings?" and, "Are we cross-fertilizing enough to see that kind of stuff," and organizing little workshops and things like that.

DY: Is that fun?

MB: At the moment it's just been kind of a subcommittee, but it is kind of interesting to see what other people do because I'm so focused in biology and if it's not biology it's chemistry or physics. But to me people who do finance or forestry or all this kind of

other stuff—"Now I am in the forestry department, but I do all this math"—that's very cool.

TS: Maybe we skipped too fast over what's innovative about what you're doing with advisement and placement with that test. You had mentioned that you're moving toward scholarship of teaching it sounds like. Maybe scholarship of mentoring would fit in here. What exactly is innovative about what you're doing?

MB: We had a very large non-success rate in our pre-calculus class. Part of the problem was we were approaching our non-majors with the *Earth Algebra* and the applied stuff in a very positive and non-traditional way, and our majors had only one choice when they entered. If they weren't in developmental studies they had to go into this pre-calculus class, which was this mad dash through everything you should have learned in high school from basic algebra all the way through trigonometry. It had this huge non-success rate because we were meeting the needs of very few people. There were some students who had learned it all well in high school and were like, "Why am I sitting through this?" It was problematic because about a third of our students were that, about a third of our students were totally unprepared for this and needed a much slower pace. And then a third of our students were appropriately placed in this class, had seen the material before, but needed a refresher. The first third of the students that I discussed that were sitting there bored were causing problems for this third that it was appropriate for them to be in because they would ask questions or make comments that made it seem like, "Oh, you should know this already." When, no, you shouldn't know this already, that's why you're in this class. It became a very difficult dynamic and it served only about a third of the people in there.

TS: And them not very well.

MB: Right. So we decided to split up that class and say, "You can still take that class if it's appropriate, but we're also going to have a two semester version, one semester of algebra and one semester of trigonometry that will take the same materials at a slower pace." But we needed a way to figure out which class students should really take coming in as freshmen. And we're getting so much bigger that it used to be you would just walk into the Math department and talk to somebody and they'd say, "Okay, so do you know this? Does this scare you? Okay, you need to be in that class." Well, there's no way we can do that any more. So two or three years ago the chair of the curriculum committee in my department said, "Okay, we're going to have these new classes. Do you want to do the placement test?" So I very naïvely, even though I'd been there for ten years, said, "Okay, but only if I have total control over it. I have certain ideas of how it should be, and I don't want any . . . ." Well, nothing's ever like that. You always have accountability and it wasn't even like I had accountability just in the Math department. The Math department actually did let me do . . . but we've got to deal with the registrar and how they do things in admission and everything and all of these computer systems. We needed it in Banner and this and that. And everybody's been wonderful. I don't even mean to complain about any of these constituencies, but I didn't even realize that all these different masters . . . but anyway, the important things to me were I wanted a test that

people could take online, anywhere, any time, and I wanted them to be able to take it multiple times. So we needed to approach it in a way that that was not going to cause a security problem in the sense that I needed to set up the motivational factors so that students wouldn't cheat. We're going to have it set up where they can print it out, they could take it to their sister, they could have somebody else take it for them, you know. I had to set it up so that there was no motivation for them to do that. What we did was we said that the placement was optional; it was a recommendation; it was not required. They were not going to have any barriers to enrolling in any of these classes, but that this test was going to make a recommendation with them. We tried to put some very strong language in there, very supportive stuff that said, "We really want you to succeed; we don't want you to take a class that's harder than you can handle because then you have to go back and take the next one anyway, and you're two semesters behind." So the hardest part about that has been the communication. I realize I can't just put it on a website and everybody will understand it. I have to talk to all the advisors in the CAPS Center [Counseling, Advising, and Program Services], and I have to talk to the orientation people, so there's a lot of communication that goes around about that. But that's still my central message that this is supposed to help you. We want you to be in the right class, it's only a recommendation, if you think it's wrong, we encourage you to come and talk to one of us, but this is why we're doing it.

TS: So you give the test and you get the results and they get the results, but they get to decide which course they want to take.

