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TO: Members of the Maryland State Board of Education
FROM: Jack R. Smith, Ph.D.
DATE: February 23, 2016
SUBJECT: Study of PARCC Results by Mode of Delivery (Mode Effect)

PURPOSE:

To share with the State Board an analysis of the 2014-2015 PARCC results by mode of delivery: online vs. paper.

BACKGROUND:

For the initial administration of the PARCC tests, 876,787 tests were scored in grades three through eight and ten in English/Language Arts (ELA) and grades three through eight mathematics, Algebra I, and Algebra II. Tests were administered using two different modes of delivery: 713,672 online computer-based tests (80%) and 163,115 paper-based tests (20%). As part of the internal validation process, student performance on both modes of delivery was studied to ensure that the mode of delivery itself did not cause an effect on student performance.

EXECUTIVE SUMMARY:

A simple comparison of mode of delivery by PARCC performance level illustrates that paper results were generally higher than online results on all ELA tests and on higher level math tests (Math 08, Algebra I, and Algebra II). For Grades four through seven math tests, online performance was similar or higher than paper performance.

There are three general reasons for possible mode effects: technical issues with the test itself in the development, administration, scoring, and/or reporting; the population of students that took each mode of delivery varied; or readiness issues where students were not equally prepared to engage both modes of delivery.

ETS, Pearson, PARCC Inc., and PARCC's Technical Advisory Committee have closely studied the results for any technical issues. For the most part, their research is inconclusive. There is no evidence of technical flaws in the development, administration, scoring or reporting of the assessment that would contribute to a mode effect.

MSDE staff studied the populations of the two modes of delivery and discovered that within the Maryland data, 81% of the students that took the PARCC paper forms scored Proficient or Advanced on the prior year's MSA/HSA assessment. For PARCC online test-takers, 76% scored Proficient or Advanced the prior year. This difference in population accounts for an average of 40% of the observed mode effect across all tests.

Readiness issues were also studied. As part of the technical review, extended response items seem to be most impacted by the mode of delivery. Although there were no technical issues found within the items themselves, there does seem to be a collective effect. Initial concerns were shared that students taking online forms would not perform as well as paper because of not having enough time to type online responses and the newness/lack of practice with the online tools such as the equation editor for mathematics would negatively affect students' online performance. There, however, is no evidence to support these claims. Few online students ran out of time to complete the test and for grades four through seven math tests, the modes were comparable; in some cases, online outperformed paper.

Through informal discussions with test-takers of both modes, there was a common theme of not knowing what was expected to score well on the extended response items. Students shared that they would default to the size of the response box to better determine how much was enough. From a visual perspective, the size of the response space on the paper forms was much larger than on the online form. To better understand if this truly had an impact, the response length of both the online and paper responses will be studied as well as how the space is presented on the test forms. The students also shared that they had little experience in developing extended responses from start to finish with the use of technology. Most did not engage the technology until the final draft stage of the writing process. This is also worthy of additional study.

In summary, there are many benefits to transitioning to online testing including better alignment between real world expectations and practices, increased student engagement, increased accessibility for students with disabilities and English language learners, faster reporting of results and reduced cost. With this in mind, online testing is the standard when developing the PARCC assessments. The PARCC performance levels were set using online forms only. Maryland is transitioning its assessment program to be entirely online by the 2016-2017 school year (with the exception of the need for accommodations such as Braille). While doing so, Maryland has delayed the use of the PARCC assessment data for high stakes purposes for students and teachers to allow time to transition to the new assessments. MSDE will continue to work with districts concerning newness and readiness related issues. With the availability of practice tests along with sample responses and the new item analysis reports and other supporting resources, the expectations will become clear to all stakeholders. MSDE as well as the consortium as a whole will continue to study this issue moving forward.

ACTION:

For information purposes only. No action required.

