

**At or Above *Proficient*: The Reporting of NAEP Results in the Internet Age**<sup>1,2</sup>

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<sup>2</sup> Center for Educational Assessment Report No. 710. Amherst, MA: University of Massachusetts, Center for Educational Assessment.

## Introduction

Score reporting is among the most challenging aspects of test development facing testing agencies today. In many ways, it is no longer enough to have a psychometrically sound instrument that provides a valid and reliable measure of student proficiency, nor is summarily labeling test performance with a single scale score satisfactory: stakeholders crave context for the score test-takers obtain, connecting back to the purpose of the test (Ryan, 2006). Context can mean many things, depending on the purpose of the test and the intended users of the data, but includes (and is not limited to) comparison to/between reference groups, diagnostic performance data at the subdomain or perhaps even item level, narrative descriptions of strengths and weaknesses, and/or performance level descriptions that elaborate on what examinees at different proficiency levels know and can do.

In addition, how people access information about tests is changing, and the direction of change is toward online reporting. To be certain, score reports that provide information about individual test-taker performance are in many cases sent by mail, but more and more testing agencies are offering examinees the option of seeing scores immediately after completion of a test (for computer-administered exams) and/or online access to scores at a later date. For reporting in aggregate about how schools, districts, states, and countries perform on educational tests, which is the focus of this paper, while agencies commonly share results and other materials with the broadcast and printed media, these testing programs are also developing and maintaining increasingly extensive web sites to report on test performance which users can access at their convenience (Knupp & Ansley, 2008). The web sites for large-scale educational assessments generally include content that is results-oriented as well as other information about a testing program (technical documentation, policies, released test items, etc.). Though it is

common for results be presented as static displays (text, charts, and graphs), communicating test data over the Internet also has given testing agencies the opportunity to fundamentally change how score reporting occurs by developing interactive, web-based tools that give intended users of test score data the flexibility to explore results corresponding to their own interests.

Such is the case for the National Assessment of Educational Progress (NAEP), as NAEP's presence on the Internet is evolving and expanding steadily. While the web is not the only means by which NAEP results are being disseminated to NAEP's audiences, the increasingly key role of the NAEP website as a source for quick access to information about NAEP is unsurprising in today's world. Much information about the NAEP testing program, including multiple years' worth of results for a number of content areas including core subjects such as Mathematics and Reading, is currently available on the NAEP website hosted by the National Center for Education Statistics (NCES) within the U.S. Department of Education's Institute of Education Sciences (IES) (<http://nces.ed.gov/nationsreportcard/>).<sup>3</sup> Via this website, users have the opportunity to access a considerable amount of information on NAEP, from executive summaries of results and interactive tools to more general policy information about the NAEP program and the content of the assessments.

The purpose of this paper is to provide a brief overview of the web-based score reporting practices used by the National Assessment of Educational Progress (NAEP), as an example of the Internet as a score reporting (and test information) medium. For states and other groups involved in reporting the results of large-scale educational tests, NAEP's reporting efforts serve as an example of the kinds of materials that testing programs can make available, and the ways in

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<sup>3</sup> In addition, there is also a separate, dedicated web site created for the initial release of NAEP assessment results that is targeted to the broad public audience (<http://www.nationsreportcard.gov>). As the content of that site largely mirrors that of the main NAEP website, this review focuses on the [nces.ed.gov/nationsreportcard](http://nces.ed.gov/nationsreportcard) site.

which test data and information can be shared in an online setting. Stakeholders interested in NAEP data can get access to a wide range of information, and in the following sections, we provide an overview of the information included in NAEP's web presence with respect to both content and format. These topic areas discussed are 1) the NAEP homepage, 2) interactive/media tools, 3) static, data-oriented web pages, and 4) programmatic/informational web pages. For each grouping, we offer some take-home suggestions for testing agencies tasked with developing and maintaining online assessment resources for large-scale tests.

### *The NAEP Homepage*

As mentioned previously, prospective audiences for NAEP results can begin their experience with NAEP at <http://nces.ed.gov/nationsreportcard/>, the NAEP homepage (Figure 1). The banner information at the top and bottom on the page identifies NAEP as a program unit within NCES, which is within the IES, which itself is within the U.S. Department of Education. Turning to the main body of the page, the menus on the left are grouped into "About NAEP" and "Subject Areas". Users seeking information about a specific NAEP content area such as Reading or Civics can use the links in the latter menu to access that content directly, while the "About NAEP" menu is somewhat more varied. It includes links for specific NAEP audiences (parents, researchers, media, and educators). This is itself a major component of NAEP score reporting in that NAEP has been a leader in carrying out research with different stakeholder groups to find out what program materials and results are of interest to each of those groups (Jaeger, 2003; Levine, Rathbun, Selden, & Davis, 1998; Simmons & Mwalimu, 2000; Hambleton & Slater, 1997). In these studies, the researchers involved members of a range of intended audiences for NAEP and asked them to comment on their reporting interests and/or

react to different score reporting displays and materials, to help determine how best to communicate with different users of the data.

