

Blast From the Past: A Quantitative Study Comparing Florida's and Maryland's Assessments and Students Performance in STEM

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ABSTRACT

States are establishing high stakes assessments to serve as measurement tools of students' academic abilities. This study essentially compares Maryland's and Florida's mathematics and science assessments for similarities and differences. Building from 5–10 years of student level quantitative data (secondary data) and critical analyses of the states' exams, the examination of the effects of increase testing on student subgroups, and the impacts of increase testing on Maryland's and Florida's graduation rates were looked at. Data reveals the negative impacts of increase testing on students' performance, particularly those of low socioeconomics and those that are of a minority status—Black or Hispanic. Moreover, secondary data analyzed revealed that: (a) there were some similarities and differences between Maryland's and Florida's assessments, and (b) for both states, poor minority students were the lower performers. For future studies, it is recommended that more analyses of states' assessments and students' performance be conducted in order to enhance the educational literature, particularly with respect to assessment issues.

Key Words: *assessments, FCAT, HSA, minority/non-minority academic performance, socioeconomics and achievement, and high stakes tests*

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INTRODUCTION

The quality of mathematics and science achievement of students in America has been a major area of concern for the last fifty years. Over that time, the federal government launched and participated in a variety of attempts to promote mathematics

and science education. Arguably, the most significant of these occurred after the Soviet Union launched Sputnik in 1957 (Mathematics and Science Initiative Concept Paper, 2006). As a response to the Soviet's demonstration of superior technological capability, and within 12 years of Sputnik, America upgraded its mathematics and science education programs, launched satellites, saw its own astronauts orbit the earth, and launched the first man on the moon (Mathematics and Science Initiative Concept Paper, 2006).

However, it was not until the mid-1980s that the Department of Education recognized the need to reach more students and teachers (Mathematics and Science Initiative Concept Paper, 2006). The National Science Foundation (NSF) also worked to broaden the focus of mathematics and science education from a focus on an elite group of students to a focus on all students (Project 2061). From the 1980s onwards, NSF made tremendous efforts to increase curriculum development in mathematics and science for K-12 students and pre-service and in-service teacher education.

According to Diane Ravitch, testing or assessment and accountability were linked in educational assessment; however, it was not always this way. In the 19th century, students were tested to see how they mastered what they were taught (Ravitch, 2002). If they did not pass the test they were left back, no one was held accountable, not the student nor the teacher. Back then, most students who managed to make it out of high school and applied to college were accepted. Only the most prestigious colleges, such as Harvard, Princeton, and Yale required the passing of an entrance examination (Ravitch, 2002). This led to the formation of the College Entrance Examination Board in 1900. With the establishment of the field of educational psychology, a reform in

educational testing was seen. Scientific methods were applied to perfect testing as a measurement of student performance. In order to make school a more pleasant experience for students, social promotion became popular in education (Ravitch, 2002). This practice did not hold students or teachers accountable for students' poor performance. The field of education began pushing for accountability around 1966 with the release of the Coleman Report. This report was based on a study of inequities in opportunities for some racial minority children. Adding funds to increase resources to low functioning schools brought about a demand for accountability. With this accountability came a demand for school improvement (Ravitch, 2002).

Moreover, Stiggins (2002) suggests that we must improve classroom assessment if we are going to use assessment to increase student achievement and school improvement. Stiggins states that the past 50 years has seen an evolution in school assessment and it is believed that school improvement requires three things:

- the articulation of higher achievement standards
- transforming those standards into rigorous assessments
- and, accountability of educators

History of High School Assessments

In the last century or so, society became concerned with high school graduation. Few students attended high school, and even fewer graduated. Concerns in the past 40 years about the social problems associated with those who did not complete high school, sparked the debates about educational accountability. The term 'dropout' was coined by Edward Bellamy in the 1960s. As concerns grew, there were many discussions about the differences between the General Education Diploma (GED) and

the high school diploma and how each fits into a changing society. The web of influences that shaped entrance and exits out of school, as well as engagement with learning became of interest to those in the business world. The main discussion focused on the reciprocal relationship between labor-market participation and school attendance, and this push-pull relationship was clearly affected by high-stakes testing.

Further, graduation examinations first appeared in the form of the Certificate of Initial Mastery which was proposed by Marc Tucker in the late 1990s. This initial step led to education reform legislation in such states as Washington State, Texas, and Massachusetts in the early 1990s (Wikipedia, 2006). The Certificate of Initial Mastery was awarded to students who passed a series of performance-based assessments by age 16. After being awarded the certificate, students were qualified to choose to either go to work, enter a college preparatory program, or study for a technical and professional certificate (Wikipedia, 2006).

With the dawning of the year 2000 and beyond, we have seen creation of new high school exit exams. Although the exit exams have improved in format since the 1990s, they are still tied to mastery of curriculum content standards. Dorn (2003) writes about three key issues that profoundly affect the relationship between high stakes testing and graduation patterns. First, dropping out is more of an indirect, rather than direct result of high stakes testing. If students can not finish high school by the age of 19, they are lured away by the opportunities of the workforce. Secondly, the proliferation of diplomas at secondary or tertiary levels may mask the continuing inequalities in educational opportunities. Due to the high proportion of the population attending college at some point in life, one might claim that high school graduation is merely an

intermediate step in formal schooling, on the way to something bigger. Therefore, the diploma becomes a gateway for college entrance, as well as a direct pre-requisite for the competitive labor-market (p.3). Thirdly, schooling as a route to economic and social success has become part of the American belief in the existence of equality (Dorn, 2003).

Statewide assessments are cumulative (summative) assessments that test students' knowledge of core subjects. Assessments are offered in mathematics, English, reading, science and government. Additionally, assessments are offered in elementary, middle, and high schools. There are 49 states and the District of Columbia which have annual statewide standards based reading and mathematics assessments in grades 3-8, and at least once in high school. Twenty-seven states currently have annual, statewide standards based science tests for grades 3–5, 6–9, and 10–12 (Education Commission of the States, 2006). As of 2007, there are 24 states using graduation exit examinations, with four of the states having waivers. States using exit exams are:

Alabama	Florida	Georgia
Indiana	Louisiana	Maryland
Minnesota	Mississippi	Nevada
New Jersey	New Mexico	New York
North Carolina	Ohio	South Carolina
Tennessee	Texas	Virginia
Alaska	Arizona	California
Massachusetts	Washington	Utah

Significance of Florida’s and Maryland’s Use of Assessments

The assessments in Florida and Maryland are aligned with the states’ curriculum. The curriculum in each state is aligned with the federal standards. The policy assessment ensures state and federal accountability are adhered to as required by the federal mandate in the No Child Left Behind Act (2001). In addition, it ensures students are adequately knowledgeable in the basic skills that are required to compete in the labor market or to proceed to higher education.

General Purposes of the Exams

The overall purposes of statewide assessments are to gather information of three kinds:

- First, parents, students, and teachers need the Florida Comprehensive Assessment Test (FCAT) and the Maryland High School Assessment (HSA) data to provide information about students’ mastery of skills, to assess students’ performances, and to diagnose students’ needs. It is also used in most cases as a purpose for graduation.
- Second, teachers use it to further assess the overall effectiveness of their instruction and to test the effectiveness of the schools’ and states’ curriculum standards.
- Third, parents use it to assess their child’s performance and to make decisions on whether they are college ready.