Attachment

Study of PARCC Results by Mode of Delivery (Mode Effect)

Maryland State Board of Education Update
February 23, 2016

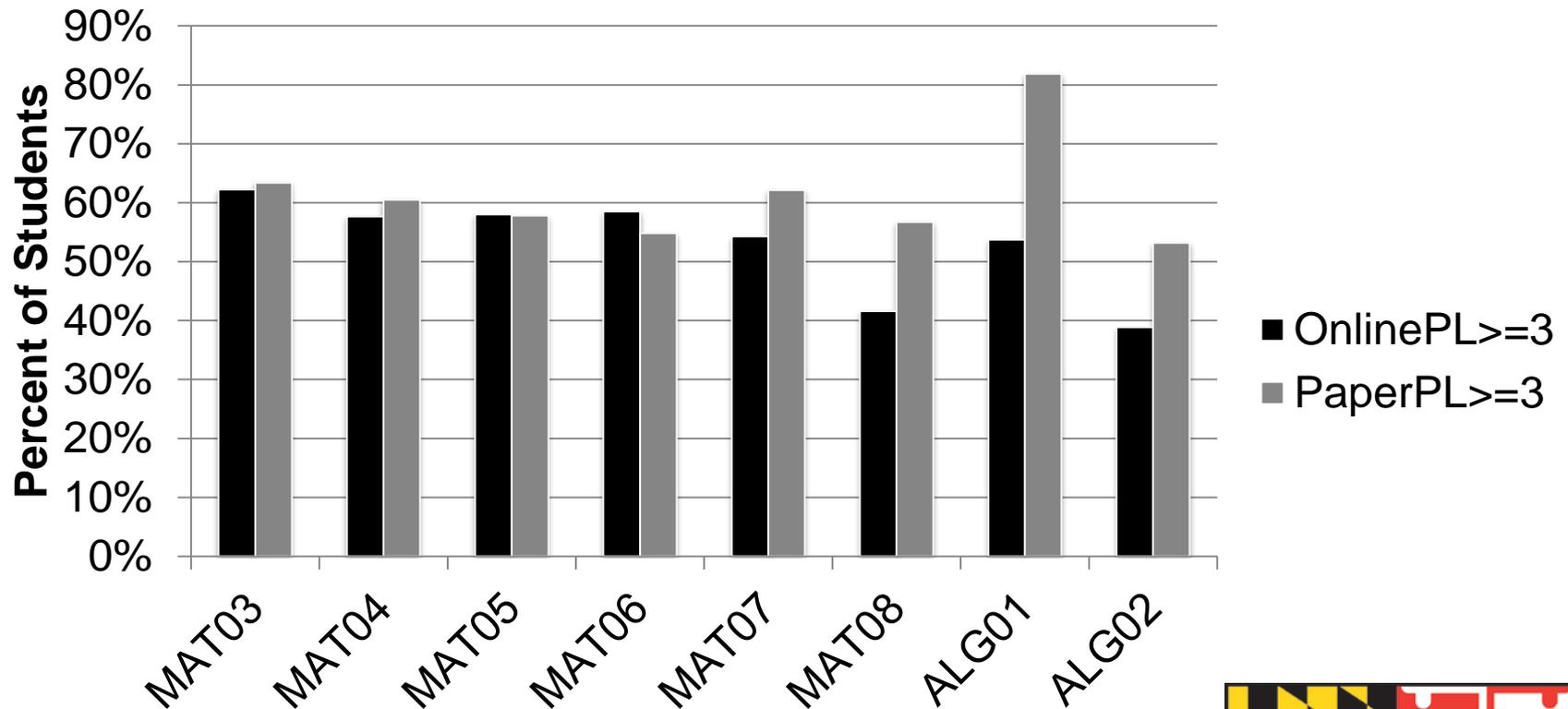
2014-2015 Administration

- 876,787 tests were scored in:
 - Grades 3-8 English Language Arts (ELA) and English 10
 - Grades 3-8 Mathematics, Algebra I, and Algebra II

- Tests were administered using 2 different modes of delivery
 - Online Computer-based Tests: 713,672 (80%)
 - Paper Tests: 163,115 (20%)

