

PROFILES IN SCIENCE

The Explosive Ambitions of Kate the Chemist

At the lecture halls of the University of Texas or on TV, Kate Biberdorf is working to catalyze more people into careers in science.

Kate Biberdorf, a professor at the University of Texas at Austin. “When I’m happiest is when I’m onstage sharing what I love,” she said. Christopher Lee for The New York Times



By Kenneth Chang

July 11, 2022

The dream is Vegas.

“Don’t make fun of me,” said Kate Biberdorf, a professor at the University of Texas at Austin, “but it would be a live show in Vegas where it’s a science show.”

That is not a typical aspiration of someone who teaches chemistry to undergraduates. For Dr. Biberdorf — better known as Kate the Chemist — that dream is part of her goal to capture the fun of scientific exploration and to entice children, especially girls, to consider science as their life’s calling.

“When I’m happiest is when I’m onstage sharing what I love,” she said.

She’s thinking of a big spectacle, like the long-running magic shows of David Copperfield at MGM Grand or Penn & Teller at Rio Las Vegas. “If we can convince people to go to science shows when on vacation,” she added, not entirely convinced herself.

For now, her efforts have focused on television and publishing, not Vegas. Over the last few years, she has written two books of science experiments to try at home, a science book for adults and, with Hillary Homzie, a children's book author, a series of novels starring a younger, fictional version of herself.

On television, she has already become something of a contemporary update of science popularizers like Bill Nye the Science Guy or Donald "Mr. Wizard" Herbert.

Perhaps you've seen her.

Dr. Biberdorf, 36, has appeared on NBC's "Today," "The Late Show With Stephen Colbert" and other programs with demonstrations of color-changing chemicals, magnetic slime and, very often, chemical reactions accompanied by bright, loud bangs.

During a "Today" show segment in 2019, she, along with Craig Melvin, the show's news anchor, and Dylan Dreyer, the meteorologist, forcefully dumped buckets of hot water into liquid nitrogen, instantly engulfing them in eruptions of billowing white vapor.

The three, wearing lab coats, safety goggles and protective mitts, emerged a bit frost-blasted.

"You didn't tell me it was going to blow up in my face," Mr. Melvin exclaimed.

"This is a thundercloud," Dr. Biberdorf explained.



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The TV appearances only last a few minutes — long enough to show off some chemistry “wow” but too brief to include more than passing mentions of the how and why of what is happening.

For a deeper dive into science, Dr. Biberdorf is looking to star in a television show or two of her own.

One of the ideas she and her collaborators are pitching is “Science Unfair.” Imagine a reality television competition along the lines of Food Network’s “Worst Cooks in America,” but with students who are bombing in their science classes.

“It would be more like the kids who hate that and don’t want to do the science fair,” Dr. Biberdorf said. “We’re trying to get them together and make them do a little competition. At the end of each segment, hopefully they will now like science.”

The other pitch, on the back burner for now, is “Blow My Stuff Up,” which would combine therapy and pyrotechnics to help people recovering from a failed relationship or other unhappy experiences.

“There’s a therapist there as well, so they’re actually working on healing and moving forward in their lives.” Dr. Biberdorf said. Then, she would satisfyingly dispose of objects emblematic of the troubles that the people have put behind them.

An episode might follow someone who had long suffered driving an unreliable, junker of a car. “They finally got a new car, they just want to blow up their old car,” Dr. Biberdorf said, “and we can do that with a bunch of pyrotechnics. So I am absolutely stoked about that.”

Both of Dr. Biberdorf’s parents are psychologists, and her sister is a therapist. “It kind of brings the two worlds together,” she said.

Sizzles — demo videos showing snippets of what the show might look like — have been shown to various networks.

Growing up in Portage, Mich., just south of Kalamazoo, Dr. Biberdorf got hooked on chemistry because of an enthusiastic teacher in high school, Kelli Palsrok.

“Honestly, ever since I was 15, I knew I wanted to be a chemist because of her,” Dr. Biberdorf said. “My dream, truthfully, is to be her for the next generation of kids.”

Ms. Palsrok remembers the young Kate as “pretty much the same as she is now,” she said. “Always enthusiastic about chemistry and science. Very well-rounded student. Loved the hands-on stuff.”

But the field of chemistry has not always been welcoming to Dr. Biberdorf. “You are judged on your appearance,” she said. “And I look a certain way, and I dress a certain way.”

Which is to say, she wears heels, skirts and lipstick.

“I lean into my feminine side,” she said. “But that’s just because I like it, and I feel like I’m at my best when I present that image.”

