

*Oklahoma Innovations* Radio Show

Air Date: November 8, 2009

Guests: **Donna Nelson**, Department of Chemistry & Biochemistry, University of Oklahoma

[ Music ]

From the OCAST Radio Network, this is *Oklahoma Innovations*, a weekly science and technology radio magazine brought to you as a service of OCAST, the Oklahoma Center for the Advancement of Science and Technology. OCAST is the state's only agency whose sole focus is technology, its development, transfer, and commercialization. OCAST mission is to identify and fund promising research in technologies that allow Oklahoma to compete in a global market economy from our own backyard. This program features some of the state's most gifted and talented scientists, inventors, entrepreneurs, manufacturers, and business leaders who all have one common goal, developing technology-based economic growth for all Oklahomans. Now here are your hosts, Gary Owen and Steve Paris.

>> **Gary Owen:** Welcome to another edition of Oklahoma's science radio magazine, *Oklahoma Innovations*. I'm Gary Owen and this is.

>> **Steve Paris:** Steve Paris.

>> **Gary Owen:** That's right.

>> **Steve Paris:** Hi, Gary.

>> **Gary Owen:** We're the crew that brings you fun stuff every weekend.

>> **Steve Paris:** Yeah.

>> **Gary Owen:** You never know who's going to be on our show.

>> **Steve Paris:** You never do, and you know, if, if you don't have fun listening to this show and listening to our excellent guests, then I don't know what else we can do.

>> **Gary Owen:** Well.

>> **Steve Paris:** Because we've had some of the best in the state on this show.

>> **Gary Owen:** We have a great guest this week. Dr. Donna Nelson is a science advisor for the AMC show, *Breaking Bad*. Now, that's not all that she does.

>> **Steve Paris:** That's just a small part of what she does.

>> **Gary Owen:** That's just a small part about that, and if you're not familiar with that show, *Breaking Bad*; this is about Dr. Nelson's consulting, about a New Mexico chemistry teacher who is diagnosed with terminal lung cancer, and decides to start making meth to get more money for his family after he is gone. We'll find out more about that a little later.

>> **Steve Paris:** It's a very strange story line.

>> **Gary Owen:** Very strange, but we'll talk about it later.

>> **Steve Paris:** But, I've seen it. It's a good show, and I'm sure a lot of other people have, too.

>> **Gary Owen:** What a fun job, though, huh?

>> **Steve Paris:** You bet, you bet. And, you know, Dr. Nelson is an organic chemist and she's got some perspective on some issues I think that; I think, I think you're going to find fascinating.

>> **Gary Owen:** It will be fun.

>> **Steve Paris:** So, make sure you stick around.

>> **Gary Owen:** Yes. So, tell us about the events at OCAST.

>> **Steve Paris:** Well, you know, Gary, we have a program we've had for a little over ten years now; it's called our OCAST Intern Partnership Program. And, what we do is we fund university students, college students who have been trained specifically in different areas of technology and science, and we put them together. Pardon me; it's allergy season.

>> **Gary Owen:** It is, it is; yes. Sorry about that, folks. Steve has.

>> **Steve Paris:** Yes.

>> **Gary Owen:** This problem every once in awhile.

>> **Steve Paris:** I do.

>> **Gary Owen:** You should see a chemist.

>> **Steve Paris:** I need to see somebody.

>> **Gary Owen:** They can help you.

>> **Steve Paris:** Anyway.

>> **Gary Owen:** I'm kidding.

>> **Steve Paris:** So what the internship program is about is we fund half of their salary. We put them together with a private sector firm; they fund the other half. We make sure that there's a faculty monitor, a, a monitor, a person on the faculty at one of the universities who works with this student and makes sure that they're being used the way they're supposed to be used at the, at the business. And, our goal is to have these students have some level of success, become familiar with some of the Oklahoma companies and hopefully stay right here in Oklahoma.

>> **Gary Owen:** That's the ultimate goal right there.

>> **Steve Paris:** And, we've even had some of them become CEO's of the companies that they've worked for.

>> **Gary Owen:** Uh-huh, entrepreneurs, you bet.

>> **Steve Paris:** You bet. So it's, it's a wonderful program and I would invite anyone out there who has a company, who needs a tech based, college trained student to work in their company; look on our website, the OCAST website. Just type OCAST in your browser and look for it; you'll find it very easily. And, you can find that part about the intern partnership program and I think it'll; it might be something that can be very helpful.

>> **Gary Owen:** Well, not only that; if we've got some parents out there listening who have students interested in science, perhaps are going to one of the universities that are involved in this program, check it out.

>> **Steve Paris:** Yeah.

>> **Gary Owen:** Because there's some great opportunities there.

>> **Steve Paris:** There, there are and usually, the program for each student will last about two years.

>> **Gary Owen:** Wow.

>> **Steve Paris:** And as I said, we pay half and the employer pays half. And, we, we make sure those students aren't just taking out the trash and mopping the floors. That's not the kind of work we're talking about; we're talking about.

>> **Gary Owen:** No, they actually get right in there and.

>> **Steve Paris:** Yes.

>> **Gary Owen:** Do some of the work.

>> **Steve Paris:** We're talking about tech, technology challenges.

>> **Gary Owen:** And what a great way to have mentors working with you, side by side.

>> **Steve Paris:** Oh, yes.

>> **Gary Owen:** In those fields.

>> **Steve Paris:** You bet.

>> **Gary Owen:** Great opportunities.

>> **Steve Paris:** You know, a big, key, important part of that is our university faculty members who participate and help those students.

>> **Gary Owen:** Uh-huh.

>> **Steve Paris:** And make sure that the, that the employer and the student are getting the maximum benefit from the program.

>> **Gary Owen:** Now, we're kind of getting into the, the, towards the end of the year as we get into the fourth quarter. Anything that our taxpayers and listeners should know about as far as what's going on with OCAST?

>> **Steve Paris:** You know, just this past weekend, we conducted one of our programs where we bring peer reviewers in from around; not from Oklahoma, but from outside the state of Oklahoma.

>> **Gary Owen:** Yeah, this is an interesting.

>> **Steve Paris:** You bet. And, why do we do that? Well, we want to keep it pure. We don't want to have any undue political influence on the decisions that are made.

>> **Gary Owen:** Uh-huh.

>> **Steve Paris:** But this is the OARS Program; the Oklahoma Applied Research Support Program, and so we, actually, we know now who those people, who have won; the, the folks who have successfully competed for the OARS money. Can't announce it yet because we can't do that until our board approves it, and that's going to happen later on this month and then we'll be telling the world about who received the funding this year for this, this cycle for, for these OARS projects. And, we have had over the last 22 years, we have had; you know, I, we haven't broken

it down. Of course, overall, with all of our programs, we've had more than three billion dollars in 22 years now, mind you.

>> **Gary Owen:** Wow.