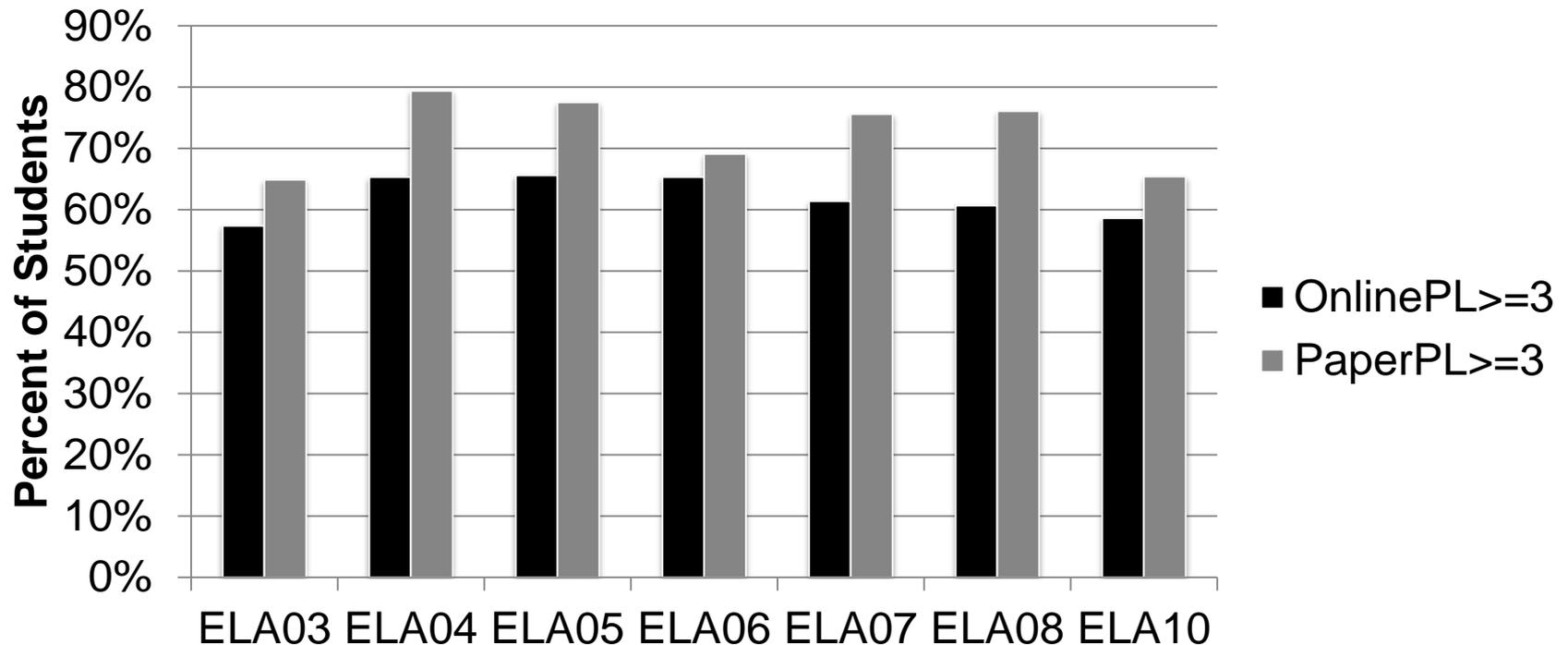
PARCC Results by Mode, Content/Test, and Performance Level

