2025 Survey on Teachers' Use of Generative AI in Math and Science Instruction (TAI0425T)

Technical Document

Introduction

The 2025 Survey on Teachers' Use of Generative AI in Math and Science Instruction (TAI0425T) was fielded on behalf of University of Washington by the RAND American Educator Panels. The project utilized the American Educator Panels (AEP) to field surveys to samples of teachers (American Teacher Panel, or ATP) about generative AI usage in math and science instructions. The Principal Investigator for this project is Min Sun of University of Washington.

The ATP is a nationally representative panel of public K-12 teachers recruited through probability-based methods from a commercially available list of U.S. public school teachers. The sampling frame for recruiting teachers to the panel was acquired from MDR Education. It is intended to be as comprehensive as possible, yet likely underrepresents new teachers, or experienced teachers new to a school or district.[1] The ATP began in 2014 and currently includes roughly 25,000 teachers. Teachers recruited to the ATP have agreed to participate in online surveys several times per school year and receive incentives for completing surveys. The ATP can produce national estimates as well as state-level estimates in about 25 oversampled states. Survey data files conducted with the ATP are weighted to state and national teacher characteristics to account for differences in sampling and response to ensure they are representative of the target population.

[1] For more information on the creation of the panels, see Robbins, M. and Grant, D. (2020). RAND American Educator Panels Technical Description. Santa Monica, Calif.: RAND Corporation. As of March 30, 2020: www.rand.org/t/rr3104

All AEP surveys are conducted online and in English. More information about the panels is available at https://www.rand.org/aep.html.

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This summary document provides an overview of the 2025 Survey on Teachers' Use of Generative AI in Math and Science Instruction and includes the following sections:

- Survey Summary
- Field Dates and Response
- Sample Design
- Weights

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TAI0425T Survey Summary

The ATP Survey, TAI0425T, was administered to a nationally representative sample of 1st – 12th grade mathematics and science teachers. The total target was 1,000 completed surveys. The survey sought to examine mathematics and science teachers' usage of generative AI in instruction and instruction planning, and sought to learn more about how Generative AI tools have influenced teaching experience and student learning experiences.

Field Dates and Response

ATP invitations were sent to a sample of 2,223 teachers. The initial invitation was sent April 3, 2025. Table 1 shows the distribution of emails sent at each contact. During the field period, 1,016 teachers fully completed the survey, while another 44 teachers partially completed the survey. There were 11 sampled teachers who were screened out as ineligible to complete the survey, and an additional 14 completed responses were deemed ineligible during data cleaning. After excluding these cases, a total of 979 cases received a weight. The completion rate for this survey was 44.5%. More information on the sample and weighting are provided in the last section of this document.

Table 1. Survey Outreach schedule

Contact	Date of contact	Number of Emails sent
Invitation	April 30, 2025	2,219
1st reminder	May 06, 2025	1,536
2nd reminder	May 08, 2025	1,357
3rd Reminder	May 15, 2025	1,246

Sample Design

The TAI0425T sample was designed to be nationally representative of grade 1-12 grade public school mathematics and science teachers during the 2024-25 school year with the goal of completing 1,000 surveys. Based on past panel performance, a 45% completion rate was expected. The teacher survey sample used grade 1-12 teachers in the American Teacher Panel (ATP) as its sampling frame.

As teachers in the sampling frame were selected with non-equal probabilities, and to avoid extreme design effects in the analytic sample, the sample of teachers was selected using probability sampling so that the final probabilities of selection were similar across participants to produce a sample close to a representative random sample design. With a particular participant i having a probability p_{fi} of being in the sampling frame (a probability estimated via calibration to allow the sampling frame to be similar to the population of teachers and principals) we selected the probability p_{si} of sampling from the frame so that:

$$p_{si}/p_{fi} \approx constant \qquad (1)$$

where the constant is the same across all participants. Even though the strictly equal equation has a unique solution, for some participants especially within small states, the solution can lead to a probability greater than 1 and as such adjustments were made through trimming for all the selection probabilities to be reasonable.

The survey has an approximate measure of error (MOE) of +/- 3.22% with 95% confidence for a binary estimate with a 50% distribution. This MOE is adjusted to account for weighting.