>> **Steve Paris:** Coming to Oklahoma for research. A very small part of that is OCAST money; the much bigger part is money from the federal agencies, private sector companies and different outside the state sources for funding that have come to Oklahoma. Had we not been competing for that, had our, our researchers in the state not been competing for that money, well, it would have gone somewhere else.

>> **Gary Owen:** Uh-huh.

>> **Steve Paris:** And, we might as well have it here in Oklahoma with some very bright people making good use of those research dollars.

>> **Gary Owen:** And, the bright side of this entire picture is that your tax dollars, a percentage of your tax dollars, have created jobs.

>> **Steve Paris:** Exactly.

>> **Gary Owen:** Have attracted talent to the state.

>> **Steve Paris:** Right, uh-huh.

>> **Gary Owen:** Have evolved great new business.

>> **Steve Paris:** Uh-huh.

>> **Gary Owen:** Opportunities for a lot of folks here in Oklahoma, so.

>> **Steve Paris:** Well, that's exactly right. And, some, some might say; well, we don't need to be doing that. Well, let me tell you, it.

>> **Gary Owen:** We need to diversify.

>> **Steve Paris:** Yes, that's right. They did it in Palo Alto. They did it in Austin. They've done it in the research triangle in North Carolina. They've done it in different locations all around the country, all around the world, really. And, the societies that have, that have invested in science and technology and in research, R&D, we call it; that's where the high paying, high quality jobs are, are, that's where they occur. And, it's not only just jobs, it's wealth that's created for investors, for people who are doing the research, and it's a very important part of all of our future. So, those of us, if, if we don't do that.

>> **Gary Owen:** Uh-huh.

>> **Steve Paris:** We're going to always be behind. And I'm discovering and you are too that Oklahoma doesn't want to be behind in anything.

>> **Gary Owen:** No, we don't, and just to; we mentioned this, I think, in one of our previous shows, but I always like to tout this because I think it's an important statistic. When we look at where OCAST started, and when we started this radio show 14 years ago, roughly what was our return?

>> **Steve Paris:** Oh, back then it was about, probably about seven dollars to one.

>> **Gary Owen:** And where are we today?

>> **Steve Paris:** We're at \$22; no, \$20 to one.

>> **Gary Owen:** That's a great.

>> **Steve Paris:** Little over \$20.

>> **Gary Owen:** Great growth, that's fabulous.

>> **Steve Paris:** Yeah.

>> **Gary Owen:** And now, ladies and gentlemen, it's time for our, that time of the program where we bring you some science news from around the globe. Scientists say; I can't believe this. Astronomers say they have seen the furthest back in time ever, measuring light from a star that exploded 13 billion years ago, and they're saying just after the dawn of the universe. How do they know that?

>> **Steve Paris:** I don't know.

>> **Gary Owen:** How do they know this? I don't, I don't get this.

>> **Steve Paris:** I understand carbon dating. I don't understand how they can figure out how, how far that light has traveled in that amount of time.

>> **Gary Owen:** Well, they say they traced a gamma-ray burst called GRB 090423, to see the light from the massive star that died 630 million years after the big bang that brought the universe into being, they reported in the journal Nature this past week. Two separate teams measured what they call the red shift of the object at about 8.2. Red shift is the distortion of light as it travels across space and time, and is often likened to the sound of a train, rising and falling as it approaches and passes the listener. This extreme red shift, the highest ever recorded, shows the burst occurred when the universe was less than five percent of its current age. Okay. Researchers studying antibiotics in pregnancy have found a surprising link between common drugs used to treat urinary infections and birth defects. Reassuringly, the most used antibiotics in early pregnancy, penicillins, appear to be the safest. Bacterial infections themselves can cause problems for the fetus if left unchecked, and experts say so pregnant women shouldn't avoid antibiotics entirely. Instead, women should discuss, obviously, antibiotic choices with their doctors. And, this is interesting. A new treatment for H1N1 flu may already be on pharmacy shelves; cholesterol lowering statin drugs like Lipitor and Zocor.

>> **Steve Paris:** Really?

>> **Gary Owen:** Yeah, a large study found that people who were taking these drugs, when they caught seasonal flu and had to be hospitalized, were twice as likely to survive than those who were not on such medicines. This doesn't prove that statins can cure flu, or that starting on them after catching the flu would help. A federal study is underway now to test that. Doctors are optimistic because previous studies also found the statins may improve survival from infectious diseases.

>> **Steve Paris:** Wow.

>> **Gary Owen:** Isn't that interesting stuff?

>> **Steve Paris:** It is.

>> **Gary Owen:** Yeah. And, I got a good one here, now. Those of you, when you're going to work Monday morning and you get frustrated by those bad drivers weaving in and out of the lane

in front of you; they can't help it, folks. Believe it or not, they've done some research on these people. They found that people with a particular gene variant performed more than 20 percent worse on a driving test than people with a different DNA sequence. The study may explain why there are so many bad drivers out there. About 30 percent of Americans have the variant, according to a team at the University of California, Irvine. And, the team tested 29 people; 22 without the gene variant and 7 who had it, asking them to drive 15 laps on a simulator and then repeat the test a week later. The gene controls a protein brain-derived neurotrophic factor, which affects memory. I don't know what that has to do with their driving, but okay, I'll buy it. Steve has our innovations in history.

>> **Steve Paris:** Thank you, Gary. On November 4th, 1846, an artificial leg was patented by B. F. Palmer, of Meredith, New Hampshire, who got a leg up on all the other competition, according to the U.S. Patent Office. This month marks the 156th anniversary of Gail Borden's patented for, or patent for evaporated milk. And, the electric shaver was patented November 6th, 1923. The first direct dial long distance telephone call was placed November 10th, 1951, as the mayor of Englewood, New Jersey called the mayor of Alameda, California without using an operator.

>> **Gary Owen:** Oooh.

>> **Steve Paris:** 29 years ago, November 12th, the Voyager I spacecraft made its closest approach to Saturn, sending back spectacular pictures of the rings. And, I've got one more quick announcement.

>> **Gary Owen:** Oh, you're fine; you've got plenty of time.

>> **Steve Paris:** Okay. This is from our friends, you know, with the Oklahoma Inventors Congress.

>> **Gary Owen:** Oh, yeah; I like those people.

>> **Steve Paris:** Okay. The Tulsa chapter of the Oklahoma Inventors Congress will hold their November monthly meeting on Tuesday, November 10th, that's this Tuesday, at the Village Inn at 5230 South Yale in Tulsa. Chapter chair inventor Leo Byford encourages members to bring their questions about the process of protecting and developing their ideas from concept to commercialization, so.

>> **Gary Owen:** Do you know what? Do you have their website information there? If you're, if you're an inventor or inventor want to be; maybe you've just got a widget idea and you'd like to find out more about this organization, great organization, why don't you give them the website?