MB: Correct. And it has completely turned around the problem. The problems that I anticipated did not at all materialize. We had a different problem, and that is everybody was all worried they're going to want to take classes higher; they're going to have other people take a test so they do better, but that's not what happened.

TS: Taking them lower?

DY: The intimidation factor?

MB: So they place into Math 1113 and they register for Math 1111, so we've got to do a better job about communicating that, no, we really do trust these results and we really want you to be in the right class. If you take a lower class it might take you a semester longer to graduate, and you don't need to be there. But there is this intimidation factor. Students show up, and they want to take the lowest possible class.

DY: Because they don't want to fail.

MB: Yes.

TS: I was going to ask you before you even had the placement test, why people that didn't need it were taking the pre-calculus? Couldn't they just start out with a calculus course?

MB: Yes, but they didn't. For the most part they didn't. They would say, "I want the easy 'A,'" or they would say, "I don't know, I took the first class. I came into college, I took the first class." We didn't have it set up and it's still true that you can't enroll in Calculus I without getting a pre-requisite over-ride of 1113. A lot of students, they're new, they don't know how to navigate the system, they don't know how to shoot an e-mail to the assistant math chair, so they just take the class. It just seems in a lot of ways the better choice. So we need to do a better job about communicating to the students. I think part of the service of giving the placement test is those students who do place into Calculus I, they can skip pre-calculus, and they're empowered to make that decision. They're told, "You're not guessing this independently. We think that you're ready for it, and by the way, here's the link to get the override that you need instead of trying to register and you can't get in and you don't know why."

TS: Well, it's nice that there is a placement test. I just think back in the Dark Ages when I started, it was totally dependent on an advisor which course I took and, of course, a student doesn't even have to go to an advisor any more.

MB: Yes, I think the problem with the placement test, we've got some information on them, but at the same time it's not going to work unless we have the communication. The advantage of the advisor is that you at least have the one-on-one communication, but you may not have the information you need to know that person's skills. You need both. So we're still working on it, but there's some success there.

TS: Well, Dede asked earlier about intellectual climate when you got here; maybe as a wrap-up question we might ask, how do you perceive the intellectual climate on campus now?

MB: The intellectual climate on campus?

TS: Isn't that a horrible term?

DY: Well, we have our department and we have our college and then we have the institution. Depending on where you work and that sort of thing, you may pick up things that others don't, and so it's a really interesting individual perspective to find out from people.

TS: Some people have talked about students. Some have talked about their colleagues, research focus.

MB: Well, I've touched on some of this already. First of all, when I accepted the teaching award, I said something that was really true. I said that I have these three kids, two have autism, one was born with a medical problem, and the Math department is the most supportive Math department that I've ever heard of in the country.

DY: I remember your saying that.

MB: When I said to my assistant chair, "I need to be able to teach classes between ten and two for the foreseeable future. Not just this semester and I'll pay you back, but for the

foreseeable future because I've got kids that need to go to therapies on different days of the week and things switch around and I need to be there." I mean, it just happened. And this is not just me, but if anybody in the department has to miss, we just send an e-mail out, "Can you cover my class?" And it gets done. It just gets done. We have this running joke that women arrive as faculty in the fall and have babies in the spring. Our new faculty come and they have babies in the spring because it's such a supportive environment. You talk at other places and people say, "Oh, there's no way I'm going to have a baby before tenure." And it's just not like that with us because we are such a supportive group of all the personal side of life. I think that's essential. I'd go crazy if I didn't work at a place that valued that. Even if I didn't have all these demands on my personal time I'm a very strong believer in the balance of a person, and you can't just work 120 hours a week and be effective at what you do when what we do is interact with other people. So I work in a really wonderful department in that sense.

