
NAEP Writing Background Question Cognitive Lab Report

Prior to pilot testing new or revised writing background questions in 2010 with a large, national sample of students, teachers and school administrators, ETS conducted a structured cognitive lab study to investigate:

- **Accessibility:** are respondents able to understand the intent of the questions and provide a response;
- **Readability:** is the vocabulary used appropriate for the intended respondents, particularly fourth-grade students; and
- **Usability:** for computer-based student questions at grades 8 and 12, are students comfortable with the single and/or multiple-question presentation.

Data from the cognitive lab will primarily inform subsequent revisions to new writing background questions prior to the 2010 national pilot as well as provide the program with preliminary information on presentation of computer-based questions. Early identification of problematic question, prior to administration to a large number of respondents, will increase the quality of the questions by reducing or eliminating confusing or intrusive language. Sample size limitations do not allow in-depth examination of question performance or relationships among questions. Data from the 2010 pilot will allow for a more thorough examination of the questions.

Appendix A contains the student, teacher and school background questions included in the cognitive lab study.

New writing background questions were investigated in cognitive lab studies in December 2008, and the selected and/or revised questions will be included in a national pilot test in 2010. ETS has proposed a mixture of new and previously-administered (or trend) questions for the 2011 writing assessment. Given the change in administration mode for the grades 8 and 12 student background questions (from paper-and-pencil to computer-based), all grades 8 and 12 student questions will be classified as new, even if the wording of the questions are identical to previously-administered questions. Trend background questions proposed for the 2011 writing assessment were not included in the cognitive labs.

Table 1 presents the number of participants and questions¹ included the December 2008 cognitive labs. Cells have different sample sizes reflecting our attempt to maximize information

¹ The number of questions included in the cognitive lab only represent the number of proposed new questions; the number of proposed trend questions are not reflected.

while staying within the upper limit of 9 participants per question (which can be tested without clearance from OMB). Smaller samples of teachers and school administrators reflect our assumption that feedback from adults on questions would not vary as much as feedback from students. ETS's experience with cognitive labs with adults for various research projects, including those conducted for the National Indian Education Study (NIES), supports the use of smaller teacher and school administrator samples. For students, there are six new questions for 4th grade, and 24 new questions or subparts of matrix questions² that are shared across 8th and 12th grades. At grades 8 and 12, all the proposed student writing questions will be included in the cognitive labs due to the change in the administration mode; at grade 4, only the subset of proposed questions that are new for the 2011 administration are included. For teachers, the same ten new questions are proposed for grades 4 and 8; and for schools, the same six new questions are proposed for grades 4, 8 and 12.

Table 1: Number of Cognitive Lab Participants and Questions

Respondent	Grade Level	# of Questions	# of Participants
Student	4	6	5
	8	24	4
	12	24	4
Teacher	4	10	3
	8	**	3
School	4	6	2
	8	††	2
	12	††	2

** same teacher questions for grades 4 and 8

†† same school questions for grades 4, 8 and 12

² For matrix questions composed of a single stem and multiple subparts, each subpart is considered a separate question.

Cognitive Lab Procedures

Students

The cognitive labs for students (grades 4, 8 and 12) were conducted at the ETS usability lab. Students were recruited via an internal ETS newsletter to ETS employees, which is the typical procedure for recruiting cognitive lab participants, and has proven successful previously. ETS attempted to balance males and females, and to include minority group participants in the samples. The cognitive lab lasted no more than an hour and a signed parent permission form was secured for each participant. Students were compensated (\$25 gift card) for participating in the study. The 4th grade students responded to the new writing background questions in paper-and-pencil format since this is the administration format for the 2010 pilot and 2011 operational writing assessments. The 8th and 12th grade students responded to the new writing background questions on a computer delivered via PowerPoint. This procedure has worked well in previous cognitive labs where the goal is to simulate a computer-based survey. At grades 8 and 12, we also investigated two presentation formats for matrix questions. The first presentation format displayed matrix questions with the set leader and one sub-item displayed at a time on each slide. The second presentation format displayed the matrix questions in a manner similar to how matrix questions appear in paper-and-pencil questionnaires, with several sub-items with their corresponding set leader on each slide. Comparing these two formats enabled us to evaluate the display preference for students as well as any particular problems students might have with either of the formats. (Additional information on presentation formats will be gathered following the selection of the delivery platform and hardware configuration as part of a larger system tryout.)