2014-2015 Maryland PARCC Results



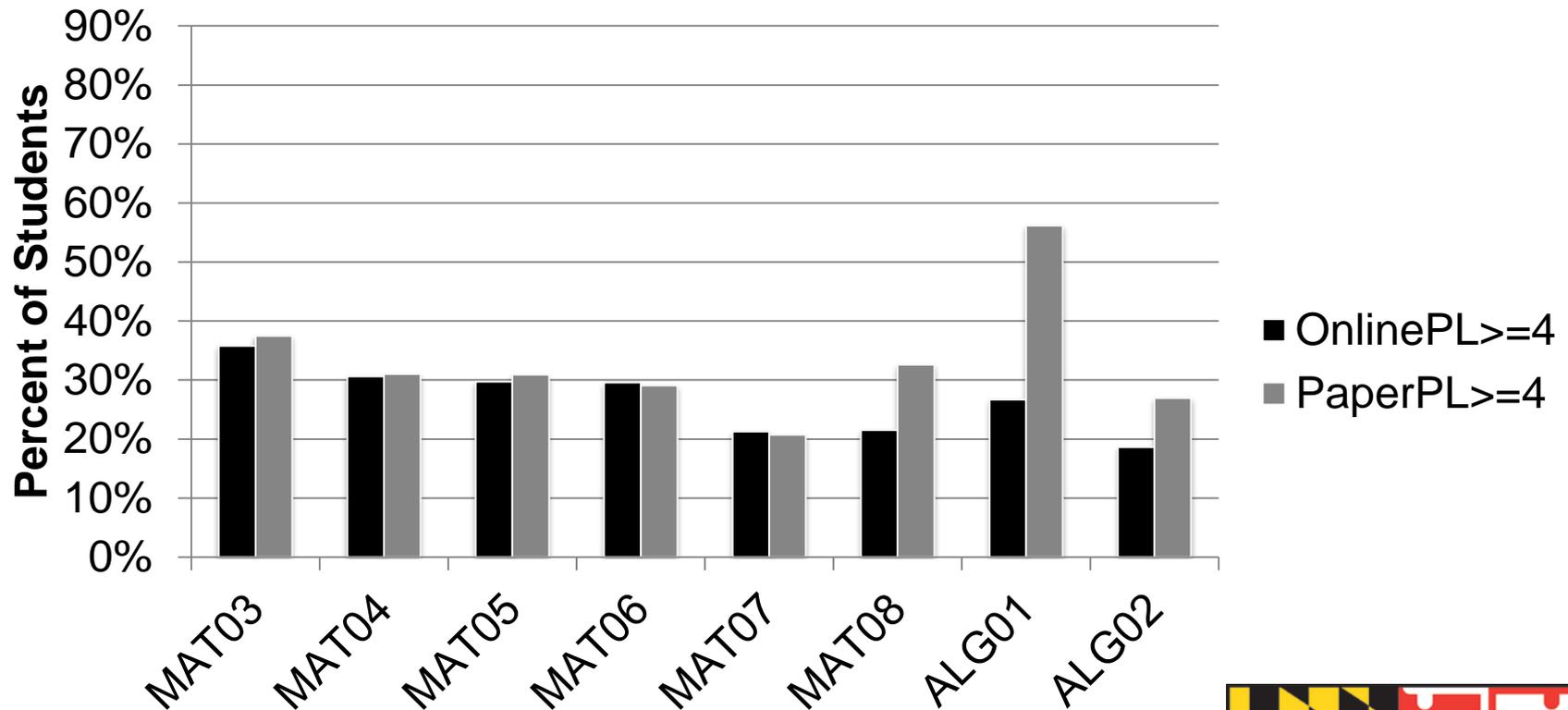
PARCC Results by Mode, Content/Test, and Performance Level

