

DIVERSITY, EQUITY, AND INCLUSION INITIATIVES INVENTORY FOR INTRODUCTORY COLLEGE STATISTICS COURSES

Kirsten Doehler and Heather Barker
Elon University, USA
kdoehler@elon.edu

Statistics instructors have a unique opportunity to engage students in work around Diversity, Equity, and Inclusion (DEI) because there is a plethora of data that can be investigated. An online survey was administered to investigate how introductory college statistics faculty are using DEI topics. Approximately 300 participants reflected on their institution's priorities related to DEI as well as constraints they face in incorporating DEI-based statistics activities. Preliminary results show that the primary constraints that prevent instructors from incorporating DEI-related activities are lack of resources and time and concern about student discomfort. Additional results and findings will be shared. Because there has not been a survey of this nature, these results will be useful as a metric for the inclusion of DEI into introductory statistics classes.

INTRODUCTION

There are limited examples in the statistics education literature that showcase how activities related to Diversity, Equity, and Inclusion (DEI) have been incorporated into statistics coursework (DiPietro, 2009; Doehler & Taylor, 2018; Esfandiari, 2018; Lesser, 2007; Warner, 2019). In order to investigate faculty sentiment regarding the importance of DEI in the introductory statistics curriculum and DEI initiatives among these instructors, an inventory was developed and administered, with over 300 responses. Some study participants strongly support the infusion of DEI-related activities into introductory statistics classes, which is exemplified by the following quote from a participant:

You know that achieving the full potential of all your talents is a strategic imperative—research has repeatedly shown that diverse teams drive better business performance. More diverse companies are more innovative, resilient, and better able to cope with complex challenges.

Although many instructors support efforts to add DEI-based curriculum to the introductory statistics curriculum, there are numerous constraints that prevent this from happening. One study participant states, “It's difficult enough to make students feel more comfortable in a mathematics classroom without adding socially controversial material.”

Instructors of introductory statistics courses may have a large amount of statistical training, but most are not experts in critical race theory or other DEI-related topics. Lesser (2007) provides a thorough review of the state of teaching statistics for social justice with descriptive examples of the inclusion of such topics in specific statistics domains. Lesser (2007) warns statistics faculty of avoiding these topics or falsely assuming that other departments are doing this work:

A different type of detachment in academic settings occurs when faculty in multiple departments separately assume they may delegate teaching critical thinking, social justice, or any other interdisciplinary theme or skill to some unidentified “other department.” The result of this, of course, is often that no one does it. (p. 12)

Since the release of Lesser (2007), there have been many more statistics faculty sharing resources among each other, although an updated paper similar to Lesser's has not been published. This led us to create the inventory in this study to determine if statistics faculty have heeded his warning and taken up the task of including topics around diversity, equity, and inclusion into their courses. Because introductory college statistics and data science courses are often required in many majors and taught by a diverse group of faculty, we decided to focus our inventory questions around those courses.

Specific information about the inventory is in the following section of the paper. There is a section related to demographic information on survey respondents and inventory results, which includes information on the proportion of instructors that have included DEI elements into the introductory statistics curriculum and challenges of doing so. The Conclusion section of the paper provides some final comments and future research directions.

DIVERSITY, EQUITY, AND INCLUSION INVENTORY

The Diversity, Equity, and Inclusion Initiatives inventory was developed to gather information from instructors of college level introductory statistics courses. The inventory included five sections (see Figure 1). [The length of the inventory prohibits us from sharing it in its entirety, but we will share it upon request.] The first section asked demographic questions about the instructor and their institution. The next section asked instructors to describe what topics they currently include in their introductory statistics course. This second section included question items about goals from the College GAISE report (ASA Revision Committee, 2016) and DEI topics they currently address. The third section included questions about constraints they may have faced in trying to include DEI topics. Next, participants were asked about personal and institutional beliefs about infusing DEI into introductory statistics curriculum. Finally, participants were asked about their experience with professional development around these topics. The inventory was created in consultation with faculty who are part of the Center for Race, Ethnicity, and Diversity Education (CREDE) on our campus.

To be eligible to take the survey, participants had to indicate that they had taught introductory statistics courses at the college level. The inventory was administered between late August and mid-October 2021 under approval of the Institutional Review Board at our university.

