



I-SOMADS

Start of Block: required_masder_consent

masder_consent **Title of research study:** Developing Validated Instruments to Measure Student/Faculty Attitudes in Undergraduate Statistics and Data Science Education **IRB #:** IRB-FY2025-79 **Investigator:** Michael A. Posner, Professor of Statistics and Data Science, michael.posner@villanova.edu, 610-519-3016 **Key Information:** This study involves research and is voluntary. You can stop at any time without penalty. **Purpose of the Research:** We are gathering data on attitudes toward data science. We are interested in (1) what these attitudes are, and (2) how attitudes relate to student and instructor characteristics and classroom environment. The following survey asks demographic information and about your attitudes towards teaching data science. The long term goal of this research is to improve instruction in data science courses. **Procedures:** The entire survey should take about 15 minutes to complete. We request that you complete every item, but you are not required to do so. Your survey responses may be linked with other data collected as a part of this study. You have been asked to give us your name and email address. The purpose is to verify your participation in this study, and to link your survey responses with any other responses you complete as part of this project. A dataset that excludes all personal identifying information will be made publicly available for educational researchers. The study investigator may grant access to approved researchers to use identifiable data for validated studies after a Data Use Agreement has been signed. **Risks / Discomforts:** This study is educational research and does not have any known associated risks. **Benefits to Prospective Subjects and/or to Others:** By filling out this survey, you may be better able to identify your feelings toward teaching data science. Your responses may also aid data science education researchers in improving instruction in data science courses. For Villanova-specific resources and other mental health resources, visit the Villanova IRB website. To view these online, navigate to irb.villanova.edu and click "Participating in a Research Study." As a participant in research, you have rights. Visit the Villanova IRB website to read the Participant Bill of Rights. To read online, navigate to



irb.villanova.edu and click "Participating in a Research Study." **Consent will be given through clicking "I accept" on Qualtrics surveys, by selecting one of the following options:** I have read and understand the terms and conditions of this research study and agree to participate. I understand my participation is voluntary and that I may withdraw at any time without penalty. By clicking "yes" I am indicating my permission to participate in this study.

- ☐ Yes: I agree to participate. (1)
- ☐ No: I do not agree to participate. (2)

End of Block: required_masder_consent

Start of Block: required_constrcuts

construct_directions

Directions The statements below are designed to identify your attitudes about **teaching undergraduate-level introductory data science**. Each item has 7 possible responses. The responses range from "Strongly Disagree" through "Neither Agree Nor Disagree" to "Strongly Agree". Please read each statement. Mark the ONE response that most clearly represents your degree of agreement or disagreement with that statement. Try not to think too deeply about each response. Record your answer and move quickly to the next item. Please respond to all of the statements.





Items

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree Nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
Being a good data science teacher is important to my sense of self. (id_attain_1)	☐	☐	☐	☐	☐	☐	☐
I would feel respected if my colleagues came to me for advice about teaching data science. (id_attain_2)	☐	☐	☐	☐	☐	☐	☐
Positive feedback about my teaching from students is important to me. (id_attain_3)	☐	☐	☐	☐	☐	☐	☐
Positive feedback about my teaching from my colleagues is important to me. (id_attain_4)	☐	☐	☐	☐	☐	☐	☐
Teaching data science is a crucial part of my identity. (id_attain_5)	☐	☐	☐	☐	☐	☐	☐
Teaching data science is a part of who I am. (id_attain_6)	☐	☐	☐	☐	☐	☐	☐
Being an exceptional data science teacher is my aspiration.	☐	☐	☐	☐	☐	☐	☐



(id_attain_7)

I get anxious when I think about teaching data science. (id_cost_1)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Finding real-world examples/data is too time consuming. (id_cost_2)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

I prioritize other work tasks over teaching data science. (id_cost_3)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Teaching data science is rewarding. (id_cost_4)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Teaching data science makes me feel insecure. (id_cost_5)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Teaching data science well takes too much time away from personal priorities. (id_cost_6)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Teaching can be emotionally draining for me. (id_costgenteach_1)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Being a good teacher requires sacrificing other parts of my job. (id_costgenteach_2)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Teaching well is too time consuming. (id_costgenteach_3)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------