Figure 1. The NAEP Homepage (<http://nces.ed.gov/nationsreportcard/>)

The screenshot shows the NAEP homepage with the following elements:

- Header:** ies NATIONAL CENTER FOR EDUCATION STATISTICS, U.S. Department of Education, Institute of Education Sciences. Navigation links: NewsFlash, Staff, Contact, Site Index, Help, KIDS ZONE, NCES, GO.
- Secondary Navigation:** Publications & Products, Surveys & Programs, Data Tools, Tables & Figures, Fast Facts, School, College, & Library Search, Annual Reports, What's New, About Us.
- Main Content Area:**
  - ABOUT NAEP...** (overview, long-term trend, high school transcript study, special studies, selected schools, parents, researchers, media, educators, tech documents)
  - SUBJECT AREAS...** (arts, civics, economics, geography, mathematics, reading, science, u.s. history, writing)
  - Search NAE** (Go)
  - HELP | SITE MAP | CONTACT US | GLOSSARY | NEWSFLASH**
  - SAMPLE QUESTIONS | ANALYZE DATA | STATE PROFILES | PUBLICATIONS**
  - National Assessment of Educational Progress**
  - THE NATION'S REPORT CARD**
  - Thank You, NAEP 2009 Participants!** (with image of a hand writing on a whiteboard)
  - Thank you to the thousands of schools and students across the nation who participated in NAEP 2009! Now that data are in, **preparations for reporting results are underway.**
- INSIDE NAEP** (What Are the Differences Between Main NAEP and Long-Term Trend NAEP?)
  - Data collection for 2009 main NAEP has just been completed, and preparations are underway to release results for the 2008 long-term trend assessment. Although both assess mathematics and reading, there are four main differences—the content assessed, the students selected (sampled), the administration timing, and the results reported. [Learn more!](#)
- NEW & NOTEWORTHY**
  - Explore the [most recent NAEP assessments](#).
  - Save the date! Scheduled for April 13–17, the 2009 AERA/NCME annual meeting is fast approaching. Check out our list of [NAEP-related sessions](#). Beginning April 12, there will also be several NAEP training sessions offered at the conference, so be sure to register soon before they fill up!

*Last updated 05 March 2009 (AA)*

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**NCES Headlines**

- Release of FY 2007 Public Education Finance Data
- Enrollment in Postsecondary Institutions, Fall 2007
- Mini-Digest of Education Statistics, 2008
- After-School Programs in Public Elementary Schools

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[Pubs/Products](#) | [Surveys/Programs](#) | [Data Tools](#) | [Tables/Figures](#) | [FastFacts](#) | [School/LibrarySearch](#) | [Annuals](#) | [What's New](#) | [Kids Zone](#)  
[ied.gov](#) | [Institute of Education Sciences](#) | [NCER](#) | [NCEE](#) | [NCSER](#)

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**ies NATIONAL CENTER FOR EDUCATION STATISTICS** 1990 K Street, NW  
 Washington, DC 20008, USA  
 Phone: (202) 502-7300 ([map](#))

[NewsFlash](#) | [Staff](#) | [Contact](#) | [Site Index](#) | [Help](#) | [RSS](#) | [Privacy Policy](#)

NCES GO

[Statistical Standards](#) | [FedStats.gov](#)

Also in the “About NAEP” menu are links for some of NAEP’s special programs and studies, including long-term trend and the transcript study. Prominently featured here too is a

link to a series of pages with technical documentation of the assessment program (Figure 2). Per the *Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 1999) test developers have a responsibility to make this information available to prospective test users, and this area of the NAEP website illustrates the kind of things that other publishers might consider as ways to make these often complex psychometric details public.

Figure 2. NAEP Technical Documentation on the Web

ABOUT NAEP... SUBJECT AREAS... HELP SITE MAP CONTACT US GLOSSARY NEWSFLASH

SAMPLE QUESTIONS ANALYZE DATA STATE PROFILES PUBLICATIONS

search NAEP go

## NAEP Technical Documentation

The Nation's Report Card (home)

[Table of Contents](#) | [Search Technical Documentation](#) | [References](#)

This section of the NAEP website, technical documentation on the web (TDW), is written for researchers and assumes knowledge of educational measurement and testing. TDW contains information about the technical procedures and methods of NAEP. The TDW site is organized by topic (from Item Development through Analysis and Scaling) with subtopics, including information specific to a particular year or assessment (e.g. 2000–2001, mathematics).

To view one specific topic, select from those below, and follow the internal links. Note that breadcrumb trail navigation keeps track of what you've read. Each page has a link for previewing a printer-friendly version, if you wish to print.

To view all contents currently available on the TDW website in a single display, click on the "Table of Contents" link above. This will direct you to a complete list of all contents, from which you can select, compile, and print.

[Instruments](#)  
[Sample Design](#)  
[Data Collection](#)  
[Processing Assessment Materials](#)  
[Scoring](#)  
[Database](#)  
[Weighting](#)  
[Analysis and Scaling](#)

— More Information —

Read an overview of the [NAEP assessment design](#).

Examine the NAEP [schedule of assessments](#).

Find out about [NAEP state participation](#).

For planning research, find out [what variables are in each dataset](#).

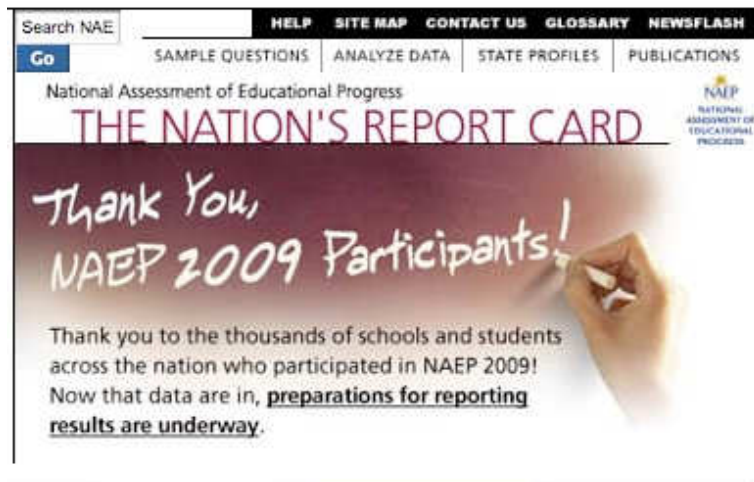
Consult the [glossary of terms](#) used in NAEP technical documentation.

