A Snapshot:

The State of STEM in Florida

January 2010

Florida Center for Research in Science, Technology, Engineering, and Mathematics

Forward

In January of 2009, Enterprise Florida's Strategy Council issued a Discussion Paper that outlined its findings relative to the current state of STEM – science, technology, engineering and mathematics – education and the need for a STEM proficient workforce to advance Florida's innovation economy. The findings indicate that 15 of the 20 fastest growing jobs through 2014 will require substantial math and science preparation, and that Florida, as well as the United States more generally, is failing to develop an adequate supply of STEM-capable workers. Florida's increasingly knowledge-based economy is driven by innovation, which has as its foundation a dynamic and well-educated workforce equipped with STEM knowledge and skills. While the economy calls for a larger and more proficient STEM workforce, enrollment and success in those courses is declining. As a state and nation, we are losing ground.

In response to this information, leaders from the business, education, policy, and research communities have pledged to work collaboratively to create and implement a business-led, evidence-based, STEM plan that will position Florida as a leader in market relevant STEM talent development and retention. This plan will link the needs of targeted industries with education and training to create and sustain a seamless system for STEM education in Florida.

We submit this report of the current state of STEM in Florida to serve as a resource describing achievement and performance baseline data to be used in the development of a strategic STEM plan. As a result of advancements in technology and an increasingly global economy, Floridians today compete in an international job market. Therefore, we begin this report by comparing the performance of K-12 students in our nation to that of students in other nations, using findings from both the Trends in International Mathematics and Science Study (TIMSS) and the Programme for International Student Assessment (PISA). Sources of information on the achievement of Florida's K-12 students include the National Assessment of Educational Programs (NAEP), the Florida Comprehensive Assessment Test (FCAT), student enrollment in upper level courses, and student achievement on Advanced Placement (AP) exams. Within the Florida State University System (SUS) and Independent Colleges and Universities of Florida (ICUF), we examine metrics including course enrollment, majors chosen, and degrees awarded across a variety of STEM fields. Additionally, we utilize these sources for evidence regarding the relative performance of females and minorities. In order to advance our state's economy, we must focus on improving the STEM proficiency of ALL Floridians. To achieve this aim, Florida has adopted the Next Generation Sunshine State Standards, identifying the deep content knowledge and skills that each student must demonstrate, and is revising the FCAT accordingly. Finally, we indicate sources of information for describing the current STEM workforce in Florida. *Science and Engineering Indicators 2010*, produced biennially by the National Science Board, contains state trends in science and technology. These indicators are useful in examining Florida's STEM progress, and in determining its national rankings. We hope that this STEM education and workforce information may be of use to business leaders as they define the regional and statewide needs of Florida- the demand side of the workforce equation.

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USA Compared to Other Nations

STEM florida

The USA and Globalization

"A substantial portion of our workforce finds itself in direct competition for jobs with lower-wage workers around the globe, and leading-edge scientific and engineering work is being accomplished in many parts of the world."

"...workers in virtually every sector must now face competitors who live just a mouse-click away in Ireland, Finland, China, India, or dozens of other nations whose economies are growing."

- National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. (2007). *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future,* p. 1.

The studies below provide evidence for comparing K-12 Science and Mathematics achievement of students in the USA to that of students in other countries.

International Studies of Student Performance

Trends in International Mathematics and Science Study (TIMSS)

- Administered by the International Association for the Evaluation of Educational Achievement.
- TIMSS data have been collected every four years since 1995, with most recent data collected in 2007.

Programme for International Student Assessment (PISA)

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT OECD

- Administered by the Organisation for Economic Co-operation and Development.
- PISA assessments have been carried out in 2000, 2003 and 2006.

"…the TIMSS 2007 assessment was administered to carefully drawn probability samples of students from the target populations in each country. The target populations were students enrolled in the fourth grade or eighth grade of formal schooling..."

TIMSS & PIRLS International Study Center. (2008).

For additional information about TIMSS, see http://nces.ed.gov/timss/faq.asp#7

TIMSS Science

The USA and Globalization

"Because other nations have, and probably will continue to have, the competitive advantage of a low wage structure, **the United States must compete by optimizing its knowledge-based resources, particularly in science and technology,** and by sustaining the most fertile environment for new and revitalized industries and the well-paying jobs they bring."

- National Academy of Sciences, National Academy of Engineering, and Institute of Medicine. (2007). *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future,* p. 4.

Trends in International Mathematics and Science Study (TIMSS) primarily measures the degree to which 4th and 8th grade students have learned mathematics and science concepts and skills likely to have been taught in school.

TIMSS Science 2007: Nations Surpassing the USA

Grade 4 Science	Avg. Score	Grade 8 Science	Avg. Score
TIMSS scale average	500	TIMSS scale average	500
Singapore	587	Singapore	567
Chinese Taipei	557	Chinese Taipei	561
Hong Kong SAR	554	Japan	554
Japan	548	Korea, Rep. of	553
Russian Federation	546	England	542
England	542	Hungary	539
United States	**539**	Czech Republic	539
		Slovenia	538
		Hong Kong SAR	530
		Russian Federation	530
		United States	**520**
28 countries scored below the USA		37 countries scored below the USA	

Average scores of nations surpassing the USA when assessed for Science as part of the TIMSS. Shading indicates statistical significance (p<.05).

Data Source: National Center for Education Statistics. (2009). *Highlights from TIMSS 2007.*

TIMSS Mathematics

Education and the Economy

"If the United States had in recent years closed the gap between its educational achievement levels and those of better-performing nations such as Finland and Korea, GDP in 2008 could have been $1.3 trillion to $2.3 trillion higher. This represents 9 to 16 percent of GDP."

"The recurring annual economic cost of the international achievement gap is substantially larger than the deep recession the United States is currently experiencing."

- McKinsey & Company. (2009). *The Economic Impact of the Achievement Gap in America's Schools*, p. 5-6.

Trends in International Mathematics and Science Study (TIMSS) primarily measures the degree to which 4th and 8th grade students have learned mathematics and science concepts and skills likely to have been taught in school.

TIMSS Mathematics 2007: Nations Surpassing the USA

Grade 4 Mathematics	Avg. Score	Grade 8 Mathematics	Avg. Score
TIMSS scale average	500	TIMSS scale average	500
Hong Kong SAR	607	Chinese Taipei	598
Singapore	599	Korea, Rep. of	597
Chinese Taipei	576	Singapore	593
Japan	568	Hong Kong SAR	572
Russian Federation	544	Japan	570
England	541	Hungary	517
Netherlands	535	England	513
United States	**529**	Russian Federation	512
		United States	**508**
25 countries scored below the USA		39 countries scored below the USA	

Average scores of nations surpassing the USA when assessed for Mathematics part of the TIMSS. Shading indicates statistical significance (p<.05).

Data Source: National Center for Education Statistics. (2009). *Highlights from TIMSS 2007.*

PISA Science

Importance of Quality STEM Education

"The Bureau of Labor Statistics projects that employment in science and engineering occupations will grow 70 percent faster than the overall growth for all occupations."

- Tapping America's Potential. (2008). *Gaining Momentum, Losing Ground,* p. 4.

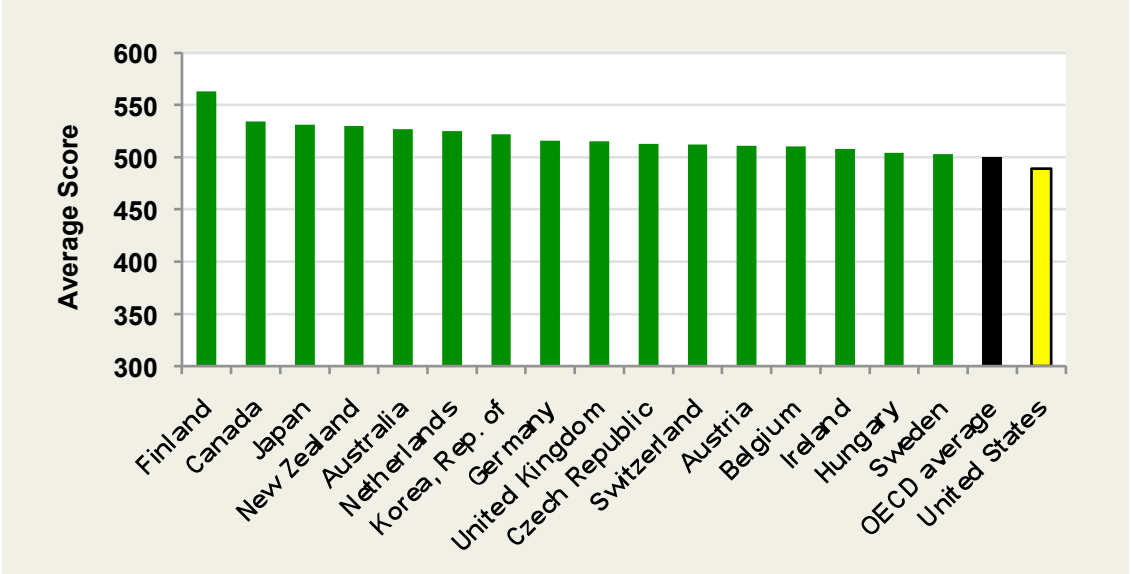
The conclusion of a study of 50 countries:

"Educational quality – measured by what people know – has powerful effects on individual earnings, on the distribution of income, and on economic growth."

- Hanushek & Wößmann (2007). *The Role of Education Quality in Economic Growth*, p. 76

PISA seeks to measure how well young adults at age 15 can *use* their knowledge and skills to meet real-life challenges, rather than merely the extent to which they have mastered a specific school curriculum.

PISA Science 2006



OECD nations scoring measurably above the USA average score (p<.05).

Data Source: National Center for Education Statistics. (2007). *Highlights from PISA 2006.*

PISA Mathematics

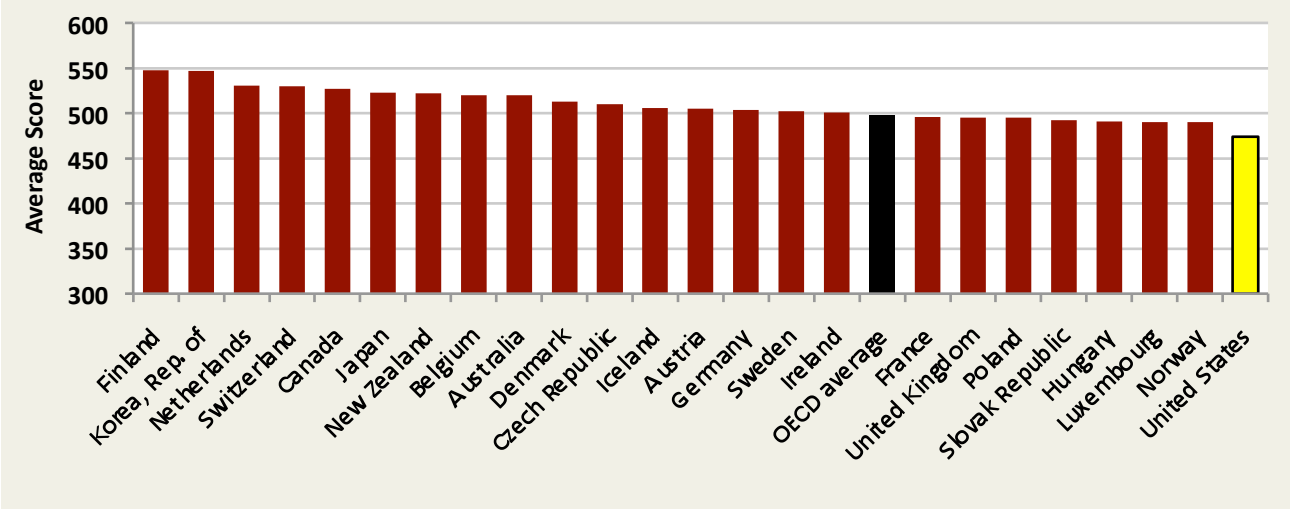
STEM Achievement and the Economy

"Average test scores in mathematics and science that are larger by one standard deviation…are associated with an average annual growth rate in GDP per capita that is two percentage points higher over a 40-year period (1960-2000)."

- Hanushek & Wößmann (2007). *The Role of Education Quality in Economic Growth*, p. 32.

PISA seeks to measure how well young adults at age 15 can *use* their knowledge and skills to meet real-life challenges, rather than merely the extent to which they have mastered a specific school curriculum.

PISA Mathematics 2006



OECD nations scoring measurably above the USA average score (p<.05).

Data Source: National Center for Education Statistics. (2007). *Highlights from PISA 2006.*

Florida: A National and International Comparison

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The State's Role in STEM Education

"Many states have adopted effective innovation practices—if not yet a comprehensive innovation agenda—by making investments in K–12 education and raising science, technology, engineering, and math (STEM) standards; using their role as the main funders of higher education to improve these institutions' production of math and science-related degrees; and linking research and development to key industrial, economic, and labor and skills targets."

- National Governors Association, *Innovation America: A Final Report,* p. 2.

The evidence below allows us to compare K-12 Science and Mathematics achievement of students in Florida to that of students in the rest of the nation.

Sources of Information on Student Performance

National Assessment of Educational Progress (NAEP)

The Nation's Report Card

- Administered by the National Assessment Governing Board and the U.S. Department of Education
- Representative sample of students assessed.
- Results are reported at the state level for grades 4 and 8.
- Most recent science assessment released in 2005. Most recent mathematics assessment released in 2009.

"Since NAEP assessments are administered uniformly using the same sets of test booklets across the nation, NAEP results serve as a common metric for all states..."
– National Center for Education Statistics, http://nces.ed.gov/nationsreportcard/about/

Student Enrollment in Upper Level Courses

- Reported by the National Center for Public Policy and Higher Education.

Student Achievement in Advanced Placement Exams

CollegeBoard Advanced Placement Program

- Administered by the College Board.

NAEP Science 2005

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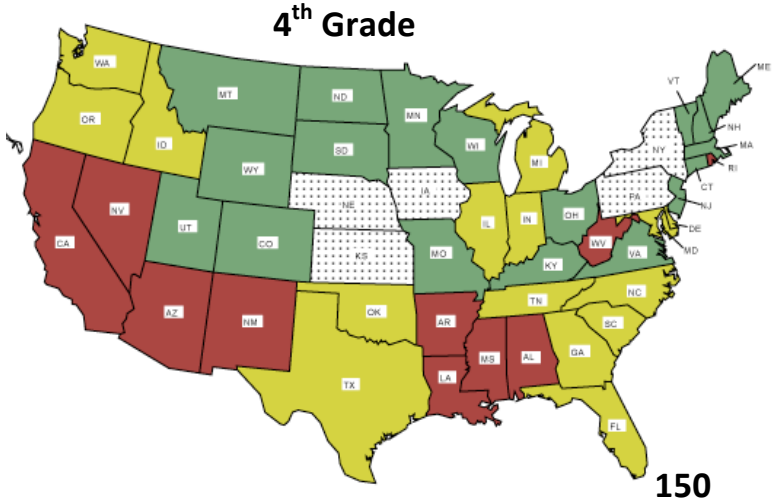
Florida's Science Performance Relative to Other States

Fourth grade students in Florida perform on par with their national peers, while 8th grade students in Florida perform below the national average.

