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Mode of Administration Effects on MCAS Composition Performance for Grades Four, Eight, and Ten

Executive Summary

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A Report of Findings Submitted to the
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Executive Summary

Both testing and technology have the potential to help improve teaching and learning. Recent research, however, suggests that these two strategies for improving education, namely state level testing programs and writing on computers, may work against each other. Two previous studies provide evidence that students accustomed to writing on computers perform better on written tests when these students are allowed to compose their responses on a computer. In both studies, the magnitude of this improved performance was statistically and practically significant.

Although prior research on computer use and performance on open-ended test items administered on paper does not call into question the value of state level accountability systems, it does suggest that these systems should begin thinking about alternative ways of administering open-ended items. As state level accountability tests begin transitioning from paper administration to computer administration, several issues will arise. First, until all students are accustomed to writing on computers, a better understanding of the extent to which the mode of administration affects student performance at different grade levels must be developed. Second, given the many computing devices available, the affect of performing open-ended items on desktop computers need to be contrasted with performance on cheaper and more portable writing devices such as eMates and AlphaSmarts. Third, before testing programs offer students the option of performing tests on paper or on computer, the extent to which handwritten versus computer printed responses influence raters' scores needs to be explored. Fourth, administrative procedures for administering tests on computers in schools must be developed.

The series of studies presented here focus on the mode of administration effect in grades four, eight and ten. These studies also examine the mode of administration effect at different levels of keyboarding speed and for SPED students. In addition, two studies presented here examine the mode of administration effect for AlphaSmarts and eMates. The extent to which handwritten versus computer printed responses influence raters' scores is also explored. Finally, this series of studies concludes with recommend procedures state level testing programs can employ to provide schools and students the option of performing open-ended items on computers.

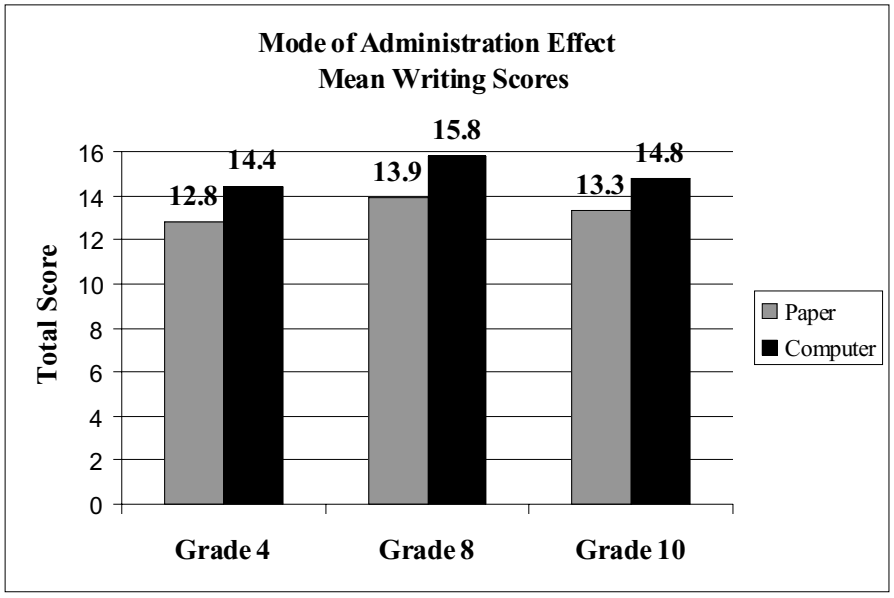
Summary of Studies

Study Details:

- Study occurred during February and March, 2000 in Wellesley (MA) Public Schools
- 152 fourth grade students, 228 eighth grade students, 145 tenth grade students
- Students were randomly assigned to write their essays on paper or on computer
- Same MCAS Language Arts Composition Prompt that was used in the Spring of 1999
- Students had approximately 1 hour to compose a draft and 1 hour to create a final version
- Essays were scored by teachers and advanced graduate students using MCAS Scoring Materials
- All essays composed on paper were transcribed verbatim into the computer and all essays were then printed in the same format so that readers did not know whether the essay was originally written by hand or on a computer