2014-2015 Maryland PARCC Results



PARCC Results by Mode, Content/Test, and Performance Level

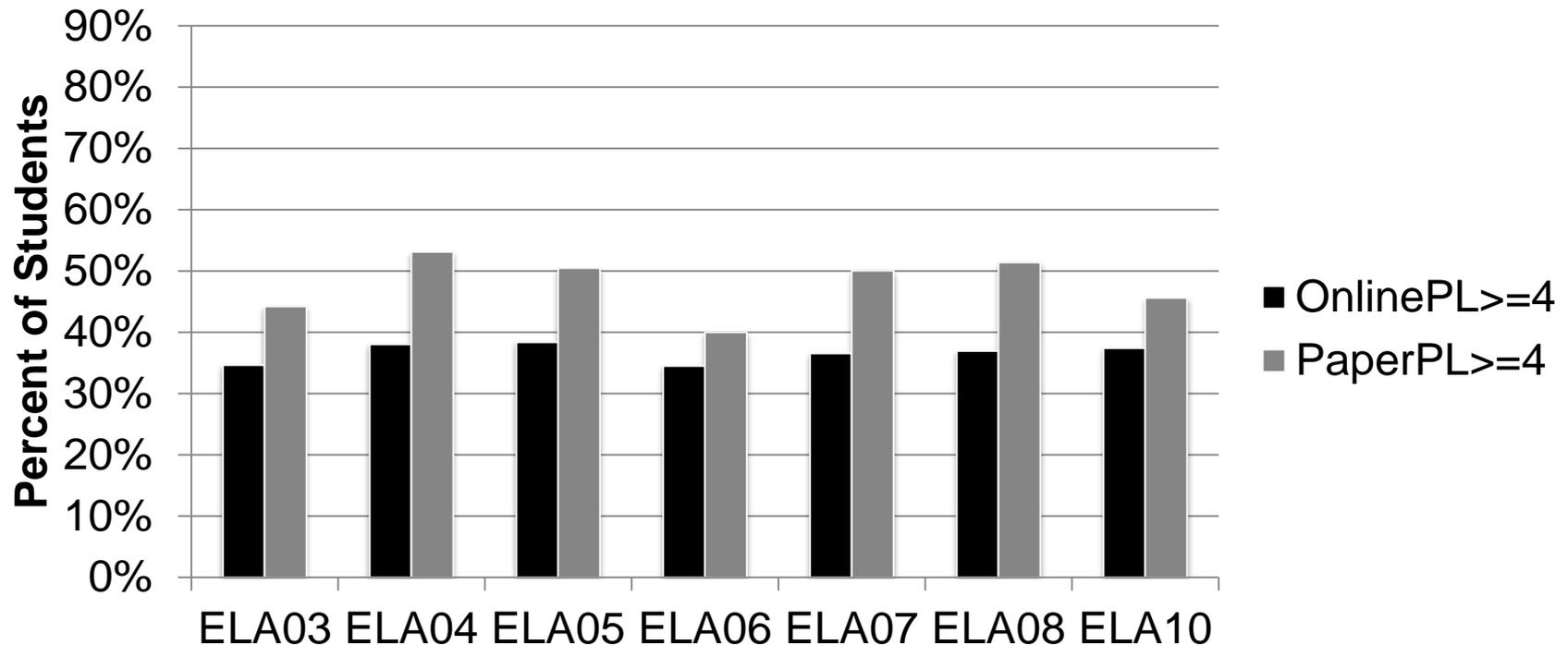
2014-2015 Maryland PARCC Results



Performance Level 4 and 5 are used for College and Career Readiness Determination

PARCC Results by Mode, Content/Test, and Performance Level

2014-2015 Maryland PARCC Results



Performance Level 4 and 5 are used for College and Career Readiness Determination

Possible Reasons for Mode Effect...

1. Technical issues with the test itself in the development, administration, scoring, and/or reporting of results
2. The population of students that took each mode of delivery varied
3. Readiness - students were not equally prepared to engage both modes of delivery

1. Technical issues with the test

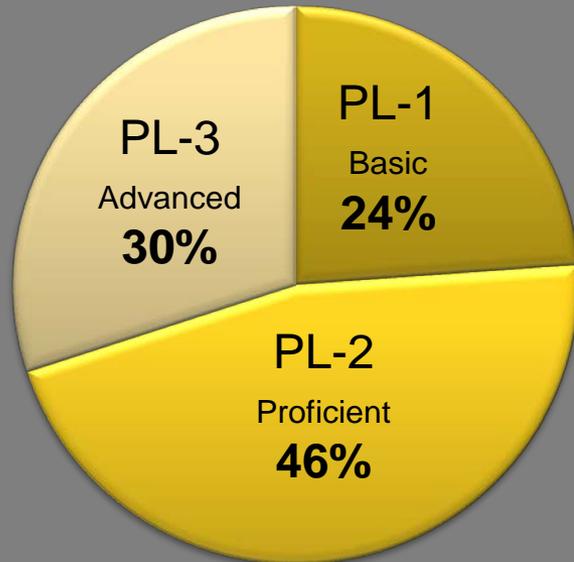
- Inconclusive – there is no evidence to support that there are any technical issues in the development, administration and scoring of the test that contributed to a mode effect