The 8th and 12th grade students completed the entire questionnaire section³ first, without interruption, allowing ETS to determine the length of time students actually take to respond to all of the proposed questions. The students then were asked to read the questions again and “think aloud” as they responded to the questions. Prompts, prepared in advance, aided interviewers in collecting as much relevant information as possible from each student. Directions for the computer-delivered 8th and 12th grade student questionnaires also were new. Students were asked about the clarity of the directions. Directions for other groups (4th grade students; all teachers; all school administrators) did not change and are standardized across NAEP assessments; thus, these directions were not specifically included in the “think-aloud” cognitive labs for those groups. Both paper-and-pencil and computer-based formats were matched as closely as possible to the current NAEP questionnaire formats. Fourth grade students did not complete the entire questionnaire section (i.e., Section 4) first, as the 8th and 12th grade students did, because most of the 4th grade questions are trend, and only seven of the 21 proposed questions were classified as new and included in the cognitive lab.

³ All questions proposed for the grades 8 and 12 student writing background question section (i.e., Section 4) are considered new, due to change in administration mode, and included in the cognitive lab.

Teachers and School Principals

The data collection with the teacher and school principal samples were conducted at the schools where the teachers and principals were employed. Teachers and principals were compensated \$50 for their time. They responded to the new writing background questions in a paper-and-pencil format. In the NAEP 2011 writing assessment, although teachers and school principals will be able to choose to answer questionnaires using a computer or paper and pencil, typically 90% of them have answer using paper and pencil. For each question, they followed instructions for the think-aloud protocol.

Think-Aloud Protocol

The main goal of the think-aloud protocol was to address issues of question accessibility, readability, and sensitivity with the new questions and new directions. The think-aloud protocols entailed asking participants to articulate their thought processes while reading directions and answering questions. Interviewers were trained to maximize a respondent's verbal expression without biasing responses and to take notes in the session. One training exercise entailed interviewers watching a video of a think-aloud procedure to familiarized themselves with how to ask questions of cognitive lab participants. Additionally, think-aloud protocols were audio taped if reference to individual sessions are needed. (See Figure 1 for the think-aloud protocol introduction and template.)

Figure 1: Think-Aloud Protocol Introduction and Template

Hello! My name is (YOUR NAME). Thank you so much for your help. Today you will be participating in a special study to understand how people take survey items. The goal of this research is to make sure the questions we are asking in the survey are the most appropriate questions. I have some questions that students like you, in many different schools, will be asked about themselves, their schools, and their families. The questions have no “right or wrong” answers, but some may not be easy to understand and answer. I would like your help in trying to make these questions easier to understand and answer. I’ll be taking notes on what you tell me.

Now let’s talk about how you will help me try out the questionnaire. The main thing that I need you to do is think aloud as you answer each question so that I will know what you are thinking. In other words, I would like you to say aloud everything you say silently to yourself when you are thinking. This is not what people usually do, so I’ll give you an example. Please read and answer the item below.

The choices for some questions will be displayed on your screen as shown below. Now read the example, think out loud your answer, and fill in the oval beside your answer.

How often do you watch television?

- A *Never or hardly ever*
- B *Once or twice a month*
- C *Once or twice a week*
- D *Almost every day*

While the participant is responding, the interview will prompt the participant with probes, such as the following;

Probes

Did you understand the question?

Did you understand the choices of answers (e.g., Never or hardly ever, Once or twice a week)?

How many times did you have to read the choices for an answer?

Did you understand the activities being asked about (e.g., Watch television)?

How many times did you have to read the question before you were able to answer?

If a student in your class asked you what this questions means, what would you say?

Data Analysis and Results

The members of the cognitive lab interview team were all ETS researchers with previous experience in conducting cognitive labs using a think-aloud protocol. Some members of the team participated in the cognitive labs for the NIES. Data analysis was qualitative in nature and the cognitive lab team met to discuss the think-aloud protocols and decide which questions need to be revised. The following *Results* section presents summary statements for questions flagged as potentially confusing or problematic. Some, but not all, of the flagged questions were revised and revisions are included in Appendix A for NCES review.