PURPOSE OF STUDY

With states “phasing in” mandatory graduation exit exams, there is a need for new states to model their assessment programs after pioneer states such as Florida. This study was designed to make some stakeholders (teachers, administrators, etc.)

aware of the strategies used by Florida and Maryland in their efforts to strengthen and improve their academic programs. Moreover, few previous studies done on assessment issues have focused their attention on comparing states' assessments in order to examine and explore the possible differences and similarities that may exist between the various states' assessments. The study compares Florida's and Maryland's math and science assessments, and also closely explores similarities and differences between students' math and science performances in both states. The study also examines possible relationships between students' socioeconomics and achievement, students' race/ethnicity and achievement, and increase testing and students' high school dropout rates.

LITERATURE REVIEW

NCLB Act, Accountability, and AYP Since 2002

The Elementary and Secondary Education Act (ESEA) passed in 1965 as a part of President Lyndon Johnson's War on Poverty gave the federal government investment opportunities in elementary and secondary education. The ESEA was reauthorized in 1994, and signed into law by President George W. Bush on January 8, 2002 as the No Child Left Behind Act (Florida Education Association, 2004). The expansion of ESEA into the NCLB Act (2001) brought with it the increased federal role in education.

The NCLB Act detailed each state's responsibilities as follows:

- To develop challenging academic standards, especially in mathematics and science,

- To assess students' progress by constant testing measures by way of the various states' assessments designed to ensure that students are meeting the challenging state academic achievement and content standards,
- To give an account of students' progress over the year in order to meet the accountability mandate of the NCLB Act. In other words, each state offering assessments must produce annual state and school district report cards that inform parents and communities about state and school progress (U S Department of Education, 2003),
- And, to hold schools, school districts, and the individual states accountable for making Annual Yearly Progress (AYP), the NCLB Act sought to hold schools accountable for making academic progress with their students and for overcoming achievement gaps, such as those seen between poor and rich students, urban and suburban schools, and between minorities and non-minorities (Florida Department of Education, 2006). The ultimate goal of the AYP Plan under the NCLB Act was to accomplish a 100% proficiency level on each state's mathematics and reading assessments by 2013–2014 (nothing was mentioned of science).

The AYP formula was determined as follows:

- Determine how each state defines "proficient" student performance in mathematics and reading,
- Decide what indicators of student performance would be included in the definition of AYP,

- Set incremental AYP targets that would have established minimal levels of increased student performances from 2002–2003 through 2013–2014,
- And, set an initial threshold that is at a minimum the higher of the percent of students proficient in the statewide lowest achieving subgroup (Florida Education Association, 2004).

Additionally, according to the Maryland State Department of Education (2006), in order for AYP to be assessed, each subgroup of students had to take the exams and perform at least at the proficient level in order for AYP to have been met. In other words, African Americans, Asians, Hispanics, Whites, American Indians, and Special Education students had to be assessed as separate subgroups in order for AYP to be successfully determined for each school and school district tested (the achievement levels were: basic, proficient, and advanced, but students had to perform at the proficient level for AYP to be met). Based on the federal No Child Left Behind Act of 2001, schools must have met 39 criteria for AYP to have been met at that school. Districts must have met the same criteria, except that school grades were not taken into consideration. If any one of the 39 criteria were not met, the school did not meet adequate yearly progress under the federal accountability plan (Florida Department of Education, 2006). If a school did not meet all 39 criteria but was high performing or received an 'A' or 'B' school grade under the A+ plan, then the school would have been designated 'provisional' AYP (Florida Department of Education, 2006).

What are the Florida FCAT and Maryland HSA?

The Florida Comprehensive Assessment Test (FCAT) is a statewide exam given by the state of Florida to students in grades 3–10 (math & reading), and grades 5, 8,

and 11 (science assessments). The exam is given in reading, mathematics, government, and science. It is an exit assessment that must be taken in either grade 10 (as is the case of mathematics and reading), or in grade 11 (as is the case of science). The Maryland High School Assessment (HSA) is also a state exam, like the FCAT and is given in Reading/English, Algebra/Data Analysis, and Biology. The Maryland HSA in English 2, Algebra, and Biology were made exit exams as of 2009. Students in Maryland have to pass English 2, Algebra, and Biology assessments in order to receive a Maryland high school diploma. In the case of Florida, mathematics and reading are exit exams that must be passed (as of 2002) in order for high school graduates to receive their diplomas (Fulton, 2006). Specific skills and concepts measured by the Maryland HSA and Florida FCAT are:

Maryland HSA Exams in Biology and Mathematics:

Biology

The nature of matter

Earth & Space science

Processes of Life

The nature of science & interaction of living things in the environment

Mathematics

Algebra I concepts

Data analysis concepts

Florida FCAT Exams in Sciences and Mathematics:

Science concepts

Physical & Chemical

sciences

Earth & space sciences

Life & environmental sciences

Mathematics

Trigonometry

General mathematics

Algebra

Overall, with regards to the science portion of the assessments, the Maryland HSA is made of 100% biological type questions; whereas, the Florida FCAT is divided into 50% biological questions and 50% physical and chemical questions. The science exams consist of objective type questions (multiple choice), extended constructed responses (ECRs), and brief constructed responses (BCRs). The mathematics portion of the exam tests general mathematics as in the case of the Florida FCAT, and Algebra I and data analysis as in the case of the Maryland HSA. Both math exams are made of objective type questions (multiple choice), ECRs and BCRs.

Socioeconomics and Achievement

There are some researchers that disagree that socioeconomic standing (i.e. family poverty & family education) is to blame for students' (esp. Blacks & Hispanics) underperformance in schools (Ogbu, 2003; Paik, 2004; Wang, 2004). However, there are others who believe that socioeconomics does play a pivotal role in students' academic achievement. Mortenson (2001) points out that parents' socioeconomics can have powerful effects on K-12 learning and success in college. For example, 13 year old students whose parents had not graduated from high school scored 9 percent lower on mathematics and science achievement tests and 12 percent lower on reading achievement tests than students whose parents had at least some college education (United States Department of Education, 2000a). About 25 percent of high school graduates from lower socioeconomic backgrounds go to college and earn a degree; whereas, nearly 80 percent of the graduates from higher socioeconomic backgrounds do. Also, Black households headed by single mothers were found to suffer from high

levels of poverty. Children of these individuals usually underperformed in schools as well (Kauchak & Eggen, 2005; US Bureau of Census, 2002). To further advance the socioeconomic argument, researchers have found that high SES students: scored higher on intelligence and achievement tests, got better grades in schools, missed less school, had lower dropout rates, and had fewer suspensions. On the other hand, Konstantopoulos (1997, p.5) and others have found that low SES students achieved lower grades, missed more school days, achieved lower test results on intelligence and achievement tests, and had higher dropout rates.

National and international benchmarks are confirming that minority students from low-income families are performing poorly (Mathematics and Science Initiative Concept Paper, 2006). Specifically turning our focus to the NCLB Act of 2001, we see that one of the Act's main goals was to narrow the achievement gap between the poor and rich, but we can clearly see that this was not achieved. In section 1001 of the NCLB Act of 2001, the general purpose statement of the Act states that it was designed to ensure that all children had a fair, equal, and significant opportunity to obtain a high quality education. Clause 2 of the NCLB Act further stated that the mission of the Act was to meet the educational needs of low achieving children in the nation's highest poverty schools, and Clause 3 stated that one of the mission of the Act was to close the achievement gap between high and low performing schools, and the gap between rich and poor students and that between minority and non-minorities. Years after the NCLB Act of 2001, we have not realized any of the aforementioned goals as were stated in Clauses 2 and 3 of the Act. Critics of state assessments have argued that these high stakes assessments are not improving student learning and are increasing the test score gaps between rich

and poor students, high and low achieving schools, and between minorities and non-minorities (Gaylor, 2005; Maryland State Department of Education, 2005).