Last updated 10 February 2009 (RF)

[Printer-friendly Version](#)

Returning to Figure 1 and moving to the right from the “About NAEP” and “Subject Areas” menus, the bulk of the area in this boxed-off area of the homepage is used for highlighting NAEP initiatives, programs, or assessments, depending on what is happening with NAEP at any given time. For example, in Figure 3, the news item brings to the attention of site visitors the fact that NAEP 2009 testing was recently completed in schools across the country (with links to details about forthcoming results). At other times, such as when results are released, this area highlights those.

Figure 3. Detail from the NAEP homepage.



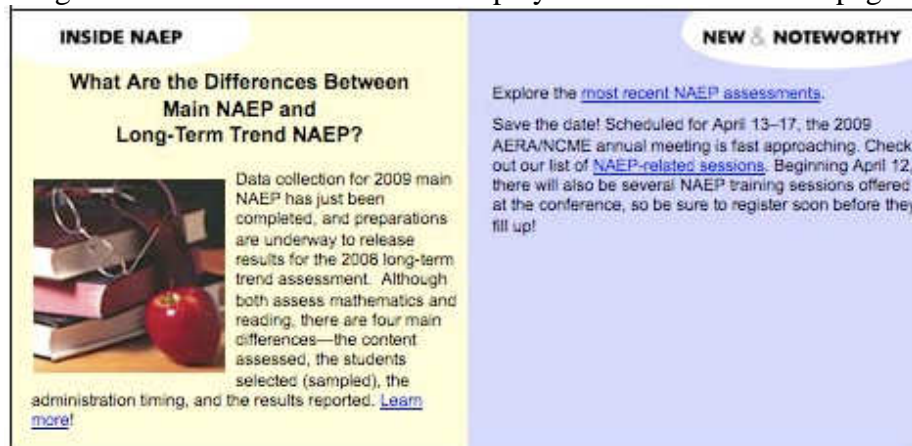
Along the top of Figure 3 are a number of important links in terms of organizing online assessment resources. There is a search function, which allows users to look for information within the NAEP site, and in white text on black buttons are links to help, a site map, contact information for the program, a glossary, and the NAEP newsflash (an email-based news alert system).

The next series of links (Sample Questions, Analyze Data, State Profiles, and Publications) include some of the more particularly unique and exciting aspects of NAEP on the web. In the case of Sample Questions and Analyze Data, those will be discussed in greater detail later in this paper, but the inclusion of these as more or less permanent links on the homepage is

an indication of the extent to which they are important areas of the NAEP web site. The State Profiles link and the Publications link likewise provide visitors with direct links to state-specific information and access to hundreds of downloadable PDFs of NAEP reports and results.

The next area of the NAEP homepage to focus on is the lower half of the page (Figure 4), where information can be rotated in as it becomes newsworthy.

Figure 4. Additional information displayed on the NAEP homepage



Here, as before, visitors are shown more information about topics of current interest to the NAEP assessment program, specifically details about main and long-term trend NAEP, recent results, and NAEP-related sessions at upcoming national educational research conferences.

Overall, the NAEP homepage provides site visitors with a well-organized introduction to the vast quantity of information that is out there about NAEP. In terms of developing online reporting resources, some take-home guidelines for testing programs regarding the homepage of a test and score reporting site are:

- Be aware of your stakeholders and their interests, and build that into the design of the homepage.
- Consider what is important and timely to site visitors, and maintain the homepage accordingly.
- Provide users with clear and direct access to results or information that is in high demand/commonly accessed (for example, Math or Reading results, due to NCLB; or participation guidelines).

- Research with stakeholders can help to inform site design and content to maximize usability: don't be afraid to talk with them and show them mockups!

### *Interactive/media Tools*

Reporting test scores and information on the web allows users to access data on demand, but that is just one benefit of online reporting. In *administering* tests by computer one true advantage of computerized delivery is harnessing the power of the computer to assess knowledge and skills in ways that cannot be done well in other test formats; so too with online *reporting* the opportunity is there to disseminate results with creative and innovative tools. Interactive/media tools are defined by a high degree of user choice in generating what results and/or analyses are called up to be displayed on a page. This includes the use of multimedia and clickable data resources that, for example, might allow users to manipulate the format (tables or graphs), information (scale scores, proficiency levels, percentiles), and type of results displayed (national, state, subgroups, gaps, etc.).

NAEP is a leader in this area. Originally called the NAEP Data Tool, the current version is known as the NAEP Data Explorer (NDE; <http://nces.ed.gov/nationsreportcard/nde/>) and allows users to explore decades' worth of NAEP data from the comfort of their offices or homes, at the click of a mouse. A screen capture of the variable section page is given below in Figure 5. In this case, Grade 8 reading, in several states is selected for analysis, with results being divided for gender.

Figure 5. Example of variable selection with the NDE

ABOUT NAEP... SUBJECT AREAS... HELP SITE MAP CONTACT US GLOSSARY NEWSFLASH

SAMPLE QUESTIONS ANALYZE DATA STATE PROFILES PUBLICATIONS search NAEP go

## NAEP Data Explorer main

National Assessment of Educational Progress (NAEP)

Switch to Advanced Mode View Quick Start intro Select Criteria Go to Results

### Select Criteria

Start over Get help

Select one or more options from each of the categories below. You may follow the numbered steps, or make selections in any order you like. For more information about a category, click on the information symbol (i) next to its name. Quick Start displays the variables available for the most recent year of the subject you have selected.