4th Grade



150

States performing above the national average

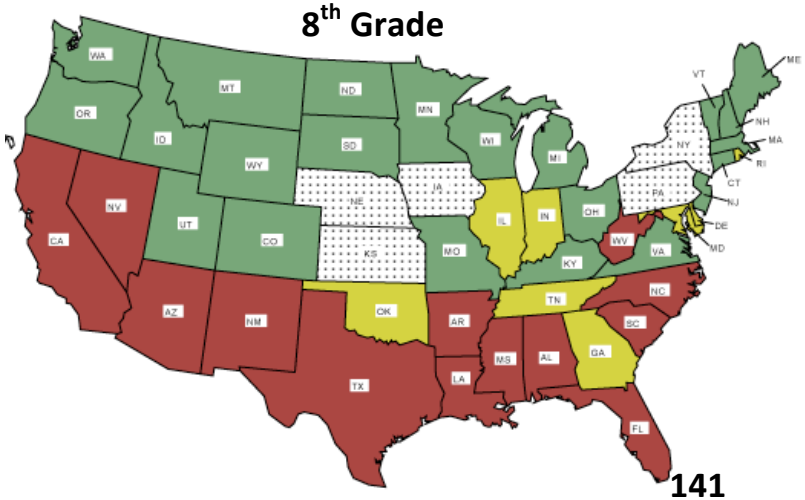
States performing at the national average

States performing below the national average

Insufficient Data

The national average score was **149.**

8th Grade



141

States performing above the national average

States performing at the national average

States performing below the national average

Insufficient Data

The national average score was **147.**

Data Source: National Assessment of Educational Progress. (NAEP). 2005 is the only year for which NAEP Science data for Florida are available.

Websites: 4th grade: http://nationsreportcard.gov/science_2005/s0107.asp

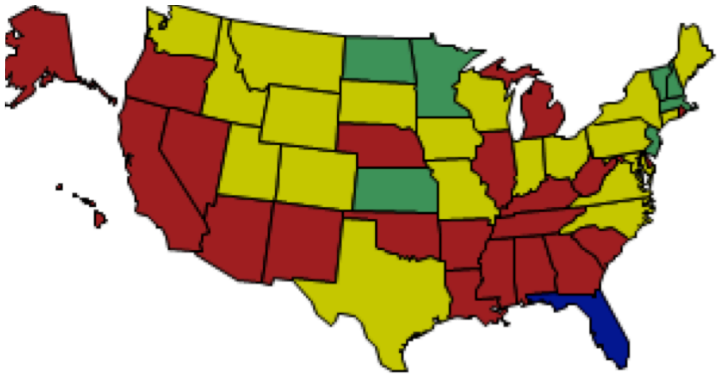
8th grade: http://nationsreportcard.gov/science_2005/s0107.asp?tab_id=tab2&subtab_id=Tab_1#chart

NAEP Mathematics 2009

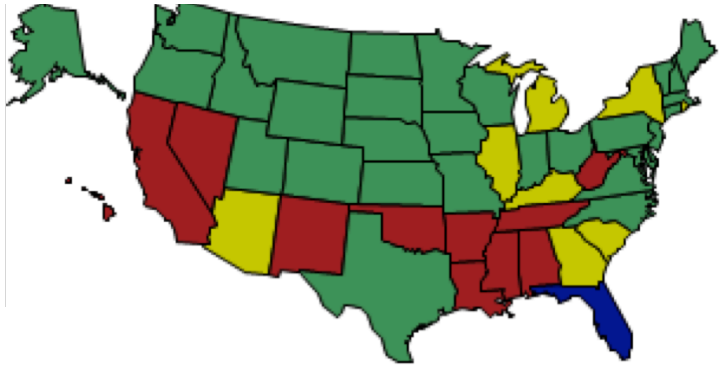
Florida's Mathematics Performance Relative to Other States

Fourth grade students in Florida slightly outperform their national peers, while 8th grade students in Florida perform slightly below the national average.

4th Grade



8th Grade



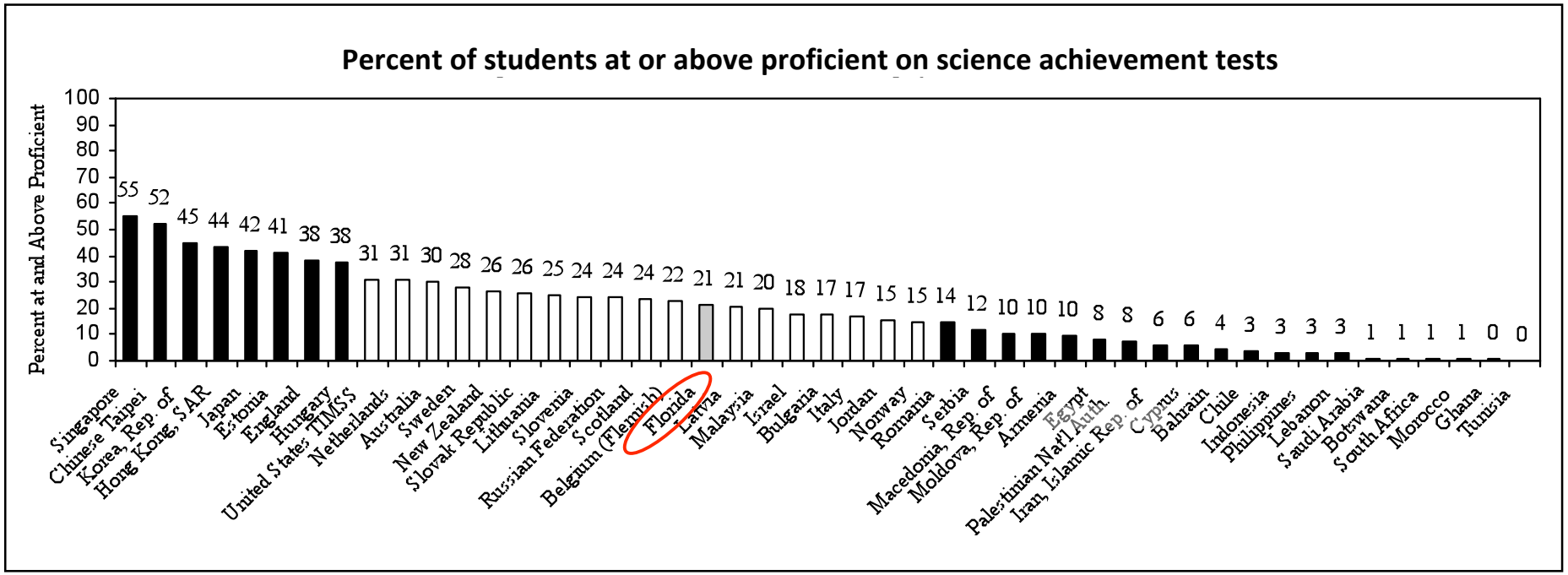
State/Jurisdiction performance relative to Florida:

4th Grade		8th Grade
7 scored higher		31 scored higher
23 scored lower		12 scored lower
21 not significantly different		8 not significantly different
National average score: **239**		National average score: **282**
Average of Florida's students: 242		**Average of Florida's students: 279**

Data source: National Center for Education Statistics. (2009). *NAEP Mathematics 2009 State Snapshot Reports.* Additional NAEP Mathematics Data from 2003, 2005, and 2007 are available in Notes, Section A.

Florida and Other Nations: Science

A comparison between science achievement of Florida's students and students in other nations is possible by statistically linking NAEP and TIMSS.



Comparison between grade 8 2005 NAEP state science results for Florida and grade 8 2003 TIMSS national science results for the percent at and above proficient based on NAEP achievement levels projected on to the TIMSS scale

Data Source: Phillips, G. W. (2007). *Chance Favors the Prepared Mind: Mathematics and Science Indicators for Comparing States and Nations*, p. 35.

See Notes, Section B for information on the linking of NAEP and TIMSS.

Florida and Other Nations: Math

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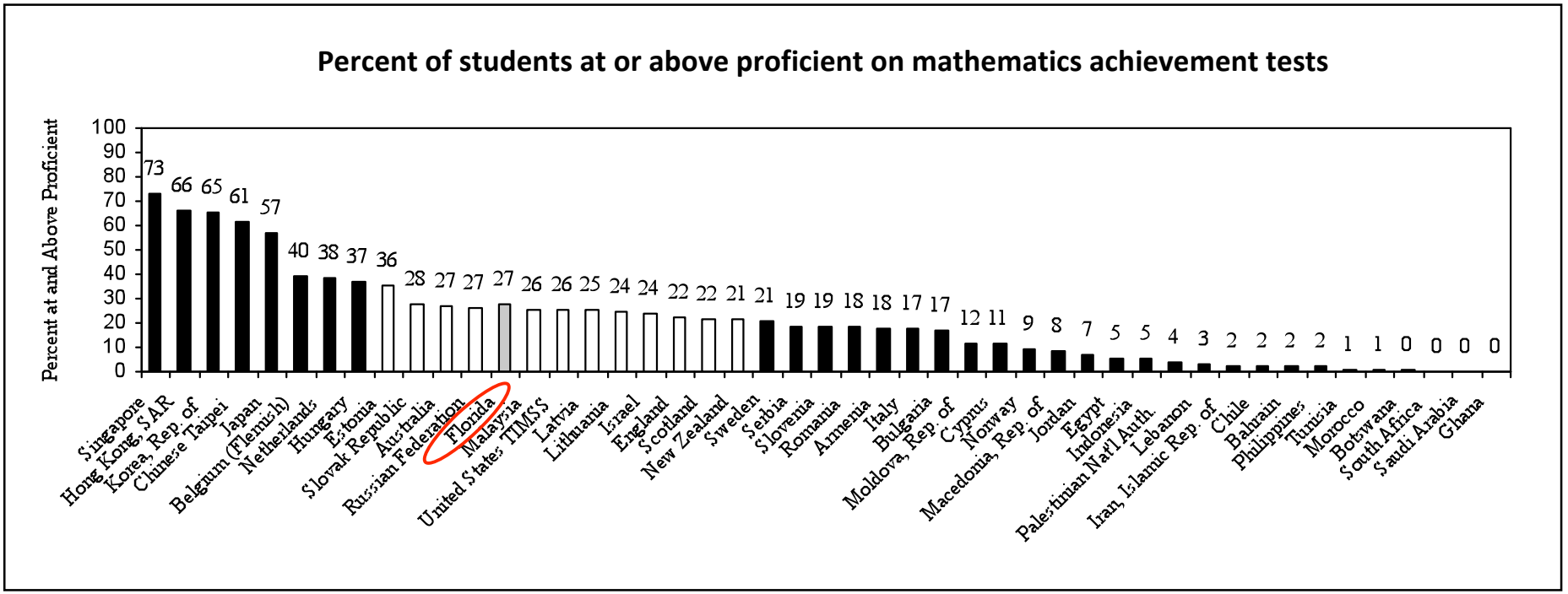
"Although there is considerable variation in state performance, states are not as variable as nations. Even the highest achieving states within the United States were still significantly below the highest achieving countries, and the lowest performing states were still significantly higher than the lowest achieving countries."

- Phillips, G. W. (2007). *Chance Favors the Prepared Mind: Mathematics and Science Indicators for Comparing States and Nations*, p. 1,2.



Comparison between grade 8 2007 NAEP state mathematics results for Florida and grade 8 2003 TIMSS national mathematics results for the percent at and above proficient based on NAEP achievement levels projected on to the TIMSS scale

Data Source: Phillips, G. W. (2007). *Chance Favors the Prepared Mind: Mathematics and Science Indicators for Comparing States and Nations*, p. 35.

See Notes, Section B for information on the linking of NAEP and TIMSS.

Access to Challenging Courses

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Raising the Bar for STEM Education

College students who took Algebra II or higher in high school are more than twice as likely to feel prepared for math expectations in college (60% feel well prepared) than students who did not take Algebra II (26% feel well prepared).

Also, *non-college students* who took Algebra II or higher are far more likely to say they are prepared for the math they will face at work (68%) than non-college students who did not take algebra II (46%).

- Achieve, Inc. (2005). *Rising to the Challenge: Are High School Graduates Prepared for College and Work?*

Other states have already raised the bar for high school graduation requirements in mathematics.

- See http://www.achieve.org/StateProfiles.

Compared to states that rate the highest in terms of preparing students for college, far fewer students in Florida are enrolled in upper-level mathematics and science courses.

Percent of students enrolled in courses with challenging subject matter

Florida[1]	
9th to 12th graders taking at least one upper level math course[2]	42%
9th to 12th graders taking at least one upper level science course[3]	27%
Top States[4]	
9th to 12th graders taking at least one upper level math course[2]	64%
9th to 12th graders taking at least one upper level science course[3]	40%

1- Data on course taking in grades 9-12 were not updated for Florida in the 2008 Measuring Up Report, so the 2006 report data (for 2003-04) are shown.
2- Upper level math courses are Geometry, Algebra 2, Trigonometry, or higher.
3- Upper level science courses are Chemistry, Physics, or advanced Life, Physical, or Earth Sciences.
4- Top states=median of top 5 performing states on each indicator.
Data Source: The National Center for Public Policy and Higher Education. (2006). *Measuring Up 2006: The State Report Card on Higher Education, Florida.*

Advanced Placement (AP) Scores

STEM florida

The Need for Qualified STEM Teachers

"Research indicates that a highly qualified teacher is one of the most important factors in raising student achievement, yet according to the Bureau of Labor Statistics, school districts across the country have difficulty hiring qualified math and science teachers."

- Tapping America's Potential. (2008). *Gaining Momentum, Losing Ground,* p. 4.