A total of 46 new writing background questions were included in the cognitive lab study. Table 2 summarizes the number of flagged questions by grade level and respondent. None of the six new school questions were flagged as problematic based on data collected in the study. Also, none of the six new grade 4 student questions were flagged.

Table 2: Number of Flagged Questions

Respondent	Grade Level	New Questions	
		Total	Flagged
Student	4	7	0
	8 & 12	25	5
Teacher	4 & 8	19	2
School	4, 8 & 12	6	0

Student – Grades 8 and 12

- **Timing.** All 8th grade students took less than 10 minutes to answer the 24 questions. The 12th grade students took well under 10 minutes.
- **Computer-based Matrix Questions.** One 8th grader and two 12th graders preferred having the multiple-stem format for matrix questions because they didn't appear to stretch out forever. Three 8th graders and two 12th graders preferred to have the single-stem format for matrix questions because they were less confusing. We recommend testing the two matrix formats with a larger sample in the computer system tryouts.
- **Computer-based Directions.** Students had no trouble understanding the directions used for the computer based questions. Figure 2 is a screen shot of the Power Point presentation for grades 8 and 12 students.

Figure 2. Example Grades 8 and 12 Student Matrix Question: Multiple Sub-items per Screen.

Task	Question Number	Testing Tools			
NAEP Writing	1 of 12	Back	Calc	Print	Next

This section has 12 questions. Fill in only one oval for each question.

When you are finished selecting your answers select the "next button" on the top right of the screen to go to the next set of questions.

Please indicate how much you disagree or agree with the following statements about reading and writing. Fill in **one** oval on each line.

	Strongly disagree	Disagree	Agree	Strongly Agree
a. Writing things like stories or letters is one of my favorite activities.	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Writing helps me express my ideas.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- **Flagged Questions.** Based on the comments of one or more student, the following questions were flagged for further review by ETS research and item development staff. Some, but not all, flagged questions were revised to address problematic wording.
 - **Overall.** There was variability in opinions about what the questions mean by “write.” One student thought it might mean using your hand to write with a pen or pencil and asks if she should include time spent typing (she asked this regarding Question 11). Some students included the time they spend on homework, even when that homework involves reading something and then writing a response. Some included the time it takes to figure out a response to a question and write it. Some said of math class, “We don’t write, we just use numbers.” For example, is solving a math problem writing? *Based on these results we recommend that the Writing Standing Committee and the Background Variable Standing Committee be consulted to define “writing” and to suggest the best way to incorporate a definition into the student background questionnaire.*
 - **Question 3a.** One student did not know what log meant. *Recommend deleting the word “log” from the stem.*
 - **Question 3g.** Students did not know what business material was. *Recommend deleting “business material” and adding “job application”.*
 - **Question 5b.** Some students were unclear about what “cut and paste” meant. Also it may imply plagiarism. *Recommend deleting “cut and paste”.*
 - **Question 10.** Students wanted to know if this question includes note taking? *Recommend adding “note taking” to the stem.*
 - **Question 12.** The examples in this question lead students to eliminate e-mails and IMing. *Recommend adding “e-mailing” to the stem.*

Teacher – Grades 4 and 8

- **Flagged Questions.** Based on the comments of one or more teacher, the following questions were flagged for further review by ETS research and item development staff. The flagged questions were revised to address problematic wording.
 - **Question 1c.** Teachers were unsure what prewriting exercises are. *Recommend adding examples of prewriting activities to the stem.*
 - **Question 3.** Teachers thought “informal” should be taken out since all professional development activities are formal. Additionally, teachers did not interpret this item to reflect outside writing activities. *Recommend revising the stem to read “During the past two years, have you written outside of school for personal enjoyment or enrichment?”*

Appendix A
Proposed New Writing Background Questions
Tested in Cognitive Lab & Proposed Revisions

