

# 2012 Grade 4 Writing Computer-Based Assessment Study

## Reflecting changes in technology, the National Center for Education Statistics (NCES) is transitioning to technology-based assessments for the National Assessment of Educational Progress (NAEP).

NCES conducted the NAEP Grade 4 Writing Computer-Based Assessment (WCBA) Study to determine if fourth-grade students could write effectively on the computer and examine the feasibility of administering additional technology-based assessments to fourth-grade students in the future. The study consisted of two parts:

- ▶ Small-scale usability testing to inform development of the assessment platform for fourth-grade students
- ▶ A pilot writing assessment administered to a sample of 13,000 students nationwide

Lessons learned from the study can inform future development of computer-based assessments as well as shed light on what fourth-grade students know and can do. Note that the sample used in this study is not representative of the nation. The performance results only pertain to participants in the pilot study. Please use caution when interpreting these findings.



## Development

NCES first conducted a usability study to learn more about fourth-grade students' abilities to respond to writing assessments presented on the computer. The WCBA platform administered to eighth- and twelfth-graders in 2011 served as the model for this study. The following lessons informed the refinement of the WCBA platform for the fourth-grade pilot assessment.

### 1. Lesson: Simplified directions improve understanding.



**Challenge:** Students had difficulty reading and following directions to adjust the computer screen. The original directions were lengthy and the format was complex. Many students either skipped the page altogether or took longer than two minutes to complete the tasks.



**Solution:** The format was redesigned to present one instruction at a time and a recorded voice-over of the instructions was added. Designers also included a prompt to click a "Completed" checkbox, ensuring that students viewed the page before moving forward.



**Challenge:** Students did not spend enough time reading the general directions. Approximately 32% of students clicked through the original directions screens without reading them completely.



**Solution:** The directions were rewritten using fewer words that were read aloud for students automatically.

## 2. Lesson: Prominent and well-labeled tools enhance ease of use.



**Challenge:** Students used icons more than drop-down menus to access word processing tools in the original design, which meant they were not accessing all of the available editing options.



**Solution:** More icons were added to the toolbar, text and icons for drop-down menus were enlarged, and rollover labels for the icons were added.



**Challenge:** 68% of students had difficulty locating the writing panel, set in a separate column at the far right side of the screen. Many would click on “Next” without clicking on the arrows to get to the area to type in their response.



**Solution:** The buttons marking the writing panel were enlarged so that students could easily locate them.



**Challenge:** 25% of students misinterpreted the function of the original text-to-speech icon, which was a person with a speech bubble. Students thought it would either open a chat window or represented a feature for replying to email.



**Solution:** The button icon was changed to be an ear with sound waves and a rollover label was added to describe the feature.



**Challenge:** 32% of students thought a “Reset” button beneath individual questions would erase all prior answers and take them back to the beginning of the section.



**Solution:** The button was relabeled as “Clear Answer” to clarify that clicking the button would delete the answer to that particular question only.

## Universal Design and Accommodations

Computer-based assessments, like the WCBA, allow for universal design features that make the assessment accessible to a wider population of students and remove the need for separate testing sessions and additional administrator staff. The following universal design features were built into the WCBA platform:

- ▶ A ‘text-to-speech’ function to read aloud all or selected portions of directions, tasks, and stimulus materials. Students were provided with earphones.
- ▶ Adjustable font size up to 48 points to ensure readability of directions and materials.
- ▶ A variety of color schemes, including a high-contrast option.

Additional accommodations that were not part of the WCBA platform were also available for students with disabilities and English language learners. They included, but were not limited to:

- ▶ Extended time
- ▶ Breaks during testing
- ▶ Testing in a separate session
- ▶ A screen magnifier



## Performance

The WCBA platform was updated following the usability study and used to administer the Grade 4 WCBA pilot assessment. The pilot investigated fourth-grade students' ability to compose typed responses to different prompts under 30- and 20-minute conditions. Results are for students who completed two 30-minute tasks, unless otherwise noted. Student actions are also reported for the lowest-performing 20% of students, the highest-performing 20% of students, and the students performing in between those two groups.

### 1. How did fourth-grade students perform under different testing conditions?

Students who responded to two 30-minute prompts were scored using a **six-point** rubric.

**39%** of student responses received a score of 1 or 2, in which students showed little to marginal writing skills.

**47%** of student responses received a score of 3 or 4, which represents developing or adequate writing skills.

**14%** of student responses demonstrated competent or effective writing skills and received a score of 5 or 6.

Students who responded to three 20-minute prompts were scored using a **four-point** rubric.

**44%** of student responses received a score of 1, in which students showed marginal to insufficient writing skills.

**6%** of student responses received a score of 4, which represents competent, controlled writing skills.

### 2. How much did fourth-grade students write?

**110** was the average word count for student responses. Responses with fewer than 100 words received scores ranging from 1 to 6 on the rubric, as did student responses with more than 500 words. The highest-scoring student responses contained 179 words on average, compared to 60 words in the lowest-scoring responses.

**31%** of students typed 1,001 keystrokes or more. 71% of the highest-scoring student responses used 1,001 keystrokes or more, compared to 9% of the lowest-scoring responses.

### 3. How often did fourth-grade students use editing tools?

**55%** of students used the backspace key fewer than 100 times. 38% of the highest-scoring students used the backspace key fewer than 100 times, compared to 66% of the lowest-performing students.

**39%** of students used the spell check tool at least four times. 47% of the highest-scoring students used the spell check at least four times, compared to 30% of the lowest-performing students.

### 4. How did fourth-grade students perform when writing for different purposes?

**17%** of student responses received a score of 5 or 6 when asked to “convey experience.”

**15%** of student responses received a score of 5 or 6 when asked to “explain.”

**10%** of student responses received a score of 5 or 6 when asked to “persuade.”

## Assessment Questions

Students responded to two writing tasks that included age- and grade-appropriate real-world issues. Each writing task included text, and some also included pictures, audio, or video components. Students were asked to compose responses that fulfilled one of three purposes:

- ▶ **Convey:** Students were tasked with bringing a real or imagined experience to life for the reader.
- ▶ **Explain:** Students were tasked with presenting information and ideas to others in a manner that aids understanding of a topic.
- ▶ **Persuade:** Students were tasked with persuading the reader to take action or convincing the reader to change his/her viewpoint on a variety of topics important to others (e.g., peers, school, the nation).