**1 Grade:**

- Grade 4
- Grade 8
- Grade 12

**2 Subject:**

- Civics
- Economics
- Geography
- U.S. History
- Mathematics
- Math – New Framework
- Reading
- Science
- Writing

**3 Jurisdiction(s):**

- Illinois
- Indiana
- Iowa
- Kansas
- Kentucky
- Louisiana
- Maine
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Mississippi
- Missouri
- Montana
- Nebraska
- Nevada
- New Hampshire
- New Jersey
- New Mexico

**4 Variable(s):**

- Major Reporting Groups
  - All Students (*Overall Results*)
  - Gender
  - Natl School Lunch Prog eligibility (3 categories)
  - Parental education level (from 2 questions)
  - Parental education level (from 2 questions)(2005)
  - Public or nonpublic school (5 categories)
  - Public or private school (2 categories)
  - Race/ethnicity used in NAEP reports after 2001
  - Region of the country (2003 and later)
  - School identified as charter (National Public)
  - School location (2005-06)
  - School location (9 categories) (2005-06)
  - School location, urban-centric (12 categories)
  - School location, urban-centric (4 categories)
  - Student classified as having a disability
  - Student is English Language Learner (2 categories)
  - Student is English Language Learner (3 categories)
  - Gaps and Changes in Gaps

**5 Year(s):** I want to see results for  most recent year only  all years available 14 variables available; 1 selected

What next? Click "Go to Results" to see tables that match your selections.

Switch to Advanced Mode View Quick Start intro Select Criteria Go to Results

Once variables are selected, users can click on “Go to Results” and a table such as that in Figure 6 appears.

Figure 6. Example of NDE results

The screenshot shows the NAEP Data Explorer interface. At the top, there are navigation menus for 'ABOUT NAEP...', 'SUBJECT AREAS...', 'HELP', 'SITE MAP', 'CONTACT US', 'GLOSSARY', and 'NEWSFLASH'. Below these are links for 'SAMPLE QUESTIONS', 'ANALYZE DATA', 'STATE PROFILES', and 'PUBLICATIONS'. A search bar is present with the text 'search NAEP' and a 'go' button. The main title is 'NAEP Data Explorer main' with the subtitle 'National Assessment of Educational Progress (NAEP)'. Below the title, there are buttons for 'Switch to Advanced Mode', 'View Quick Start intro', 'Select Criteria', and 'Go to Results'.

The main content area is titled 'View Results' and includes links for 'Printer-friendly', 'Save HTML / Export To Excel', and 'Get help'. A 'TIPS' icon is also visible. The text below the title reads: 'Here are the results you've selected. From this point, you can view your results as a graphic, check whether differences in the results are statistically significant, view different performance measures, and create cross-tabulations using two variables. Other options are available in the [Advanced mode](#) of the NAEP Data Explorer.'

There are two main sections for user selection:

- 'I want to see results by:' with radio buttons for:
  - average scale score
  - average scale score with percentages
  - average scale score with standard deviation
  - percentages only
  - achievement level (cumulative)
  - achievement level (discrete)** (selected)
  - percentiles
- 'I want results in a:' with radio buttons for:
  - table** (selected)
  - graphic (SVG)
- 'Show me:' with radio buttons for:
  - totals only** (selected)
  - cross-tabulation
- 'Are differences statistically significant?' with a 'Find out' button.

The results section is titled 'Percentages of students at each achievement level for reading, grade 8, Gender [GENDER]: By jurisdiction, 2007'. It contains a table with the following data:

Gender	Year	Jurisdictions	Below Basic	Standard Error	At Basic	Standard Error	At Proficient	Standard Error	At Advanced	Standard Error
Male	2007	Connecticut	26	( 2.0)	43	( 1.8)	29	( 1.9)	3	( 0.5)
		Maine	21	( 1.4)	50	( 2.0)	28	( 1.9)	1	( 0.3)
		Massachusetts	20	( 1.0)	44	( 1.7)	34	( 1.8)	3	( 0.7)
		New Hampshire	23	( 1.5)	46	( 2.2)	29	( 1.7)	2	( 0.4)
		Rhode Island	33	( 1.6)	43	( 1.6)	22	( 1.3)	2	( 0.4)
		Vermont	20	( 1.8)	45	( 1.7)	32	( 1.9)	2	( 0.6)
Female	2007	Connecticut	20	( 1.8)	37	( 1.6)	36	( 1.8)	7	( 0.8)
		Maine	13	( 1.2)	42	( 1.9)	41	( 1.7)	4	( 1.0)
		Massachusetts	12	( 1.2)	38	( 1.9)	44	( 1.9)	6	( 1.1)
		New Hampshire	13	( 1.3)	43	( 1.7)	40	( 2.4)	4	( 0.7)
		Rhode Island	28	( 1.4)	41	( 2.3)	28	( 2.0)	3	( 0.6)
		Vermont	11	( 1.2)	40	( 2.3)	44	( 2.1)	5	( 1.1)