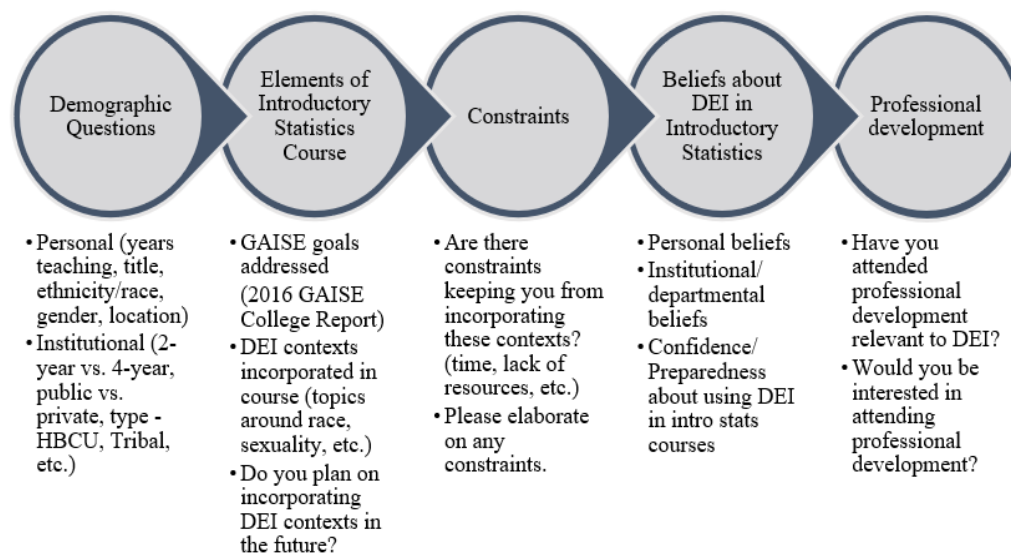


Figure 1. Diversity, equity, and inclusion initiatives inventory layout

DEMOGRAPHICS OF RESPONDENTS

The survey was distributed to several email listservs that are known to host statistics instructors such as the ones associated with the Statistics and Data Science Education section of the American Statistical Association and the Consortium for the Advancement of Undergraduate Statistics Education. There were 298 participants that completed the survey. Though initial survey invitations were sent to institutions or organizations in the United States, six countries and 40 states within the United States (including Washington, D.C.) are represented. Table 1 displays select demographics of participants.

RESULTS

The results of participant responses to questions about the inclusion of DEI into the introductory statistics classes they teach will be shared in this paper. Specifically, the answers to the following two items will be shared, as well as a breakdown of responses by identity where applicable. Note there are many more items to analyze and share. Those results will be shared in later papers.

1. Have you incorporated activities that focus on diversity, equity, and inclusion (DEI) in your introductory statistics classes?
2. Are there any constraints that you can identify which keep you from adding DEI-based lessons, data sets, or discussions to your introductory statistics courses?

Table 1. Demographics of survey participants

	Count	Percent		Count	Percent
Gender identity			Institution Type		
Man	137	46.0	Public 4-year	168	56.4
Woman	150	50.3	Private 4-year	74	24.8
Non binary/third gender	4	1.3	2-year institution	53	17.8
Race*			Institution Identifier*		
White	173	58.0	Historically Black College/University	45	15.1
Black or African American	50	16.8	Tribal College/University	39	13.1
American-Indian/ Alaskan Native	36	12.1	Liberal Arts	124	41.6
Native Hawaiian/ Pacific Islander	23	7.7	Women's College/University	47	15.8
Asian	21	10.6	Military Institution	14	4.7
			R1 (high research)	35	11.7
Job Title					
Adjunct Professor	23	7.7	Full Professor	81	27.2
Assistant Professor	56	18.8	Lecturer/Teaching Professor	67	22.5
Associate Professor	59	19.8	Graduate Student	7	2.35

Note: A * denotes a category where participants could choose multiple answers. Also, categories that do not sum to 100% included an "other" choice not shown here.

All 298 participants responded to question 1 above. Of those 298, 229 (76.8%) responded yes and 69 (23.1%) responded no. At least 50% of respondents across all job types indicated they had incorporated DEI activities into their classes, except for graduate students (three had while four had not). Interestingly, assistant and associate professors were more likely to have incorporated DEI activities (82.1% and 83.1% respectively) compared to full professors (74.1%). When broken down by race, White participants were less likely to have incorporated DEI activities (71.7%) compared to the other races. All other race categories had at least 80% of participants indicate they had incorporated DEI activities, with the Native Hawaiian/Other Pacific Islander category having the highest percent (95.7%). The gender categories of man and woman had almost no difference in incorporating DEI activities (76.6% and 76.7% respectively), while those identifying non-binary or third gender (four participants) all indicated that they had included DEI activities into their instruction.