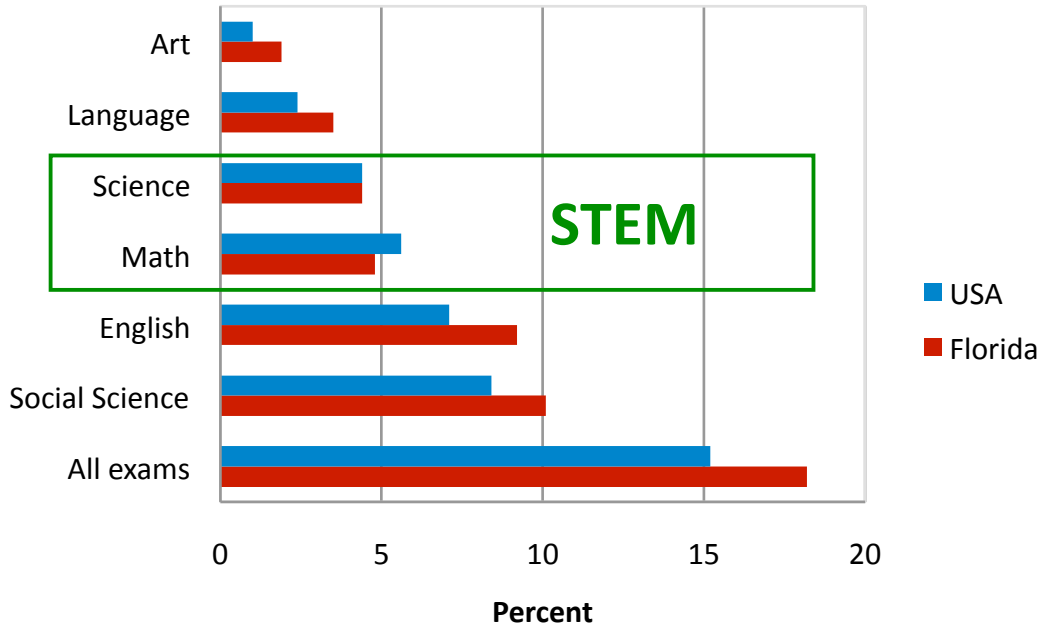
The Need for High Expectations

Four out of five college students (82 percent) and non-college students (80 percent) say that they would have worked harder if their schools had demanded more of them, set higher academic standards, and raised expectations on the amount of coursework and studying required for a diploma.

- Achieve, Inc. (2005). *Rising to the Challenge: Are High School Graduates Prepared for College and Work?*

Florida exceeds the national average in overall performance on Advanced Placement exams, scoring higher than the national average on most subjects EXCEPT mathematics and science.

Percent of all 2008 high school graduates scoring 3 or above on one or more AP exams



Data Source: College Board. (2009). *The 5th Annual AP® Report to the Nation: Florida Supplement*.

Public Perception about STEM

STEM Public Awareness

"As leaders in government, business and education move forward to address this issue, as they build a strong leadership consensus to act, they may be well advised to reach out to parents and students directly as well."

- Public Agenda. (2006). *Reality Check 2006,* p. 2.

What Parents Say

- Increasing the number and quality of math and science courses would improve high school education in the USA (67%).
- It's crucial for most of today's students to learn higher-level math skills like advanced algebra and calculus - the gateway to success in college and work (62%).

HOWEVER:

- 57% say their child takes enough math and science now.
- The percentage of parents who see a serious problem in their own public schools not teaching enough math and science declined between 1996 (52%) and 2006 (32%.)

What Students Say

- Most **students in grades 6-12** want schools to prepare them for good jobs in a competitive world.

HOWEVER:

- Only 50% say strong math and science skills are absolutely essential for their future.
- Only 28% think kids are not taught enough math and science.
- Almost 4 in 10 say they would be "really unhappy" in a career that required "doing a lot of math or science".

Source: Public Agenda. (2006). *Reality check 2006, Issue no. 1: Are Parents and Students Ready for More Math and Science?*

The State of STEM in Florida

STEM Florida

Florida and Education

"Florida's underperformance in educating its young population could limit the state's access to a competitive workforce and weaken its economy over time. As the well-educated baby boomer generation begins to retire, the diverse young population that will replace it does not appear prepared educationally to maintain or enhance the state's position in a global economy."

- The National Center for Public Policy and Higher Education. (2006). *Measuring up 2006: The State Report Card on Higher Education, Florida.* p. 3.

The information sources below allow us to evaluate K-12 science and mathematics achievement of students in Florida, including:

- Overall STEM performance
- Performance in particular STEM areas
- Gender-specific performance
- Ethnicity-specific performance

Sources of Information on Student STEM Performance in Florida

K-12

- Florida Comprehensive Assessment Test (FCAT)
  - Administered by the Florida Department of Education
- National Assessment of Educational Progress (NAEP)
  - Administered by the National Assessment Governing Board and the U.S. Department of Education
- Course enrollment/completion
- Advanced Placement (AP) examinations
  - Administered by the College Board

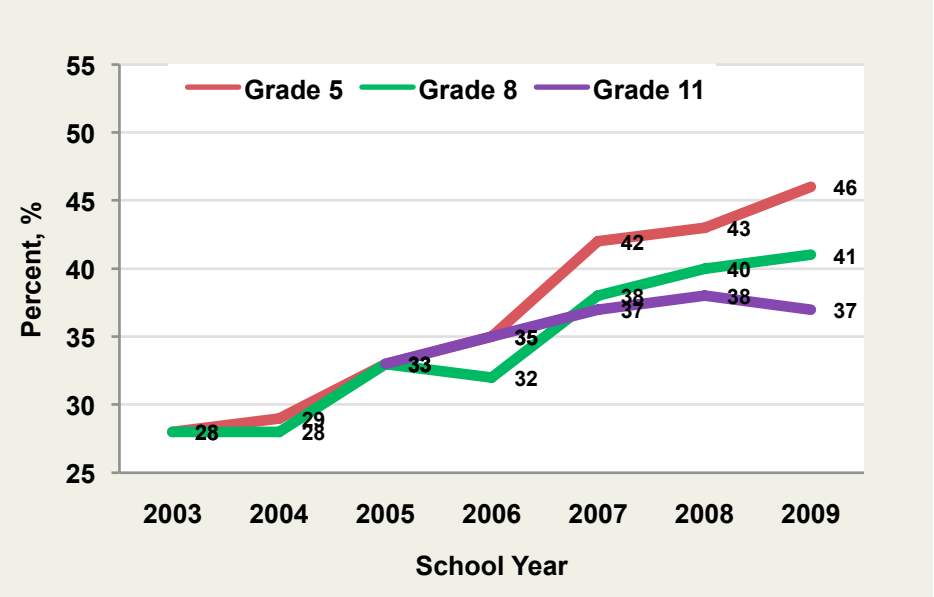
Higher Education

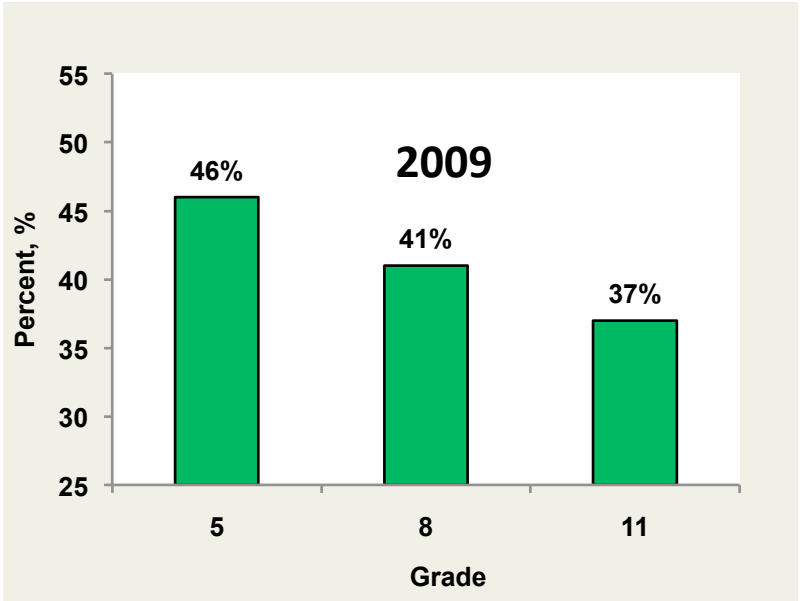
- College readiness
- College degrees awarded

FCAT Science

The FCAT is a criterion-referenced test that measures how well Florida students are meeting the Sunshine State Standards, adopted by the Florida Board of Education.

Percent of students at or above grade level on FCAT Science





Major Findings:

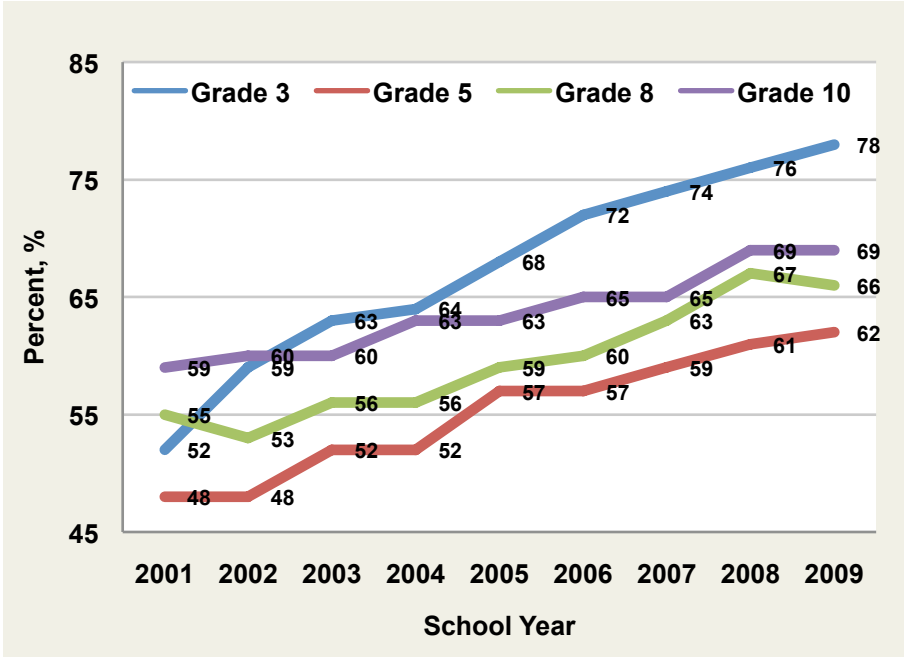
- **There have been considerable improvements in performance at grades 5 and 8 since 2003, but much more improvement is needed.**
- **Currently less than 50% of Florida's students perform at or above grade level in science.**
- **Performance levels decline from grades 5 to 11.**

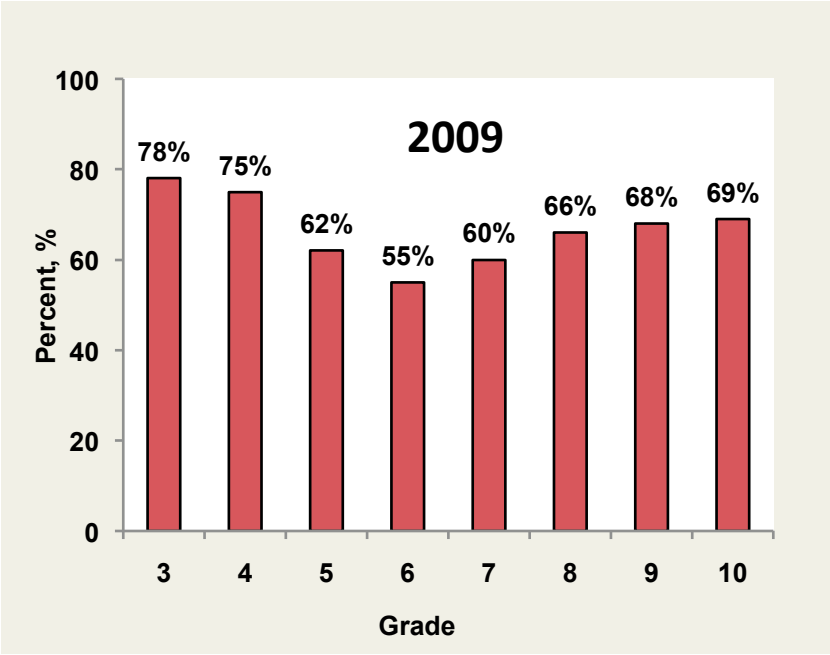
Data Source: Florida Department of Education. (2009d). *Science Scores: Statewide Comparison for 2003 to 2009.*

FCAT Mathematics

The FCAT is a criterion-referenced test that measures how well Florida students are meeting the Sunshine State Standards, adopted by the Florida Board of Education.

Percent of students at or above grade level on FCAT Mathematics





Major Findings:

- **The percent of students scoring at or above grade level has increased for all grades. *Florida is moving in the right direction.***
- **The size of the increase was greatest in the elementary grades. *More momentum is needed, especially in the upper grades.***
- **Florida's students score higher in mathematics than in science, but many students are still below grade level.**

Data Source: Florida Department of Education. (2009c). *Mathematics Scores: Statewide Comparison for 2001 to 2009,* http://fcat.fldoe.org/fcinfopg.asp

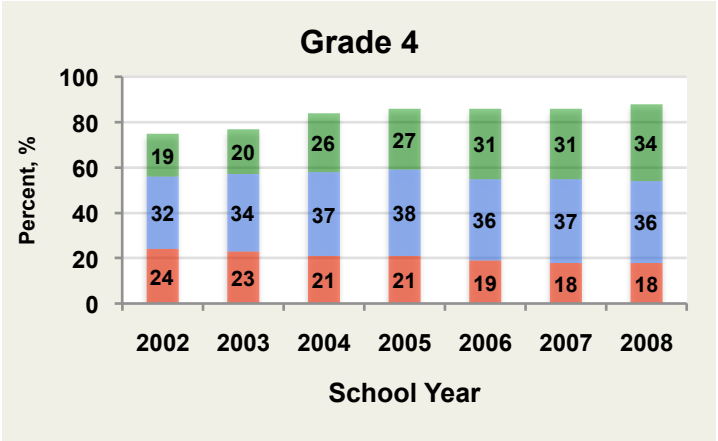
FCAT Mathematics: Higher Performers

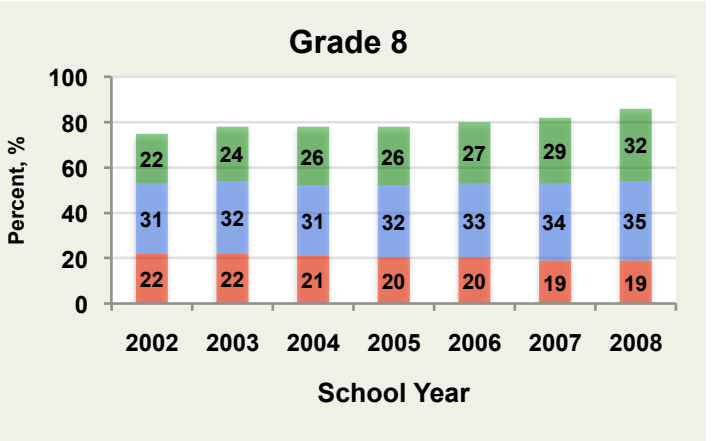
Major Findings:

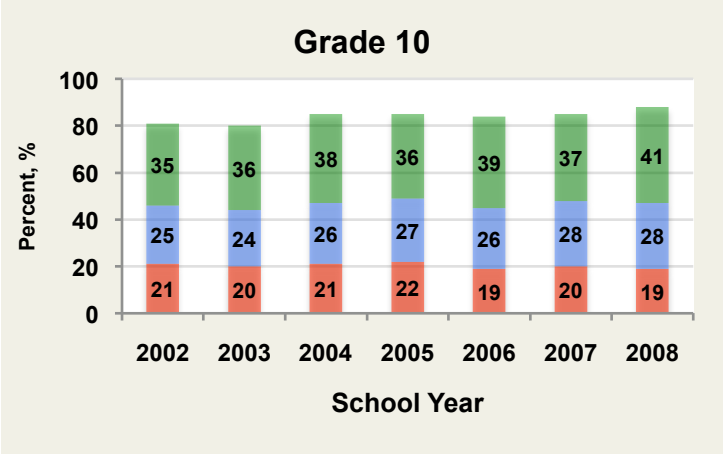
For all years shown, a greater percent of 10th grade students scored at advanced levels than did 4th or 8th grade students.