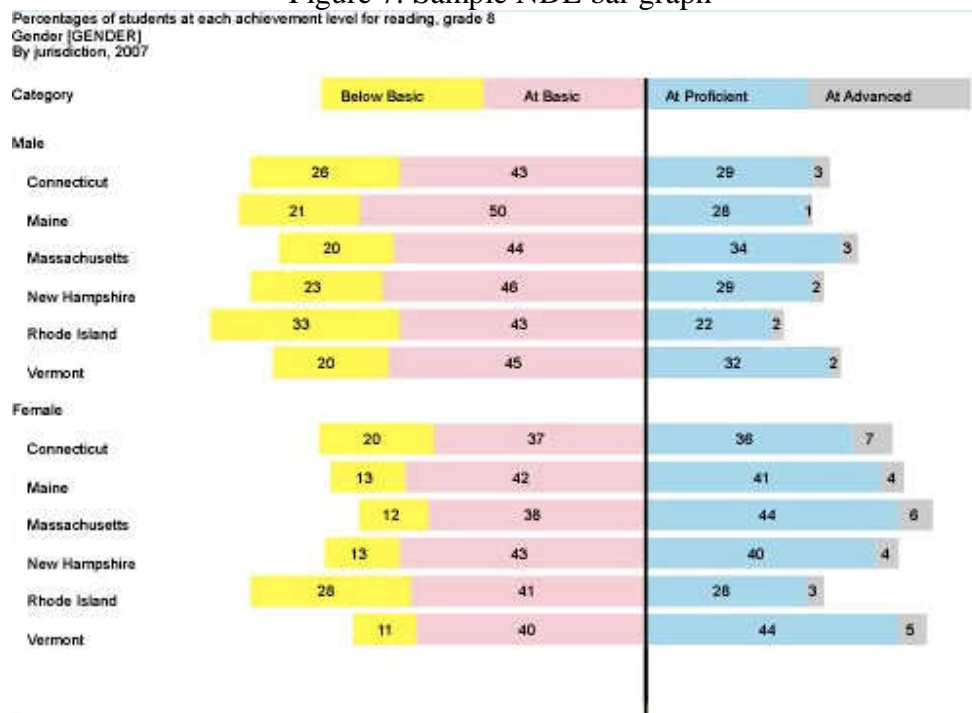
NOTE: Observed differences are not necessarily statistically significant. Detail may not sum to totals because of rounding.  
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2007 Reading Assessment.

At the bottom of the interface, there are buttons for 'Switch to Advanced Mode', 'View Quick Start intro', 'Select Criteria', and 'Go to Results'.

Here, users are afforded a significant amount of autonomy in determining the data and information they are presented with. As NAEP reports both scale scores and achievement levels, users can choose from among multiple ways of representing those data. Information can be structured in tables or graphs as well (an example of an NDE graph is given in Figure 7). The

NDE graphs are similarly interactive, as in the example below the colors of different bars can be changed by clicking on them, and the line of reference moved as desired.

Figure 7. Sample NDE bar graph



There are many more functionalities of the NDE than discussed here, including the capability to carry out tests of statistical significance, regression, and various crosstabs. Ultimately, the NDE is a highly flexible data analysis tool that puts score reporting in the hands of intended audiences.

Another popular interactive tool on the NAEP web site is the NAEP Question Tool (<http://nces.ed.gov/nationsreportcard/itmrls/startsearch.asp>), by which site visitors can access sample questions and other question-level information in all of the NAEP content areas. As before with the NDE, for the Question Tool users begin by selecting a year, a content area, and a grade, then turn to advanced criteria such as content strands, cognitive domains, item difficulty, and item type. In mere seconds, users are presented with a list of NAEP items meeting the criteria in the selection page.

Figure 8. NAEP Question Tool selection page

**Questions Search** Tutorial Tool Help

To search for questions, follow the numbered steps and select one or more options from each of the categories below. For more information about a category, click on the information symbol (i) next to it. Under Advanced Criteria, you will see additional information for the subject you have selected. To restrict your search, click on the checkbox next to the criteria of interest to you. [Read more about NAEP Questions](#), and [view the copyright policy](#).

You must choose one of each assessment type, subject, year, and grade, in order for the advanced criteria selection to appear.

**1 Assessment Type** (i)

Main  Long-Term Trend

**2 Basic Criteria**

<b>Subject</b> (i)	<b>Year(s)</b> (i)
<input checked="" type="radio"/> Civics	<input type="checkbox"/> 1990
<input type="radio"/> Economics	<input type="checkbox"/> 1992
<input type="radio"/> Geography	<input type="checkbox"/> 1994
<input type="radio"/> Mathematics	<input type="checkbox"/> 1996
<input type="radio"/> Reading	<input type="checkbox"/> 1998
<input type="radio"/> Science	<input type="checkbox"/> 2000
<input type="radio"/> U.S. History	<input type="checkbox"/> 2001
<input type="radio"/> Writing	<input type="checkbox"/> 2002
<b>Grade</b> (i)	<input type="checkbox"/> 2003
<input type="checkbox"/> Grade 4	<input type="checkbox"/> 2005
<input type="checkbox"/> Grade 8	<input checked="" type="checkbox"/> 2006
<input checked="" type="checkbox"/> Grade 12	<input type="checkbox"/> 2007

[Select All](#), [Clear All](#)

**3 Advanced Criteria** (i)

Restrict results by selecting from any of the following criteria:

Content Area

All Selected

What Are Civic Life, Politics, and Government?

What Are the Foundations of the American Political System?

How Does the Government Established by the Constitution Embody the Purposes, Values, and Principles of American Democracy?

What is the Relationship of the United States to Other Nations and to World Affairs?

What Are the Roles of Citizens in American Democracy?

Cognitive Domain

Difficulty (i)

All Selected

Easy

Medium

Hard

Type

Reset Show Results

By selecting an item from the resulting list, users are given the text of the item and a wide range of other information (Figure 9). In addition to the item text, other item-level results include how students did on the question (percent in each score category), content classification of the item, how an item is scored (which is particularly useful for polytomous items), examples of student responses, and a distractor analysis.

Figure 9. Sample NAEP Question Tool output

Question Detail [Modify Search](#) [Previous Search Results](#) [Tool Help and Tutorial](#)

← Question 1 of 38 → [Add Question](#)

To Print Folder: Empty

Subject: Civics Grade: 12 Block: 2006-12C5 No.: 1  
Description: Understands sample ballot

[Question](#) [Performance Data](#) [Content Classification](#) [Scoring Guide/Key](#) [Student Responses](#) [More Data](#)

[Printable Version](#) [View Ballot/View Public Question](#)

Open the envelope labeled X that you have been given and remove the sample ballot.