>> **Steve Paris:** I have it. It's [www.oklahomainventors.com](http://www.oklahomainventors.com); [oklahomainventors.com](http://oklahomainventors.com).

>> **Gary Owen:** [oklahomainventors.com](http://oklahomainventors.com); boy, what a great organization . . .

>> **Steve Paris:** Yes, it is.

>> **Gary Owen:** . . . for the people in Oklahoma. We have a lot of great organizations in our state, like OCAST and others who help people with innovation. And, our guest coming up, we mentioned in the early part of the program, is an organic chemist, and she's one of very few women holding a job like that in her field. And again, she's also a science advisor for the AMC show, *Breaking Bad*. We'll find out more about all of that when we come back, on your Oklahoma Science Radio magazine, *Oklahoma Innovations*.

[ Music ]

>> The waving wheat can sure smell sweet when the wind comes right behind the rain. But, what happens when the rain doesn't come? Wheat growers across Oklahoma know too well the impact that a poor growing season can have on crops and markets. Drought, disease and poor soil are just a few of the things that keep farmers up at night. But, what if those issues were a thing of the past? In labs funded by the Oklahoma Center for the Advancement of Science and Technology, researchers are finding new ways for producing better plants that can withstand unfavorable conditions, creating opportunities and improving the economy. That's what OCAST is all about. OCAST is looking for small business owners, serious about investigating new products, services and processes. For more information, call OCAST toll-free at 866-265-2215, or visit their website at [ocast.ok.gov](http://ocast.ok.gov). In a state deeply rooted in agriculture, plant science helps Oklahoma farmers grow their business.

[ Music ]

>> **Gary Owen:** We are delighted to have with us in studio Dr. Donna Nelson, Associate Professor from the University of Oklahoma. She's an organic chemist and we're going to find out all about what she's doing in the lab here momentarily, but one of the things that captured our interest, with Steve and I, is that, and we talked about this shortly before the break, is that she is the science advisor for the AMC show, Breaking Bad. Now, the reason we like to do this, because this is, you know, it's a network and.

>> **Steve Paris:** Human interest story.

>> **Gary Owen:** It's a big show; yeah, it's a human interest story.

>> **Steve Paris:** But, let me point out; this is a very small part.

>> **Gary Owen:** It is very small.

>> **Steve Paris:** Of what Dr. Nelson does.

>> **Gary Owen:** But, it's kind of, it's kind of cool, though.

>> **Steve Paris:** It's fascinating though and, and she donates her time for this.

>> **Gary Owen:** That's right, that's right.

>> **Steve Paris:** So, I guess the next question is, Donna; how did you get involved with Breaking Bad?

>> **Donna Nelson:** Well, you're quite right; it is a small part of what I do. I'm actually a professor of chemistry at the University of Oklahoma, and I'm a member of the American Chemical Society. And, so in one of the issues of a magazine of the American Chemical Society, Chemical and Engineering News, I read this article about this new television show, Breaking Bad, about, as you mentioned earlier, a chemistry teacher who found that he needed to make money to benefit his family because he was expecting to die shortly, and so his creative way to support his family was to synthesize methamphetamines. And so, he was making a plea to chemists through this article in Chemical and Engineering News that he wanted to have accurate science in his show. This was going to be a hit show in prime time television and, and he was struggling because he had no degree in science and he wanted to do accurate science, accurate chemistry. And, he was making contacts with DEA agents and they could provide him some information about what a drug bust was like, but he didn't really have information about what it

would be like to teach organic chemistry to high school students. And so, in that article, he made a plea; if there was anybody that could help him out. He was going to places like the Web and Google, et cetera, Wikipedia, to try to learn chemistry, but he was struggling with it and he needed somebody to really.

>> **Gary Owen:** He needed a professional, yeah.

>> **Donna Nelson:** Help him out. Yeah, and check and just make certain that what they were saying and what they were writing on the board, et cetera.

>> **Gary Owen:** Just like the medical shows, the medical dramas on television; they've got medical advisors, the doctors.

>> **Steve Paris:** Of course they do.

>> **Donna Nelson:** Right.

>> **Gary Owen:** You know, to help the actors.

>> **Donna Nelson:** Right. And so, I volunteered. The way I looked at it is; well, I'm not so certain that I really like the content of this show.

>> **Steve Paris:** No.

>> **Gary Owen:** Yeah.

>> **Donna Nelson:** But, we, we've been needing a science show in prime time television for a long, long time.

>> **Gary Owen:** Yeah.

>> **Donna Nelson:** To help inspire kids to go into science.

>> **Steve Paris:** Excellent point.

>> **Donna Nelson:** And so, I realized though, that with or without a science advisor, they were going to have a hit.

>> **Gary Owen:** Yeah.

>> **Donna Nelson:** And so, I looked at it and I thought, it's better, since this is going to be a hit; it's better to have good science on television than inaccurate science.

>> **Gary Owen:** Sure.

>> **Donna Nelson:** So, I went ahead and volunteered and, and it's just; it's really been fun. They would ask me all sorts of things, like the appropriate phraseology to use.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** In some of their scripts. Sometimes they would e-mail me and say; we need to draw some molecules on the board. We're going to be teaching about structures of alkenes today, for example. And so, can you draw us some appropriate chemical structures to draw on the board. And, I would e-mail them back a, you know, some structures.

>> **Gary Owen:** Wow.

>> **Donna Nelson:** And then, when it would air, I would see those structures!

>> **Steve Paris:** You'd see it.

>> **Donna Nelson:** That I had drawn, up there on the board, behind him. Exactly. [ Laughter ] And another time, there was a, a very unusual message. They e-mailed me and said; can you tell us how much methylamine it would take, would be needed, to synthesize 40 pounds of methamphetamine.

>> **Gary Owen:** Oh, geez.

>> **Donna Nelson:** And, give us the, give us the answer in pounds.

>> **Gary Owen:** Oh, my gosh.

>> **Donna Nelson:** I'm serious, yeah. And so, you know, that, that sounds like an easy question, but it's not.

>> **Steve Paris:** Not to me.

>> **Donna Nelson:** Because methamphetamine comes in a solution, so I had to go away and figure out; you know, look it up and see how this methylamine was sold, et cetera, and figure out much how much you would need and, and then.

>> **Gary Owen:** So you actually had to do a little research on your own there.

>> **Donna Nelson:** I did, yeah, because methamphetamine is not one of the things that I normally make in lab.

>> **Gary Owen:** Right.

>> **Donna Nelson:** And so, you know, I had to go look up some things in the literature. And then, I noticed that when one of their shows aired, it showed them rolling out this drum.

>> **Gary Owen:** Oh, my.

>> **Donna Nelson:** Of methyl; I mean, they needed to know if they could lift it. How heavy was it?

>> **Gary Owen:** Wow.

>> **Donna Nelson:** Could they put it in the back of a car? You know, did they need a dolly, et cetera.