The percent of students scoring at the advanced levels increased between 2002 and 2008 for each grade. The greatest increase (15 percentage points) occurred in the 4th grade.

FCAT Performance: Percent of students performing at Basic, Proficient, and Advanced Levels







Advanced, FCAT Levels 4 & 5

Proficient, FCAT Level 3

Basic, FCAT Level 2

Below Basic (FCAT Level 1) not shown

Data Source: Center on Education Policy. *(2009). State Test Score Trends through 2007-08. Are Achievement Gaps Closing and Is Achievement Rising for All?*

FCAT Mathematics: Districts

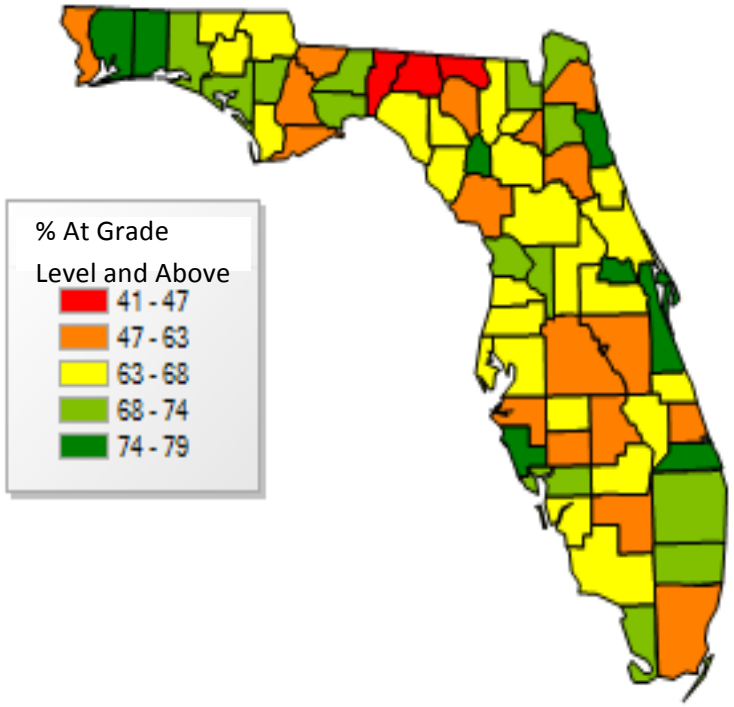
Concern: The majority of school districts in Florida are facing challenges in teaching mathematics.

- In 2009, over 2/3 of the districts in Florida had fewer than 68% of their Grade 3-10 student population performing on grade level and above in mathematics.
- Only 8 districts had at least 74% of their Grade 3-10 student population performing on grade level and above in mathematics.

For the **ten school districts with the highest student enrollment**, accounting for ~60% of PreK-12 student enrollment, the percentages of students at grade level and above are as follows:

Districts	Percent of student population at grade level or above
Dade, Duval, Polk	47-63
Hillsborough, Lee, Orange, Pinellas	63-68
Broward, Palm Beach	68-74
Brevard	74-79

Grades 3-10 performing on grade level and above (FCAT Mathematics 2009)



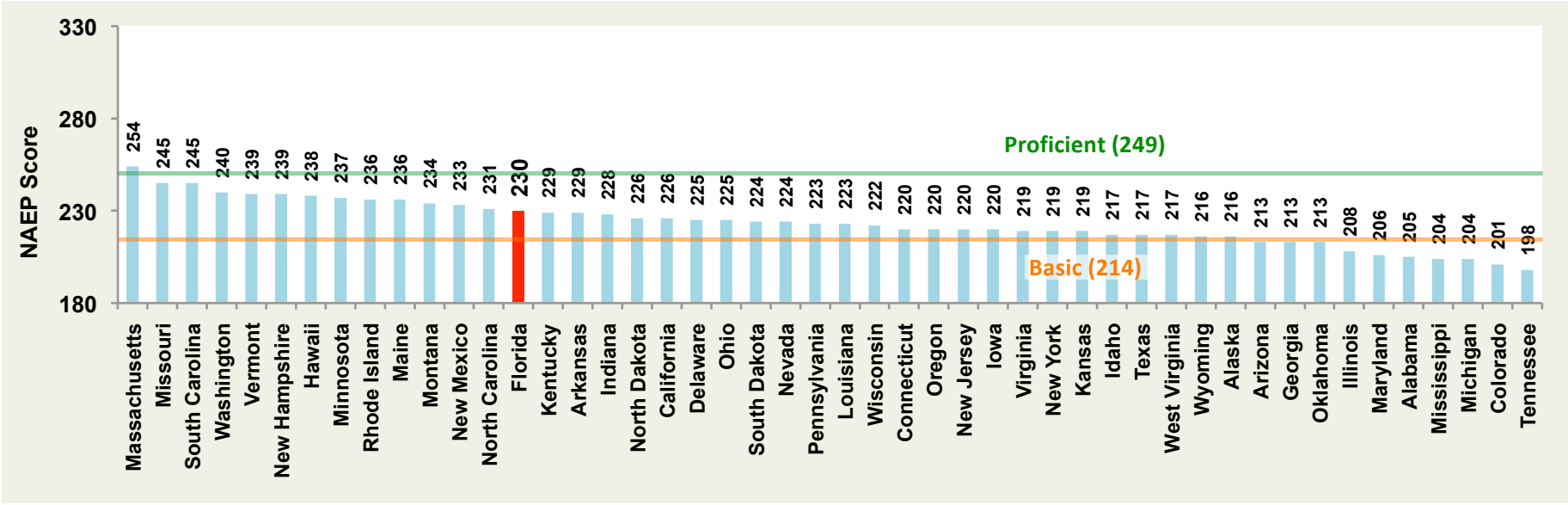
Percent of students who scored 3 or above on the Florida Comprehensive Assessment Test (FCAT) in mathematics in each school district

Data Sources: Florida Department of Education, http://fcat.fldoe.org;
Florida Department of Education. (2010). *Membership in Florida's Public Schools, Fall 2009.*

State Proficiency Standards: Grade 4 Math

State assessments in each of the 50 states have a proficiency standard, a "cut-off" score indicating the level of achievement required to be considered proficient in a particular grade and subject. States develop their own tests (e.g., FCAT in Florida) and set their own proficiency standards, which vary considerably. NAEP provides a common metric for comparing this "cut-off" score, or bar, set by each state. Only Massachusetts sets the bar higher than the NAEP Proficient standard in both 4th and 8th grade mathematics. The vast majority of states, including Florida, set the bar between NAEP Basic and Proficient standards.

Comparison between grade 4 state requirements for proficiency in mathematics, projected onto the NAEP scale



NAEP scale equivalent scores for the state grade 4 mathematics standards for proficient performance, by state, 2007

Data Source: National Center for Education Statistics. (2009). *Mapping State Proficiency Standards Onto NAEP Scales: 2005-2007*, Figure 3.

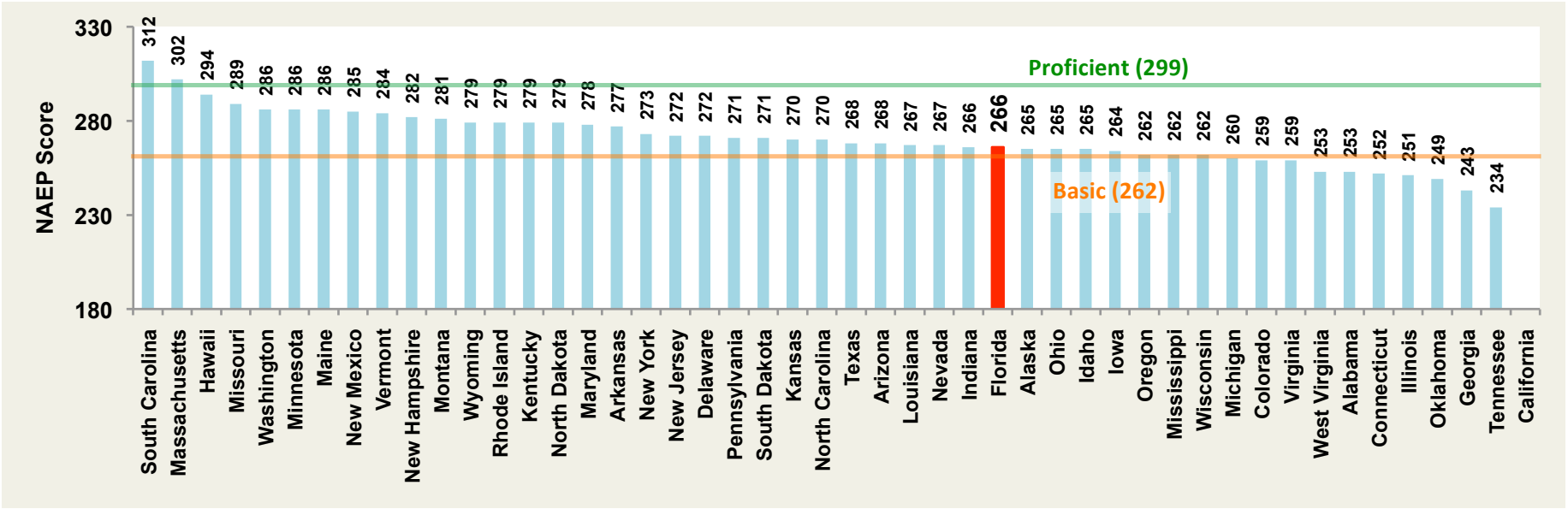
For details on the linking of state assessments and the NAEP, and a definition of basic and proficient levels, see Notes, Section C.

State Proficiency Standards: Grade 8 Math

STEM Florida

State assessments in each of the 50 states have a proficiency standard, a "cut-off" score indicating the level of achievement required to be considered proficient in a particular grade and subject. States develop their own tests (e.g., FCAT in Florida) and set their own proficiency standards, which vary considerably. NAEP provides a common metric for comparing how high different states set the bar. Florida sets the bar higher in 4th grade relative to other states, but lower than many other states in the 8th grade.

Comparison between grade 8 state requirements for proficiency in mathematics, projected onto the NAEP scale



NAEP scale equivalent scores for the state grade 8 mathematics standards for proficient performance, by state, 2007

Data Source: National Center for Education Statistics. (2009). *Mapping State Proficiency Standards Onto NAEP Scales: 2005-2007*, Figure 3.

For details on the linking of state assessments and the NAEP, and a definition of basic and proficient levels, see Notes, Section C.

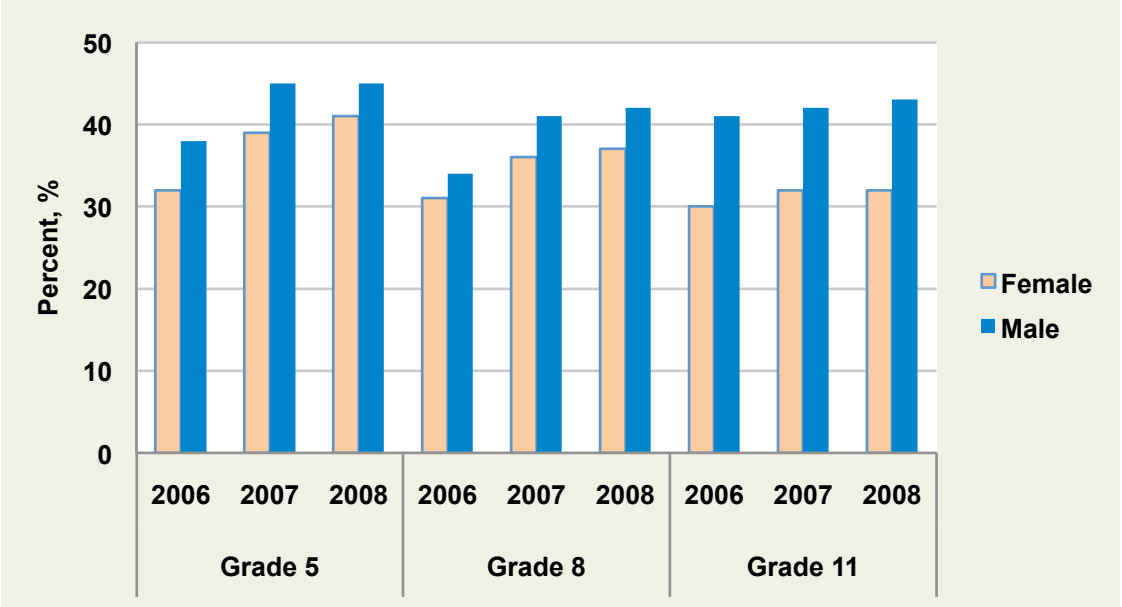
Females in Science: K-12

The science achievement gap between males and females begins in elementary school and widens in the upper grades. Males consistently outperform females in all grade levels tested.

"The jobs of the future are going to require of the workers a basic understanding of the fundamental principles of mathematics and science. If we do not in some way persuade girls to study such subjects in elementary and secondary school, they are automatically cutting themselves out of a great many job opportunities."