Race/Ethnicity and Achievement

Academic achievement in general, and science and mathematics achievement favor some groups over others, whether it is suburban/urban, economically privileged/economically disadvantaged, or non-minority/minority. The US Department of Education's Report, The Nation's Report Card, Math 2000 revealed that while Whites, Blacks, and Hispanics in grades 4 and 8 made gains on the National Assessment of Educational Progress (NAEP) since 1990, the large gaps between these subgroups' performance have remained slightly unchanged (Mathematics and Science Initiative Concept Paper, 2006). In the 2000 assessment, White students in grades 4, 8, and 12 had higher scores than Black or Hispanic students and the differences in scores were substantial (Mathematics and Science Initiative Concept Paper, 2006). For example, White fourth graders scored 236 points on average in 2000 compared to 205 points for Blacks and 212 points for Hispanics. For eighth graders, White students scored 286 points while Black students scored 247 points and Hispanic students scored 253 points. For 12th graders, Black and Hispanic students demonstrated similar mathematical skills to those of White eighth graders (Mathematics and Science Initiative Concept Paper, 2006).

With regards to science test scores, the results between minority and non-minority students were similar to those of the earlier reported mathematics scores. According to the National Center for Educational Statistics (2000), by grade 12, Blacks

are the lowest performing group in America compared to Whites, Asians/Pacific Islanders, American Indians, and Hispanics.

The increase in exit exams in the 24 states was predicted to affect 55% of minority public school students. It was estimated that in 2011, 8 in 10 minority students were to be tremendously affected by the impacts of mandatory statewide assessments (Dee & Jacob, 2006; Gaylor, 2005). In 12 states for which the report included performance data from the statewide assessments in math and science, African Americans, Hispanics, and English language learners had lower pass rates than their White counterparts in the states' assessments (Gaylor, 2005). For example, the performance gap in reading and English for White students versus Black students ranged from a five points difference in Georgia to a 41 points difference in Florida. In mathematics, the performance gap ranged from 17 points in Georgia to 45 points in Minnesota for White students versus Black students. The gap between Whites and Hispanics was also wide (Gaylor, 2005).

If a failure to pass an exit exam on the first try leads to higher dropout rates or other negative consequences, then African Americans and Hispanics will be the groups greatly affected (Maryland State Department of Education, 2003). In all states reporting passing rates by student subgroups, African Americans and Hispanics were less likely to pass exit exams in math and science, particularly on their first try. In Massachusetts for example, Asian Americans and Whites were about twice as likely as Hispanics and about one and three quarters as likely as African Americans to pass the state's mathematics exam on the first try (Maryland State Department of Education, 2003).

Given the abundant statistical data available that clearly shows that state assessments are not working for African Americans and Hispanics, and for poor urban school students, then how can one say that the mission or goal of the NCLB Act has been successful? The failures of the NCLB Act were outlined in the literature as such:

- It has helped to widen the test score gap between student subgroups rather than closed the pre-existing gap,
- Low achieving schools continued to underperform compared to high achieving schools,
- And, African Americans and Hispanics continued to underperform on exit exams compared to their White and Asian peers.

Testing and Graduation Rates, Testing and High School

Dropout Rates

While Maryland began to phase in its graduation exit exams in 2009, Florida's FCAT has been well established for some time. In 2005, 20 states used exit exams as a graduation requirement (Center on Education Policy, 2005), and in 2009, the number increased to 25 states. It is difficult to determine if any increase in high school dropout rates were a direct result of graduation exit examinations due to the varying reasons that students drop out of school. However, the Center on Education Policy convened a panel composed of researchers and practitioners with expertise in exam policies and dropout issues. The results of the report were discussed in March 2003, and are listed below:

- Amerein and Berliner (2002 a & b) used time series research designs to look for changes in dropout rates, high school graduation rates, and enrollment in GED

programs after the exit exam was introduced. For each of these outcomes, they compared each state's trend lines to the national ones to control for normal fluctuations and extraneous influences on the data. The researchers concluded that high school exit exams led to higher dropout rates, lower graduation rates, and increased enrollments in GED programs in the majority of states.

- Jacob (2001) used data from the National Educational Longitudinal Study (NELS), a data set that monitored a nationally representative sample of students in the graduation class of 1992 as they progressed from the eighth grade through high school. Controlling for prior student achievement and a variety of other student, school, and state characteristics, Jacob found that exit exams had no appreciable effect on the probability of dropping out for the average student. But, he found that low achieving students in states with exit exams were about 25% more likely to drop out of high school than comparable peers in non-test states.
- Also using the NELS data set, Warren and Edwards (2003) found that students who were required to pass exit exams in the early 1990s were about seventy percent more likely to obtain a GED instead of a regular high school diploma. This effect was found regardless of students' race and ethnicity, socioeconomic status, or achievement level.
- Carnoy and Loeb (2003) used statistical model-fitting techniques to see whether states' use of high stakes tests were predictive of high school survival rates. They found no effect of high stakes tests, such as exit exams, on the progression rates through high school for Black or White students (though they could not rule out some effect for Hispanic students).

- In Minnesota, Davenport et al. (2002) investigated graduation rates to see whether any changes occurred after the introduction of the state's new exit exam, the *Basic Skills Test*. They did not find any overall negative impact on graduation rates. But interestingly, they found that a large number of students (mostly low income and minority students) graduated without having passed both tests, probably due to exemptions and other loopholes. Also intriguing was the fact that over half of the students who dropped out had already passed both tests, indicating that for a substantial number of students passing the tests was not the primary determinant in their decision to leave school (Center on Education Policy, 2005).

This report highlights the difficulty in researching this subject; both in tracking the students and determining if a definitive correlation exists between the decisions to drop out of high school and receiving a high school diploma via passing a high school exit exam. The Center on Education Policy's Report (2005) quoted students and teachers who stated that the overall improvement in educational achievement was far more important than any stress they may feel before, during, or after the test (p.7).

Further, opponents of high stakes exit exams argue that these exams drive already low graduation rates downwards, and that by raising graduation standards to such a high level forces many students, minorities in particular to drop out of high school (Green and Winters, 2004). Although, proponents of these exams are arguing that there is little empirical evidence to support the notion that increased testing leads to lower graduation rates and an increased dropout rate, there are those critics who counter argues that the evidence in support of the negative effects of high stakes testing

are insurmountable (Green & Winters, 2004). Specifically, Amrein and Berliner (2002 b) examined whether states that adapted exit exams have seen increased dropout rates, decreased graduation rates, or increased percentages of students pursuing a GED instead of a high school diploma. They found that 66% of states that implemented high school exit exams were negatively impacted by the tests (Amrein & Berliner, 2002 a & b). Further, Rearden and Galindo (2002) used the NELS data set to examine the effect of exit exams. What they found was that students who were required to pass a test to enter the 9th grade were more likely to drop out prior to entering the 10th grade (Rearden & Galindo, 2002). But one drawback of their study was that they failed to evaluate whether high school exit exams, which are given in either grades 10 or 11, led to higher dropout rates, instead they focused only on exams that were required for high school entrance (Green & Winters, 2004).

In Florida in May 2003, education officials were faced with a serious problem when nearly 13,000 seniors were not anticipated to graduate because they failed the FCAT exams (Cable News Network LP, 2005). Additionally, not only was Florida seniors affected in 2003 but so was high school seniors across the United States. In 2003, thousands of students nationwide were denied diplomas in the 19 states where exit exams were mandatory in order to receive a high school diploma. Further, it was predicted that in 2008, 7 in 10 public school students and 8 in 10 minority students would have been greatly affected by the negative impacts of exit exams (Gaylor, 2005). Moreover, Dee and Jacob (2006) conducted a study in which they presented new empirical evidence on how exit exams influenced educational attainment. They used data from the 2000 census and the National Center for Education Statistics Common

Core of Data (CCD) and found that exit exams significantly reduced the probability of completing high school, particularly for Black students. Additionally, further analysis also revealed that grade level dropout data from the CCD indicated that Minnesota's recent exit exam increased the dropout rate in urban and high poverty school districts as well as in those school districts with large populations of minority students (Dee & Jacob, 2006). The study also showed that Minnesota's exit exam lowered the dropout rate in low poverty and suburban school districts, particularly amongst 10 and 11 graders (Dee & Jacob, 2006). According to the findings of Dee and Jacob (2006): "exit exams have the capacity to improve student and school performance for certain student subgroups but also appear to have exacerbated the inequality in educational attainment."