>> **Gary Owen:** Yeah.

>> **Donna Nelson:** And so, those are the ways in which, you know, I've helped them out.

>> **Steve Paris:** Well.

>> **Donna Nelson:** And, and the show is realistic now.

>> **Steve Paris:** That, and that's very important.

>> **Donna Nelson:** Yeah.

>> **Steve Paris:** I mean, whether you agree with the script or not.

>> **Donna Nelson:** Right.

>> **Steve Paris:** That's not the issue. The issue is, it's going to happen.

>> **Donna Nelson:** Right.

>> **Steve Paris:** And, and you can do your best to try to help them be factual.

>> **Donna Nelson:** Exactly, exactly.

>> **Steve Paris:** So people won't be confused.

>> **Donna Nelson:** Because there are going to be kids out there watching this and picking up this science.

>> **Steve Paris:** Right.

>> **Donna Nelson:** And you know, I've watched some of the shows and to me, it certainly does not make they're, what they're doing glamorous at all.

>> **Gary Owen:** No!

>> **Donna Nelson:** I mean, they, they get beat up and shot at and.

>> **Gary Owen:** Yeah.

>> **Donna Nelson:** It makes it look like they have a horrible life, which I suspect is accurate.

>> **Gary Owen:** Now, the positive side of our guest, folks, is that she's had some great publicity. Her research, which we're going to talk about here shortly, has been cited by several newspapers, magazines and journals, including the New York Times, the Christian Science Monitor and CNN. That's some great credibility to your work.

>> **Donna Nelson:** Oh, thank you. I've enjoyed so many things. I've also given Capitol Hill briefings, before Congress. When I did that, I was able to take the students who had helped me do the research, and they were able to go and watch their work presented before Congress.

>> **Gary Owen:** Wow.

>> **Donna Nelson:** It was extremely exciting for them.

>> **Steve Paris:** Wow.

>> **Donna Nelson:** I really enjoy these things so much.

>> **Steve Paris:** And all this from a, a woman who was, who grew up in Eufaula, Oklahoma.

>> **Donna Nelson:** That's right.

>> **Steve Paris:** The county seat of McIntosh County.

>> **Donna Nelson:** That's right. I, and my parents, were born in Eufaula, and some of my grandparents, and even some of my great-grandparents were born here, back when it was Indian territory. So, I have deep roots in Oklahoma and that's true; I am a, a native Oklahoman. I got my bachelor's degree at University of Oklahoma and then went outside to get my PhD at U.T., Austin. And then, post-doc'd at Purdue and then came back here for my faculty position at University of Oklahoma.

>> **Steve Paris:** So, you've, you've, you've left Oklahoma to continue your education; now, you're back here teaching.

>> **Donna Nelson:** Exactly.

>> **Steve Paris:** At the University of Oklahoma.

>> **Donna Nelson:** Exactly.

>> **Steve Paris:** Well.

>> **Donna Nelson:** And, I see a lot of Oklahoma kids in my classes; it's really nice.

>> **Steve Paris:** Well, that's, that's something we want to touch on, and we, I have just a few seconds here on this segment. But, are you, are you seeing more students interested in science and technology than maybe you did just a few years ago? Has it, has it changed any?

>> **Donna Nelson:** I think it has. A lot of the kids that I see are wanting to be pre-med, pre-vet, pre-dent, pre-pharmacy.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** Because I teach organic chemistry.

>> **Steve Paris:** Right.

>> **Donna Nelson:** But, you know, they can't all.

>> **Steve Paris:** They're there.

>> **Donna Nelson:** Go into those medical professions.

>> **Steve Paris:** Yeah, they're there on a purpose, right?

>> **Donna Nelson:** Right, they are absolutely there, wanting to learn, and, and it's a great bunch of kids. It really is. I enjoy seeing them. And now, about half of them are young ladies.

>> **Gary Owen:** Oh, that's great.

>> **Donna Nelson:** It's great, yeah.

>> **Steve Paris:** Well, we'll talk about that.

>> **Gary Owen:** Yeah, that's very encouraging for you.

>> **Donna Nelson:** Yeah.

>> **Steve Paris:** That's a change; it's a welcome change.

>> **Donna Nelson:** Oh, yeah. It's wonderful.

>> **Gary Owen:** Very encouraging for you.

>> **Donna Nelson:** They're, they're very bright young ladies.

>> **Gary Owen:** That's fascinating.

>> **Donna Nelson:** Yes, and very serious.

>> **Gary Owen:** And, when we come back from the break, one of the things that, I don't know about our listeners, but I'm curious about; we mentioned she's an organic chemist. What's the difference? We're going to find out when we come back, on *Oklahoma Innovations*.

[ Music ]

>> Now in its 14th year, this is *Oklahoma Innovations* on the OCAST Radio Network.

>> The stress of finding a job after college is compounded for recent graduates entering a tough job market, but thanks to the Oklahoma Center for the Advancement of Science and Technology,

more students connect with the state's most advanced technology companies while earning income and valuable on the job training. Through the OCAST R&D intern partnerships program, students gain experience in the industry, work with mentors, and operate specialized instruments. Intern training leads to starting salaries 12 percent higher than Oklahoma's average per capita income. OCAST is investing in Oklahoma's best and brightest, creating jobs, investing in our future; that's what OCAST is all about. OCAST is seeking intern partnership opportunities that will allow Oklahoma students to gain hands on experience in science and technology careers. For more information, call OCAST toll-free at 866-265-2215, or visit their website at [ocast.ok.gov](http://ocast.ok.gov). The future of Oklahoma looks bright.

>> Imagine not being able to see your daughter on her wedding day, or experiencing your grandchild's first smile. An estimate one and three-quarter million Americans over age 50 have developed a loss of vision or blindness due to age related macular degeneration. And, of the more than 200,000 Oklahomans living with diabetes, 90 percent will develop eye disease. With the support of the Oklahoma Center for the Advancement of Science and Technology, an Oklahoma company is developing innovative treatments for blinding eye diseases. The research will improve the lives of people across the nation, create new treatments that are more comfortable for patients, and prevent vision loss. OCAST is looking for Oklahoma researchers serious about investigating new treatments and products that improve the quality of life and the economy for Oklahomans. For more information, call OCAST toll-free at 866-265-2215, or visit their website at [ocast.ok.gov](http://ocast.ok.gov). Investing in science and technology; it's good for your health.

>> Research and development, technology transfer and commercialization, creating high paying jobs in Oklahoma, is what OCAST is all about. This is *Oklahoma Innovations*, on the OCAST Radio Network.