**Questions 1-3** refer to the front of the sample ballot that you have been given.

1. There is one column on the ballot entitled "Nomination by Petition." What can you assume from the presence of this column on the ballot?
  - A) Voters cannot submit petitions directly to the government.
  - B) None of the candidates in this column is likely to receive more than 10 percent of the vote.
  - C) More Independents than Democrats or Republicans wanted to run for President.
  - D) Candidates who are not from major parties but show a certain level of support can get on the ballot.

The third interactive data tool to be described here is the State Comparisons Tool (<http://nces.ed.gov/nationsreportcard/nde/statecomp/>), which gives users the opportunity select variables and carry out state-level comparisons (Figure 10). In this case, the output is a series of tables.

Figure 10. The NAEP State Comparisons Tool variable selection

You can create tables that compare states and jurisdictions based on the average scale scores for selected groups of public school students within a single assessment year, or compare the change in performance between two assessment years. For example:

- See how the average reading score for male students in a particular state compares to the average reading score for male students in other states in 2005, or
- See how the change (from 2002 to the focal year) in reading scores for male students in a particular state compares to the change in reading scores for male students in other states.

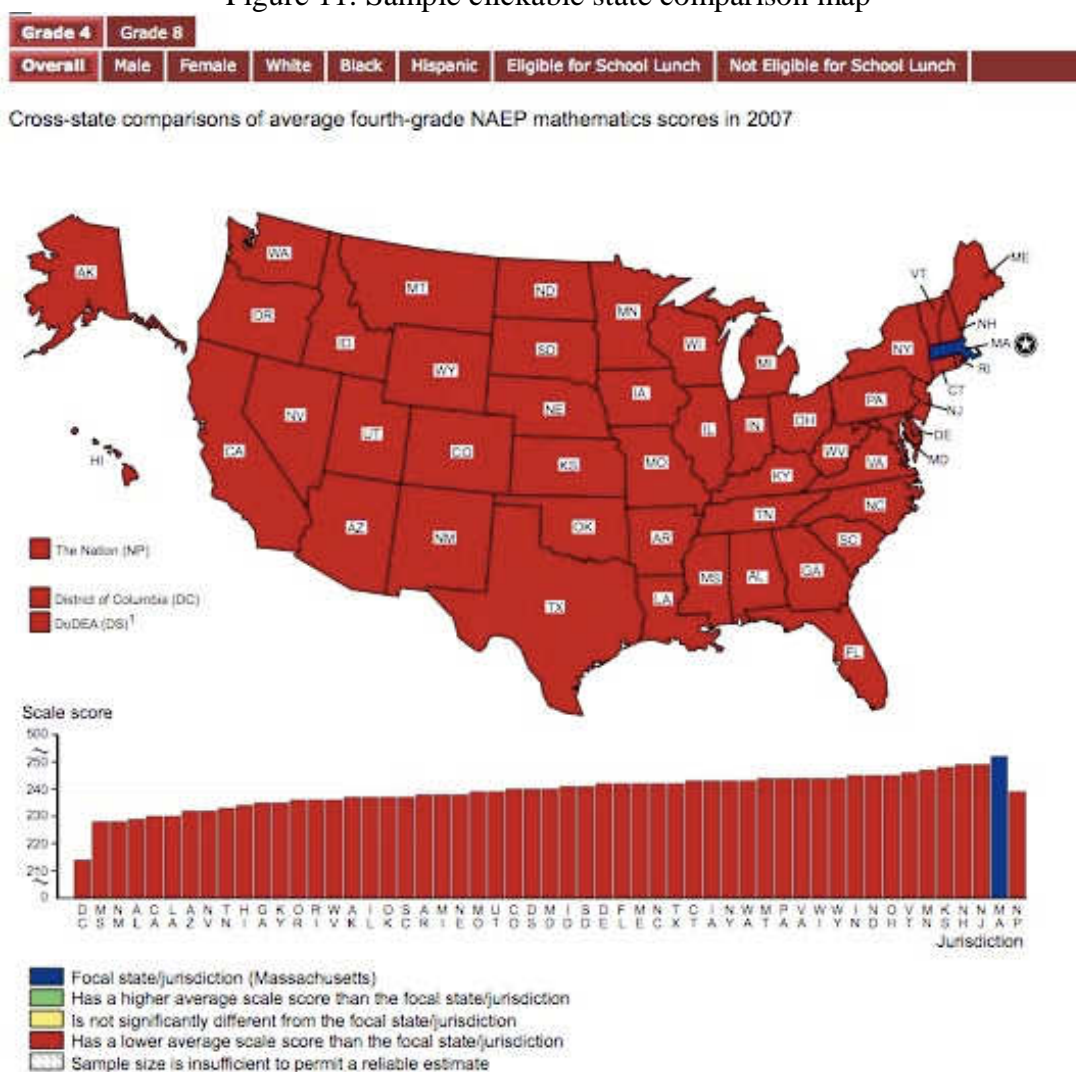
For more information regarding the use of State Comparisons, print a [Quick Reference Guide](#) (355K PDF).

*We need your help to make NAEP State Comparisons better! Please [send us your comments and suggestions](#).*

The last interactive tool to be mentioned here are the clickable state comparison maps, and example of which is given in Figure 11. Here, users are presented with a map of the United States, and can click on a given state or jurisdiction to set it as the reference group. Once done,

all other states change color on the basis of their performance relative to the focal unit. In the example below, Massachusetts fourth-graders scored the highest in the nation in mathematics in 2007, and accordingly all other NAEP assessment units are colored red to indicate that their average scale scores are lower than that of Massachusetts. These comparisons can also be done relative to certain other demographic characteristics (gender, race, school lunch eligibility).