Weights

To provide a weighted sample similar to the population of grade 1-12 public school mathematics and science teachers in the United States, we created weights. The weighting process accounts for the probability of selection into the TAI0425T survey from the teacher panel, the likelihood an invited teacher completes the survey, and these likelihoods are calibrated to reproduce the population distribution of grade 1-12 teachers. This weighting approach is widely used for probability-sample surveys[3] and to adjust for nonresponse,[4] including U.S. Department of Education surveys such as the Teacher Follow-up Survey.[5]

The final analysis weights in the data file are the product of three interim weights:

1. Calibrated weight of the sampling frame – A calibration weight that assigns a weight for each ATP member based on teacher and school characteristics so that the sum of the weights along the calibration factors closely match characteristics of the national population of public school teachers based on the National Center for Education Statistics' (NCES) estimates.
2. Sample selection weight – The inverse of the probability of selection into the survey sample using the ATP as the frame.
3. Survey response weight – The inverse of modeled probability of a teacher completing the survey. The response adjustment is important to eliminate observed sources of response bias.

The products of these weights were subsequently recalibrated and trimmed if necessary. The sampling and weighting approaches were designed to assure a representative sample and limit the size of the design effect. The sampling frame weights (1) were calculated to make the panel match the national population of public school teachers based on the teacher and school characteristics reported in Table 2. The inverse of the selection probabilities p_{si} were used as the sample selection weight (2). The response weights (3) were estimated by modeling the likelihood p_{ri} of a selected participant responding to the survey conditional several teacher and school characteristics. For parsimony, a variable selection method was used to choose the model that best fit the data. The main weight was estimated as the product of the sampling frame calibration weight ($1/p_{fi}$), the sample selection weight ($1/p_{si}$), and the response weight ($1/p_{ri}$):

$$\text{Weight} = (1/p_{fi}) \times (1/p_{si}) \times (1/p_{ri})$$

Because there is no guarantee this main weight will sum to the total population of interest, this main weight was calibrated once more by stratum to the population of grade 1-12 public school teachers in the United States within each stratum to obtain the final weight. If some of these final weights were extreme, a trimming process (at the 95th percentile) was used to reduce the outliers and the trimmed weights were re-allocated for the population totals to remain the same after trimming.

Table 2 summarizes the estimates for standard teacher and school ATP variables, which were the variables used for calibration.

Table 2: Teachers: Unweighted, Weighted, and Population Estimates for Calibration VariablesVariable	Unweighted [CI]	Weighted [CI]	Population
School Level			
Elementary	52.7 [49.6, 55.8]	50.3 [47.0, 53.5]	50.2
Middle	20.9 [18.4, 23.5]	20.3 [17.7, 22.9]	20.5
High	26.4 [23.6, 29.1]	29.4 [26.4, 32.4]	29.4
School Size			
Small	28.6 [25.8, 31.4]	29.7 [26.7, 32.6]	29.7
Large	71.4 [68.6, 74.2]	70.3 [67.4, 73.3]	70.3
School Locale			
Suburban	37.9 [34.9, 40.9]	38.9 [35.7, 42.0]	39.0
Town/Rural	32.0 [29.0, 34.9]	31.1 [28.1, 34.1]	31.1
Urban	30.1 [27.3, 33.0]	30.0 [27.1, 33.0]	30.0
School Percent Minority			
0-50%	49.1 [46.0, 52.3]	45.4 [42.2, 48.6]	45.2
50-100%	50.9 [47.7, 54.0]	54.6 [51.4, 57.8]	54.8
School Neighborhood Poverty			
IPR 0 to 200 (High Poverty)	12.5 [10.4, 14.5]	14.9 [12.4, 17.3]	15.0
IPR 201 to 400	56.6 [53.5, 59.7]	54.5 [51.3, 57.7]	54.3
IPR 401 to 999 (Low Poverty)	30.9 [28.0, 33.9]	30.6 [27.7, 33.6]	30.6
Teacher Gender			
Female	76.8 [74.2, 79.5]	75.2 [72.3, 78.0]	75.2
Male	23.2 [20.5, 25.8]	24.8 [22.0, 27.7]	24.8
Teacher Race			
Black	5.5 [4.1, 6.9]	8.2 [6.1, 10.3]	8.6
Hispanic	9.5 [7.7, 11.3]	9.6 [7.7, 11.5]	9.6
White	76.7 [74.1, 79.4]	75.0 [72.1, 77.9]	74.7
Other	8.3 [6.5, 10.0]	7.2 [5.6, 8.8]	7.2
Teacher Experience			
Less than 10 years	28.4 [25.6, 31.2]	34.2 [31.0, 37.4]	34.5
10 years or more	71.6 [68.8, 74.4]	65.8 [62.6, 69.0]	65.5

NOTE: Population data for teachers are from the NCES National Teacher and Principal Survey (NTPS 2020-2021), school characteristics are from the NCES Common Core of Data (CCD 2023-2024). and school neighborhood poverty estimates are from the U.S. Department of Education (2021-2022).