Teaching well is exhausting. (id_costgenteach_4)	☐	☐	☐	☐	☐	☐	☐
It takes too much effort to teach well. (id_costgenteach_5)	☐	☐	☐	☐	☐	☐	☐
My personal life suffers from my job as a teacher. (id_costgenteach_6)	☐	☐	☐	☐	☐	☐	☐
It is challenging to teach data science. (id_difficulty_1)	☐	☐	☐	☐	☐	☐	☐
Getting students to develop statistical thinking is difficult. (id_difficulty_2)	☐	☐	☐	☐	☐	☐	☐
Teaching data science well takes a lot of hard work. (id_difficulty_3)	☐	☐	☐	☐	☐	☐	☐
Teaching data science is hard for a new instructor. (id_difficulty_4)	☐	☐	☐	☐	☐	☐	☐
It is easy to teach data science well. (id_difficulty_5)	☐	☐	☐	☐	☐	☐	☐
It is easier to teach data science well compared to other courses. (id_difficulty_6)	☐	☐	☐	☐	☐	☐	☐



Getting students to develop computational/algorithmic thinking is difficult.
(id_difficulty_7)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

I am good at clearly explaining difficult data science concepts.
(id_teachsc_1)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

When I teach data science, I create an environment where students are encouraged to ask questions.
(id_teachsc_2)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

If I cannot explain a data science concept well, I find different ways and try again. (id_teachsc_3)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

I create multiple ways to engage students in class.
(id_teachsc_4)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

I am able to modify my data science teaching when the need arises.
(id_teachsc_5)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Teaching comes naturally to me.
(id_teachsc_6)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

I can teach students how to identify appropriate data science techniques.

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------



(id_expectancy_1)

I am confident in my ability to help students learn data science.

(id_expectancy_2)

I can teach students how to explain results that use data. (id_expectancy_3)

I struggle when teaching others difficult data science concepts.

(id_expectancy_4)

I am confident in my ability to teach students to make their code run efficiently.

(id_expectancy_5)

I am confident in my ability to teach students to create appropriate data visualizations.

(id_expectancy_6)

I can teach students to transform data into the necessary structure for a specific task.

(id_expectancy_7)

I struggle to teach students how to read external data from various formats.

(id_expectancy_8)

☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐



Teaching data science ethics is very challenging for me.

(id_expectancy_9)

Being a good data science teacher helps me achieve my career goals.

(id_goals_1)

I am only teaching data science because it is part of my job. (id_goals_2)

I want to win an award for teaching data science. (id_goals_3)

Teaching data science is very satisfying to me.

(id_goals_4)

Positive feedback about my teaching is important to me. (id_goals_5)

I became a teacher because it is fulfilling. (id_goalsgenteach_1)

It is important to me to be a good teacher.

(id_goalsgenteach_2)

Teaching is satisfying. (id_goalsgenteach_3)

I feel successful when my students succeed.

☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐



(id_goalsgenteach_4)

I want to teach well so
that my students do well.
(id_goalsgenteach_5)

Teaching data science is
boring. (id_intenj_1)

I find it exciting to be part
of a young, growing field.
(id_intenj_2)

I have minimal interest in
teaching data science.
(id_intenj_3)

There are courses I
would much rather teach
than data science.
(id_intenj_4)

Teaching data science is
exciting for me.
(id_intenj_5)

I dread teaching data
science. (id_intenj_6)

I teach data science to
help students engage our
data-driven world.
(id_utilitystud_1)

Teaching data science
helps students make
informed decisions.
(id_utilitystud_2)

☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐
☐	☐	☐	☐	☐	☐	☐



Teaching data science helps students become critical thinkers.
(id_utilitystud_3)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

I teach data science to prepare students for successful careers.
(id_utilitystud_4)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Teaching data science is my way of contributing to society. (id_utilityinstr_1)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

The only reason I teach data science is to make a living. (id_utilityinstr_2)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Teaching data science makes me better at doing data science.
(id_utilityinstr_3)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

Teaching data science helps me achieve my goals. (id_utilityinstr_4)

☐	☐	☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------



id_global_1

	Strongly Disagree (1)	Somewhat disagree (2)	Neither agree nor disagree (3)	Somewhat agree (4)	Strongly agree (5)
Teaching data science requires me to constantly learn new skills. (1)	☐	☐	☐	☐	☐

End of Block: required_constructs

Start of Block: required_demographics



gender What gender do you identify with?

- ☐ Woman (1)
 - ☐ Man (2)
 - ☐ Non-binary (3)
 - ☐ Prefer not to disclose. (4)
 - ☐ Prefer to self-describe: (5)
-



race What is your race, ethnicity, or origin? Select all that apply.