I think the wider campus, partly because it's so big and so diverse now and we've grown so much, that there's a wide variety of things going on. I'm very encouraged at the university level that learner-centered teaching is clearly valued by the administration. The new president has made it part of the mission that there is this faculty fellow in learner-center teaching, or that there's such a great CETL, anyway. I've learned, as I've looked at other institutions how lucky we are to have such a place as CETL that is supportive of teaching and learning and clearly is valued. When we get these sorts of resources, it means it's valued and that's great. We're really lucky about that. I do think that there are a lot of different things going on, and people have all kinds of different priorities. I think the thing that I worry about most is that the junior faculty feel that maybe this isn't going to hold up and teaching isn't going to continue to be valued. So just like I'm not satisfied if any of the students fall through the cracks, I'm not satisfied if any of the faculty are falling through the cracks and are not getting the support that they need to develop their teaching. So that's where my work is laid out. But, overall, I think as an institution, I'm really happy with the way we have emphasized great teaching.

TS: I think you've answered another concluding question of why you stayed here.

MB: Why I've stayed here is a very good question, actually, because we have a two-body problem—my husband and I trying to keep jobs in the same city, so once we did find them we're pretty well settled here. But at the same time one of the reasons that I haven't left is because I just don't think any other place could support me as much as Kennesaw State has in terms of my personal needs and supporting what I want to do. If I went somewhere else, they might want out of me something that I could do, but I don't feel passionate about. Right now, the only time I get really excited about research is when I'm working on it with undergraduates, and I can see them get excited about it. Maybe I will move into that, but at the same time, no place values what I do in teaching as much as I've seen Kennesaw State value it and reward me in the ways that they have. That's why I'm here.

TS: Are you doing some research projects with students?

MB: Not at the moment, but I have worked with students. Actually I haven't talked about what I've worked on since I've been here—the mathematical biology stuff that I've been working on is epidemiology and the spread of epidemics. Particularly, when I came out of my post doc at Emory I was working on malaria, so I did some modeling in malaria with some students, and then I moved into small pox and the interest associated with bio-terrorism and that sort of thing. So that's been exciting, and I'm probably going to move into avian flu next. That's exciting and topical. Students get interested in it easily. The math isn't unapproachable, so it's been fun doing that kind of stuff.

TS: And it ties applied mathematics and service and teaching; all blend together don't they?

MB: That's right. That's why I love being here. All those things are valued as opposed to, "Okay, I better put this all under one column because I better make all this work the one way it's valued." No, the whole diversity of it is valued here.

TS: Well, I'm about out of questions. Did you have any more?

DY: What you just said made me think about your saying you were the only person who was glad that Jimmy Carter was elected! What an interesting note to end on, the kind of work that he's done in terms of eradicating . . . .

MB: Yes, yes, yes, the whole public health part of it, and the diseases that are easily avoided with low cost medications. We're not even talking about AIDS here, which is huge. But there are some diseases out there that cause far too much suffering, and so I think getting a mathematical handle on those kinds of things is very important and saying, "Look at how much money goes into the "X" budget and look how little money it would take to eradicate some disease that's easily curable that's causing so much human suffering." So, yes, that is a good way to look at the whole big picture.

DY: Do people pay attention to numbers?

MB: They do. There is this sense that if it's got a number on it then it must be . . . .

DY: It's real.

MB: It's real. But part of the whole asymptotic analysis that I did for my Ph.D. thesis was all about talking about orders of magnitude and talking about the difference between a million and a billion. We hear those words in the news and they just float on by, and yet what we have to realize is that some things are expensive and some things are cheap. "Million" is cheap and "billion" is expensive. We have to get a handle on that when we're talking about these big picture things. Yet a lot of that just flies by us in society. One of the things I like to do is just talk about what all of that means and making that real to students.

TS: Just hearing you getting excited about teaching here during the interview, it's obvious why you're so popular in the classroom. I'm sure that enthusiasm carries over into all your classes.

MB: I can't help it! They look at me like I'm crazy some times, but I do have fun with it. It's such a fun job just to be able to do math all day. I love it!

DY: We do have good jobs, don't we?

MB: We do, it's great!

DY: It's wonderful.

MB: All I get to do is what I love all day long. Except for the meetings part!

TS: Right. Well, we won't talk about that!

MB: Okay.

DY: Well, keep doing what you're doing because it's wonderful. Thank you.

MB: Thanks!

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