



**Multi-Stage Testing (MST) Study
Cognitive Laboratory Report:
Proposed Questionnaire Items**

April 26, 2010

Multi-Stage Testing (MST) Study Background Questionnaire Item Cognitive Laboratory Report and Recommendations

This report details the administration of three Multi-Stage Testing (MST) Study items to eighth-grade students in a cognitive laboratory environment with a mock computer interface. The report presents information about the cognitive lab participants. Then the format of the cognitive laboratory is described. Student responses to the items that were administered in the cognitive labs are discussed next. Finally, recommendations for potential revisions to items are presented.

Participant Information

For a number of reasons, including the limited timeframe in which to conduct the cognitive labs, the difficulty in recruiting schools due to spring break, other standardized testing, etc., it was decided to recruit the students by asking ETS employees if they had eighth-grade students who would be interested in participating. Nine eighth-grade students were recruited to participate in the study and given a \$20 gift card as incentive to participate. Parents brought the students to ETS for the cognitive lab. Students met with an interviewer and observer to respond to the three items and follow-up questions. Items were administered via computer so that the student could respond similarly to how they would respond in the actual study questionnaire.

Information about the schools the students attend was collected via the Internet using several sources, including the CCD public school data (2007-2008 school year) from the National Center for Education Statistics website and the schools' websites.

- Of the nine students who participated in this study, eight students attend six public schools, and one student attends a private Roman Catholic school.
- Five of the schools are located in Mercer County, one in Hunterdon County, and one in Middlesex County, which are all located in central New Jersey.
- All of the schools are classified as suburban, except one, which is listed as rural.
- All of the schools are co-educational.
- The public schools include grades 6–8 or 7–8 only, but the private school includes kindergarten through grade 8.
- Most of the students in the schools are identified as White, non-Hispanic. In one school Hispanics make up approximately 15 percent of the total population; in another 8 percent of the students are identified as Asian/Pacific Islander; in another school 13 percent are identified as Black, 10 percent as Hispanic, and 3 percent as Asian/Pacific Islander, for a total of 26 percent non-White; in another school 44 percent are identified as Asian/Pacific Islander and 44 percent as White; and in another school just over 50 percent of the students are minority students, with 38 percent identified as Asian, 8 percent as Black, and 4 percent as Hispanic.

- Of the five public schools, two are classified as Title I Schools. Sixteen percent of students at one school qualify for free or reduced-price lunches, and 11 percent of students qualify at another school. Fewer than 10 percent of students qualify for free or reduced-price lunch at the remaining schools.

Cognitive Laboratory Process

The three questions posed to the participants were all multiple choice or yes/no format. The questions are located in the Appendix and address the students' reactions to computer-based testing.

When students arrived to the cognitive lab, they were seated in front of a laptop presenting the computer interface. The interviewer then explained the cognitive lab procedure to participants (after verifying that the student had parental permission to participate in the form of a signed consent form), and students were informed that the lab would be recorded.

Students were instructed in the "think aloud" method. The interviewer first explained the process the student would follow, and then the interviewer answered a sample question by thinking aloud as he responded to the sample question. The student was then given the sample question and asked to practice the think aloud process as he/she answered the sample question.

After explaining the protocol and practicing the think aloud process, students were asked to begin by reading the first question aloud and talking through his/her answers. After the student answered each question, the interviewer asked follow-up questions as appropriate to further elucidate the student's cognitive processes as she/he answered the questions. After answering the second MST item (not the second follow-up question), students were told to imagine that the third question referred to the last math test that they took in school and to answer the question as if it were following that test. The questions used in the protocol as follow-up to the actual MST questions are listed in the Appendix.

Proposed Questionnaire Items

Item 1 (VE355201)

The first item asked if the student had taken a test on the computer before; this item elicited the most questions from students. Three students asked if this question referred to practice tests or just graded tests. Seven students indicated that they had taken practice tests on the computer, and four students indicated they had taken real tests or otherwise been engaged in computer-based data collection (online student council voting). Multiple students explicitly mentioned an online practice center called Study Island (available at <http://www.studyisland.com/>).

