Researchers make space for queer-spectrum identities in scientific surveys

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To improve STEM classes, educators must understand STEM students and their experiences. Collecting data by asking the right questions is the first critical step toward creating positive change, two Colorado State

University researchers say in a new study.

In the study, published in *PLOS ONE*, Aramati Casper and Becki Atadero expose the cisgender and heterosexual bias in standard survey practices. They recommend a more inclusive method that will allow scientists to collect data representing all people and better serve all students.

"Queer-spectrum students are a population that experiences harm from our current systems on a daily basis," said Casper, a research scientist in civil and environmental engineering whose work focuses on integrating social justice, equity, diversity and inclusion into STEM classes. "Learning about these students' experiences is really important to help create systemic change."

An unintended study

Casper and Atadero, an associate professor in civil and environmental engineering, didn't set out to overhaul survey standards. As part of a larger study to improve STEM education, they were surveying engineering and computer science students at four institutions when Casper challenged one of the questions on the survey.

The demographic question asked students to self-identify as man, woman or "other." This question is standard practice for collecting gender information, but it is often offensive to those with gender identities outside the binary man and woman categories.

Casper, who is a non-binary/genderqueer lesbian, tried to find best practices for an inclusive way to collect gender information, but their search came up short.

"What I thought was going to be an afternoon of looking through peer-

reviewed literature or other resources to find best practices led to us developing our own," said Casper, who also teaches biology and conducts ecology research at CSU.

Casper developed two queer-inclusive demographic questions and administered them as part of the survey of 3,698 undergraduate students. The study tested three survey types for gender—conventional, queer-inclusive and open-ended—to determine which method gathered the best data.

The researchers found that offering multiple queer-identity options prompted the most response from students disclosing queer identities. Significantly fewer students shared queer genders in response to the conventional (male, female, other) question, and the open-ended option, where students could write in a response, had the lowest response rate.

The study also tested a survey question for sexual, romantic and related orientations. This question is not commonly included in demographic surveys, but some students have offered feedback that their queer-orientation identities influenced their academic experiences.

Casper and Atadero's study is one of the first to differentiate between queer gender identities and queer sexual, romantic and related orientations. They advocate for collecting data on both when asking for demographic information because, "they're different identities and relate to different parts of people's experiences," Casper said.

Identity can be hard to define

The study acknowledges that collecting reliable data on queer-spectrum individuals can be difficult because of inconsistencies in defining identities. The researchers use "queer" as an umbrella term but note that not all individuals identify with that term.

In addition to offering survey respondents the choice of multiple identities, Casper recommends allowing multiple responses, to give people the opportunity to communicate more nuanced identities. They also suggest asking respondents for input on how their identities could be better represented.

The additional categories and optional feedback may seem like minor changes, but they are meaningful improvements for those who have been excluded in the past and send a message that some people taking the survey are expected to have queer identities.

"We're changing the tone of the survey and giving people the power and agency to help make this better," Casper said.

Serving all students

The study found queer students were underrepresented in engineering and computer science programs relative to national data, a finding confirmed by other recent studies published since Casper and Atadero wrote their paper. The CSU study cites two nationwide polls in which nearly one-fifth of respondents disclosed having some kind of queer-spectrum identity.

Casper and Atadero said collecting this demographic data is integral to effectively supporting and educating students.

"It's important to understand our students and serve our students," Atadero said. "We need to know who's there and how they're experiencing the STEM classroom. We need to know how our classrooms and curriculum affect everybody, not just the average student."

An invitation

Some of Casper's colleagues expressed interest in using the study's recommendations, so these have been published as a two-page supplement. Casper includes their contact information in the supplement and invites other researchers to collaborate on implementing and refining best practices.

More information: A. M. Aramati Casper et al, Revealing the queer-spectrum in STEM through robust demographic data collection in undergraduate engineering and computer science courses at four institutions, *PLOS ONE* (2022). DOI: 10.1371/journal.pone.0264267

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