

ASPECT

Assessing Students' Progress on the Energy Concept

Field Test Summary

Spring 2021 & 2022

Introduction

The assessment tasks developed as part of the Assessing Students' Progress on the Energy Concept were field tested with students from across the U.S. This document describes the field-testing process and summarizes the demographic information of the students who participated.

FIELD TESTING

Designing the tests

Because 3D tasks require a significant amount of time for students to answer and scorers to score, we designed field test instruments that limit the number of 3D tasks to three and then combine those 3D tasks with DCI-focused, multiple-choice items. The goal was to design a test that would allow students to reveal their 3D understanding but only require one class period to complete. Each field test form was composed of three 3D tasks and a set of 15 DCI-focused, multiple-choice items. The DCI-focused, multiple-choice items were drawn from an existing item bank that assesses energy disciplinary core ideas at the elementary, middle, and high school levels (Herrmann-Abell & DeBoer, 2018). The DCI-focused items were selected to cover the DCIs targeted by the 3D tasks and to span a wide range of difficulties. Included among those 15 DCI-focused multiple-choice items were several items that all test forms had in common so that the data could be combined into one data set for the Rasch analysis.

We developed a total of 14 test forms. Two versions of each form were used. One version was the inverse of the other so that tasks and items that appeared at the end of one version were at the beginning of the other version. Test forms for elementary students included the elementary and middle school tasks, but not the high school tasks. Test forms for middle and high school students included all the tasks, elementary through high school.

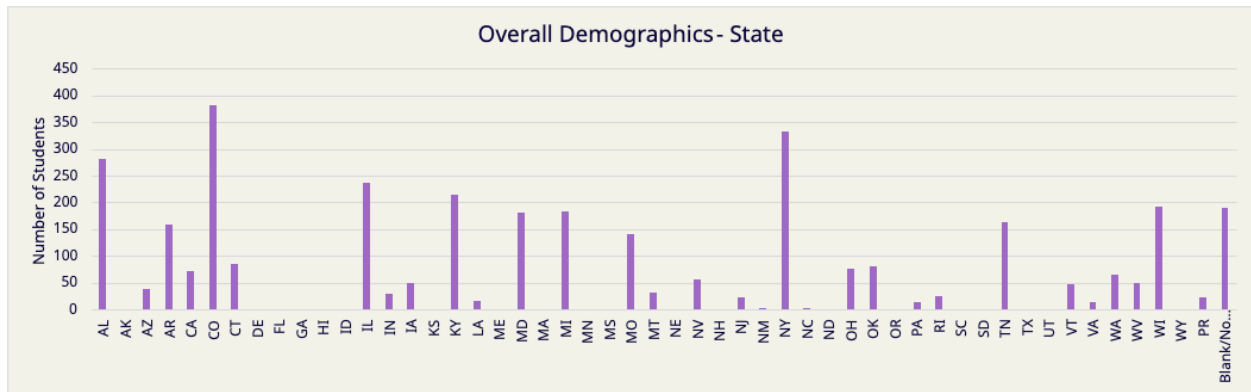
Administrating the tests

The field test was administered using an online assessment utility in the spring of 2021 and 2022. Teachers were sent login tickets that contained a login ID and the URL address to one test form and a script to read to their students that explained the purpose of the project and provided instructions on how to take the test. Teachers were instructed to randomly distribute the login tickets to their students and to give the students one class period to complete the test. On average, 196 students responded to each task.

STUDENT DEMOGRAPHICS

Across the two testing windows, 3446 students participated in the field testing. In 2021, 2,058 students in grades 4 through 12 in the classrooms of 50 teachers from 27 states across the U.S. participated. In 2022, 1,388 students in grades 4 through 12 in the classrooms of 44 teachers from 16 states and Puerto Rico participated. Students were presented an optional set of demographic questions at the beginning of the test. The tables and graphs that follow provide information about the student demographics.