Problems arising from the negative effects of implementing mandatory high stakes exit exams have forced:

- States to monitor the effects of exit exams and continued efforts to speed up implementation of academic interventions and enrichment that can minimize the negative effects of the tests on key populations,
- States to come up with waivers for some minority groups of students and for students with disabilities who may be unable to pass these exams (even after several tries),
- States to look at alternative tests to replace exit exams,
- Some states to lower test scores,
- Amendments or changes to some exit exams (Gaylor, 2005).

Despite a few empirical studies done to try to correlate increase testing with higher dropout rates and lower graduation rates, there is still no study that has definitively

concluded that increased testing have greatly impacted high school drop out rates and graduation rates (Amerein & Berliner 2002 a & b; Center on Education Policy, 2003; Dee & Jacob, 2006; Jacob, 2001; Warren & Edwards, 2003). Research on the impact of exit exams on dropout rates is limited and inconclusive; so testing policies continue to be made in the absence of good information about their probable consequences (Gaylor, 2005). While we cannot yet directly link exit exams to higher dropout rates, there is enough evidence to suggest a possible relationship between the two variables says Keith Gaylor, Center for Education Policy, Associate Director and leader of the Exit Exam Project (Gaylor, 2005).

METHODS—PRIMARY & SECONDARY ANALYSES

Maryland's 2004, 2005 HSA exams, and Florida's 2002, 2003, 2005 FCAT exams were analyzed and test items were compared for similarities and differences with respect to: tests designs, testing standards, rubrics/scoring protocols, tests biases, types/kinds of test items, reliability and validity constructs. Additionally, secondary quantitative data from the Maryland Report Card (2006), and Florida Department of Education (2006) were examined to assess possible links between socioeconomics and students' performance, race/ethnicity and students' performance, and increase testing and students' graduation rates. The aforementioned relationships or links were compared for both states.

RESULTS

Some similarities that were found between the Florida FCAT and Maryland HSA assessments were:

Tests Administration

Both states' exit exams in mathematics and science were given in high school, either in grades 10 or 11.

Tests Designs

- Both the Maryland's HSA exam and Florida's FCAT exam had more objective (multiple choice) type questions than extended constructed or brief constructed responses.
- Both tests eliminated possible random guessing (and thus may have contributed to an increase in test score reliability) by utilizing a varied alphabetical selection for multiple choice questions, such as choice selections of either A–D or F, G, H and J for Maryland's HSA or choices A–D or F–I for the Florida FCAT exams.

Examples of this were:

Question 6 of the 2005 Florida FCAT science exam where A–D selection method was used.

Question 6

Earthquakes occur in many regions of the world. Why are there no major earthquakes in Florida?

- (a) Earthquakes cannot occur on a peninsula
- (b) Florida is over a hot spot where no earthquakes occur
- (c) Earthquakes cannot occur in limestone sedimentary rock
- (d) There is no tectonic plate boundaries located near Florida

In another example, question 2 of the Fall Maryland 2004 HSA algebra/data analysis exam, the selection choices were a choice of either an F, G, H or J answer selection.

For example:

A park ranger spent \$208 to buy 12 trees. Redwood trees cost \$24 each and spruce trees cost \$16 each. How many of each tree did the park ranger buy?

(F) 10 redwoods and 2 spruce

(G) 9 redwoods and 3 spruce

(H) 3 redwoods and 9 spruce

(J) 2 redwoods and 10 spruce

Readability of Tests Questions

Clear and concise questions were seen on both states' mathematics and science tests.

Validity

Both states' mathematics and science assessments seemed to have covered the established states' mathematics and science standards (content specific validity).

Reliability of Tests Questions

Both states' mathematics and science assessments were reported to have a high Cronbach alpha reliability rating of greater than 0.80. Maryland's algebra exam reliability rating was 0.89 to 0.90 for the three forms of the exam (forms A, B, & W). Maryland's biology exam reliability also exceeded 0.80 at a reported rate of 0.92 to 0.93 for all five forms of the exam (forms A, B, C, D, & W) (Maryland Department of Education, 2003 & 2005). For the Florida FCAT, the mathematics Cronbach alpha rating was about 0.80, but no data was given for science (Florida State Department of Education, 2003).

Rubric / Performance levels for Maryland's HSA exams & Florida's FCAT exams

Performance levels under AYP rules

Both states have three established performance levels under AYP. They are:

Advance = outstanding/highest achievement on examination

Proficiency = average/passable performance on examination

Basic = below standards/not passing on examination

Rubric for Test Items

Both states have five levels of rubric scoring. They are:

Level 5 = full and complete understanding of questions/problems

Level 4 = good understanding of problems/questions

Level 3 = basic understanding

Level 2 = some understanding

Level 1 (in Florida's case) and level 0 (in Maryland's case) = no understanding of problems.

Despite similarities between the two states with respect to exams designs, format, and tests construction, there were also key differences as well. Some of these are outlined as follows:

Purpose of exams

The Florida FCAT mathematics (but not science) exit exam is required for Florida's graduation purposes and has been a requirement since 2002; whereas, in the case of Maryland, the HSA algebra and science exit exams were established as a graduation requirement in 2009.

Skills/content measured

As for the science exit exams, the content/skills measured for the two states are distinctly different. Maryland HSA biology covers processes of nature, earth and space science, processes of life, the nature of science, and interactions between living things; whereas, the Florida FCAT science covers general science concepts such as physical

and chemical sciences, earth and space sciences, life and environmental sciences, scientific thinking, and analysis of scientific data.

The mathematics exit exam covers mainly algebra and data analysis for Maryland; whereas, the Florida FCAT math exit exam covers more geometry and trigonometry concepts.

Tests item types

The Maryland HSA exit exams in both mathematics and science consist of a wide range of test items. Test items are considered to be: easy, moderately difficult, and difficult.

Below, there is an example of an easy biology HSA test item.

Question 9 (2005 HSA biology)

The energy required for photosynthesis is provided by

- (a) proteins (b) sunlight (c) chlorophyll (d) carbohydrates

An example of a moderately difficult item was question 24 of the 2005 HSA biology exam.

Question 24

Which of these describes the relationship between cholera bacteria and copepods?

- (F) mutualism (G) parasite-host (H) commensalisms (J) producer-consumer

And a difficult item was question 26 of the 2005 HSA biology exam.

Question 26

A scientist cloned a goat. Which of these is a true statement about the cloned goat?

- (F) It has new genes and traits

(G) It lacks the genes for reproduction

(H) It has genes that are identical to the original goat

(J) It looks the same as the original goat but has different genes

As for the mathematics HSA, the exam also consists of easy, moderately difficult, and difficult items. For example, question 2 of the 2004 HSA algebra was an easy item.

Question 2

A park ranger spent \$208 to buy 12 trees. Redwood trees cost \$24 each and spruce trees cost \$16 each. How many of each tree did the park ranger buy?

(F) 10 redwoods & 2 spruce

(G) 9 redwoods & 3 spruce

(H) 3 redwoods & 9 spruce

(J) 2 redwoods & 10 spruce

Question 3 was an example of a moderately difficult item.