- U.S. Representative Vernon Ehlers (R-Michigan)
Nuclear physicist and member of the
House Subcommittee on Research and Science Education,
AAAS. (2009). *Testifying before U.S. House Subcommittee, Leshner Details Gender Gap in Science and Engineering.*

Percent of students at or above grade level on FCAT Science



Percent of students who scored 3 or above on the Florida Comprehensive Assessment Test (FCAT) in science

Data Source: Florida Department of Education, http://fcat.fldoe.org

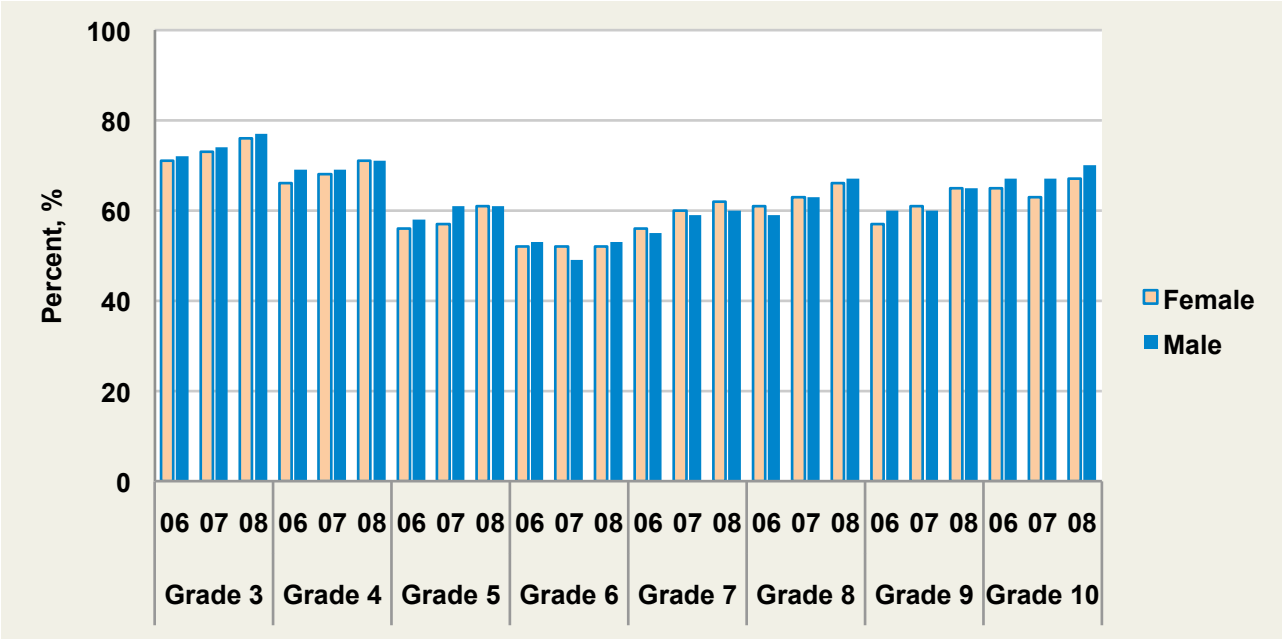
Females in Mathematics: K-12

There is minimal to no gender gap in average achievement relative to Florida's mathematics standards as measured by the FCAT. Males and females perform similarly at all grade levels.

"Average gender differences are small or nonexistent, and our society's focus on them has diverted attention from the essential task of raising the scores of both boys and girls."

- National Mathematics Advisory Panel. (2008). *Foundations for Success: The Final Report of the National Mathematics Advisory Panel*, p. 32.

Percent of students at or above grade level on FCAT Mathematics



Percent of students who scored 3 or above on the FCAT in mathematics

Data Source: Florida Department of Education, http://fcat.fldoe.org

Females in STEM: K-12

STEM florida

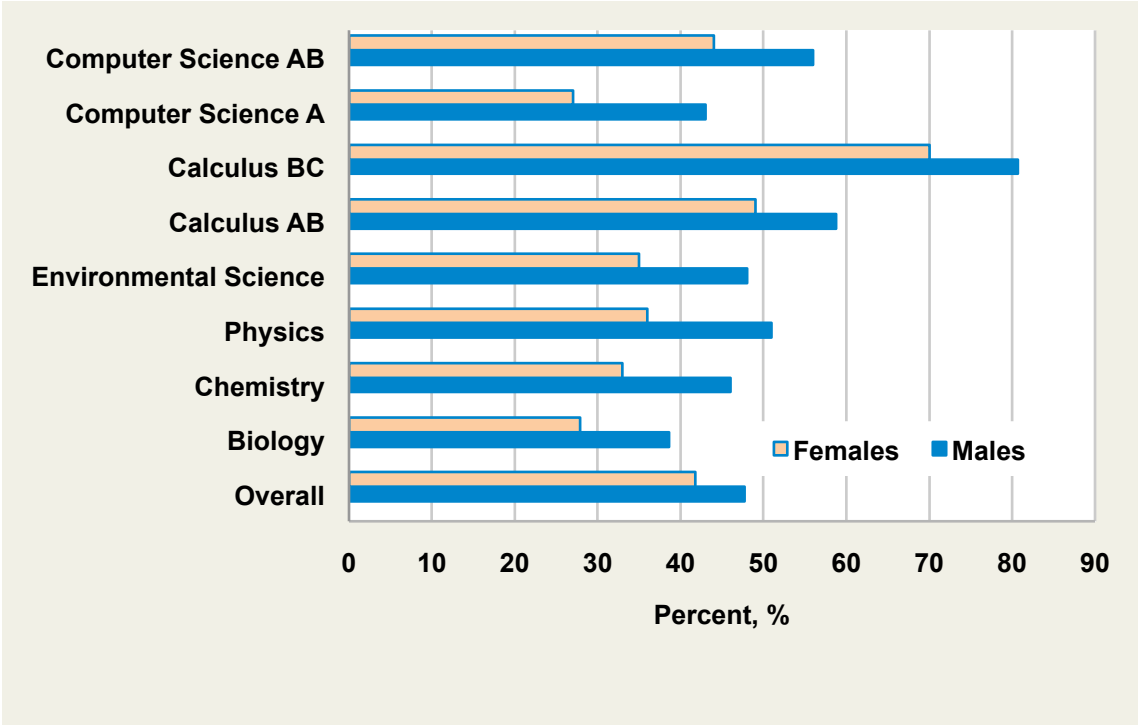
"In general, researchers have found that girls and women have less confidence in their math abilities than males do and that from early adolescence, girls show less interest in math or science careers."

"However, it is important to note that not all girls have less confidence and interest in mathematics and science, and that girls, as well as boys, who have a strong self-concept regarding their abilities in math or science are more likely to choose and perform well in elective math and science courses and to select math- and science-related college majors and careers."

- Institute of Education Sciences. *Encouraging Girls in Math and Science,* (2007). p. 6

Males consistently outperform females on Advanced Placement exams in mathematics and science.

Percent of Florida AP test-takers in each gender group scoring 3 or above in 2008



Data Source: College Board (2009). *The 5th Annual AP® Report to the Nation: Florida Supplement.*

Minorities in Math: FCAT

In Florida, achievement gaps between White, Hispanic, and African American students in FCAT Mathematics persist across K-12 grade levels but have decreased over time. Gaps appear in elementary grades and increase in middle and high school.

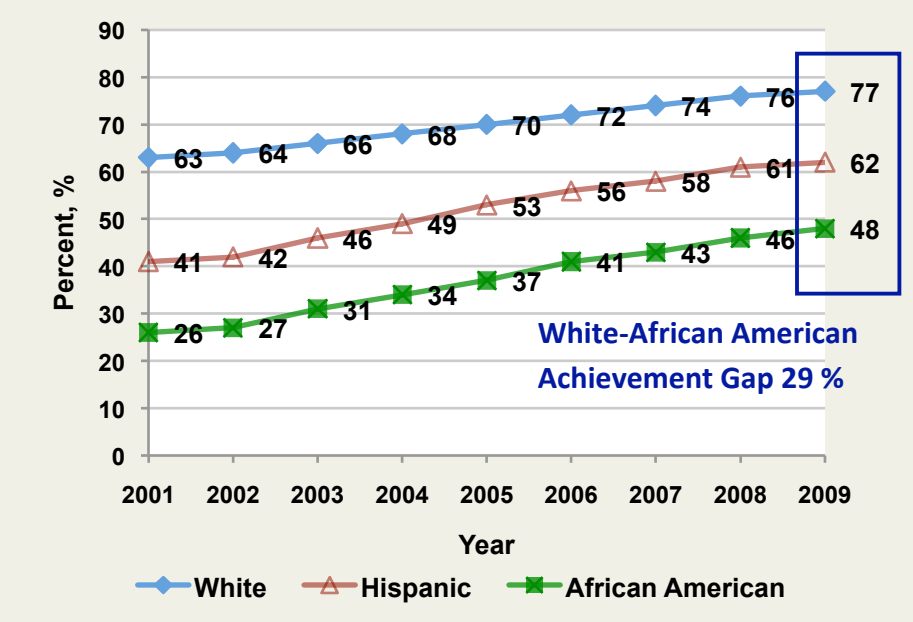
Potential for economic gains by improving education for all Floridians

"If the gap between black and Latino student performance and white student performance had been similarly narrowed, GDP in 2008 would have been between $310 billion and $525 billion higher, or 2 to 4 percent of GDP. "

"The magnitude of this impact will rise in the years ahead as demographic shifts result in blacks and Latinos becoming a larger proportion of the population and workforce."

- McKinsey & Company (2009). *The Economic Impact of the Achievement Gap in America's Schools*, p. 5-6.

Percent of students at or above grade level on FCAT Math: Grades 3-10



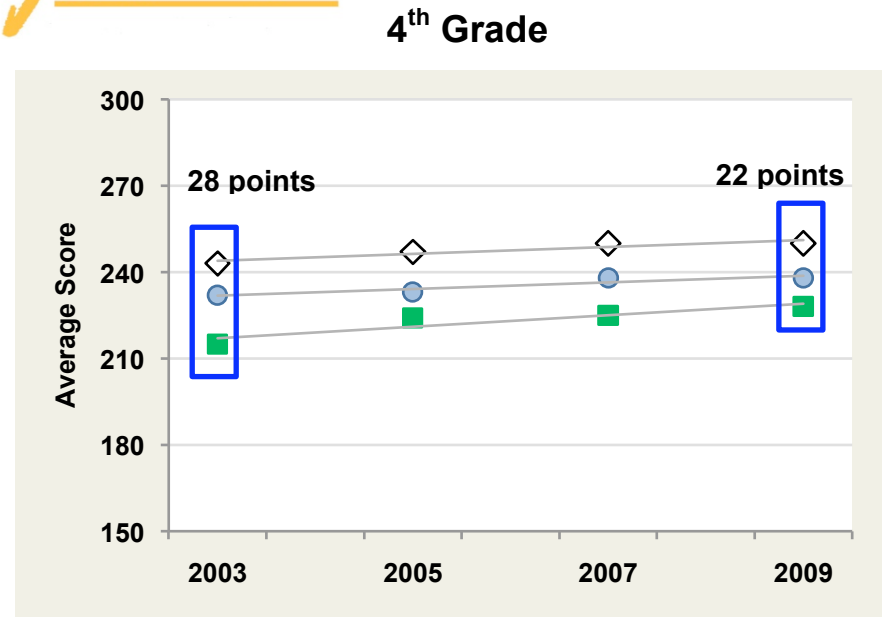
White-African American Achievement Gap by Grade in 2009	
Grades 3-5	25%
Grades 6-8	30%
Grades 9 & 10	32%

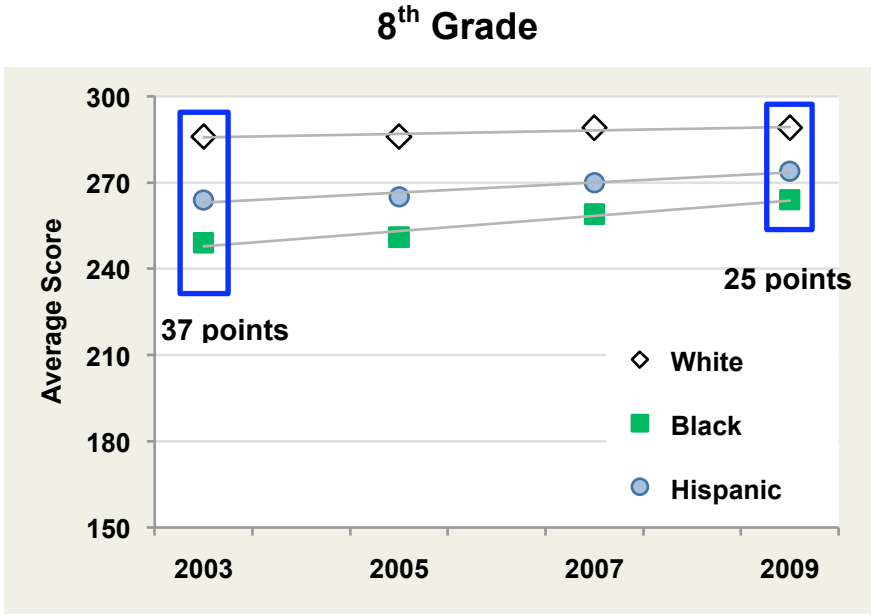
Percent of students who scored 3 or above on the Florida Comprehensive Assessment Test (FCAT) in Mathematics

Data Source: Florida Department of Education, Mathematics Grade 3-10 Achievement Level Graphs, http://fcat.fldoe.org/fcinfopg.asp

Minorities in Math: NAEP

On the National Assessment of Educational Progress (NAEP), the mathematics achievement gap between Florida's White, Black, and Hispanic students is narrowing but still persists.





Major Findings:

- **Student performance in mathematics increased over time for Black, Hispanic, and White students in both 4th and 8th grades.**
- **In both 4th and 8th grades, the achievement gap is greatest between Black students and White students.**
- **Black students improved more than White students in both 4th and 8th grades; the achievement gap narrowed from 2003 to 2009.**
- **In 8th grade the gap has narrowed more (12 points) than in the 4th grade (6 points).**
- **However, the 8th grade gap (25 points) remains higher than the 4th grade gap (22 points).**

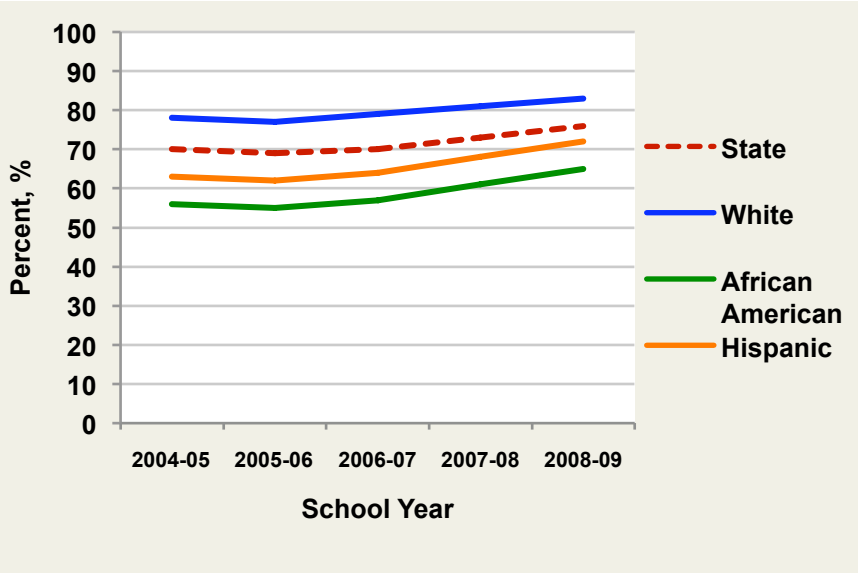
Data Source: NAEP Data Explorer, http://nces.ed.gov/nationsreportcard/naepdata/

High School Graduation Rates

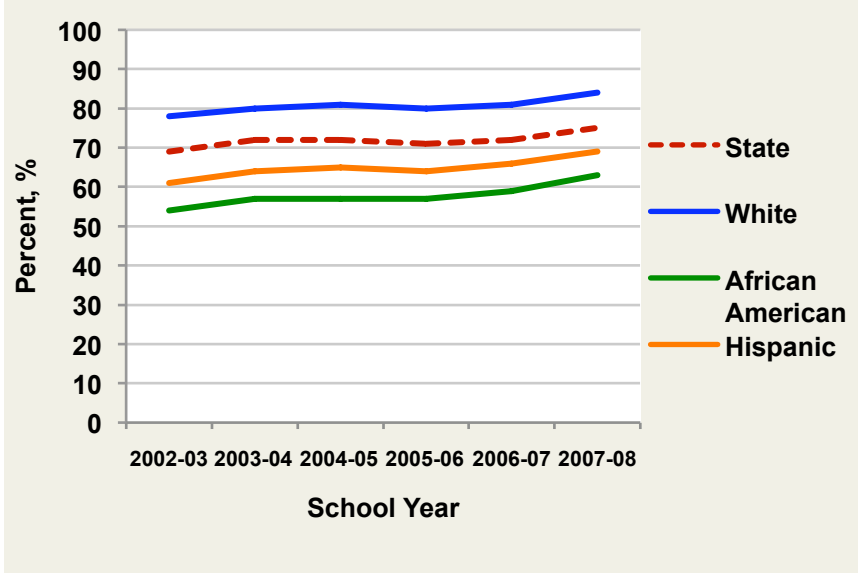
Though high school graduation rates have improved in Florida, gaps persist between White, Hispanic, and African American students.