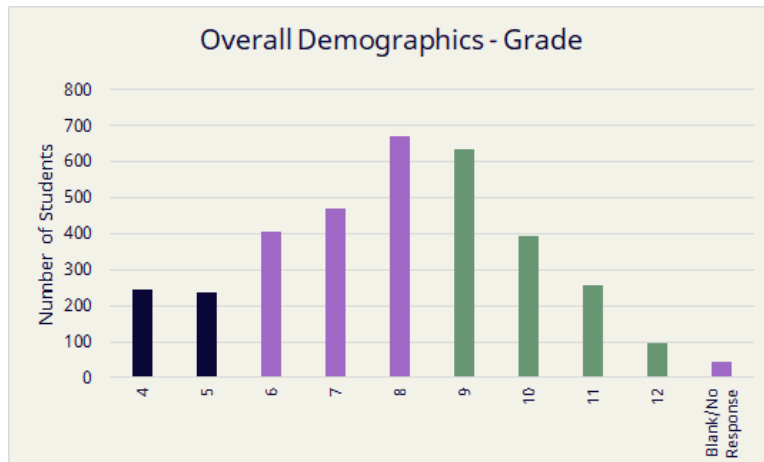
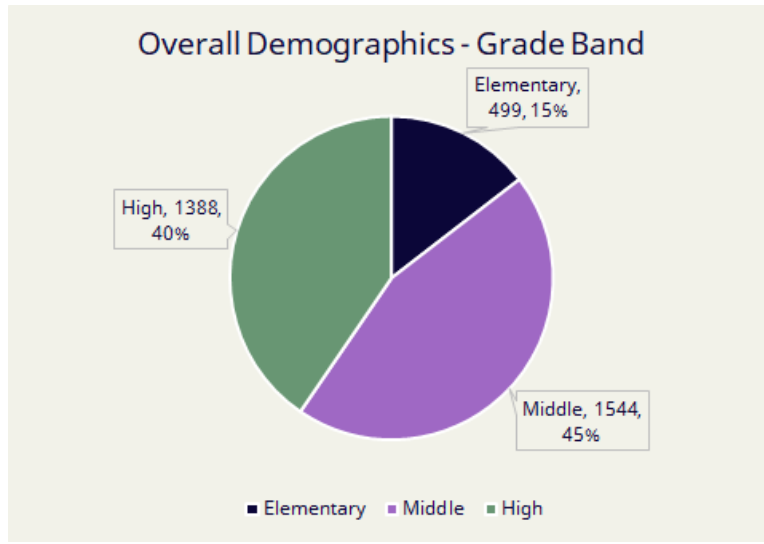
State



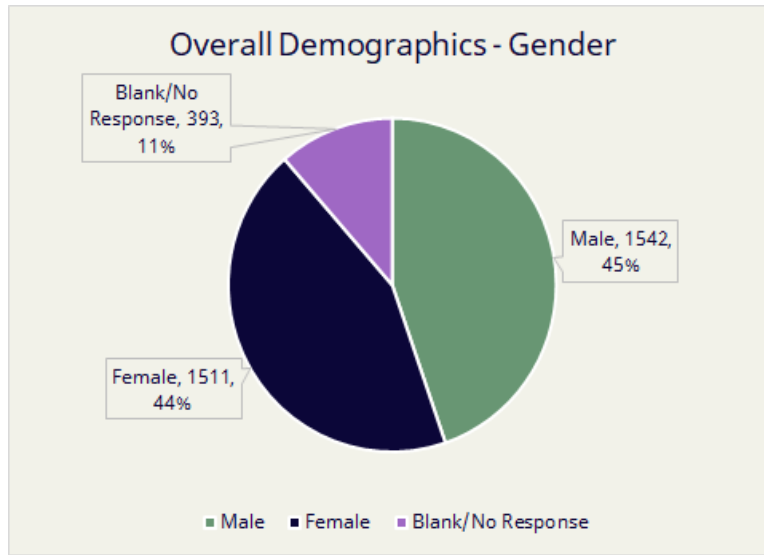
Breakdown by State

State	%	n	State	%	n	State	%	n
AL	8%	280	MD	5%	181	PA	0.4%	13
AZ	1%	39	MI	5%	183	RI	1%	25
AR	5%	158	MO	4%	141	TN	5%	163
CA	2%	72	MT	1%	31	VT	1%	47
CO	11%	382	NV	2%	55	VA	0.4%	13
CT	2%	84	NJ	1%	23	WA	2%	65
IL	7%	236	NM	0.1%	3	WV	1%	50
IN	1%	29	NY	10%	333	WI	6%	192
IA	1%	49	NC	0.1%	3	PR	1%	22
KY	6%	214	OH	2%	75			
LA	0.5%	16	OK	2%	80			