Grade 4 Student

VE032882

1. In a week, about how much do you write for **reading** homework?

- A None
- B A few words
- C A few sentences
- D 1 page
- E More than 1 page

VE032905

2. In a week, about how much do you write for **science** homework?

- A None
- B A few words
- C A few sentences
- D 1 page
- E More than 1 page

3. In a week, about how much do you write for **social studies** homework?

- A None
- B A few words
- C A few sentences
- D 1 page
- E More than 1 page

4. In a week, about how much do you write for **math** homework?

- A None
- B A few words
- C A few sentences
- D 1 page
- E More than 1 page

5. In a day, about how much time do you spend writing during classes at school?

- A None
- B 15 to 30 minutes
- C 1 hour
- D More than 1 hour

6. In a day, about how much time do you spend writing for school homework?

- A None
- B 15 to 30 minutes
- C 1 hour
- D More than 1 hour

7. In a day, about how much time do you spend writing on your own and not for school—for example, writing stories or keeping a journal at home?

- A None
- B 15 to 30 minutes
- C 1 hour
- D More than 1 hour

Grades 8 and 12 Student

VE035611

1. Please indicate how much you disagree or agree with the following statements about reading and writing. Fill in **one** oval on each line.

	Strongly disagree	Disagree	Agree	Strongly agree	
a. Writing things like stories or letters is one of my favorite activities.	A	B	C	D	VE035613
b. Writing helps me express my ideas.	A	B	C	D	VE035628

VE035633

2. How often do you do each of the following? Fill in **one** oval on each line.

	Never or hardly ever	Once or twice a month	Once or twice a week	Almost every day	
a. Write in a private diary or journal on your own time	A	B	C	D	VE035640
b. Write stories or poems for fun on your own time	A	B	C	D	VE035644

3. For school this year, how often do you write each of the following? Fill in **one** oval on each line.

	Never or hardly ever	A few times a year	Once or twice a week	At least once a week	
a. Thoughts or observations in a log or journal	A	B	C	D	VE035648
REVISION a. Thoughts or observations in a journal					
b. A simple summary of something you have read	A	B	C	D	VE036272
c. A report about something you have studied or researched	A	B	C	D	VE036275
d. An essay in which you analyze or interpret something	A	B	C	D	VE036277
e. A letter or essay in which you try to convince or persuade others to believe or do something	A	B	C	D	VE036280
f. A story, such as a story about a personal or imagined experience	A	B	C	D	VE036282
g. Business material, such as a résumé or a letter to a company	A	B	C	D	VE036283
REVISION g. Job application, a résumé or a letter to a company					

4. When you write a paper or report **for school** this year, how often do you do each of the following? Fill in **one** oval on each line.

	Never or hardly ever	Sometimes	Almost always	
a. Brainstorm with other students to decide what to write about	A	B	C	VE036296
b. Organize your paper before you write—for example, make an outline or draw a chart	A	B	C	VE036297
c. Make changes to your paper to fix mistakes and improve it	A	B	C	VE036298
d. Work with other students in pairs or small groups to discuss and improve your paper	A	B	C	VE036313

5. When you write a paper or report **for school** this year, how often do you do each of the following? Fill in **one** oval on each line.

	Never or hardly ever	Sometimes	Almost always	
a. Use a computer from the beginning to write the paper or report—for example, use a computer to write the first draft	A	B	C	VE036315
b. Use a computer to make changes to the paper or report—for example, by means of spell checking or cut and paste	A	B	C	VE036316
REVISION b. Use a computer to make changes to the paper or report—for example, by means of spell checking				
c. Look for information on the Internet to include in the paper or report	A	B	C	VE036318

6. In a week, about how much do you write for **English/language arts** homework?

- A None
- B Several words
- C A few sentences
- D A couple of paragraphs
- E 1 to 3 pages
- F 4 to 5 pages
- G More than 5 pages

NOTE: Based on reviews from NCES following the cognitive lab study, the number of options for this item were reduced from seven to five.

7. In a week, about how much do you write for **science** homework?

- A None
- B Several words
- C A few sentences
- D A couple of paragraphs
- E 1 to 3 pages
- F 4 to 5 pages
- G More than 5 pages

NOTE: Based on reviews from NCES following the cognitive lab study, the number of options for this item were reduced from seven to five.

8. In a week, about how much do you write for **social studies** homework—for example, geography, government, or history?

- A None
- B Several words
- C A few sentences
- D A couple of paragraphs
- E 1 to 3 pages
- F 4 to 5 pages
- G More than 5 pages

NOTE: Based on reviews from NCES following the cognitive lab study, the number of options for this item were reduced from seven to five.