Percent of high school students graduating

(a) Excluding GEDs



(b) Including GEDs



The above rates were calculated (a) using the National Governors Association's (NGA) recommended method, mandated by the Florida Legislature in 2006 (standard and special diplomas included; GEDs excluded), and (b) using Florida's regular method including standard diplomas, special diplomas and GEDs.

Data Source: Florida Department of Education. (2009b). *Florida Public High School Graduation Rates, 2007-08.*

College Freshmen

Florida high school graduates in 2007 who required remediation at post-secondary institutions based on entry-level tests (CPT, SAT-I, ACT):

• Graduates entering Florida's community colleges:

– 44% in mathematics
– 32% in reading
– 27% in writing

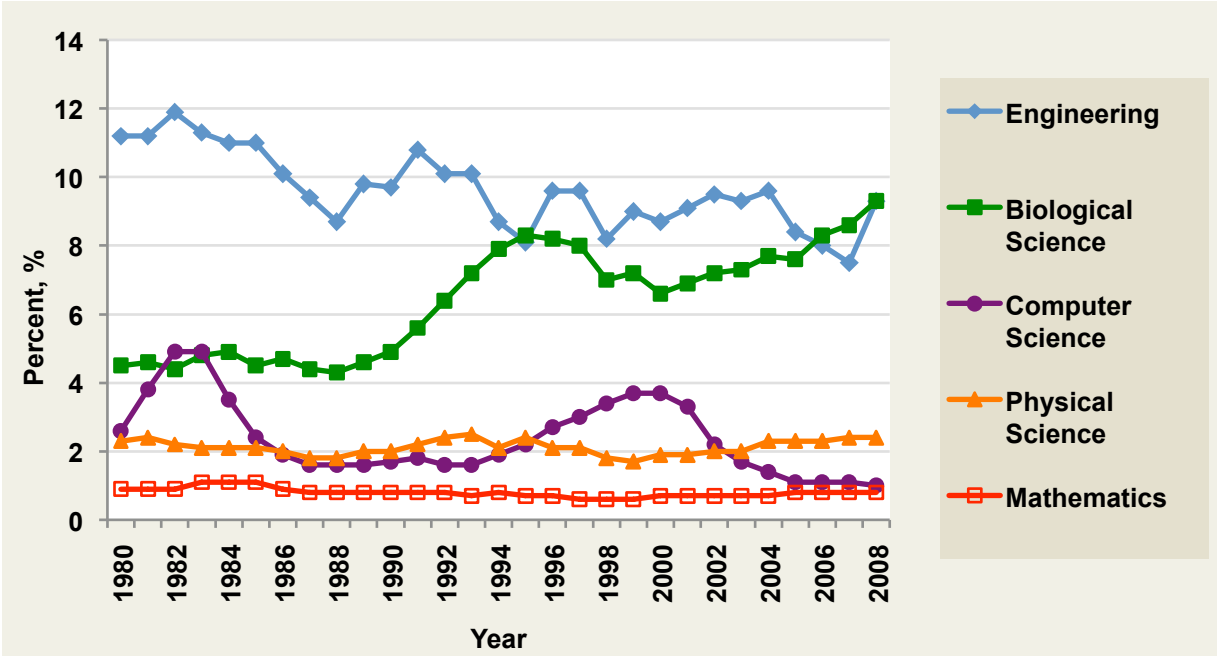
• Graduates entering Florida's state universities:

– 3% in mathematics
– 2% in reading
– 2% in writing

- Florida Department of Education. (2009a). *Florida Public High School Graduates: State Summary by Type of Institution Attended.*

Among incoming freshmen in the USA, Engineering and Biological Sciences are the most popular choices for student STEM majors. Mathematics and Physical Sciences are the least popular, while interest in Computer Science has varied considerably during the last three decades.

Intended major of incoming USA freshmen



Data Source: Higher Education Research Institute. (2009). *The American Freshman: National Norms for Fall 2008*.

STEM Bachelor's Degrees: SUS

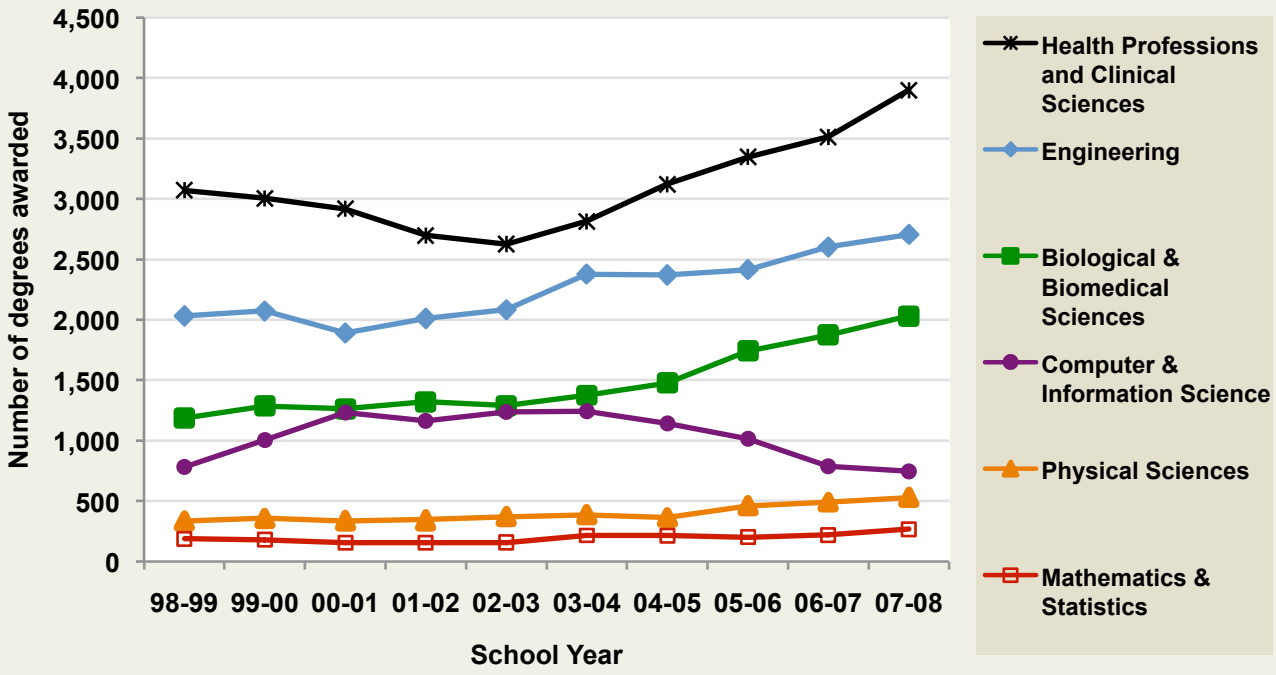
"STEM majors accounted for 14 percent of all undergraduates enrolled in U.S. postsecondary education in 2003–04 and 15 percent of 2003–04 high school graduates who were enrolled in postsecondary education in 2006."

"Roughly one-third of students who entered a STEM field during the first year switched to a non-STEM field over the next 6 years."

- National Center for Education Statistics. (2009). *Students Who Study Science, Technology, Engineering and Mathematics (STEM) in Post-Secondary Education,* pp. 17-18.

Within Florida's State University System (SUS) , the highest number of bachelor's degrees in STEM fields are awarded in Health Professions/Clinical Sciences and Engineering. The fewest degrees are awarded in Mathematics and Physical Sciences.

STEM Bachelor's degrees awarded in Florida's State University System

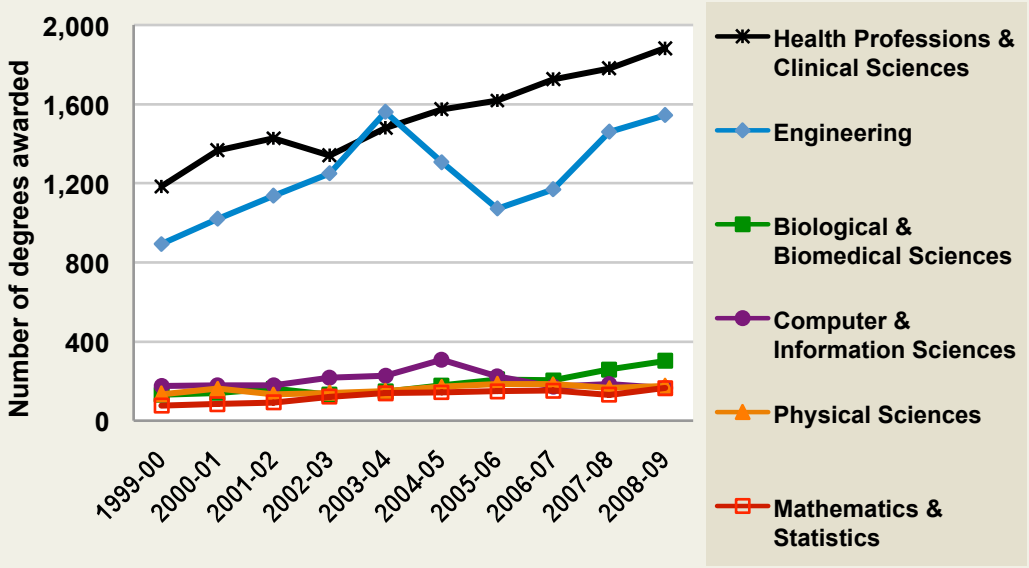


Data Source: Florida Board of Governors, Interactive University Database, http://www.flbog.org/resources/iud/
For a definition of Health Professions and Clinical Sciences, see Notes, Section D.

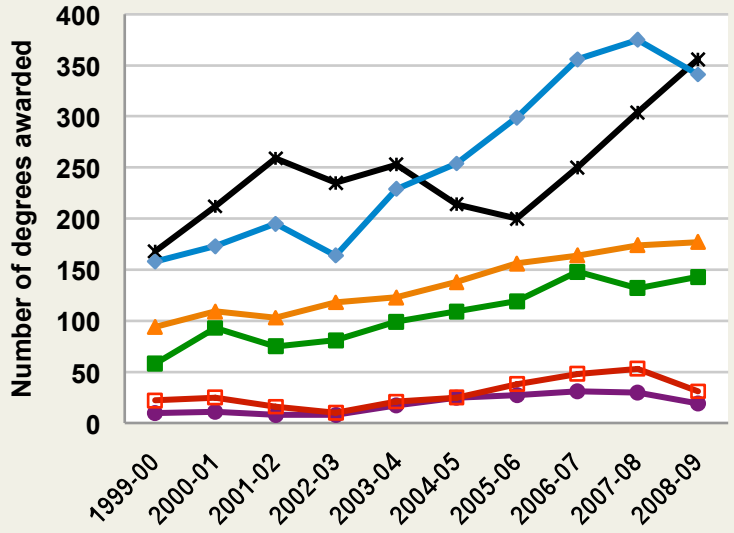
STEM Advanced Degrees: SUS

In the State University System (SUS), the number of master's degrees awarded has risen over the last decade in Engineering and the Health Professions, while the number of master's degrees in other STEM fields have remained about the same. The number of doctorates awarded in STEM fields has risen over the last decade in the Physical Sciences, Biological/Biomedical Sciences, and particularly in Engineering and the Health Professions. However, the number of doctorates awarded in Mathematics and Computer/Information Sciences have remained about the same.

STEM master's degrees awarded in Florida's SUS



STEM doctorate degrees awarded in Florida's SUS



Data Source: Florida Board of Governors, Interactive University Database, http://www.flbog.org/resources/iud/
For a definition of Health Professions and Clinical Sciences, see Notes, Section D.

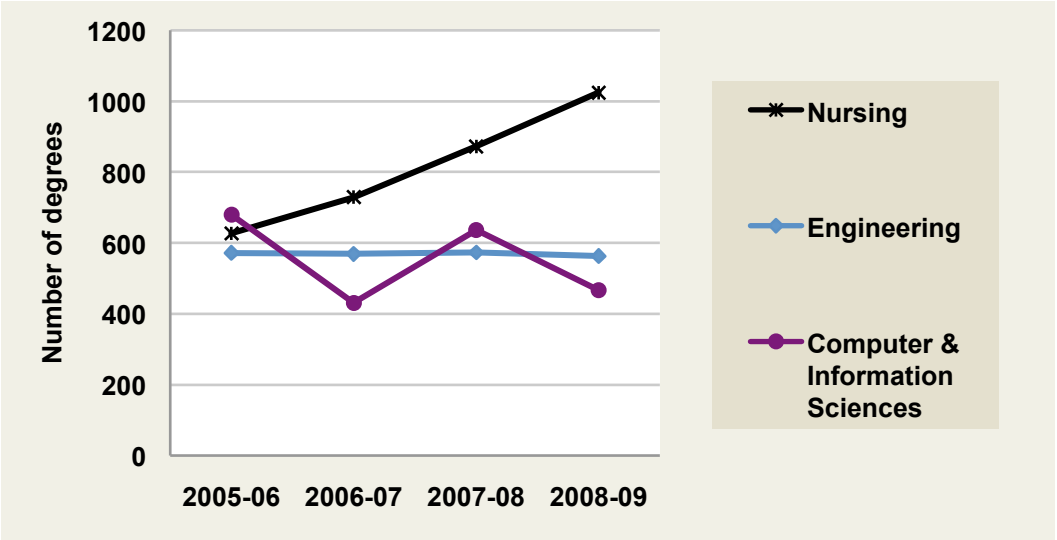
STEM Bachelor's Degrees: ICUF

At Florida's 28 Independent Colleges and Universities, the number of bachelor's degrees in nursing is on the rise, while degrees in engineering have shown no change. Degrees in computer/information science vary year to year, and show no net increase.