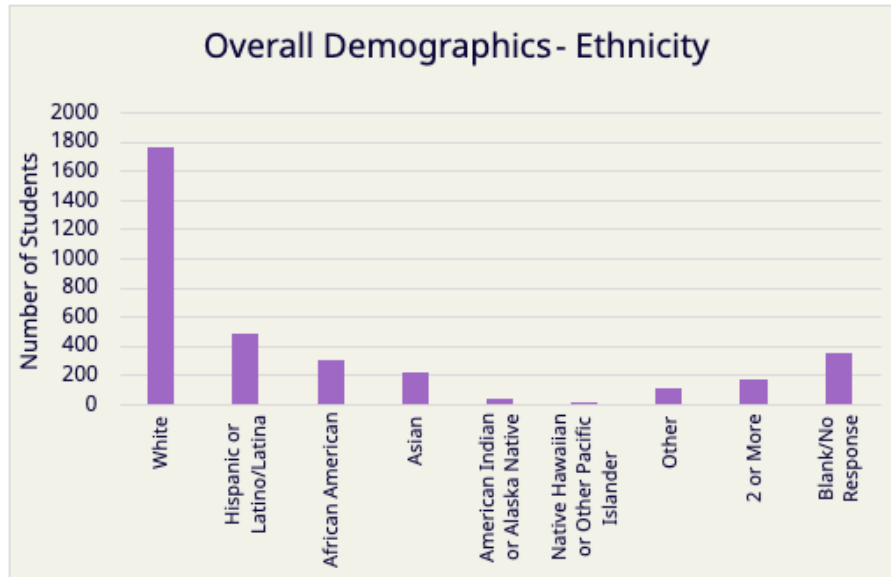
Grade band



Gender



Race/Ethnicity

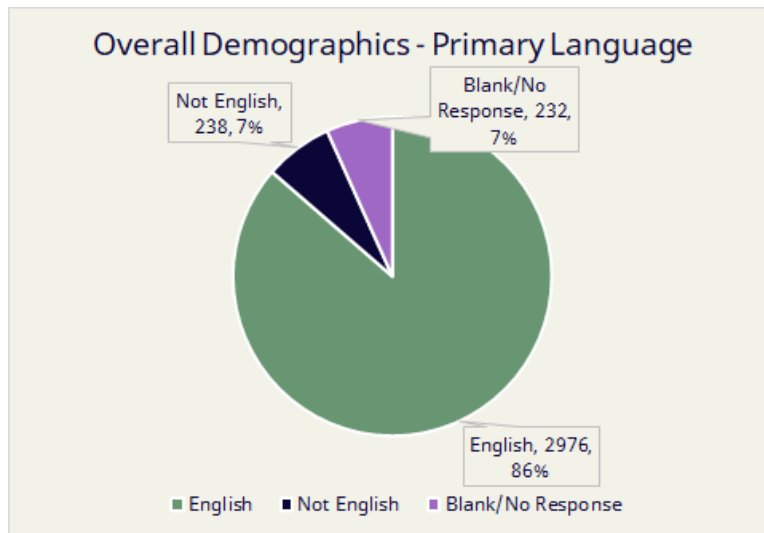


Breakdown by Race/Ethnicity

	White	Hispanic or Latino/Latina	African American	Asian	American Indian or Alaska Native	Native Hawaiian or Other Pacific Islander	Other	2 or More	Blank/No Response
%	51%	14%	9%	6%	1%	0.3%	3%	5%	10%

n	1766	479	303	216	36	12	114	169	351
---	------	-----	-----	-----	----	----	-----	-----	-----

Primary Language



The research reported here was supported by the Institute of Education Sciences, U.S. Department of Education, through Grant R305A180512 to BSCS Science Learning. The opinions expressed are those of the authors and do not represent views of the Institute or the U.S. Department of Education.