Question 3

Paul earns scores of 76, 78, and 86 on his first three science tests. What score does he need on his fourth test to earn a mean score of 82?

(a) 78 (b) 80 (c) 84 (d) 88

Question 9 is an example of a difficult item on the 2004 mathematics HSA.

Question 9

Look at the pattern 12, 36, 108, 324.....If this continues, what will be the next term?

(a) 540 (b) 648 (c) 972 (d) 1,296

So again, we saw a wide variation of test items with both the Maryland's HSA biology and mathematics tests. But with the Florida FCAT, the exam items for both the science and mathematics tests were considered difficult items. The Florida FCAT items did not appear to cover a wide variety of item difficulty levels as did the Maryland HSA exams. In fact, all test items on the Florida FCAT mathematics and science tests were considered to be very difficult in my opinion as a trained practitioner and the test items were not considered to be pitched at the level of the average 10th or 11th grader. Specific examples are the following items listed below which were drawn from the 2003 Florida science FCAT:

Physical science question 1 (Brief constructed response question)

A ball is dropped from a height of 20 meters above the ground. As the ball falls, it increases in speed. At what height above the ground, in meters, are the kinetic and potential energies of the ball equal?

Environmental science question 2 (Extended constructed response)

Explain how the introduction of the *Melaleuca* trees has altered the ecosystem.

For the mathematics FCAT, the exam consisted of all very difficult items and specific examples were as follows:

Trigonometry question 6 (2002 FCAT mathematics)

A surveyor's chain is a device used by surveyors to measure land. A surveyor's chain is exactly 22 yards long. A surveyor measures one side of a ranch to be 75 chains long. What is the distance in feet?

Trigonometry question 13 (2002 FCAT)

A 6 foot tall forest ranger used shadows to approximate the height of a large tree. At a time when the shadow of the tree was 112 feet long, the ranger's shadow was 8 feet long. What is the approximate height of the tree in feet?

(F) 84 ft. (G) 110 ft. (H) 140 ft. (I) 149 ft.

Scoring of tests

The Florida FCAT and Maryland HSA exams utilized different scoring scales. The Maryland HSA biology exam used a scale of 260 to 650 points; whereas, the Florida FCAT science exam used a scale of 100 to 500 points. The HSA algebra used a scale score of 240 to 625 points; whereas, the FCAT math used a scale of 100 to 500 points.

Potential Tests Biases or Cultural and Language Sensitivity Issues

The Florida FCAT exam seems to cater to a diverse student population and is given in three forms: English, Spanish, and Creole. However, the Maryland HSA does not appear to cater to a diverse ethnic student population with varied languages, and therefore the Maryland HSA is only given in one form, which is English.

METHODS—Secondary Analyses

Secondary analyses were conducted and results presented accordingly:

- First, relationships between students' socioeconomic levels and mathematics and science achievement were examined for Florida and Maryland,
- Second, relationships between students' race/ethnicities and mathematics and science achievement results were examined for Florida and Maryland,
- Third, relationships between increase testing and lower graduation rates for the two states were looked at,

- And fourth, relationships between increase testing and increase in high school dropout rates for both states were examined. The effect of increase testing on graduation rates and dropout rates was examined for the periods 1998 to 2005; so we looked at periods before 2002 and before the establishment of NCLB mandates, also we looked at periods after 2002 and after implementation of NCLB mandates to see if there were patterns of decline in high school graduation rates and patterns of increase in high school dropout rates since implementation of NCLB and the testing movement.

Table 1

Percentages of Baltimore City, Montgomery County, and Maryland students scoring at the proficient level or above on the 2006 Algebra and Biology HAS Exams

Grades & Content area	BCPSS (%)	Montgomery (%)	Maryland (%)
Grades 9 -12			
Mathematics	36.8	78.8	66.6
Science (Biology)	47.9	78.4	67.8

Source: Maryland Report Card, 2006.

- *Note: BCPSS = Baltimore City Public School System*
- *BCPSS = poverty stricken area; students from lower socioeconomic backgrounds*
- *Montgomery County School System = wealthier county; students from higher socioeconomic backgrounds*
- *Advanced level = outstanding achievement, Proficient level = average/passing score, Basic level = below standards*

Table 1 results revealed that for Maryland State (as a whole), 66.6% of all algebra students performed at the proficient level or above. And for biology students, 67.8% of

all students in the state performed at the proficient level or above. For Montgomery County, 78.8% of algebra students and 78.4% of biology students performed at the proficient level or above. For Baltimore City, students performed at a 36.8% proficiency level or above in algebra and at a 47.9% proficiency level or above in biology. Data is indicating that Montgomery County students' performance levels in math and science exceeded that of students in Baltimore City and Maryland State (overall) for 2006. Baltimore City Public School students' results were the lowest recorded performance for 2006, far below that of the state's performance and that of Montgomery County.

Table 2

Percentages of Dade County, Palm Beach County, and Florida students scoring at the proficient level or above on the 2006 math and science FCAT.

Grade & Content area	Dade (%)	Palm Beach (%)	Florida (%)
Mathematics	62	69	61
Science	25	36	35

Source: Florida Department of Education, 2006.

Note: Miami Dade County Schools: students from a lower socioeconomic background

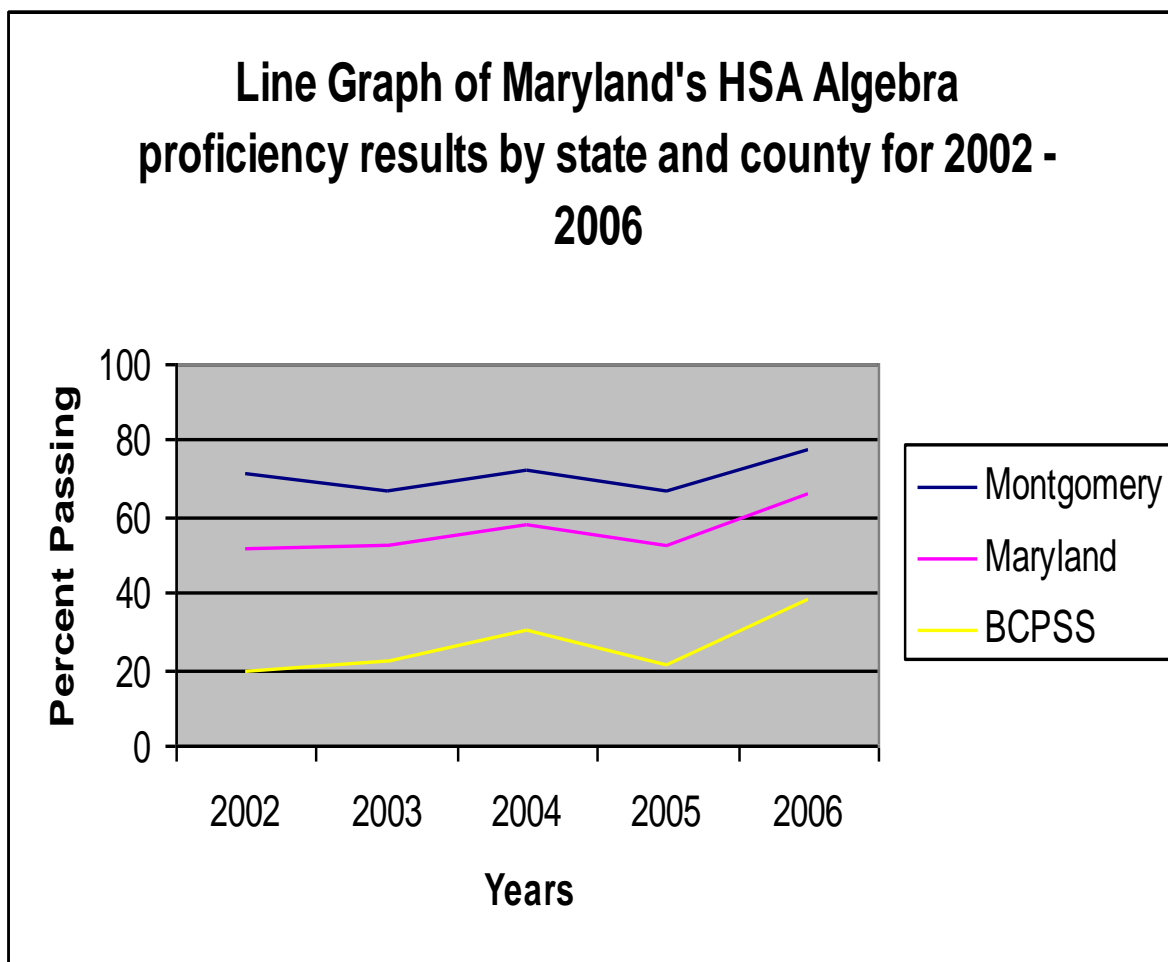
Palm Beach County Schools: students from a higher socioeconomic background