Major Findings:

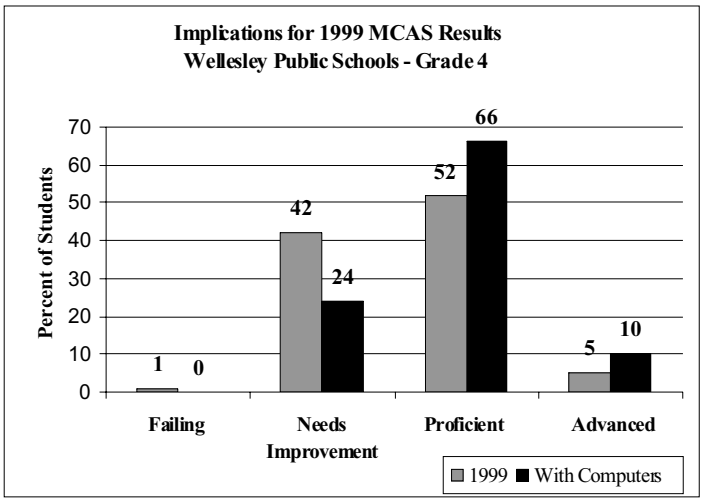
- Students performed significantly better when they composed essays on computer
- Students who performed both the Language Arts Composition and Open-Ended questions on computer would score four to eight points higher on a scale that ranges from 200 to 280
- Effect about the same in grades four, eight and ten
- Students receiving Special Education services for Language Arts may benefit even more by taking written portions of the MCAS Language Arts test on computer

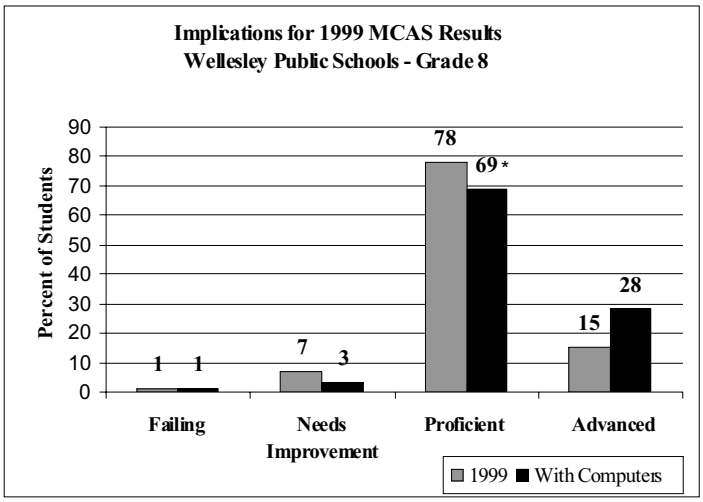


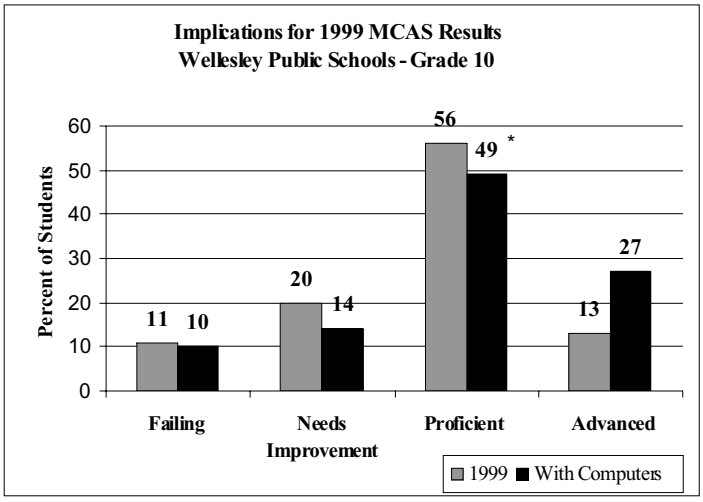
Implications for Wellesley MCAS Language Arts Scores