Independent Colleges and Universities of Florida (ICUF)

Florida's Independent Colleges and Universities consist of 28 private, non-profit educational institutions accredited by the Southern Association of Colleges & Schools (SACS). As of 2008-09, six of these institutions offered bachelor's degrees in Engineering, with the largest number awarded at Embry-Riddle Aeronautical University, Florida Institute of Technology and University of Miami. The same year, 22 of the 28 institutions offered Computer/Information Science bachelor's degrees, with St. Leo University, Florida Institute of Technology and Nova Southeastern University offering the largest number. Ten institutions offered bachelor's degrees in Nursing, with Florida Hospital College of Health Sciences, Jacksonville University, Barry University and Nova Southeastern University accounting for the largest number.

STEM bachelor's degrees awarded at the Independent Colleges and Universities of Florida (ICUF)

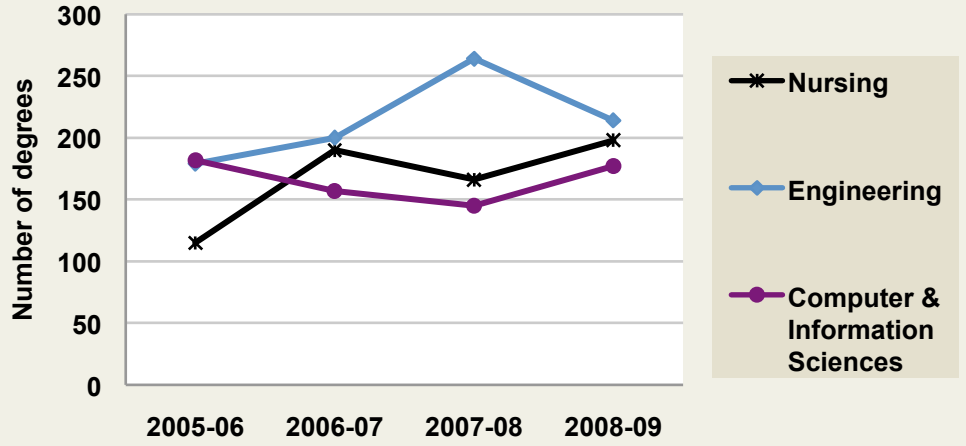


Data Source: Atherton, B. (2009). *2008-2009 Accountability Report: Quality, Productivity, Diversity, and Access.* p. 36. http://www.icuf.org/_resources/publications/2008-2009%20Final%20Accountability%20Report%20PDF.pdf

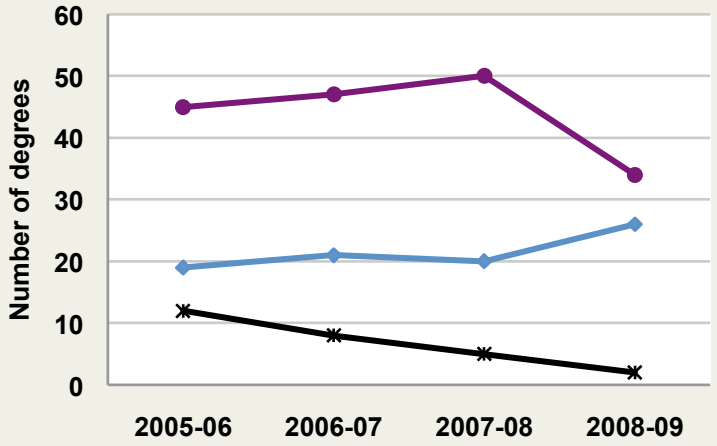
STEM Advanced Degrees: ICUF

Independent Colleges and Universities of Florida (ICUF) report graduate degrees awarded in Nursing, Engineering and Computer/Information Sciences. In Nursing, the number of master's degrees awarded has generally risen, while the number of doctorates has declined. Master's degrees in Computer/Information Sciences have remained about the same. Other trends are difficult to interpret because of year-to-year variations, resulting in part from the small number of degrees awarded.

STEM master's degrees awarded at the ICUF



STEM doctorate degrees awarded at the ICUF



Data Source: Atherton, B. (2009). *2008-2009 Accountability Report: Quality, Productivity, Diversity, and Access.* p. 36.
http://www.icuf.org/_resources/publications/2008-2009%20Final%20Accountability%20Report%20PDF.pdf

STEM Degrees: Florida and the US

Major Findings:

Florida is below the US average, below the states with the largest economies, and below the states with the highest NAEP achievement in:

- The number of NS&E bachelor's degrees conferred relative to the population of college-age individuals, and
- The percent of total degrees conferred in NS&E (including bachelor's master's and doctorate degrees).

About 1/4 of all NS&E degrees conferred in Florida are at the advanced level. This is on par with the national average and only slightly below other states with the largest economies.

Relatively few 18-24 year-olds in Florida hold bachelor's degrees in the Natural Sciences and Engineering (NS&E)[1] compared to 18-24 year olds in the rest of the nation. Florida compares more favorably to other states and the nation on the percent of NS&E degrees awarded at the advanced level (master's and doctorate degrees).

Indicator	Florida's Quartile (1=highest, 4=lowest)	Florida	US Average	States with largest economies[2]	States performing highest on NAEP[3]
Bachelor's degrees in NS&E conferred per 1,000 individuals 18-24 years old	4th	5.8	8.1	7.1	11.0
NS&E degrees as share of higher education degrees conferred	3rd	15.8%	17.6%	18.1%	18.4%
Advanced NS&E degrees as share of NS&E degrees conferred	2nd	24.6%	25.0%	27.2%	21.5%

1. For the listing of degrees included in Natural Sciences and Engineering, see Notes, Section E.

2.Average of data from California, New York, and Texas.

3. Average of data from 10 states with highest NAEP scores (average of 4th and 8th grade scores from 2009 Math and 2005 Science; Massachusetts, New Hampshire, Vermont, North Dakota, Montana, Minnesota, South Dakota, Maine, Wisconsin, New Jersey).

Data Source: 2007 Data. Original Sources: a- National Center for Education Statistics and b- US Census Bureau. Reported in: National Science Board. (2010). *Science and Engineering Indicators 2010.*

Females in STEM: Degrees

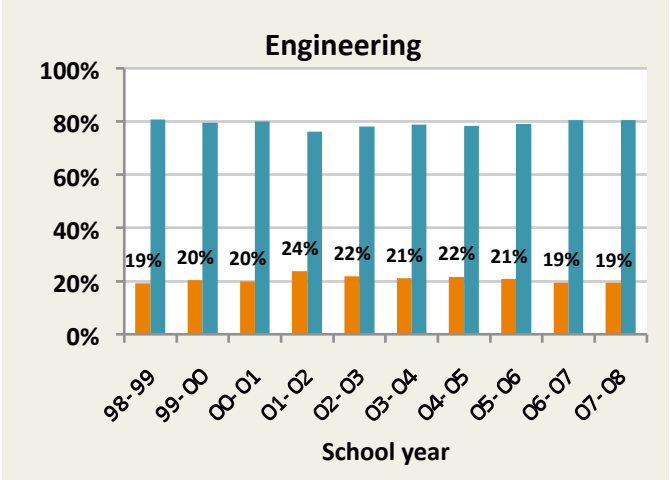
Major Findings:

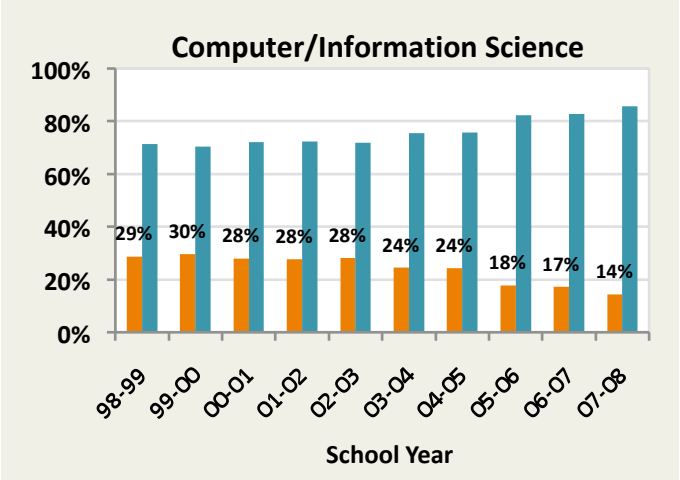
In Engineering males far outnumber females and the gap has remained constant over time.

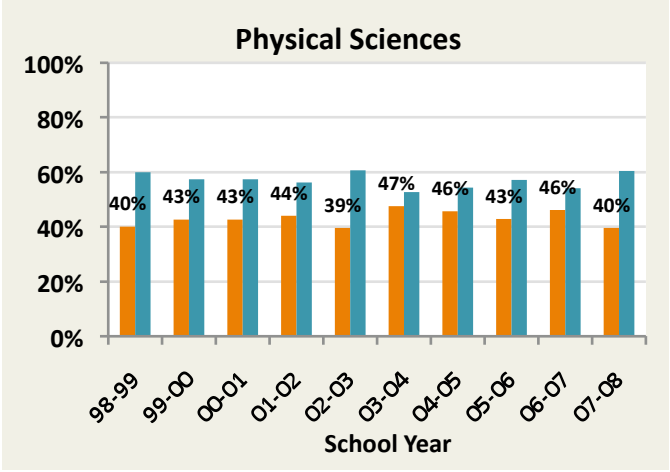
In Computer/ Information Science males far outnumber females and the gap has increased since 2000.

In the Physical Sciences, males outnumber females, but the gap is smaller than in Engineering or Computer/Information Science.

Percent of STEM bachelor's degrees awarded to females compared to males







Males
Females

Data Source: Florida Board of Governors, Interactive University Database, http://www.flbog.org/resources/iud/

Females in STEM: Degrees

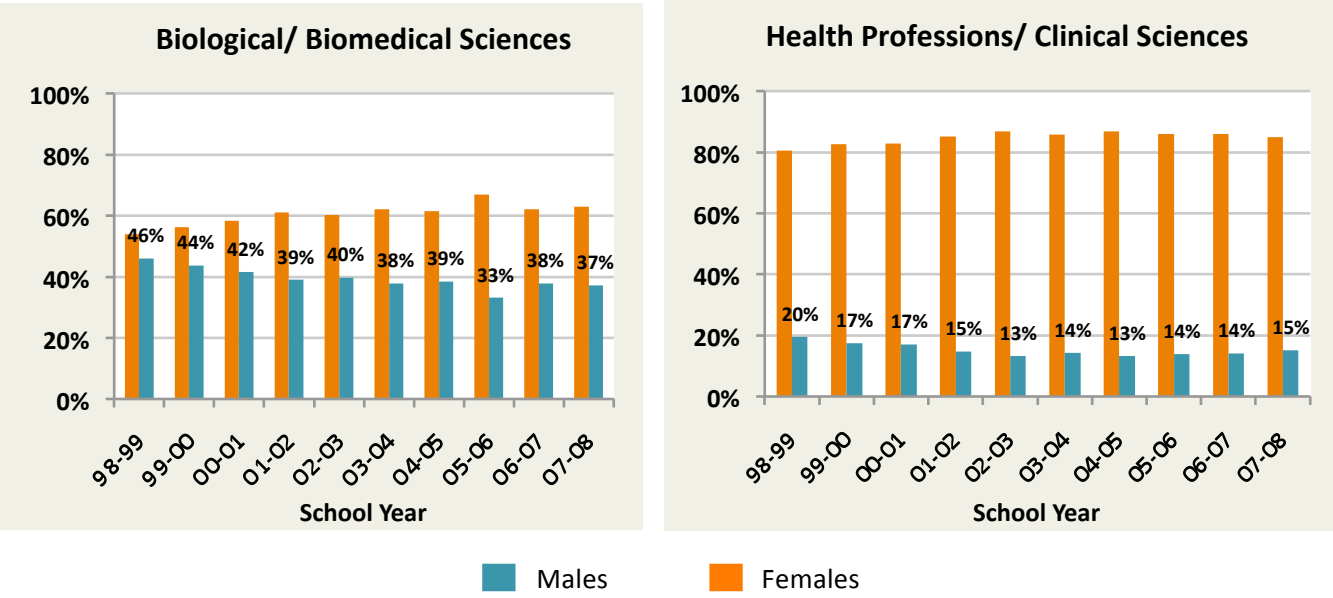
STEM Professions and the Job Market Forecast

Health care tops the list of industry subsectors forecasted to account for 86% of job growth through 2016.

- Executive Office of the President, Council of Economic Advisors. (2009). *Preparing the Workers of Today for the Jobs of Tomorrow.*

The number of bachelor's degrees awarded to females in Biological and Biomedical Sciences outnumbers the bachelor's degrees awarded to males. In the Health Professions and Clinical Sciences, the gap is even wider. For both fields, the gap is increasing over time.

Percent of STEM bachelor's degrees awarded to females as compared to males



Data Source: Florida Board of Governors, Interactive University Database, http://www.flbog.org/resources/iud/
For a definition of Health Professions and Clinical Sciences, see Notes, Section D.

