

# Barbara Olds

## An unexpected path into engineering education

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### Entering engineering education

Becoming an engineering education researcher was certainly not something planned. I had almost completed my Ph.D. at the University of Denver, and a friend of mine pointed out that there was an opening for a technical writing teacher at the Colorado School of Mines. I called them up and they were desperate, and basically I started out as an adjunct. I had little kids at the time, so I didn't want to be full time. I enjoyed working there and enjoyed working with engineering students. When a full-time position was advertised a couple of years later, I applied and was selected and basically spent the rest of my career there at Mines, where I found out that I enjoyed engineering education very much.

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There was very much of a community feel at Mines, and there were some people there that were doing what I think at the time was some cutting-edge engineering education work. I'm not sure what qualifies as rigorous research today, but it was very much at the forefront then. People like Mike Pavelich and Dendy Sloan were looking at things like the Perry Model for intellectual development, trying some innovative curriculum development. For example, I think Mines was one of the first places that had a freshman/sophomore engineering course series. I think that is pretty routine these days, but back then, it was quite revolutionary. So I had some good colleagues to introduce me to the field, get me involved, and invite me to be a part of the group. Other people also came along, like Ron Miller, who became a collaborator for many, many years. In some ways my background and theirs were complementary, and we managed to get some things done and get some funding along the way to start some programs that ended up being quite successful. So it was mostly the people, the time, and the size of the institution that got me interested.

### The importance of context

The administration at Colorado School of Mines at the time was very focused on education. At that point, there wasn't so much pressure to do research and get funding; it was more about how you teach students in the best way possible. We didn't necessarily know a whole lot about the theoretical aspects of that, but we

had a lot of intuition about what worked well, and over the years, we were able to learn more about the theory and participate and contribute to the knowledge base in engineering education. Then that small community at Mines became part of a larger community of people who were interested, through the American Society for Engineering Education (ASEE) particularly, then later through other organizations like the American Educational Research Association (AERA).

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Mines was very focused on the undergraduate mission at that time. There was some pressure to publish but not the kind of pressure that young faculty experience today—to get your ten articles or your hundred million dollars worth of grants, before you can go up for tenure. We did publish, we did do some research, but people like Mike Pavelich and Ron Miller did get some push-back about not doing “real” research—they were looking at education projects. But overall, I think what we did was seen as valuable and contributing to the mission of the institution, so in some ways, it was an easier time to do this kind of work. I think if someone were to come in now at the same level that I did when I started, it would be very difficult for them. It's just a different world, and there's good and bad to that.

**I'm sure there are still people who would say it was not real research.**

There were people in the administration who felt that this kind of work was not particularly valuable. That said, I was tenured and so was Ron, and it was largely based on the kind of education research and publication we were doing, as well as the grants that we got in that area. I became a full professor, and so overall, what we were doing was recognized as valuable. But I'm sure there are still people who would say it was not real research.

### Cultural challenges

I think I've had a pretty lucky career. I don't feel like there have been an inordinate number of challenges that I've had to face. Some people didn't feel that my work was valid, because I couldn't speak as an engineer, but I don't feel as though I was particularly badly treated at any point. I was always the first to admit that there are a lot of things I don't know about



engineering, but I think over 20 plus years, I have gained a pretty good sense of engineering students, the kinds of things that they worry about, and the kinds of things that are a systematic part of engineering education that are challenges for them. My challenges were perhaps more ones that I set for myself, in terms of trying to understand certain methods and learn things as someone whose training was not in education research or in engineering. Having to learn on my own, with a lot of help from friends, was a challenge, but one I enjoyed, and I'm obviously still learning. Who would have predicted that I would end up at a place like the National Science Foundation? I feel like I've had a good run, with all these things.

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For the first few years, the challenge was more cultural than technical. I came out of a liberal arts background, both as an undergraduate and particularly as a graduate student. Then, I arrived at a school that was very much engineering focused, very male, and very traditional and conservative, which was a bit of a culture shock. I think that the field has changed since. It's less male, although still heavily that way, and less conservative, in the sense of being more accepting of other world views or ways of life. That culture also shifted over the 20 years that I was at Mines. Mines went from about 10% women to close to 30%, over the time I was there.

### Contributions to the community

My contributions have included jumping into some areas that hadn't been studied before, like intellectual development and concept inventories, which were not a dime a dozen at the time. But I think that people-to-people interactions are probably part of whatever legacy I have that I'm proudest of. There are just a lot of people that I've been able to connect with, work with, learn from, and I hope teach a little bit along the way.

**“People-to-people interactions are what I'm proudest of.**

One of the things that I always admired about this community is that it is collaborative, so I think I was able to be a mentor to a lot of people who have come along in the field and have ended up doing wonderful things that I'm very happy to know about. Maybe I helped make this community take off—for example, bringing people together and encouraging folks to work on the *Journal of Engineering Education (JEE)* and make that a success. I've been involved in a fair amount of international work, and I'm very interested in learning what's going on in other cultures. I think that many places are at the point where we were in the U.S. 20 years ago, in terms of thinking about some of these questions, but we are also connected in ways we weren't before, so I'm assuming that the learning curve is going to be a lot steeper and quicker. I think that's great, and I'd just love to see all that happen.

### Working across borders and finding your cohort

One of the ways I've often described myself is as a border crosser. I'm not necessarily one of those people who pick something and focus on that their whole career, learning everything there is to know about it. I admire people like that, but my approach, for better or for worse, has been to get excited about a lot of things and work across borders, both literally and figuratively. I suppose that's what appealed to me about not only working in engineering education but also working at NSF, where you're looking at all kinds of fields of STEM and all age groups, in and out of school. I just find that endlessly fascinating.

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It's probably good to understand your own proclivities—that is, are you somebody who wants to contribute by focusing on a narrow but important area? In a way, it's an entrepreneurial kind of thing, in that you take advantage of what comes before you, and you explore ideas that may not be fully developed. Some of them lead to dead ends, but some of them lead to really interesting vistas. Engineers are often able to do that kind of thing, and I think it's a real skill to be able to work with people in different academic cultures. That's not a simple thing to do, if you've ever been on a committee that crosses disciplinary lines. Sometimes it takes a long time to develop trust and to understand each others' language—not just the technical language but the way of looking at the world is different, I think.

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One thing I hope new scholars have is a cohort of people who are thinking about the same kinds of things. I was lucky enough to come into this community of people at Mines that just happened to be doing this kind of work, even though I don't think they were necessarily hired to do it. We formed a community. We supported one another. What I find happens sometimes is that you have people who are the only physics educator at their institution or the only person who is interested in engineering education, and in that case, I think it gets pretty lonely, unless you work hard to develop social networks and connect with people in other places. But it's hard not to have somebody you can have a cup of coffee with and kick around ideas about how you might approach something to do with a design research project in your thermodynamics class or something.

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*This material was excerpted from a profile authored by Cheryl Allendoerfer, University of Washington, based on a 2014 interview with Dr. Olds by Bram Lewis, Virginia Tech.*