Table 2 data reveals that Florida State as a whole had 61% of all mathematics and 35% of all science students performing at the proficient level or above for 2006. Additionally, students in Miami Dade County (largely minority, urban & lower income) performed slightly above the state's proficiency level in mathematics at a reported level of 62% (1% above the state's performance level), and in science, Dade students performed significantly below the state's overall performance level and also below Palm

Beach County's performance level (at a reported proficiency rate of 25% for 2006). Palm Beach County students performed above both the state's performance level and that of Dade County in mathematics and science. Palm Beach County's students' mathematics proficiency rate was 69% and science was 36% for 2006.

Figure 1

Graphical representation of Maryland's HSA Algebra proficiency results by state and county for 2002–2006

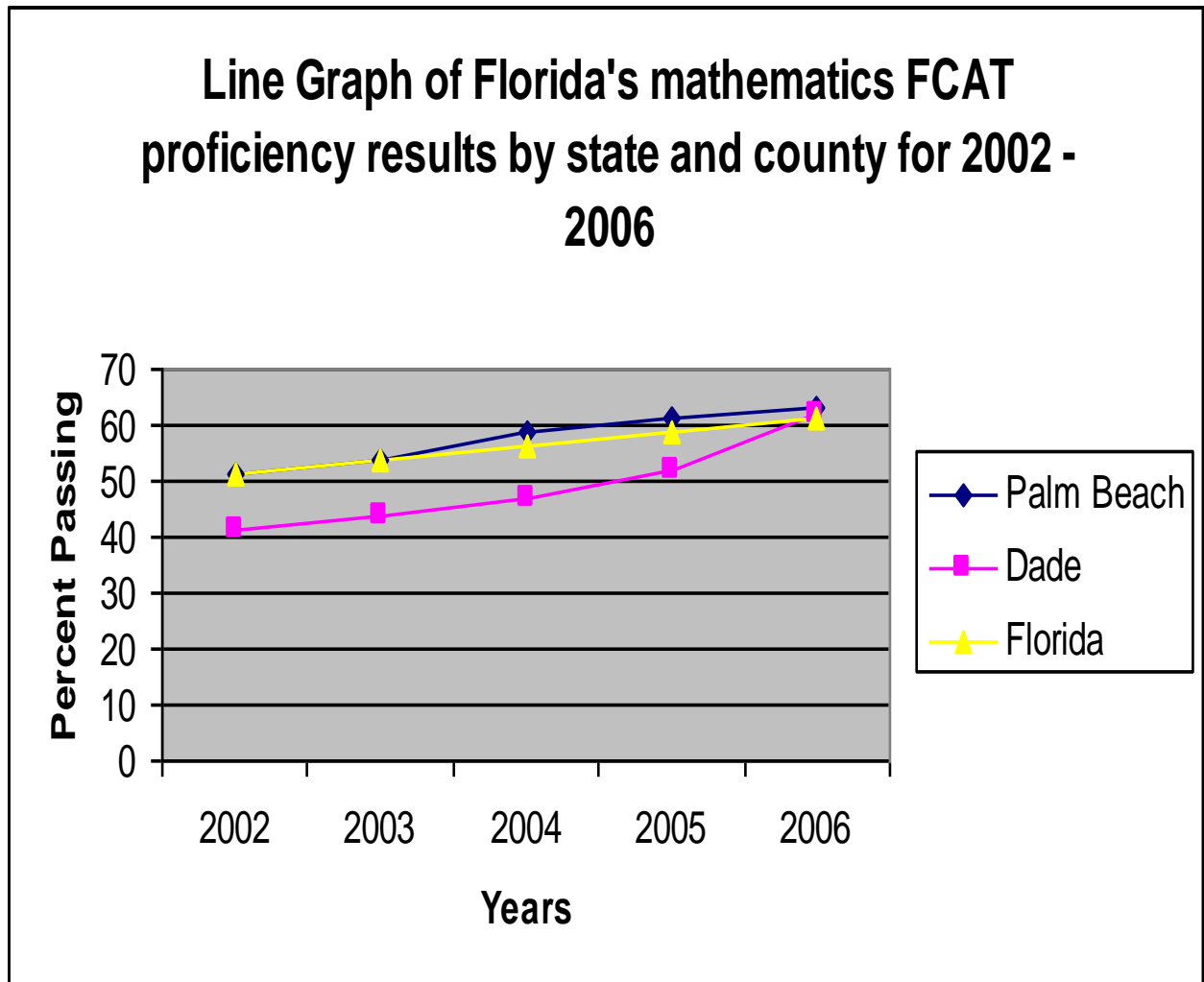


Source: Maryland Report Card, 2006.

Figure 1 reveals that Montgomery County's students' proficiency levels in algebra (math) were consistently above the state level and Baltimore City's Public Schools' students' proficiency level for the years 2002 to 2006. Baltimore City's students' algebra proficiency levels were consistently below the state's and Montgomery County's performance levels for 2002 to 2006.

Figure 2

Graphical representation of Florida's FCAT mathematics proficiency results by state and county for 2002 to 2006.