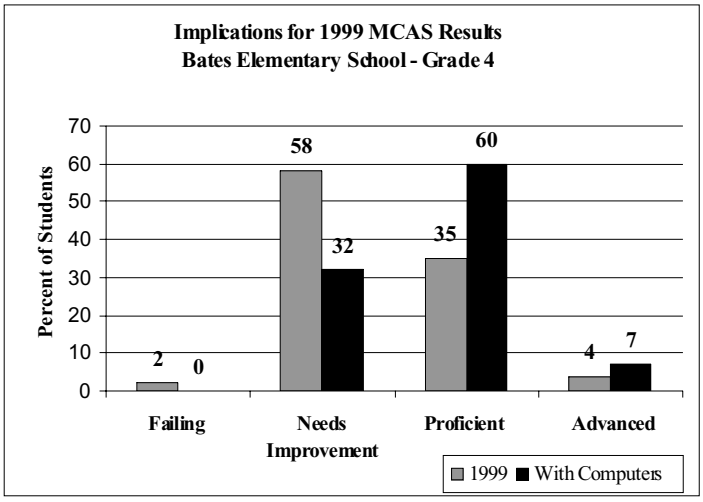
If students could perform both the MCAS Composition item and the four Open-Ended items on computers:

- The percentage of students performing at the "Advanced" Level would double
- The percentage of students performing deemed "Proficient" or better would increase
- The percentage of students "Failing" would decrease









* Note that in both grade 8 and grade 10 a large percentage of students would move from the "Proficient" to the "Advanced" category. A smaller percentage of students move from the "Needs Improvement" to the "Proficient" category. Although it may appear that the percentage of "Proficient" students decreases, the total percentage of students performing at or above the "Proficient" level actually increases.

Implication for State-wide MCAS Language Arts Scores

- Computer use is increasing rapidly across the state.
- Over 75 districts across the state, including Revere, Worcester, Stoughton, North Attleborough and Edgartown, have more high-speed computers per student than does Wellesley.

Sample of District Student to Computer Ratios Across Massachusetts

District	Student to Computer
Acushnet	2.8 to 1
Stoughton	2.9 to 1
Edgartown	3.7 to 1
Taunton	3.9 to 1
Revere	4.3 to1
Ware	4.4 to 1
Worcester	5.2 to 1
North Attleborough	5.2 to 1
Wellesley	5.3 to 1
Springfield	6.2 to1
Boston	8.0 to 1
State Average	7.4 to 1

Note: Over 75 Districts have a better student to computer ratio than Wellesley.

- Within three to four years, most students across the state will use computers regularly for writing
- Based on last year's results, within three to four years, if students could perform both the MCAS Composition item and the four Open-Ended items on computer:
    - The percentage of students performing at the "Advanced" Level would double or triple
    - The percentage of students performing above the "Proficient" Level would increase
    - The percentage of students "Failing" decreases

Recommendation: Provide schools and students the option of performing MCAS open-ended language arts items on paper or on computer.

Related Facts:

- Alberta Learning has provided schools and students the option of performing the Province Graduation English and Social Studies tests on paper or on computer since 1996.
- Recently, Alberta has also given students the option of performing the Biology and French tests on paper or on computer.
- Alberta Learning's Test Administration Manual states:

  "Producing written work on computer is common in contemporary working and learning environments. Students who have been taught to compose on a computer, and who normally produce their written work in this way, would be disadvantaged if they were compelled to hand-write extended assignments."
- In Alberta, the percentage of students opting to perform the English Graduation Test on computer has increased from 9% in 1996 to 30% in 2000.
- In Alberta, students who compose their English Essay on computer consistently perform better than students who compose their response on paper.
- Massachusetts currently has more computers per student than Alberta, Canada.
- Massachusetts does not offer students the option of performing written tests on computer.

Student to Computer Ratios

	Massachusetts		Alberta, CN
	1997	2000	2000
High Speed Computers	15.6 to 1	7.4 to 1	7.7 to 1
Computers of any type	8.4 to 1	5.1 to 1	