Based on participant responses, ETS recommends a change to the original stem of the item. Since practice tests are to be included, this will be made explicit in the item. (See page 8 in the Appendix to reference the revised version of this item.) This clarification will help verify that students are providing the desired information. Several of the students interviewed indicated that they had never taken a high-stakes test on the computer but had used the computer to practice through one or more of the available study-aid oriented websites available. Response options to the item would remain the same.

Item 2 (VE355201)

Students responded to item 2 (VE355216) without any questions or confusion. One student said he/she preferred taking the test on the computer because he/she could “see the answers, there is no erasing, and that makes it easier.” One student indicated that he/she preferred taking the test on paper, as it allows him/her to take notes and use it as scratch paper. Seven students selected the response option “It doesn’t matter,” but when asked if there was anything that would incline them to prefer one or the other, they were able to articulate a variety of reasons. These reasons included the perception that some computer tests make research resources available (making computer tests preferable), while other times computer tests are timed (which the student said made the test anxiety-inducing). Another student indicated that sometimes computer tests are harder to understand but still said the test format did not matter. Another student indicated that if scratch paper was available, then the computer would be preferable. It is recommended to keep the current item wording.

Item 3 (VE355176)

Students responded to item 3 (VE355176) without difficulty, even though the students had to imagine that they were answering the question in regard to a test taken in the past, rather than a test they had just finished. Six students selected “Agree,” and three selected “Disagree.” Reasons for selecting a response typically centered on how students performed on the test or whether they studied for the test. Students were not asked about test performance, although some volunteered that information. None of the students displayed any hesitation in answering the question. It is recommended to keep the current item wording.

Appendix

MST Items Presented in the Cognitive Laboratory

1. VE355201

Have you ever taken a test on the computer?

A. Yes

B. No

2. VE355216

Do you prefer taking a test on computer or on paper?

A. Computer

B. Paper

C. It does not matter.

[Interviewer] I would like you to think about the last mathematics test you took in school. Now I am going to show you a question. Please answer this question based on the test you are thinking about.¹

3. VE355176

Please indicate how much you disagree or agree with the following statement: This test was easy.

A. Strongly disagree

B. Disagree

C. Agree

D. Strongly agree

¹ This text is not part of the actual question but was clearly read to the students prior to them seeing the final item.

Cognitive Laboratory Protocol

1. VE355201

Have you ever taken a test on the computer?

- A. Yes
- B. No

Follow-up questions for item 1

If the student is unable to respond to this question or hesitates when responding ask why they are having difficulty. Drill down.

What type of tests have you taken on a computer?

2. VE355216

Do you prefer taking a test on computer or on paper?

- A. Computer
- B. Paper
- C. It does not matter.

Follow-up questions for item 2

Please ask the student why he/she chose a specific answer.

Why do they have this preference?

Is there anything that would make you want to change your answer?

[Interviewer] **I would like you to think about the last mathematics test you took in school. Now I am going to show you a question. Please answer this question based on the test you are thinking about.**

3. VE355176*

Please indicate how much you disagree or agree with the following statement: This test was easy.

- A. Strongly disagree
- B. Disagree
- C. Agree
- D. Strongly agree

Follow-up questions for item 3

Why do you think this test was easy?

OR

Why do you think this test was not easy?

OR

If the student is unable to decide ask the student why he/she cannot decide.

Revised MST Items Based on Cognitive Laboratory

1. VE355201

Have you ever taken a test on the computer? The test may have been a classroom test, a standardized test, a practice test or quiz, or any other type of test.

A. Yes

B. No

2. VE355216

Do you prefer taking a test on computer or on paper?

A. Computer

B. Paper

C. It does not matter.

3. VE355176

Please indicate how much you disagree or agree with the following statement: This test was easy.

A. Strongly disagree

B. Disagree

C. Agree

D. Strongly agree