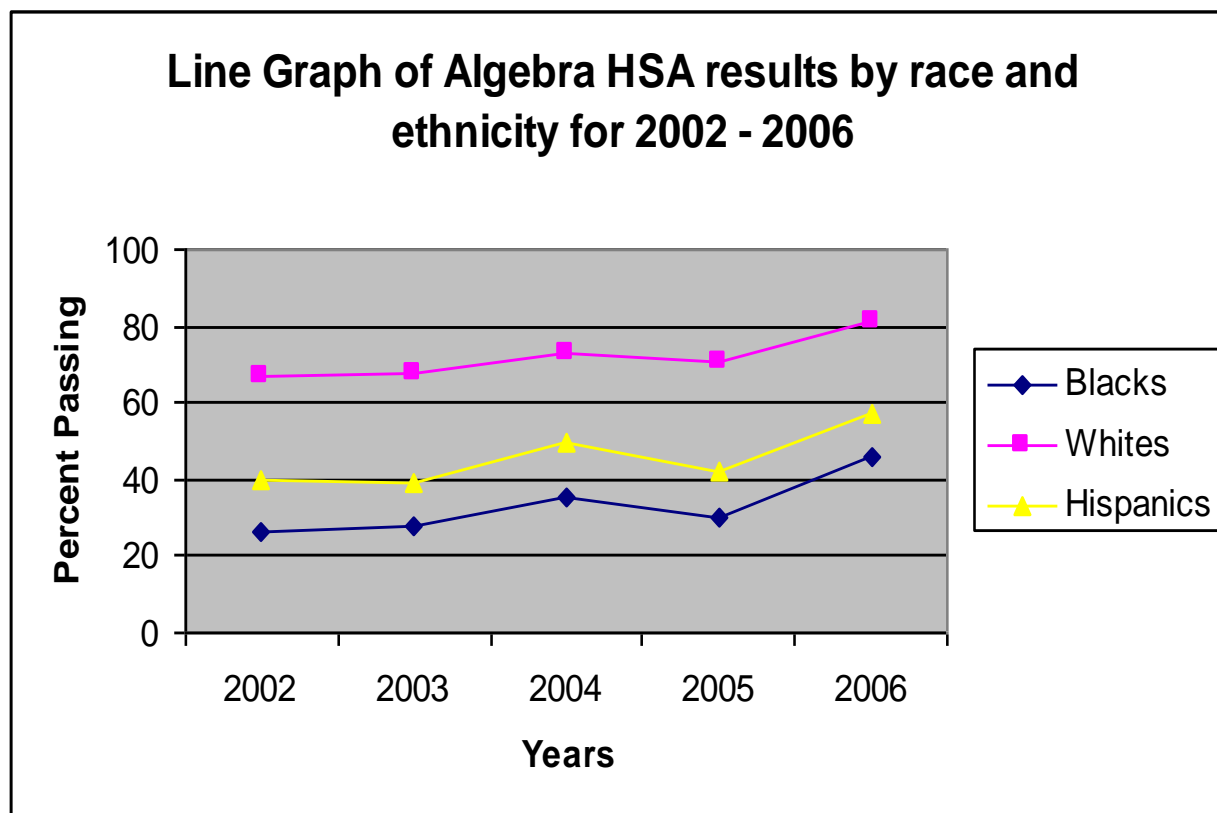
Source: Florida Department of Education, 2006.

Note: No similar data available for Florida's FCAT science results

Figure 2 reveals that Palm Beach County's students' proficiency levels in mathematics were consistently either equivalent to the state's level in 2002 and 2003, or exceeded state's performance level as in the case of 2004 to 2006. Palm Beach County students' mathematics performance also exceeded that of Miami Dade for 2002 to 2006. On the other hand, students in Dade County performance levels in mathematics for 2002 to 2006 were consistently lower than that of Palm Beach County and for 2002 to 2005 lower than that of the state of Florida as a whole.

Figure 3

Graphical representation of Maryland's Algebra HSA results by race and ethnicity for 2002 to 2006

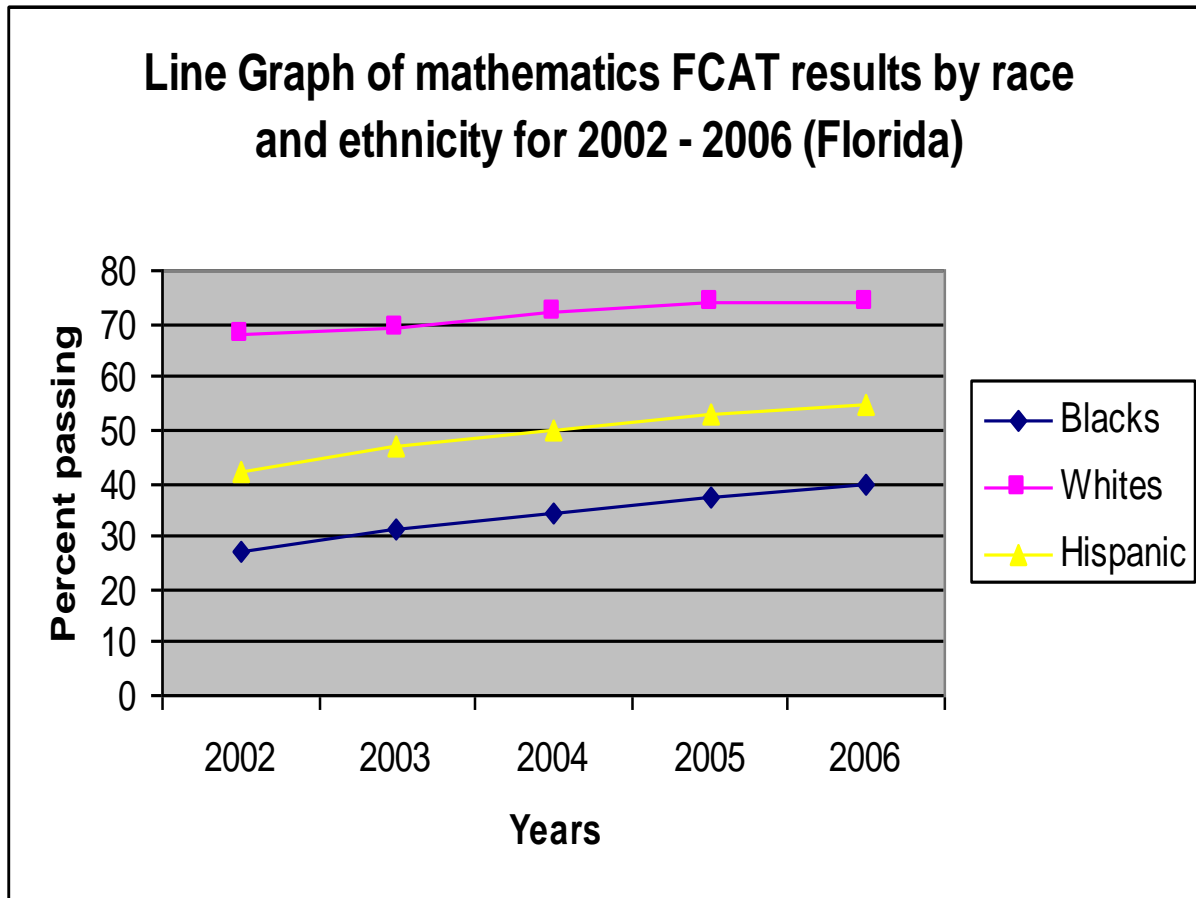


Source: Maryland Report Card, 2006.

- *Note: No similar science data presented because of limitation with Maryland's report card data on science for 2006.*

Figure 4

Graphical representation of Florida's mathematics FCAT results by race and ethnicity for 2002 to 2006



Source: Florida Department of Education, 2006.

- *Note: No similar data available for Florida's FCAT science results.*

Figures 3 and 4 show that for Florida and Maryland, Whites outperformed Hispanics and African Americans (Blacks) in mathematics assessments for 2002 to 2006. African Americans in both states were the lowest performers on the mathematics high school exit exams; whereas, Whites were the highest performers.

Table 3

High school graduation rates for Maryland and Florida compared for 1998 to 2005

State	Years							
	1998	1999	2000	2001	2002	2003	2004	2005
Maryland	80%	81%	82%	83%	84%	85%	84%	85%
Florida	60%	62%	64%	68%	69%	72%	72%	71%

Source: Florida Department of Education, 2006; Maryland Report Card, 2006.

Table 3 shows an increase in graduation rates over time for Florida and Maryland. Graduation rates appeared to increase from 1998 to 2005. Also, post NCLB 2001 saw an increase in the graduation rates for Maryland and Florida for the period of 2002 to 2005. Specifically, Maryland saw an increase from 84% in 2002 to 85% in 2005 (post NCLB mandate), and Florida also saw an increase from 69% in 2002 to 71% in 2005 and 72% in 2003 and 2004. Slightly lower graduation rates than that seen in 2002 to 2005 were seen in 1998 to 2000 (before NCLB) for both states. Thus, this would suggest that there is no definitive evidence to correlate increase testing (and the implementation of NCLB mandates and exit exams) with lower graduation rates.