2. Differing populations

- When analyzing how the students performed on the MSA/HSA the prior year
 - PARCC Paper – 81% of students scored Proficient or Advanced the prior year
 - PARCC Online – 76% of student scored Proficient or Advanced the prior year
- Paper population consists of greater population of high performing students accounting for an average of 40% of discrepancy across all tests

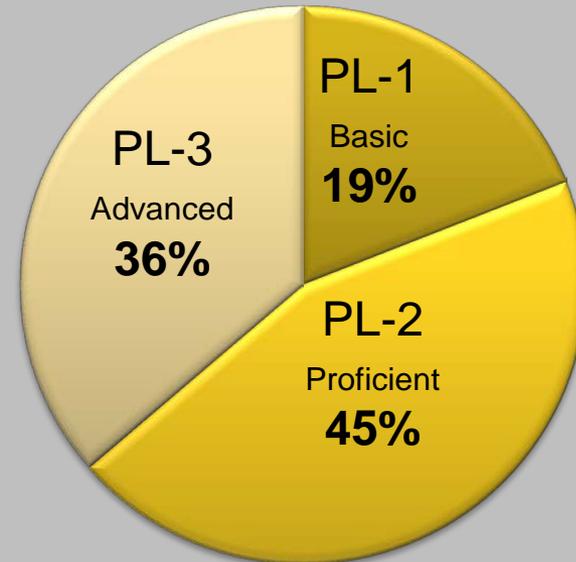
PARCC Results Broken Down by Mode and Prior Year 2013-14 MSA/HSA PL