She added, “It’s also very important for me that younger girls can see that side of a scientist.” She said women taking her college class have expressed appreciation for that.

“You can look however you want and still be into science as much as possible,” Dr. Biberdorf said.

But that does not fit the stereotype that many scientists have of women as scientists.

“I don’t think people look at me and go, ‘Well, that’s a smart lady,’” Dr. Biberdorf said. “So I know when I’m in faculty meetings or conferences or anything like that, my first three sentences need to be articulate, accurate.”



Dr. Biberdorf said she owed her passion for chemistry to her high school chemistry teacher. “My dream, truthfully, is to be her for the next generation of kids,” she said. Christopher Lee for The New York Times

As a graduate student at the University of Texas, she studied catalysts for potentially speeding up Suzuki-Miyaura coupling, a reaction commonly used in the manufacturing of pharmaceuticals.

There, she found that she did not like laboratory work. In addition, pure academia was a difficult place for her. “I didn’t want to be in that environment,” she said. “I wanted to get out of there as fast as I could.”

Her current job at the university is as a professor of instruction — all teaching and no lab research. In 2014, when she started, she was teaching two undergraduate chemistry classes, and she went to her boss asking if she could do more.

“We created an outreach program called ‘Fun with Chemistry,’” she said. “I was supposed to go to two elementary schools a semester. That was the deal.”

The program turned into something much more popular, with many more schools asking her to visit. “I interacted with something like 16,000 students that first year,” she said. “It was nuts, in my opinion.”

That in turn led to monthly appearances on “We Are Austin,” a morning show on the local CBS station.

A few years later, a thousand miles away in Los Angeles, Glenn Schwartz, noticed. He had been Bill Nye’s publicist, but the two went their separate business ways about five years ago. Mr. Schwartz wondered: Is there another Bill Nye out there?

He searched for about a year before coming across Dr. Biberdorf.

“I found Kate’s website, and I looked at some video, and I simply contacted her,” Mr. Schwartz said. “Really, it was me looking around and looking for somebody like her. And then I was lucky enough to actually find her.”

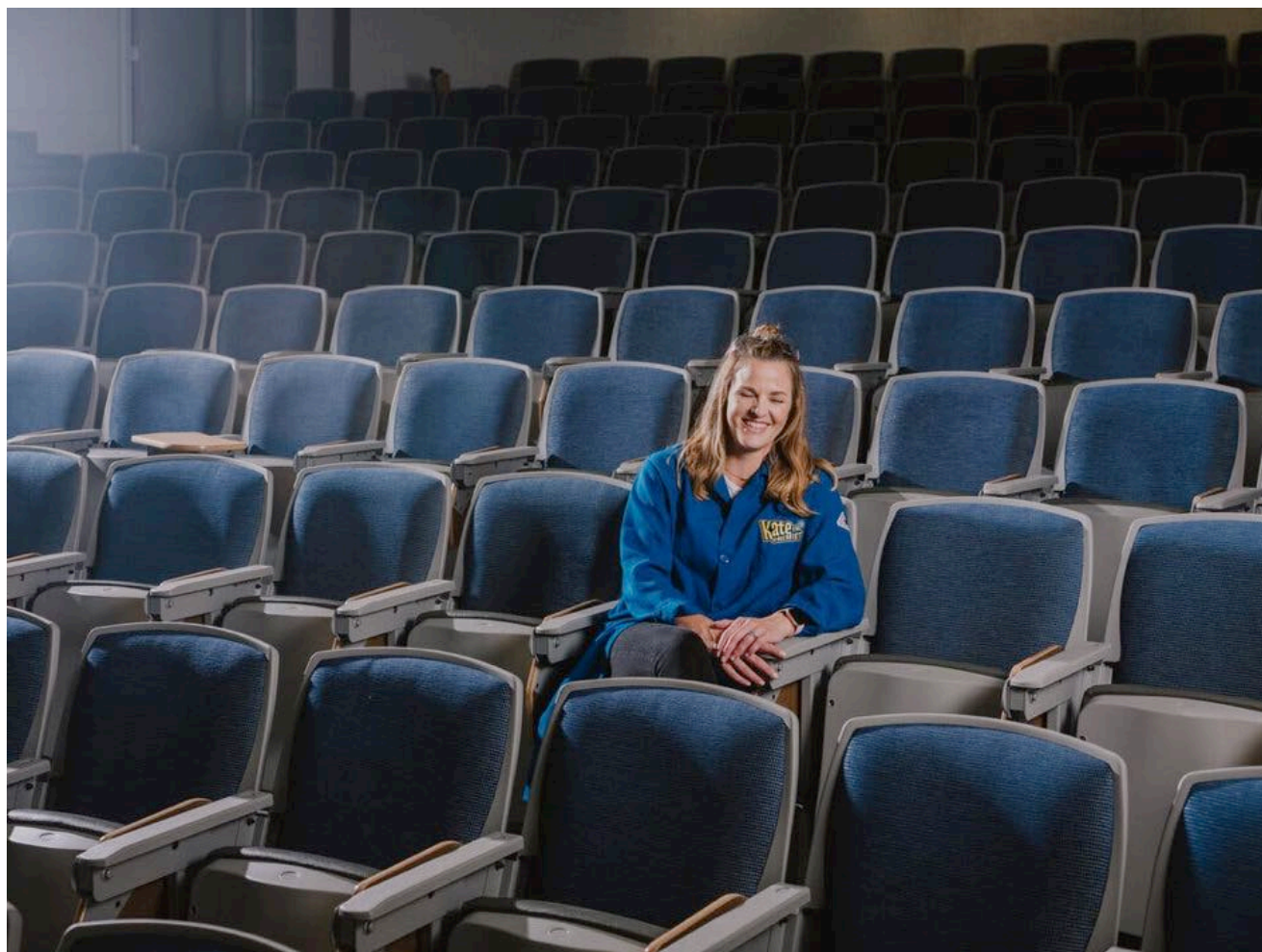
Mr. Schwartz, who is now Dr. Biberdorf’s manager, said she possessed a winning mix of credentials and personality. Although there are many people posting science videos on YouTube, “Kate was obviously different,” he said.