[ Music ]

>> **Gary Owen:** If you've just joined us, our guest this week is a science advisor for the AMC show, *Breaking Bad*. And, she is an organic chemist at the University of Oklahoma, and she is one of very few women holding a job in that field. In fact, a lack of diversity in her industry prompted her to conduct extensive research on ethnic and gender diversity among highly ranked science departments of research universities. Now, before we touch on that, I wanted to clarify something, because we say organic chemist. Okay, we've got chemists and then we have organic chemists, or; explain that, when we say, when we put the organic label on it.

>> **Donna Nelson:** Well, yeah; there a lot of different types of chemists.

>> **Gary Owen:** Right.

>> **Donna Nelson:** Excuse me; and, organic chemistry is just one of the major types of chemistry. I mean, you have analytical, inorganic, physical; and so, I'm an organic chemist, which means basically. I mean, nowadays, about the only places that you have these barriers are in the teaching, so I teach organic chemistry. And, most of the students that take organic chemistry are students who, as I mentioned earlier, are wanting to go into the medical fields.

>> **Gary Owen:** Oh.

>> **Donna Nelson:** And so, you know, you, you start out teaching, you start out taking general chemistry and then you take the other different types of chemistry; you sort of build up to it. And so, organic chemistry is what students take when they're juniors. They've, they've had several pre-requisites before they can take organic chemistry. And, the traditional definition of organic

chemistry is that it's the chemistry of carbon. So, it's carbon based chemicals, carbon based molecules. And of course, we start out with the building blocks.

>> **Gary Owen:** Uh-huh.

>> **Donna Nelson:** And, we learn all about the different types of molecules and then how you combine the molecules in reactions to build up larger molecules. And nowadays, the chemicals that are focused on, sort of at the end of the classes, because this is a two class sequence; a two course sequence.

>> **Gary Owen:** Uh-huh.

>> **Donna Nelson:** So, at the end of the course is, you're sort of studying biological molecules, because the authors, the book authors, have recognized that the students are very interested in medicine nowadays.

>> **Steve Paris:** So, by virtue of the fact that you are an organic chemist and a professor.

>> **Donna Nelson:** Uh-huh.

>> **Steve Paris:** That you, you probably run across some of the best, brightest students in the state of Oklahoma, I suspect.

>> **Donna Nelson:** Oh, absolutely. I mean, I really believe; of course, I'm probably prejudiced, but I really believe that the students in my classes are the very smartest students.

>> **Steve Paris:** Wow.

>> **Donna Nelson:** On class, because you just don't find dummies taking organic chemistry.

>> **Gary Owen:** No, no.

>> **Steve Paris:** I would never even consider it.

>> **Steve Paris:** Well, Gary mentioned some of your research that, that involved ethnic and gender diversity, and you had recognized that there was a lack of diversity in.

>> **Donna Nelson:** That's true.

>> **Steve Paris:** In the, in the industry. That, you did some wonderful research on that and it's been cited by some outstanding news organizations. Tell us about that experience.

>> **Donna Nelson:** Well, the way that happened was I saw an, an article one day, again in Chemical and Engineering News, and the, the article just basically told the number of women professors at the top 50 research universities, in chemistry.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** And so, the numbers were single digit; one, two, occasionally zero.

>> **Steve Paris:** Right.

>> **Donna Nelson:** In each chemistry department, and I taped that on the outside of my door. And, I had some students working for me, doing research for me, and they saw that and they stopped and said; hey, so long as the people were doing that survey, why didn't they go ahead and ask about minorities? You know, to try to.

>> **Steve Paris:** No.

>> **Donna Nelson:** Find out how many blacks, Hispanics, Native Americans were there.

>> **Steve Paris:** Sure.

>> **Donna Nelson:** And I said; well, you know, I think it's probably because the numbers would have been mostly zero, zero, zero, zero, zero, zero.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** I should go down the list of chemistry departments, and that wouldn't be very interesting. So, I went home that night and I started feeling really guilty.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** I started thinking; that's not the reason not to do the survey. That's the reason to do the survey.

>> **Steve Paris:** Spoken like a true researcher.

>> **Donna Nelson:** So, I went back and I told the students; you know, if you're really interested in this, I'll supervise you and we can go do this survey.

>> **Steve Paris:** Great idea.

>> **Gary Owen:** Oh, yes.

>> **Donna Nelson:** And they said; yes, we really want to do this. So, the first thing I did; I mean, I did this very ethically. I called the person who had published that work and I said; hey, are you going, do you plan to do a similar survey on minorities? And she said no. And, I said; I have students here who are wanting to do a similar survey on minorities. Would you mind if we did that? And she said no. And I said; by the way, why didn't you go ahead, as long as you were surveying all these department chairs, why didn't you go ahead and ask them about how many minorities they have? And, she said; well, we sort of looked and we saw it was zero, zero, zero, zero. And we figured that wouldn't be very interesting.

>> **Steve Paris:** So, your supposition was correct.

>> **Donna Nelson:** Exactly. So, we went ahead and did that and the, the data that we obtained were extremely interesting. I mean, that's when I did my first Capitol Hill briefing, was on those data.

>> **Steve Paris:** And, your Capitol Hill briefing was the Government Accountability Office; they used, it's connected with that, I'm sure, used your data for its July, 2004 report to Congress on Title IX.

>> **Donna Nelson:** That's right; that was right after my first Capitol briefing.

>> **Steve Paris:** Exactly, and we all know about Title IX.

>> **Donna Nelson:** That's right.

>> **Steve Paris:** I can't explain all of the different facets of it, but one of the things that's, that's probably more, or most of us are aware of is what it has meant for sports for women.

>> **Donna Nelson:** Exactly.

>> **Steve Paris:** In, in high school and.

- >> **Donna Nelson:** Exactly.
- >> **Steve Paris:** And college level.
- >> **Donna Nelson:** Yeah, of course, it's not just a sports law.
- >> **Steve Paris:** Right, it's not.
- >> **Donna Nelson:** It really pertains to everything.
- >> **Steve Paris:** That's what I meant.
- >> **Donna Nelson:** But, you do see it mostly applied to sports.
- >> **Steve Paris:** And that what I mean.
- >> **Donna Nelson:** That's exactly right.
- >> **Steve Paris:** Most of us see it in that application.
- >> **Donna Nelson:** Exactly
- >> **Steve Paris:** But, it's bigger than that.
- >> **Donna Nelson:** Exactly.
- >> **Steve Paris:** Well, what did you find out? I mean, give us kind of an overview of what it showed you.
- >> **Donna Nelson:** Well, two extremely important pieces of data were, you know, you know, professors are either full professors, associate professors or assistant professors.
- >> **Steve Paris:** Right.
- >> **Donna Nelson:** And of course, assistant professors are the most recently hired professors.
- >> **Steve Paris:** Right.
- >> **Donna Nelson:** And they're in there typically for seven years, until they come up for tenure.
- >> **Steve Paris:** Right.
- >> **Donna Nelson:** So, they either get tenure and they stay and they're promoted, or they're denied tenure and they leave. So, among those top 50 chemistry departments, we saw zero black assistant professors.
- >> **Steve Paris:** Oh, my.
- >> **Donna Nelson:** Which meant that none had been hired in the last seven years.
- >> **Steve Paris:** Wow.
- >> **Donna Nelson:** And, among Native Americans, there were also zero assistant professors. And, along the same time, PhD attainment had been increasing, so there was a question; why is it possible to hire blacks and Native Americans back when the PhD attainment was low, but not possible when the PhD attainment had increased?
- >> **Steve Paris:** Wow.
- >> **Donna Nelson:** And so, this was the question. That's what brought the Capitol Hill briefing and the GAO study and all of this.