Figure 11. Sample clickable state comparison map



<sup>1</sup> Department of Defense Education Activity (overseas and domestic schools).  
 NOTE: Reported differences are statistically significant at the .05 level. DS is an abbreviation for Department of Defense schools, and NP is an abbreviation for national public schools. View [complete data](#) with standard errors.

The interactive features of the NAEP website are among what makes NAEP a leader in large-scale score reporting, and are absolutely the result of significant investment of time and resources. At the same time, testing agencies can and should consider ways to engage site visitors in terms of data analysis and presentation. Some suggestions for developing interactive reporting features include:

- Look into what others have done, as NAEP is not alone in online reporting: many states and publishers are being very creative in developing online interactive tools.
- As with the homepage, have users articulate their data analysis needs. Is rank-ordering performance key? Or do users who are educators want item-level data to help inform their instructional practices?
- Start with things that are manageable, and look into developing comparatively simple web interfaces and databases that let users select results for a content area, unit of analysis (school, city/town, region/county, state), and perhaps limited demographic characteristics.
- Online reporting doesn't always mean that an online tool carries out the full analysis, as sometimes testing programs make available menu-driven tools that provide site visitors with downloads of data stripped of names for import into external data analysis programs such as SAS, SPSS, or Excel.
- Different users have different capabilities for understanding quantitative data, so look into presenting data in multiple formats when possible (tables, graphs, narrative, etc.).

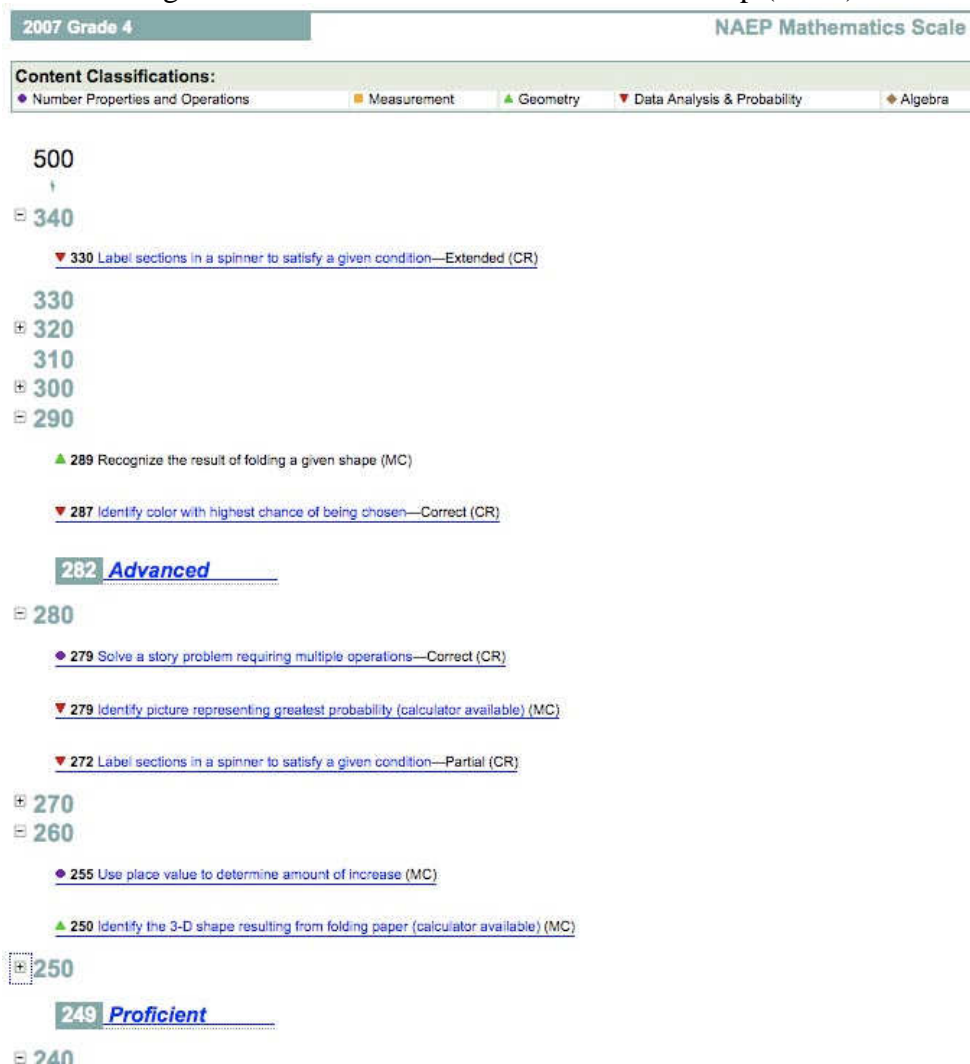
#### *Other Results and Materials for Adding Context to Scores*

Not all online reporting is interactive, nor does it have to be. In many cases, agencies put results on the Internet in structured tables, charts, and/or text formats that website users cannot manipulate, or post links to downloadable PDFs which package information in easy-to-print formats for user review, often in traditional technical report-style layouts with tables of contents. NAEP's static reports for download are called the Report Cards, and are readily available on the NAEP website from within the subject area results or by clicking on the Publications link on the homepage.

One common criticism of testing is that since every test has its own scale (be it 1 to 10, 200 to 800 in increments of 10, 100 to 700, or something else), it can be hard to know what a

particular score on a particular test represents in terms of proficiency. NAEP uses an approach to adding context to its scores called item mapping. In an item map, the difficulty level of the item is used to figure out a point on the NAEP scale where students are more likely to answer it correctly. By repeating this process for a number of items and a range of points on the NAEP scale, people who are interested in NAEP score reporting can see that in 2007, grade 4 students who scored around a 255 on the NAEP scale in mathematics were generally able to answer a multiple-choice question involving using place value to determine the amount of increase correctly (Figure 12).