Table 4

High school dropout rates for Maryland and Florida compared for 1998 to 2005

State	Years							
	1998	1999	2000	2001	2002	2003	2004	2005
Maryland	4%	4%	3.9%	3.9%	3.7%	3.4%	3.8%	3.68%
Florida	5.4%	4.6%	3.8%	3.2%	3.1%	2.9%	3.0%	3.5%

Source: Maryland Report Card, 2006; Florida Department of Education, 2006.

Table 4 showed that high school dropout rates decreased over time from 1998 to 2005 for Florida and Maryland. Higher dropout rates were observed for Maryland and Florida prior to the establishment of the NCLB Act of 2001. But lowered rates were observed for both states post NCLB for the period of 2002 to 2006. Therefore, data would suggest that there is little possible correlation between increase testing and increase high school dropout rates. Moreover, the NCLB Act's mandate of increase testing does not seem to have any contributing influence on Florida's and Maryland's high school dropout rates.

DISCUSSION

This study compared Florida's and Maryland's mathematics and science assessments and also examined the relationships between students' socioeconomics and students' mathematics and science achievement, students' race/ethnicity and students' mathematics and science achievement, and increase testing and students' graduation rates for Florida and Maryland. Thus, the aforementioned relationships of variables were examined for each of the two states and then the two states' results were compared. The Florida FCAT and Maryland HSA exams were similar in: tests administration, tests designs, readability, validity, reliability, and rubric/scoring for each

of the tests questions. However, the two states' tests were different in: purpose of examinations (up to 2008), skills measured, test item types, points scoring for pass/fail options, biases and language sensitivity issues.

From census data collected, it was shown that Montgomery County is a suburban, wealthy school district with a median annual household income of \$85,845, exceeding Maryland's median household income level of \$63,430 or the US average of \$49,424. Montgomery's population is predominantly White with there being a very low reported rate of Blacks and Hispanics (<http://www.muninetguide.com/states/maryland/Montgomery.php>; US Census, 2000). On the other hand, Baltimore City is an urban, low income school district with the lowest reported median income in Maryland recorded for 1998 to 2004. The median household income reported in 2004 was \$29,792 and the per capita income was \$19,671. Additionally, the city has the highest percentage of Blacks to Whites (<http://www.ers.usda.gov/Data/unemployment/RDList2.Asp?ST=MD>; US Bureau of the Census, 2000 & 2002). Similar census data collected for Maryland was also collected for Florida. Palm Beach County is a suburban, very wealthy Florida county with a 2004 median household income of \$94,562 (when assessing those meeting at least the lower to upper middle income levels). Palm Beach County has a higher population of Whites as compared to Blacks or Hispanics (Wikipedia, 2005). On the other hand, Miami Dade County is an urban area with a 2004 median household income of \$33,035. It has the highest population of Hispanics compared to any other Florida county (<http://quickfacts.census.gov/qfd/states/12/12086.html>).

Moreover, this study's data seem to suggest that students' socioeconomics influence achievement or test score results (see Tables 1 and 2 and Figures 1 and 2). In fact, data presented in this study show that poorer, largely urban, and largely minority populated areas such as Dade County (Florida) and Baltimore City (Maryland) had the lowest student performances in mathematics and science for the period of 2002 to 2006 (post NCLB mandates). Students' performances in Miami Dade and Baltimore City were far below Florida's and Maryland's performance levels. Whereas, data also shows that richer, largely suburban, and largely non-minority populated areas such as Palm Beach County (Florida) and Montgomery County (Maryland) had some of the highest student performances in mathematics and science, exceeding the states' performance levels for 2002 to 2006 (post NCLB mandates). The findings of this study are similar to those findings of Mortenson (2001), National Center for Education Statistics (2000), United States Census Bureau (2005), and the United States Department of Education (2000) who also found a relationship between students' poor minority statuses and their academic underperformance.

Although, some researchers (Amerein & Berliner, 2002a & b; Gaylor, 2005; Green & Winters, 2004) seem to believe that the barrage of exit exams and increase testing have led to negative consequences with respect to high school graduation rates, there are those researchers (Carnoy & Loeb, 2003; Davenport et al., 2002) who believe that either (a) results are inconclusive, or (b) data does not show where increase testing is negatively impacting high school graduation rates. The results of this study presented in Tables 3 and 4 align with that of Carnoy and Loeb and Davenport et al.; in that, the results show that increase testing and the implementation of the NCLB Act in 2001 have

had little to no effect on high school graduation rates, as high school graduation rates seemed to have increased while the high school dropout rates appeared to decrease over time from 2002 to 2005 for both the states of Florida and Maryland.

CONCLUSION, IMPLICATIONS, LIMITATIONS OF THE STUDY, AND FUTURE RESEARCH

Conclusion & Implications

States that are considering implementing graduation exit exams should carefully investigate the total cost of the program. The costs per student per year can range from \$171 to \$557 per student per year, and will increase significantly when states implement programs and strategies to improve the pass rate, or adopt more challenging tests. There are additional costs in personnel for additional tutoring, remediation classes, and specialized instructors. Preventive and remedial measures require programs to prevent failure, professional development opportunities to improve the skills of teachers who prepare students for the exams and multiple opportunities for students to succeed in passing the exams. There are additional costs associated with handling the needs of students with disabilities. "States would be well advised to make the investments as part of their budgets in the beginning instead of forcing the school district to pay later (Bhanpuri & Sexton, 2004, p.8)."

A successful graduation exit examination assures standards motivate teachers to teach the curriculum contents which lead to increases in school accountability. The program will motivate students to learn, increase emphasis on student achievement, and increase equality in education. It will provide a database for policymakers on the quality of education in order to track school improvement efforts. However, there will be

challenges. Statewide testing leads to a narrower statewide curriculum and the tests may require more remediation and preventive measures. There will be those that argue that a single test score does not measure student achievement and preparing for the test requires too much time away from non-testable materials (Education Commission of the States, 2006).

A successful high school exit exam will have provided for the cost of implementing the program in advance, as well as all associated costs at the state level, so the burden will not fall on the individual school districts. A less rigorous exam is a better way to start as it is less expensive than switching to a harder test later. Exit exams are more successful when they are integrated in a comprehensive and adequately funded program that will allow for early detection of students' learning difficulties. States should also be aware of the costs of helping special needs students to pass the exams. For Maryland, the HSA test has been given for the past few years and was first used in 2005 for accountability under the No Child Left Behind Act. The class of 2009 is Maryland's first class required to pass the exit exam as a graduation requirement (Maurer & Sullivan, 2005).

Some recommended alternatives to exit exams that can be used as a sole determinant of high school graduation are: end of course exams, waivers for students with disabilities, SAT and ACT scores, GED diploma, and advance placement exams. Some recommendations to improve testing and test scores involve the following: allocation of more resources to all schools especially those in urban and lower income areas, hire more qualified and trained mathematics and science teachers in urban and

lower income areas, and create various versions of high stakes exams in Spanish, Creole, and other languages other than just English.

Limitations of the Study & Future Research

Limitations of this study were as follows: first, the study looked at a few selected years of the Maryland and Florida assessments; second, only selected counties in Maryland and Florida were examined in this study; and third, secondary data were analyzed. In light of the limitations of this study and also taking into account literature reviewed, it is recommended that a quantitative study be conducted that would involve researchers collecting and analyzing primary data that could be collected in states such as Florida and Maryland, or other states.

ABOUT THE AUTHOR

Please note that the author presented parts of this paper as a conference presentation at the Eastern Educational Research Association (EERA) Conference held in Clear Water Florida in 2007.

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