>> **Steve Paris:** Interesting; that's.

>> **Donna Nelson:** Very, yeah; that was the question.

>> **Steve Paris:** That is just fascinating. Wow. Gary? I'll tell you what; there are so many ways we can go with, with the questions on, on this subject because of, of the widespread nature of what she's doing here. I want to, I kind of want to stick with; we've probably touched enough on diversity research.

>> **Donna Nelson:** Okay.

>> **Steve Paris:** Although if you have anything you want to throw in there later on, feel free.

>> **Donna Nelson:** Okay.

>> **Steve Paris:** Let's talk about chemistry and chemistry education research. You've touched on that and I noticed; there was something that I came across as I was looking over your material, single walled carbon nanotubes.

>> **Donna Nelson:** Oh, yes; SWNT.

>> **Steve Paris:** SWNT.

>> **Donna Nelson:** For short; SWNT.

>> **Steve Paris:** Yeah, exactly.

>> **Gary Owen:** We're familiar with that.

>> **Steve Paris:** There's a company in Norman called SWNT.

>> **Donna Nelson:** Oh, absolutely. Yes.

>> **Steve Paris:** I mean, they spell it a little differently, put a little e in there.

>> **Donna Nelson:** Yeah, yeah; SouthWest NanoTechnologies.

>> **Gary Owen:** That's right.

>> **Steve Paris:** Exactly. And, we've had them on, on the program before. But, talk to us about, about your research and what you do in the area of single wall carbon nanotubes.

>> **Donna Nelson:** Well, we do a lot of things. We, for one thing, we functionalize them, which means that we attach different groups to the outsides and we study the pristine single walled carbon nanotubes; that means as they are received from the manufacturer. We've done that on three different brands, including the SouthWest NanoTechnologies, which is located in Norman, Oklahoma.

>> **Steve Paris:** That's handy.

>> **Donna Nelson:** Oh, yes, and they were so wonderful. I have to, I have to say that they gave us a free sample.

>> **Steve Paris:** And that's an expensive product.

>> **Donna Nelson:** That is an expensive product. We love them for that. We absolutely adored them, and we still do.

>> **Steve Paris:** Yeah.

>> **Donna Nelson:** And so, so we were comparing the different brands and we found out in one brand, which was not SouthWest NanoTechnologies, I might mention, that what was advertised; when we went in and looked at it, it wasn't really what, what you were receiving. And, that was not the Oklahoma brand. That was another brand from outside the state of Oklahoma.

>> **Steve Paris:** Brand X.

>> **Donna Nelson:** Brand X, which I will not name. And yeah, they had told us that they had used, like particular catalysts.

>> **Steve Paris:** Right.

>> **Donna Nelson:** To synthesize the SWNT's, and when we went in and looked at them by a particular spectroscopic method, where you can see what metals are in there.

>> **Steve Paris:** Yes.

>> **Donna Nelson:** Those metals weren't there, but it was different metals were.

>> **Steve Paris:** Wow.

>> **Donna Nelson:** And so, that revealed what had really been used.

>> **Steve Paris:** Let's follow just a minute and, here again, we've done this on the show, but we have different listeners, different times, so.

>> **Donna Nelson:** Uh-huh.

>> **Steve Paris:** Let's talk about what, what is the practical application of, of single walled carbon nanotubes. How, how do you use those?

>> **Donna Nelson:** Well, there's going to be a lot of different methods, a lot of different ways that they'll be used. One way in which, you know, polymers.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** Are used a lot in all different industries, and there are conducting polymers and polymers that are not conducting. And so, one of the things that we've been doing is blending single walled carbon nanotubes in with polymers.

>> Mr. Nelson: Okay.

>> **Gary Owen:** Hmm.

>> **Donna Nelson:** And then, we found that in some cases, the, it increases the conductivity of those polymers.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** And, another thing that we found that's very interesting is that when you purify the single walled carbon nanotubes, the conductivity decreased, and that's a very interesting question.

>> **Gary Owen:** Interesting, yeah.

>> **Steve Paris:** So, in one case it, it conduct; in another case, maybe it can insulate.

>> **Donna Nelson:** Yes, yes.

>> **Steve Paris:** Is that a good way to explain that?

>> **Donna Nelson:** Yeah, except in this case it conducted or it conducted less.

>> **Steve Paris:** Okay.

>> **Donna Nelson:** Yeah.

>> **Steve Paris:** Okay, very good. I have had the privilege of holding some carbon nanotube material that has been placed on ice.

>> **Donna Nelson:** Uh-huh.

>> **Steve Paris:** And, you know how it; it's immediate the way it conducts the, the cold.

>> **Donna Nelson:** Yeah.

>> **Steve Paris:** And, I can't explain all that. I'm sure you could. But. but, at any rate, it's, it's just fascinating what kind of things it opens up to your imagination.

>> **Donna Nelson:** Yeah.

>> **Steve Paris:** When you, when you deal with those kinds of things.

>> **Donna Nelson:** It's fascinating and we're so fortunate to have that company.

>> **Steve Paris:** Yeah.

>> **Donna Nelson:** SouthWest NanoTechnologies, here in the state of Oklahoma.

>> **Steve Paris:** Which has been recognized by the federal government.

>> **Donna Nelson:** Yeah.

>> **Steve Paris:** As the number one.

>> **Donna Nelson:** Yeah.

>> **Steve Paris:** Or, that's not, what the term they used, but they're, they're certified.

>> **Donna Nelson:** Yeah.

>> **Steve Paris:** They're material is; it reaches a level that no one else can achieve.

>> **Donna Nelson:** Absolutely. Oklahoma can be very proud of that company.

>> **Steve Paris:** You bet.

>> **Donna Nelson:** It's put us on the map.

>> **Gary Owen:** It has, and we're seeing a lot of new things starting to evolve. Our guest is Dr. Donna Nelson. She's an associate professor of chemistry at the University of Oklahoma. We're talking about her research. We've got a lot more to talk about when we come back, on *Oklahoma Innovations*.

[ Music ]

>> This is Oklahoma's Science Radio Magazine, *Oklahoma Innovations*, with Gary Owen and Steve Paris, on the OCAST Radio Network.