- ☐ **White:** German, Irish, English, French, etc. (1)
- ☐ **Black or African-American:** African American, Haitian, Nigerian, etc. (2)
- ☐ **Hispanic, Latino or Spanish origin:** Mexican, Mexican American, Puerto Rican, Cuban, Argentinean, Dominican, Salvadoran, Spaniard, etc. (3)
- ☐ **Middle Eastern or North African:** Lebanese, Egyptian, Turkish, Iranian, etc. (9)
- ☐ **American Indian or Alaskan Native:** Navajo, Mayan, Tlingit, etc. (4)
- ☐ **Asian:** Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, Hmong, Laotian, Thai, Pakistani, Cambodian, etc. (5)
- ☐ **Native Hawaiian or Pacific Islander:** Native Hawaiian, Guamanian, Samoan, Fijian, etc. (6)
- ☐ **Some other race or origin:** Provide race(s) or origin(s) below. (7)

- ☐ **Prefer not to answer** (8)



teaching_language What is your level of fluency for the language in which you typically teach?

- ☐ I am a native. (1)
 - ☐ I am fluent, but not a native. (2)
 - ☐ I am proficient. (3)
 - ☐ I am conversant at an intermediate level. (4)
 - ☐ I have only basic or little knowledge. (5)
 - ☐ I have no knowledge. (6)
-

teach_level At what level do you teach?

- ☐ Post-Secondary Level (College/University) (1)
- ☐ Secondary Level (High School) (2)
- ☐ Both (3)
- ☐ Other (4) _____

Skip To: degree If At what level do you teach? = Secondary Level (High School)



job_instructions The following are questions about your post-secondary teaching role. For these questions, when asked about your job, please answer reflecting a typical year. (Ignoring sabbaticals, leaves of absence, etc.).



rank Recognizing that titles vary greatly across institution, which of the following **best** describes your academic rank?

- ☐ Graduate student (1)
 - ☐ Post-doc (2)
 - ☐ First rank (e.g., lecturer, assistant professor, etc.) (3)
 - ☐ Second rank (e.g., associate professor, etc.) (4)
 - ☐ Third rank (e.g., senior lecturer, full professor, etc.) (5)
 - ☐ Retired (Answer the following questions reflecting the position from which you retired.) (6)
 - ☐ Adjunct (7)
 - ☐ Other (8) _____
-





teaching_research Which of the following best describes your job responsibilities?

- ☐ Teaching-focused with no research obligations (1)
 - ☐ Teaching-focused with some research obligations (2)
 - ☐ A roughly equal balance of teaching and research (3)
 - ☐ Research focused with some teaching obligations (4)
 - ☐ Research focused with no teaching obligations (5)
 - ☐ Other (6) _____
-

full_time Is your current position full-time or part-time?

- ☐ Full-time (1)
 - ☐ Part-time (2)
 - ☐ Other (3) _____
-





tenure Are you, or have you ever been, tenured?

- ☐ Tenured (currently or previously) (1)
- ☐ Tenure track, but not tenured (2)
- ☐ Not on the tenure track, and I have never been tenured (3)
- ☐ Tenure is not available at my institution (4)
- ☐ Other (5) _____





dept Identify the discipline names that best describe the department in which you have your primary appointment. Select all that apply. (For example if you are in the “Department of Statistics and Data Science”, choose “Statistics” and “Data Science”.)

- ☐ Statistics / Biostatistics (1)
- ☐ Computer Science (4)
- ☐ Data Science (5)
- ☐ Business Analytics (12)
- ☐ Mathematics (3)
- ☐ Psychology (6)
- ☐ Education (7)
- ☐ Business (excluding analytics) / Economics / Finance (8)
- ☐ Health / Life Sciences (including nursing, pre-med, pre-vet, etc.) (9)
- ☐ Computer Engineering (10)
- ☐ Other Engineering (2)
- ☐ Other (11) _____



Page Break



degree Indicate the degree(s) which you have earned. Select all that apply.

- ☐ Undergraduate/Bachelors (1)
- ☐ Masters (2)
- ☐ Ph.D. (3)
- ☐ Other (4) _____

Display this question:

If Indicate the degree(s) which you have earned. Select all that apply. = Undergraduate/Bachelors

bach_field_study Pick the field of study that **best** describes your first undergraduate/bachelors degree.

Field of Study Choices (1)

▼ Statistics or Biostatistics (1) ... Other (Please Specify) (42)

Display this question:

If Pick the field of study that best describes your first undergraduate/bachelors degree. = Other (Please Specify)

bach_field_study_oth Please specify the field for your first undergraduate/bachelors degree.



Display this question:

If Indicate the degree(s) which you have earned. Select all that apply. = Masters

mast_field_study Pick the field of study that **best** describes your first masters degree.
Field of Study Choices (1)

▼ Computer Science (1) ... Other (Please Specify) (40)

Display this question:

If Pick the field of study that best describes your first masters degree. = Other (Please Specify)

mast_field_study_oth Please specify the field for your first masters degree.