He added, “The thing about being on TV is that you can’t teach somebody to be likable.”

Bill Nye the Science Guy does not mind sharing the science television spotlight. “Kate is going to be Kate, and Bill is going to be Bill,” he said in an interview.

Mr. Nye said their goals were the same: to intrigue children in science. “It’s the people who are watching us that we want to succeed and change the world,” he said.

(Mr. Nye is still on television, too. His latest series, “The End Is Nye,” premieres on the Peacock streaming service on Aug. 25.)



Though she does not have her Vegas shows yet, Dr. Biberdorf is planning to take a road tour of chemistry demonstrations across the country next year. Christopher Lee for The New York Times

Science on television has required a sort of research very different from the Suzuki-Miyaura coupling experiments Dr. Biberdorf used to undertake. For example, she had to figure out how to blow up a cake on “The Wendy Williams Show” last year to celebrate the host’s birthday.

For safety, fire, the usual sorts of explosives and toxic chemicals were not allowed in the studio.

“So what did I do?” she said. “I took liquid nitrogen, put it in a soda bottle and put it in a thing, and it exploded that way. Which is a bomb. But they don’t know that. So we just didn’t use that terminology. I said it’s vapor pressure. But it’s a way to spin that, right? You have to figure out how to say things so you don’t scare people.”

After a year and a half of remote teaching because of the pandemic, she returned to the lecture hall in the spring semester. “We’re able to talk a little bit about how Covid tests work,” she said. “There’s a lot of real-world applications.”

She is planning a road tour of chemistry shows next year, conducting her experiments and science entertainment at performing arts centers across the country.

“We’re just trying to figure out the logistics right now,” she said. For a demonstration like the exploding birthday cake, “How do I get that from place to place?” she wondered. “Am I rebuilding my exploding birthday cake every time, or what can I reuse?”

If the whiz-bang of the shows can intrigue audiences, she hopes people might delve into her books, where she can provide more detailed explanations and still make chemistry interesting to people not yet familiar with the jargon.

“I use as many analogies as I possibly can,” she said. “I talked about Ryan Reynolds and Blake Lively’s marriage as a way to explain double replacement reactions. And so that’s something that works for my age group. Maybe there are people that don’t know what I’m talking about, but it’s a way to hook the millennials and then Gen Z hopefully, because we need more scientists.”

She does not have her Vegas show yet, she said, but, “we have some connections with Penn & Teller.” (The magician duo, Penn Jillette and Teller, are also clients of Mr. Schwartz.)

“Maybe,” Dr. Biberdorf mused, “I can kind of sneak in there somehow and do something fun with them.”

Kenneth Chang has been at The Times since 2000, writing about physics, geology, chemistry, and the planets. Before becoming a science writer, he was a graduate student whose research involved the control of chaos. @kchangnyt

A version of this article appears in print on , Section D, Page 1 of the New York edition with the headline: Kate the Chemist’s Explosive Ambitions