Figure 12. 2007 Grade 4 mathematics item map (detail)



In some ways, reporting of static results online need not be very different than how such results are reported in traditional paper-based reports. At the same time, score reporting in general has too often been an afterthought to the larger process of test development and maintenance, so ensuring that static results available on the web follow best practices for report development is important (cf., Goodman and Hambleton, 2004, for an overview of principles for report design). Additional suggestions for reporting static results online include:

- Pay attention to the reporting interests of users, as presenting results in static format means users are only see what is shown to them.
- Try out different data displays with intended audiences to ensure that conclusions being drawn are appropriate.

- Refer to the guidelines for developing reports in the assessment literature (Goodman and Hambleton, 2004; Wainer, 1997; Wainer, Hambleton, & Meara, 1999; Ryan, 2006).

*Programmatic / informational web pages*

Programmatic / informational web pages are typically text-based resources accessible by branching off the homepage. Most other test information not described to this point can be considered examples of auxiliary information about a test that intended users of the results might want to have available. In the case of NAEP, the range of materials that fall under this heading is vast, and includes such things as the links to technical documentation cited earlier (Figure 2) as well as information about sampling and participation in a large-scale test like NAEP. A capture of the kinds of information in NAEP makes available in an overview is provided in Figure 12, which illustrates that NAEP has a FAQ, an introductory document formatted as a PDF, and the policy for inclusion of students with disabilities. NAEP also makes available frameworks documents for persons interested in knowing more about what the assessments measure (<http://nces.ed.gov/nationsreportcard/frameworks.asp>).

Figure 12. Highlight of informational material available for NAEP (overview section)

[ABOUT NAEP...](#) | [SUBJECT AREAS...](#) | [HELP](#) | [SITE MAP](#) | [CONTACT US](#) | [GLOSSARY](#) | [NEWSFLASH](#)

[SAMPLE QUESTIONS](#) | [ANALYZE DATA](#) | [STATE PROFILES](#) | [PUBLICATIONS](#)

search NAEP  
 go

## Overview

The Nation's Report Card (home)

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### NAEP Overview

- [NAEP: A Common Yardstick](#)
- [What NAEP Does—and Doesn't—Report](#)
- [Who Runs NAEP?](#)
- [NAEP Assessments: Main and Long-Term Trend](#)

#### NAEP: A Common Yardstick

The National Assessment of Educational Progress (NAEP) is the only nationally representative and continuing assessment of what America's students know and can do in various subject areas. Assessments are conducted periodically in mathematics, reading, science, writing, the arts, civics, economics, geography, and U.S. history. Assessments in world history and in foreign language are anticipated in 2012.

Since NAEP assessments are administered uniformly using the same sets of test booklets across the nation, NAEP results serve as a common metric for all states and selected urban districts. The assessment stays essentially the same from year to year, with only carefully documented changes. This permits NAEP to provide a clear picture of student academic progress over time.

There are two NAEP websites: one for program and technical information, and the other for the Nation's Report Card results.

- To read about [school participation](#) in NAEP; information for [parents](#), [educators](#), and [researchers](#); [data tools](#); [technical documentation](#); the [history of NAEP](#); and other information about the NAEP program, explore this website

#### — More Information —

- View [FAQs](#) about NAEP.
- For the latest information and publications, visit [NAEP Activities](#).
- For recent findings, visit [The Nation's Report Card website](#).
- For a full description of the NAEP program, its practices, and its goals, explore [An Introduction to NAEP](#) (1123K PDF).
- Read about NAEP policy on [inclusion](#) of special-needs students.
- Read about [school participation in NAEP](#).
- Understand why [nonpublic \(private\) school participation](#) is crucial.
- Examine [Sample Question Booklets](#) and [background questionnaires](#).
- Explore the [NAEP Questions Tool](#) for examples of questions NAEP asks in its assessments, with actual student responses.
- See recent [participation by states and districts](#); explore [state participation history](#).
- Read about [research comparing NAEP and state proficiency standards](#).
- Read [transcripts of online StatChats](#) about NAEP findings.

In determining the content to include on programmatic / information webpages, attesting programs might consider the following:

- Ask stakeholders what information about the testing program would be helpful for them to know.
- Review other testing programs' websites to find out the kind of programmatic documentation they make available.
- Post the technical manual and updates online as available.

### Discussion

By making vast quantities of data and information available to be accessed at the convenience of users who are online, NAEP is responding to the processing needs of its

stakeholders and being proactive to ensure its continued significance as The Nation's Report Card. Online reporting offers testing programs the opportunity to connect with stakeholders and communicate information in ways that more and more consumers of data have come to expect. Rather than a pre-fabricated 'story' about test results, in the case of NAEP online reporting puts website visitors in charge of deciding what information is important to them as well as the means for communicating those findings (graphs vs. tables). Relinquishing that control is a significant departure for score reporting, but with research and best practices it can increase the relevance of large-scale assessments and engage intended audiences as never before.

In this paper, in addition to brief overview of the content on the NAEP website, the goal has been to offer some guidelines for the process of developing these resources. As has been done with paper reporting, web-based reporting methods need to be critically evaluated for their information value and ease of use. Connecting with stakeholders at multiple points to identify site content and modes of dissemination is critical, and enlisting expertise in website development likewise helps to ensure that a score reporting website truly is functional and informative as intended. In NAEP's case, reporting is an activity that is carried out with great attention to detail and considerable ingenuity, and it rightly serves as a model for others' reporting efforts.

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