>> As you drive across Oklahoma, you can see thousands of gas wells sprinkled throughout the countryside. Many of these wells don't produce enough natural gas to justify pipelines, but

without this access, thousands of well sites are abandoned. With the support of the Oklahoma Center for the Advancement of Science and Technology, one company is creating a portable device, transported on a flatbed truck, to process natural gas at well sites. This technology optimizes the amount of gas that can be captured, and releases no by-products into the atmosphere. This idea provides new opportunities for small oil and gas producers, while bringing us one step closer to energy independence. Supporting innovation; that's what OCAST is all about. OCAST is looking for small business owners serious about investigating new products, services and processes. For more information, call OCAST toll-free at 866-265-2215, or visit their website at [ocast.ok.gov](http://ocast.ok.gov). Investing in research and development; it pumps new life into Oklahoma's economy.

[ Music ]

>> **Gary Owen:** This is the program where you learn about science and technology innovators; people who are in the labs, people who are in manufacturing. It all has to do, linked to science and technology and OCAST, Oklahoma Center for the Advancement of Science and Technology, brings you this show each week. I'm Gary Owen and Steve Paris is my co-host, and Steve is with OCAST. This week we're visiting with Dr. Donna Nelson, and if you ever watch the television show *Breaking Bad* on AMC and you read the credits, you'll see that she is a science advisor for that show, but that's just a very small thing of what she is totally involved with as an associate professor of organic chemistry at the OU. The last break, we were just talking about some of the research and, that she's been involved with, with single walled carbon nanotubes, and you've heard us talk about that on this show quite a bit. Steve?

>> **Steve Paris:** Very good. Donna, we've, we're going to be talking about a business case for diversity that you've mentioned, but we're going to do that a little bit later. What I'd like to do now is, I've noticed that you've had some involvement with high school students. Now, you're a university professor.

>> **Donna Nelson:** Yes.

>> **Steve Paris:** But, you've done some work with high, and some of the work I, I see had, was conducted onboard the space shuttle; is that correct?

>> **Donna Nelson:** Yes, that was a, we put together a reaction that was flown up on the getaway special.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** And so, the reaction was run onboard the space shuttle and then we ran the reaction on the ground in order to determine.

>> **Steve Paris:** Yeah.

>> **Donna Nelson:** The effect of the reaction being conducted in microgravity.

>> **Steve Paris:** Right.

>> **Donna Nelson:** And so, what we saw there is that onboard the space shuttle, you, you didn't see quite so much aggregation in the reaction.

>> **Steve Paris:** Right.

>> **Donna Nelson:** This was a, a reaction of inorganic chemistry in which precipitates were formed.

>> **Steve Paris:** Yeah, so.

>> **Donna Nelson:** And so.

>> **Steve Paris:** Well, it's understandable; you have gravity, it's going to pull some of the heavier atoms to the bottom, more than likely.

>> **Donna Nelson:** Right.

>> **Steve Paris:** And, but you worked with high school; did you work directly with the students or were?

>> **Donna Nelson:** Yeah.

>> **Steve Paris:** Okay.

>> **Donna Nelson:** Yeah, I've worked with high school students. I've had them in my lab, you know, and supervised them directly.

>> **Steve Paris:** Were these students from Oklahoma?

>> **Donna Nelson:** Yes, that particular one; this actually involved Rod Fritese.

>> **Steve Paris:** Okay.

>> **Donna Nelson:** The Frontiers of Science.

>> **Steve Paris:** Okay.

>> **Donna Nelson:** And, actually, Rod ran a, a competition.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** In which the students wrote in and proposed different reactions to be conducted onboard the space shuttle. And so, then one, the, the winning award was selected and, and as I recall, the students that won were from Cassidy School.

>> **Steve Paris:** Cassidy? Okay.

>> **Donna Nelson:** Uh-huh.

>> **Steve Paris:** Very good. Well, that's fascinating work. I mean, who; not many people can say their work wound up on the space shuttle, right?

>> **Donna Nelson:** Yeah.

>> **Steve Paris:** Okay.

>> **Donna Nelson:** Yeah, that was fun.

>> **Steve Paris:** You bet. Now, you've done work with, work with the Native American tribes to determine the incidences and the effects of attitudes toward diabetes in Native American; we all know American Indians, we have, we have a lot of them here in Oklahoma.

>> **Donna Nelson:** Right.

>> **Steve Paris:** And they have a real problem with diabetes. It seems to be connected to being Native American. Give us a take on, on what you discovered in your research in that area.

>> **Donna Nelson:** Well, this was a summer project. There was a Native American young lady and young man who were doing research during the summer with me, and they were very interested. As you know, diabetes is, you know, a serious disease.

>> **Steve Paris:** Yes, it is.

>> **Donna Nelson:** Among, for Native Americans. And so, they put together and, and I put together a, a questionnaire that was administered to their own tribal members.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** And, it's been quite awhile, but as I recall, the most important thing that came out of that was, curiously, that in many instances the, the people who had been diagnosed with diabetes didn't like taking their medication.

>> **Steve Paris:** Oh.

>> **Donna Nelson:** They were taking pills or tablets.

>> **Steve Paris:** Yeah.

>> **Donna Nelson:** And, they just didn't like it, and so they would just decide not to take their medications.

>> **Gary Owen:** Wow.

>> **Steve Paris:** So consequently, there'd be some pretty deleterious effects of.

>> **Donna Nelson:** Yeah.

>> **Steve Paris:** Of not taking care of the disease.

>> **Donna Nelson:** Yeah, I thought that that was, you know, a very important thing to discover, and it's not the sort of thing, you know, that they would necessarily always tell their physician.

>> **Gary Owen:** Yeah.

>> **Steve Paris:** So, that makes it doubly tough on a physician to try and treat someone when they're not following the directions.

>> **Donna Nelson:** Right.

>> **Steve Paris:** Yeah, and that, that becomes pretty, pretty prevalent, you say, in Native Americans or, or is it true maybe of all peoples who have diabetes in general or is it just Native Americans?

>> **Donna Nelson:** Well, I, I didn't study all people.

>> **Gary Owen:** She didn't study that.

>> **Donna Nelson:** We just studied that particular tribe.

>> **Steve Paris:** Okay, okay. Well, I think this indicates, gives a good indication of the breadth of the, of your area of endeavor. I mean, it's not only training, not only educating our, our future physicians and people who work in the medical field, but you're also doing work with high school students, you're doing work with Native American tribes; your work's wound up on the space shuttle. And, this diversity thing; you know, we call it the diversity thing, but that's an

important thing to look at and you've made some major discoveries in your research and we talked a little bit about it earlier. But, you have a business case.

>> **Donna Nelson:** Yeah, this is a new thing that has just come about. You remember back when Larry Somers made his remarks, one of the things that; this is the President of Harvard.

>> **Steve Paris:** Yeah.

>> **Donna Nelson:** One of the things that.