Display this question:

If Indicate the degree(s) which you have earned. Select all that apply. = Ph.D.

doc_field_study Pick the field that **best** describes your first doctorate degree.
Field of Study Choices (1)

▼ Computer Science (1) ... Other (Please Specify) (40)



Display this question:

If Pick the field that best describes your first doctorate degree. = Other (Please Specify)

doc_field_study_oth Please specify the field for your first doctorate degree.

add_field_study Additional degree(s) & field(s) of study not given above.



years_teach Prior to this semester/term, how many years have you been teaching the following at the undergraduate or equivalent level?

	I have never taught this class. (1)	Less than 1 (2)	1-2 (3)	3-5 (4)	6-10 (5)	11-20 (6)	Over 20 (7)
Any Subject (4)	☐	☐	☐	☐	☐	☐	☐
Statistics (1)	☐	☐	☐	☐	☐	☐	☐
Computer Science (2)	☐	☐	☐	☐	☐	☐	☐
Data Science (3)	☐	☐	☐	☐	☐	☐	☐



ta How many times have you been a teaching assistant for each of the following undergraduate classes?

	Never (1)	1 (2)	2-3 (3)	4-9 (4)	10 or more (5)
Statistics (1)	☐	☐	☐	☐	☐
Computer Science (4)	☐	☐	☐	☐	☐
Data Science (2)	☐	☐	☐	☐	☐

beyond_intro How many courses beyond the introductory level have you taken and completed as a **student**?

	None (1)	1-2 (2)	3-4 (3)	5-10 (4)	11 or more (5)
Statistics (1)	☐	☐	☐	☐	☐
Computer Science (2)	☐	☐	☐	☐	☐
Data Science (3)	☐	☐	☐	☐	☐



data_scientist Mark the response that most clearly represents your degree of agreement or disagreement with the statement.

	Strongly Disagree (1)	Disagree (2)	Somewhat Disagree (3)	Neither Agree Nor Disagree (4)	Somewhat Agree (5)	Agree (6)	Strongly Agree (7)
I am a data scientist. (1)	☐	☐	☐	☐	☐	☐	☐

data_analysis Typically, how often do you analyze data outside of courses that you teach (e.g., in your own research, consulting, etc.)?

- ☐ Never (1)
- ☐ Not more than once a year (2)
- ☐ A few times per year (3)
- ☐ I always have a data analysis project I am working on. (4)



Display this question:

*If Typically, how often do you analyze data outside of courses that you teach (e.g., in your own res...
!= Never*



what_ds_analysis What data science techniques have you used outside of courses that you teach (e.g., in your own research, consulting, etc.)? Select all that apply.

- ☐ Text mining (1)
 - ☐ Decision trees / Random forests (2)
 - ☐ Neural networks (3)
 - ☐ Deep learning (4)
 - ☐ Cluster analysis (6)
 - ☐ Classification techniques (7)
 - ☐ Regression techniques (8)
 - ☐ Natural language processing (9)
 - ☐ Data visualization (10)
 - ☐ Big data / Cloud computing (12)
 - ☐ Other (11) _____
-



ds_info Where do you get information about data science when you are stuck? Select all that apply.

- ☐ Nowhere (1)
 - ☐ Blogs (2)
 - ☐ Academic Journal Articles (3)
 - ☐ Online Search (4)
 - ☐ Textbook (5)
 - ☐ Other Faculty (6)
 - ☐ Other (7) _____
-



learn_ds_skills Since obtaining your highest degree, how have you learned the **skills** needed to do data science? Select all that apply.

- ☐ I haven't learned anything new. (1)
 - ☐ Formal course or certification (e.g., university course, MOOC, Coursera, etc.) (2)
 - ☐ Short course / Workshop / Conference (9)
 - ☐ Colleague (5)
 - ☐ Formal project / Consulting (3)
 - ☐ Informal project / Just for fun (8)
 - ☐ Textbook / Internet (4)
 - ☐ Other (7) _____
-



arti_conf Over the past five years, in what ways, if any, have you participated in learning about **data science education**? Select all that apply.

- ☐ I read books and/or articles about data science education. (1)
 - ☐ I attend conference sessions about data science education. (2)
 - ☐ I attend workshops about teaching data science. (3)
 - ☐ No, I do not do any of these things. (6)
-



leadership In the past five years, in what ways, if any, do you participate in **leadership in data science education** in your professional community? Select all that apply.

- ☐ I publish or referee articles about data science education. (1)
 - ☐ I organize and/or lead data science education workshops or conference sessions. (2)
 - ☐ I present about data science education at conferences. (3)
 - ☐ I serve on a data science education committee, editorial board, etc. (4)
 - ☐ I produce learning materials used by other data science educators. (5)
 - ☐ I have not participated in leadership in data science education in the last five years. (6)
 - ☐ Other (please explain) (7)
-

End of Block: required_demographics