9. In a week, about how much do you write for **math** homework?

- A None
- B Several words
- C A few sentences
- D A couple of paragraphs
- E 1 to 3 pages
- F 4 to 5 pages
- G More than 5 pages

NOTE: Based on reviews from NCES following the cognitive lab study, the number of options for this item were reduced from seven to five.

10. In a day, about how much time do you spend writing during classes at school?

- A None
- B 15 to 30 minutes
- C 1 hour
- D 2 to 3 hours
- E More than 3 hours

REVISION

10. In a day, about how much time do you spend writing, including taking notes, during classes at school?

11. In a day, about how much time do you spend writing for school homework?

- A None
- B 15 to 30 minutes
- C 1 hour
- D 2 to 3 hours
- E More than 3 hours

12. In a day, about how much time do you spend writing on your own and not for school—for example, writing stories or keeping a journal at home?

- A None
- B 15 to 30 minutes
- C 1 hour
- D 2 to 3 hours
- E More than 3 hours

REVISION

12. In a day, about how much time do you spend writing on your own and not for school—for example, writing stories, e-mailing, or keeping a journal at home?

Grades 4 and 8 Teacher

VB429595

1. How often do you ask your students to do the following when you ask them to write about something? Fill in **one** oval on each line.

	Never	Rarely	Sometimes	Often	
a. Think about ways to improve their writing by revising and editing	A	B	C	D	VE032854
b. Collaborate with other students—for example, by reading each other's drafts or critiquing each other's work	A	B	C	D	VE032878
c. Use a computer for completion of the prewriting exercises for a paper	A	B	C	D	VE032879
REVISION Use a computer for completion of prewriting (e.g., outlines, graphic organizers, etc.) for a paper					
d. Use a computer for the first draft of a paper	A	B	C	D	VE036831
e. Use a computer for all drafting and revising	A	B	C	D	VE036840
f. Use a computer to complete their writing	A	B	C	D	VE036849
g. Use a computer for spelling check, dictionaries, and thesaurus	A	B	C	D	VE032881
h. Use the Internet to get information for their writing	A	B	C	D	VE036856
i. Assess their own writing	A	B	C	D	VE036860
j. Assess their own writing by using rubrics provided by you or other teachers	A	B	C	D	VE036861
k. Assess the writing of other students by using rubrics provided by you or other teachers	A	B	C	D	VE036893



2. To what extent do you consider each of the following when you assess student writing? Fill in **one** oval on each line.

	Not at all	A small extent	A moderate extent	A large extent	
a. Variety in sentence construction	A	B	C	D	VE032898
b. Word choice	A	B	C	D	VE036894
c. Development of ideas	A	B	C	D	VE036895
d. Creativity of ideas	A	B	C	D	VE032910
e. Organization of ideas	A	B	C	D	VE032900
f. Mechanics and conventions, such as spelling, grammar, and punctuation	A	B	C	D	VE032906
Length of a paper	A	B	C	D	VE032903

3. During the past two years, did you participate in any informal professional development activities related to the teaching of language arts, such as writing novels or short stories?

A Yes

B No

REVISION

3. During the past two years, have you written outside of school for personal enjoyment or enrichment?

A Yes

B No



Grades 4, 89 and 12 School

1. To what extent are the following activities/programs offered in your school? Fill in **one oval** on each line.

	Not at all	A small extent	A moderate extent	A large extent	
a. Schoolwide writing initiative, such as specific guidelines or objectives for school writing instruction	A	B	C	D	VE032874
b. Literacy or writing coaching for students	A	B	C	D	VE032877
c. Professional development in writing or teaching writing—for language arts faculty only	A	B	C	D	VE032894
d. Professional development in writing or teaching writing—for all teachers	A	B	C	D	VE032897

E032907

2. To what extent is writing taught at your school in content areas other than language arts—for example, in social studies or science classes?

- A Not at all
- B A small extent
- C A moderate extent
- D A large extent

VE032914

3. To what extent does the NAEP Writing Assessment influence the writing curriculum at your school?

- A Not at all
- B A small extent
- C A moderate extent
- D A large extent



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