>> **Steve Paris:** Yeah, go, go with that, for, for those who may not know what happened, exactly.

>> **Donna Nelson:** Well, this was at the National Bureau of Economic Research, that he spoke to a small group of people at, at lunch time, and I was in the room.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** So, I actually heard this. I was one of the speakers at that meeting. And basically, he spoke for, I guess it was an hour and fifteen minutes.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** But, there were three major points that he made which, I guess you could say, that it bothered the.

>> **Steve Paris:** Sure.

>> **Donna Nelson:** The, the women.

>> **Steve Paris:** Yeah.

>> **Donna Nelson:** That he had made these remarks and.

>> **Steve Paris:** It's been about what, two, two and half years ago?

>> **Donna Nelson:** It's, yeah, it's been.

>> **Steve Paris:** Or has it been longer than that?

>> **Donna Nelson:** Yeah, more, like maybe five years.

>> **Steve Paris:** Oh, it's been that long?

>> **Donna Nelson:** Yeah, it's been quite awhile.

>> **Steve Paris:** Okay, I remember.

>> **Donna Nelson:** And so, he had made the remarks that, that in math, in particular, that women were just of lower intellect, that they just didn't, couldn't perform, and he actually made implications that some of it was tied to genetics.

>> **Steve Paris:** Wow.

>> **Donna Nelson:** That if you were a woman, you just were, were doomed to be less proficient in math. Another thing that he said was that women just, in order to get really, really good jobs, you would need to work 70 hours a week and of course, it was well known that women just didn't want to work that hard. And, I mean, this was actually one of his statements.

>> **Steve Paris:** And, you wonder how a person like that got to the level where he was.

>> **Donna Nelson:** Yeah.

>> **Steve Paris:** With those types of attitudes.

>> **Donna Nelson:** Yes, and the remarks were eventually transcribed and posted online at Harvard.

>> **Steve Paris:** Uh-huh.

>> Dr. Nelson. So, you can actually go online and read this transcription of those remarks.

>> **Steve Paris:** Whatever became of him? I've forgotten.

>> **Gary Owen:** The women took him out and strung him up, that's what happened.

>> **Donna Nelson:** Well, you know, now he's an advisor for Obama.

>> **Gary Owen:** Oh, really?

>> **Donna Nelson:** Uh-huh.

>> **Gary Owen:** Oh, my goodness. Okay.

>> **Donna Nelson:** Yeah, he's, he's been appointed to an office with Obama, you know.

>> **Gary Owen:** Well, hopefully he's learned something since then.

>> **Donna Nelson:** In, in the Treasury. Yeah, and so.

>> **Steve Paris:** Okay, go ahead and talk about your research.

>> **Donna Nelson:** So, so anyway, one of the things he mentioned was that if, if women really were able to make a really good contribution, that there would be this economic driving force such that it would be realized that, for example, businesses would be more profitable if they included women. And, that that just wasn't the case.

>> **Steve Paris:** Yeah.

>> **Donna Nelson:** That there was no business case for diversity. And so, that prompted a lot of people to try to find, see, you know, investigate this, to see if there was a business case. And so, in 2007, there's an organization, Catalyst and, here in this country, and another one, McKinsley, I think is the name, over in the, the, Europe.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** And, they actually did research on this where they collected data on companies. They broke them into two groups; those that did have women.

>> **Steve Paris:** Sure.

>> **Donna Nelson:** On the board and those that did not. And, they looked at the performances. And, and I mean, you know, not just performances where it would be sort of quality of life performances.

>> **Steve Paris:** Right.

>> **Donna Nelson:** But, I mean, you know, the bottom dollar; are they more profitable?

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** Does the stock price increase, and things like this.

>> **Steve Paris:** Right.

>> **Donna Nelson:** And, they found out that if there were women on the board, those companies were more profitable, and especially if there were three women on the board.

>> **Gary Owen:** Wow.

>> **Donna Nelson:** If there were more than two.

>> **Steve Paris:** Yeah, okay.

>> **Donna Nelson:** Then, those companies were particularly profitable. And so, this is the, just been done in 2007, and so it's sort of new. But, you know, what I have noticed is that normally, when these things happen for women.

>> **Steve Paris:** Uh-huh.

>> **Donna Nelson:** Shortly after that, you also see similar investigations for minorities, and Oklahoma is poised.

>> **Steve Paris:** Like you did; just kind of like what you did.

>> **Donna Nelson:** Exactly. Oklahoma is poised to have a wonderful contribution here, because we have such a high population of Native Americans.

>> **Steve Paris:** Yes, we do; yes, we do.

>> **Donna Nelson:** And so, it's going to become extremely important for us to ensure that our Native Americans are schooled and experts, and ready to make their contribution to science and to businesses.

>> **Steve Paris:** Outstanding; so, take that, Mr. Larry Somers, right?

>> **Donna Nelson:** Right.

>> **Steve Paris:** Well, I mean, it's fascinating research and I know, as you indicated, that there's going to be some follow on things. Who's using this information? Has anybody taken it and used, used it to try to maybe make some changes?

>> **Donna Nelson:** Our data?

>> **Steve Paris:** Yeah.

>> **Donna Nelson:** Oh, our data; oh, yes. Our data are used by, by dozens and dozens and dozens of universities and companies, and I'm asked to go consult all the time.

>> **Steve Paris:** Wow.

>> **Donna Nelson:** You know, but this driving force, you know, the business case; what it is, is they're learning that having a diversity of opinions, a diversity of ideas, is going to create, is going to increase the creativity and therefore, the innovation of these companies.

>> **Steve Paris:** There you go, right.

>> **Donna Nelson:** And, there is the competition, so it will make them be more profitable.

>> **Gary Owen:** Well, and Steve and I can attribute; this is a side note here, but without our producer, Debbie Cox, hey.

>> **Donna Nelson:** Hurray! There you go.

>> **Steve Paris:** And you're being very serious about it, I might add.

>> **Gary Owen:** I am. She is the one responsible for booking all of these wonderful guests we have on the program.

>> **Steve Paris:** Yes.

>> **Gary Owen:** You know, so we, we salute her as well. And, and of course, we have a lot of great women in Oklahoma.

>> **Steve Paris:** Of course.

>> **Donna Nelson:** We do.

>> **Gary Owen:** That are successful businesswomen and, and corporate leaders, as a matter of fact.

>> **Donna Nelson:** Absolutely.

>> **Gary Owen:** We are out of time, time, ladies and gentlemen.

>> **Steve Paris:** Hey, we, we're going to ask you back sometime.

>> **Donna Nelson:** Oh, thank you so much. Thank you so much. I really enjoyed it.

>> **Gary Owen:** Dr. Donna Nelson from OU; thank you very much for being our guest. And, thank you for listening to this week's edition of *Oklahoma Innovations*. Have a good week.

[ Music ]

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