Online



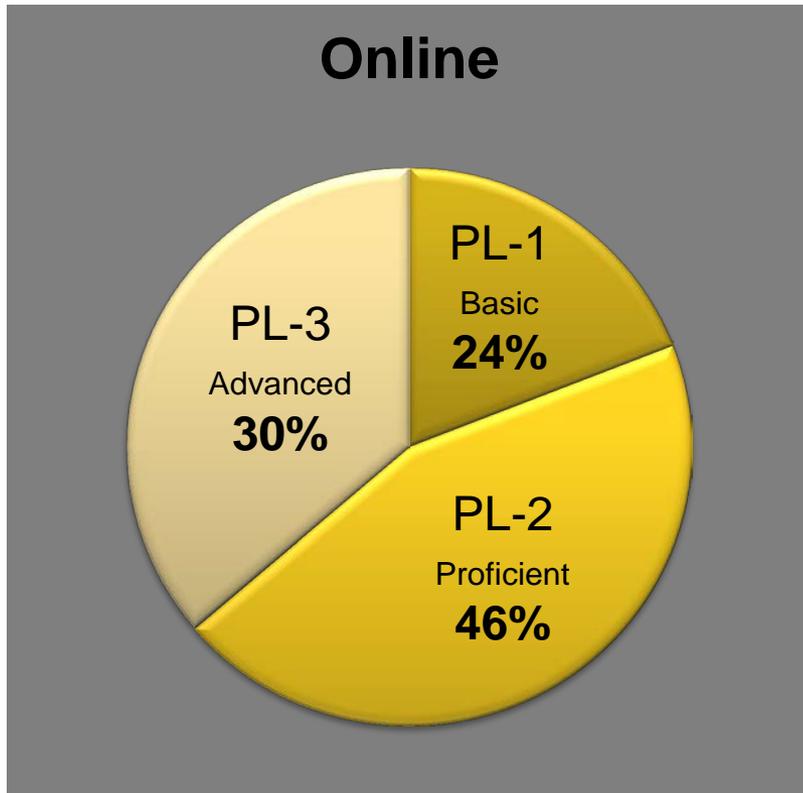
n = 569,766 Tests

Paper

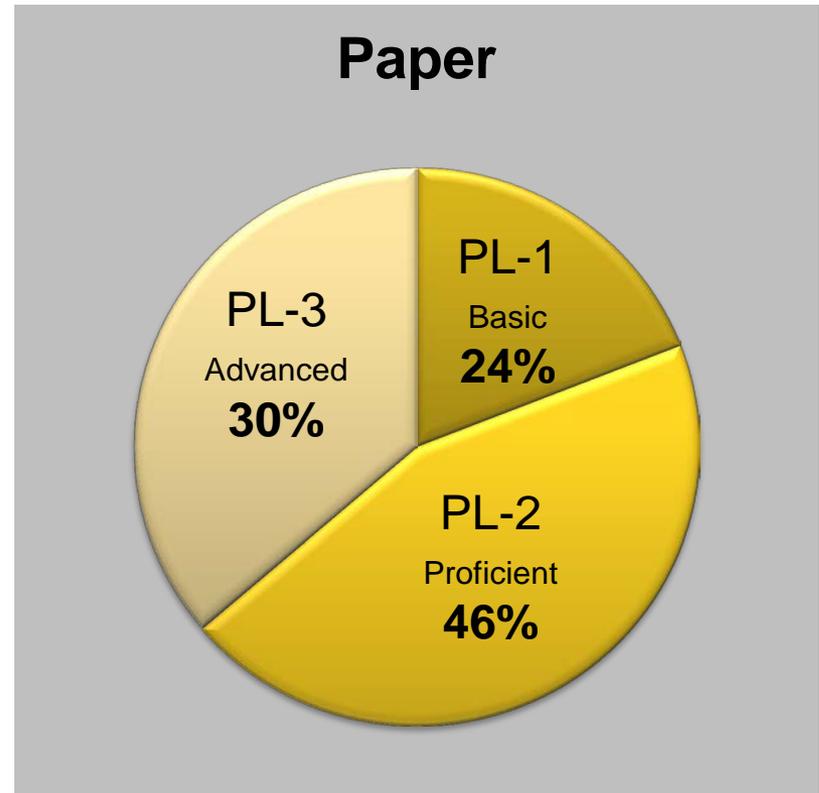


n = 108,866 Tests

Creating Matched Sample for Analysis



n = 109,237 Tests



n = 109,237 Tests

Difference in Average Scale Scores by Mode and by Test

Test	All Students	Matched Sample	FARMs	Special Education	African American
MAT03	-1				
MAT04	-2	3	1	1	2
MAT05	-1	4	4	0	4
MAT06	1	-1	0	0	1
MAT07	-4	-2	-3	-6	-4
MAT08	-14	-6	-7	-5	-7
ALG01	-22	-8	-8	-6	-5

- Negative values indicate that paper outperformed online
 Positive values indicate that online outperformed paper

Difference in Average Scale Scores by Mode and by Test

Test	All Students	Matched Sample	FARMs	Special Education	African American
ELA03	-9				
ELA04	-13	-10	-11	-10	-12
ELA05	-10	-7	-9	-8	-9
ELA06	-5	-8	-7	-9	-7
ELA07	-13	-8	-9	-8	-9
ELA08	-15	-9	-10	-10	-10
ELA10	-8	-14	-12	-11	-11

- Negative values indicate that paper outperformed online
 Positive values indicate that online outperformed paper

3. Readiness

- Item type with greatest mode effect: Extended Constructed Response (ECR) items
- Inconclusive
 - Typing time
 - Online platform tools (i.e. equation editor)
- Anecdotal
 - Not knowing how much is enough
 - “Fill the box” paper box much larger than online text box

3. Readiness con't

- In need of further research
 - Developing extended responses interfacing with technology instead of paper/pencil
 - Response length of paper vs online on Extended Constructed Response (ECR) items
 - The impact, if any, of referencing multi-media in extended responses

Findings

- Comparison of Mode by performance level illustrates that students that took the test on paper tended to outperform the online test-takers on the ELA tests and higher level math tests
- Greater percentage of higher performing students in Maryland took the paper form
- No evidence of any particular student group impacted more than the population as a whole

Findings

- Items requiring extended responses most greatly impacted by mode favoring paper
- There is no evidence of any technical issues in the development, administration, scoring or reporting of the results

Moving forward...

- Online is the new standard. The PARCC assessments were developed to be online tests. Performance Levels were set using online forms only.
- Maryland is transitioning to entirely online by the 2016-17 school year
- Newness/readiness issues need to be further studied and performance expectations made clear

Comments/Questions?