Respondents were asked whether there are any constraints that prevent them from adding DEI-based lessons, data sets, or discussions to their introductory statistics courses. This question item had six possible constraints listed (with instructions to check all that applied) and an option to select if the instructor has no constraints. There were 292 people that answered the question regarding constraints, and only 23 respondents (7.9%) chose "I do not feel any constraints on incorporating DEI activities into my courses." There were 91 (31.2%) respondents who chose only one constraint and 178 (61.0%) who chose more than one constraint. Lack of resources (55%), constraints on time (47.6%), and concerns about making students feel uncomfortable (41.8%) were the constraints chosen the most often. Lack of confidence to carry out DEI-based activities (26.0%), concern about own personal comfort levels (23.6%), and departmental or institutional constraints (20.2%) were chosen the least often.

Participants were asked an open-ended follow-up question that allowed them to elaborate on any of the constraints. Regarding concerns about student discomfort, one participant stated "I like to stay in safe territory topic-wise. I don't want to offend students or make them feel uncomfortable." When elaborating on lack of resources and time, one participant stated,

I am open to including as many initiatives related to DEI in my course, but I find that there are [not] very [many] materials or activities designed for this, and it is difficult to work them in given the breadth of information that I need to cover in my courses.

Another participant stated, “As a white male, I often lack confidence to dive deep into issues facing race and gender (though I still do it).”

There were also some negative responses about this work. One participant shared the following: “I think that what you are doing is terrible. This 'woke' BS came from the social 'sciences'. Keep it there. We don't want this BS in STEM.” Another participant stated:

Truly, diversity and equity and inclusion can all be a part of a mathematics classroom, but a pointed program to address it generally makes things worse. In my opinion, it's similar to XXX's quote: ‘How are we going to get rid of racism? Stop talking about it.’

CONCLUSION

By analyzing results from the DEI Initiatives Inventory, we have begun investigating how likely instructors of introductory statistics coursework are to incorporate DEI activities into their courses. We acknowledge limitations to this survey, especially those that arise with response bias. Participants that may have strong opinions (positive or negative) about the inclusion of DEI may have been more likely to respond. Also, we had about 450 responses, but only 298 that completed the survey.

The results support the concern from Lesser (2007) that instructors may not feel that they are the ones that should be doing the work of incorporating critical thinking about diversity, equity, and inclusion topics into their coursework. Lesser (2007) states that “[t]he very skills of data analysis, data interpretation, and questioning of assumptions that statisticians teach make them as strong a candidate as any to take significant ownership or leadership in this area” (p. 11). We strongly support this opinion as well and were pleased to learn that the majority of respondents (76.8%) are already doing this work in their courses.

Inventory results indicate that there is a demand for information on how to successfully infuse DEI into the statistics curriculum. This is supported by a survey item that asked respondents how interested they would be in attending a workshop related to infusing DEI-based activities into an introductory statistics course or other statistics course. There were 290 responses to this question, and of these, 266 (91.7%) were either somewhat interested or very interested in attending a DEI-based workshop. Perhaps this is not surprising considering the most common constraint faced to including DEI-based materials in introductory statistics is a lack of resources.

Future research dissemination will share the findings of all the parts of the inventory. It is our hope that these results will help inform curriculum advances and professional development efforts around the inclusion of DEI in introductory statistics courses.

REFERENCES

- DiPietro, M. (2009). Diversity content as a gateway to deeper learning: The statistics of sexual orientation. *Diversity and Democracy Periodicals*, 12(3) 12–13.
- Doehler, K., & Taylor, L. (2018). Diversity-related projects in an introductory statistics course. In M. A. Sorto, A. White, & L. Guyot (Eds.), *Looking back, looking forward. Proceedings of the Tenth International Conference on Teaching Statistics (ICOTS10, July 2018), Kyoto, Japan*. ISI/IASE. http://iase-web.org/icots/10/proceedings/pdfs/ICOTS10_C240.pdf?1531364323
- Esfandiari, M. (2018). Statistics: A window to understanding diversity. In M. A. Sorto, A. White, & L. Guyot (Eds.), *Looking back, looking forward. Proceedings of the Tenth International Conference on Teaching Statistics (ICOTS10, July 2018), Kyoto, Japan*. ISI/IASE. https://iase-web.org/icots/10/proceedings/pdfs/ICOTS10_C117.pdf?1531364317
- GAISE College Report ASA Revision Committee. (2016). *Guidelines for assessment and instruction in statistics education college report 2016*. https://www.amstat.org/docs/default-source/amstat-documents/gaisecollege_full.pdf
- Lesser, L. M. (2007). Critical values and transforming data: Teaching statistics with social justice. *Journal of Statistics Education*, 15(1). <https://doi.org/10.1080/10691898.2007.11889454>
- Warner, J. (2019). The brokenness of broken windows: An introductory statistics project on race, policing, and criminal justice. *PRIMUS*, 29(3–4), 281–299. <https://doi.org/10.1080/10511970.2018.1456498>