Minorities in STEM: Degrees

Percent of bachelor's degrees in STEM fields, by ethnicity, relative to undergraduate enrollment

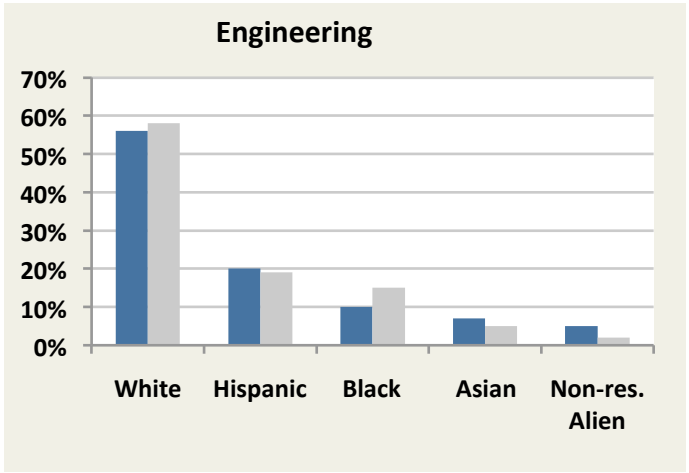
Compared to the percent of undergraduate enrollment (gray bars):

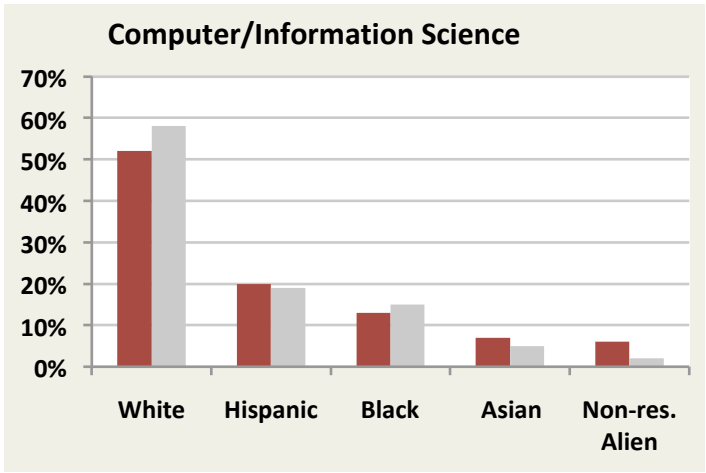
In both Engineering and Computer/Information Science:

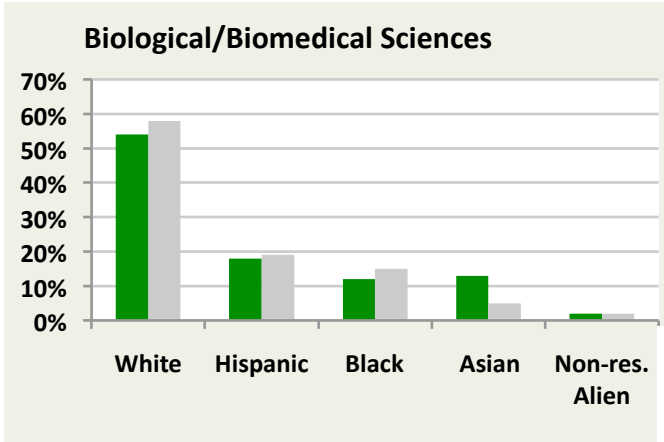
- Asians and non-resident aliens are overrepresented;
- Blacks and Whites are underrepresented.

In Biological/Biomedical Sciences:

- Asians are overrepresented;
- Blacks and Whites are underrepresented.







Bachelor's degrees awarded in 2007-2008 by the State University System

Undergraduate enrollment (all fields) in the State University System in 2007

Data Source: Florida Board of Governors, Interactive University Database, http://www.flbog.org/resources/iud/

Minorities in STEM: Degrees

Percent of bachelor's degrees in STEM fields, by ethnicity, relative to undergraduate enrollment

Compared to the percent of undergraduate enrollment (gray bars):

In the Physical Sciences:

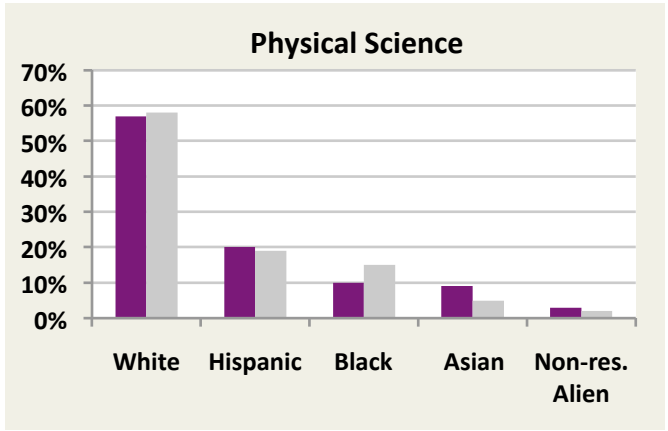
- Asians are overrepresented;
- Blacks are underrepresented

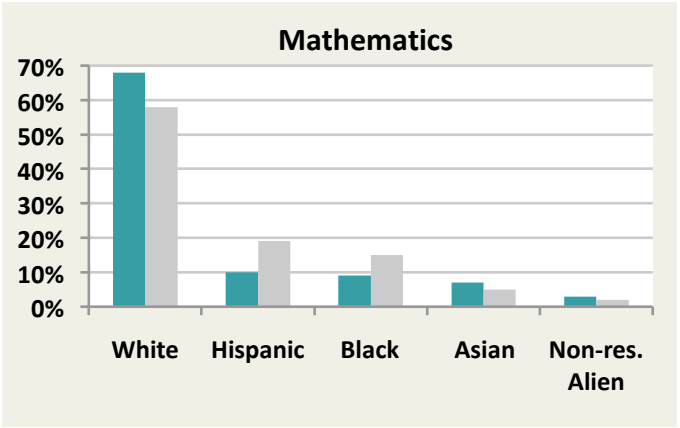
In Mathematics:

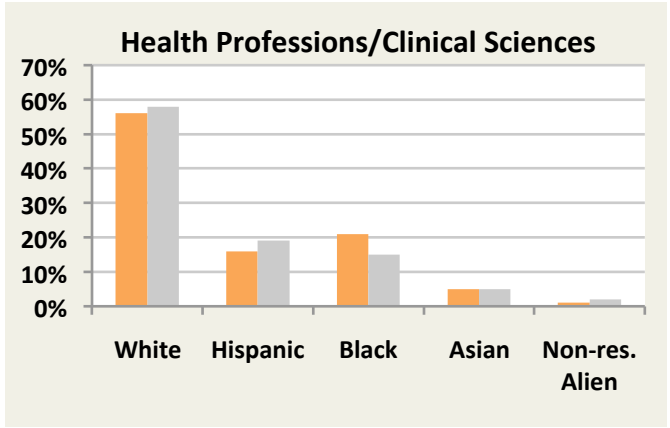
- Whites and Asians are overrepresented;
- Hispanics and Blacks are underrepresented.

In Health Professions/Clinical Sciences:

- Blacks are overrepresented;
- Whites and Hispanics are underrepresented.







Bachelor's degrees awarded in 2007-2008 by the State University System

Undergraduate enrollment (all fields) in the State University System in 2007

Data Source: Florida Board of Governors, Interactive University Database, http://www.flbog.org/resources/iud/

For a definition of Health Professions and Clinical Sciences, see Notes, Section D.

NGSS Standards

STEM Florida

Recently Florida adopted the Next Generation Sunshine State Standards (NGSSS), which require all students to demonstrate a greater, in-depth proficiency in math and science. A newly revised FCAT will test the performance of students relative to these standards.

What will Florida's new standards require of students?

- Learning important topics and concepts in-depth.
- More critical thinking and reasoning: compare, contrast, explain, justify, estimate, evaluate, analyze, synthesize.
- Mastering specific mathematics and science content at each grade level; less grade-to-grade repetition.

What will Florida's new standards require of teachers?

- Deeper content knowledge in science and mathematics.
- Increased knowledge and skill in mathematics and science teaching.
- New ways to assess student performance and to help all students maximize their learning.

Next Generation Sunshine State Standards (NGSSS):

- Revised K-12 content standards identifying what Florida students need to know and be able to do at each grade level.
- Aligned with national initiatives of the American Association for the Advancement of Science, the National Council of Teachers of Mathematics, and Achieve, Inc.
- Developed by teachers, district specialists, and university faculty with input from the public and business community.
- Adopted in Sept 2007 (Mathematics) and Feb 2008 (Science).

Website for the NGSSS: http://www.floridastandards.org/index.aspx

Measures for assessing the impact of the NGSSS:

Revising the FCAT: The FCAT will measure student achievement relative to the new, more rigorous NGSSS in 2011 for Mathematics, 2012 for Science. In the meantime, school districts are required to incorporate the new standards into their curricula.

Developing End-of-Course Exams: Students taking required courses in Mathematics and Science will be expected to pass an end-of-course test. These tests are currently being developed. The field-testing of the first exam, Algebra I, will occur in May of 2010.

For a comparison of Florida's Standards with those from other states/nations, see Notes, Section F.

Secondary STEM Teacher Certification

In Florida, college graduates may become certified to teach mathematics or science if they have the appropriate education training and **at least** the following coursework in mathematics and science:

Elementary Education (K-6):

- STEM credits are not required for state certification of elementary teachers, although specific teacher preparation programs may require them.

Middle Grades Only (5-9):

- Middle Grades Integrated Curriculum Certification:
  - 12 semester hours in each mathematics and science.
- Middle Grades Mathematics Certification:
  - 18 semester hours in mathematics, including the following disciplines:
    - calculus, precalculus, or trigonometry;
    - geometry; and
    - probability or statistics.
- Middle Grades General Science Certification:
  - 18 semester hours in science, including the following:
    - biological science;
    - chemistry or physics; and
    - earth-space science or earth science.

Middle and Upper Grades (6-12):

- Certification in Mathematics:
  - 30 semester hours in mathematics, including:
    - 6 semester hours in calculus,
    - credit in geometry,
    - credit in probability or statistics,
    - credit in abstract or linear algebra; or
  - specialization requirements completed for physics, plus 21 semester hours including the above list.
- Certification in Separate Areas of Science (biology, chemistry, earth-space science, or physics):
  - 30 semester hours in science, including 21 semester hours in the area with associated laboratory experience; or
  - specialization requirements completed for another science area (biology, chemistry earth-space science, or physics) plus 18 semester hours in area of certification.

Data Source: Florida Department of Education http://www.fldoe.org/edcert/subjlist.asp

Additional information about credentials of Florida's current secondary public school teachers has been requested from the Florida Department of Education.

K-12 Education: Funding

STEM florida

Public school teachers' salaries, expenditures for K-12 public schools as a share of GDP, and per student expenditures are much lower in Florida than in other large-economy states or in states that perform the highest on the NAEP.

Major Findings:

Florida lags behind most of the nation in:

- Salaries for public school teachers,
- Spending on K-12 public schools as a share of the gross domestic product, and
- Per student expenditures in K-12 public schools.

On average states that perform the highest on the NAEP report the highest per-pupil spending on K-12 education.

Indicator	Florida's Quartile (1=highest, 4=lowest)	Florida	US Average	States with largest economies[1]	States performing highest on NAEP[2]
Public school teacher salaries	3rd	$45,308	$50,816	$55,691	$46,800
Elementary and secondary public school current expenditures as a share of gross domestic product	4th	3.09%	3.48%	3.42%	3.89%
Current expenditures per pupil for elementary and secondary public schools	3rd	$8,567	$9,683	$10,783	$11,121

1. Average of data from California, New York, and Texas.

2. Average of data from 10 states with highest NAEP scores (average of 4th and 8th grade scores from 2009 Math and 2005 Science; Massachusetts, New Hampshire, Vermont, North Dakota, Montana, Minnesota, South Dakota, Maine, Wisconsin, New Jersey).

Data Source: 2007 Data. Original sources: a- National Center for Education Statistics, b- US Bureau of Economic Analysis, and c- National Public Education Financial Survey. Reported in: National Science Board. (2010). *Science and Engineering Indicators 2010.*

State Universities: Funding

STEM florida

Recent changes to state student aid as reported by the Florida Council of 100:

In 2009, the Florida Legislature passed Senate Bill 762, which allows the board of trustees of each university to establish a differential tuition higher than the base rate charged to the undergraduates. The differential is not to exceed 15% each year, may not be higher than the national average, and must be approved by the Board of Governors. The tuition differential can be variable by university, college, or program.

Although Bright Futures will continue to cover base tuition, it will not cover the extra tuition differential.

- Florida Council of 100. (2009). *Closing the Talent Gap: A Business Perspective.*

State Universities in Florida have lower undergraduate costs than most in the nation, while per-student state expenditures on student aid are among the highest.

Indicator	Florida's Quartile (1=highest, 4=lowest)	Florida	US Average	States with largest economies[1]	States performing highest on NAEP[2]
Average undergraduate charge at public 4-year institutions[3]	4th	$10,709	$13,424	$13,800	$14,623
State expenditures on student aid per full-time undergraduate student[4]	1st	$1,393	$1,029	$1,259	$579

1. Average of data from California, New York, and Texas.

2. Average of data from 10 states with highest NAEP scores (average of 4th and 8th grade scores from 2009 Math and 2005 Science; Massachusetts, New Hampshire, Vermont, North Dakota, Montana, Minnesota, South Dakota, Maine, Wisconsin, New Jersey).

Data Source: 3-2008 Data. 4-2007 Data. Original sources: a- National Association of State Student Grant and Aid Programs and b- National Center for Education Statistics. Reported in: National Science Board. (2010). *Science and Engineering Indicators 2010.*

STEM in the Workforce

STEM Florida

According to the Washington Economic Group, Inc., **a $1 billion investment in higher education in Florida:**

- would **directly result in the creation of 16,025 jobs**, about 89% of which would be high-wage and in the knowledge-based services sector; and
- would generate potential income from a higher-educated workforce, which would **directly create another ~16,000 jobs**, ~97% of which would also be high-wage and in the knowledge-based services sector.

-Washington Economic Group, Inc. (2008). *The Critical Role of Enhanced Educational Investment and Outcomes on the Economic Development of Florida: The Social Return on Investment (ROI) of Increased Public Funding of Higher Education.*

Florida ranks below most other states in terms of the numbers of STEM professionals in the workforce, lagging behind states with the largest economies and those with the highest NAEP achievement.

Indicator	Florida's Quartile (1=highest, 4=lowest)	Florida	US Average	States with largest economies[1]	States performing highest on NAEP[2]
Engineers as share of workforce	3rd	0.75%	1.06%	1.11%	0.93%
Life and physical scientists as share of workforce	4th	0.24%	0.40%	0.40%	0.49%
Computer specialists as share of workforce	3rd	1.53%	2.08%	2.09%	1.81%
Total individuals in science and engineering (S&E)[3] occupations as share of workforce	4th	2.69%	3.75%	3.88%	3.74%

1. Average of data from California, New York, and Texas.

2. Average of data from 10 states with highest NAEP scores (average of 4th and 8th grade scores from 2009 Math and 2005 Science; Massachusetts, New Hampshire, Vermont, North Dakota, Montana, Minnesota, South Dakota, Maine, Wisconsin, New Jersey).

3. For the listing of degrees included under Science & Engineering, see Notes, Section E.

Data Source: 2008 Data. Original Source: US Bureau of Labor Statistics. Reported in: National Science Board. (2010). *Science and Engineering Indicators 2010.*

STEM Academic Output

Florida is among the most productive states in the nation in terms of STEM academic output, as measured by the number of science and engineering (S&E)[1] doctorate degrees conferred, publications produced, and patents awarded annually.

Indicator	Florida's Quartile (1=highest, 4=lowest)	Florida	US Average	States with largest economies[2]	States performing highest on NAEP[3]
S&E doctorates conferred annually per 1,000 employed S&E doctorate holders[4] (Indicates the rate of training new doctorates)	1st	58.6	46.9	49.2	36.6
Annual academic S&E article output per 1,000 S&E doctorate holders in academia[5]	1st	592	577	642	454
Academic S&E article output per $1 million of academic R&D[6]	2nd	3.57	3.24	3.06	3.06
Academic patents awarded annually per 1,000 S&E doctorate holders in academia[4]	1st	17.8	11.6	16.0	9.0

1. For the listing of fields included under Science & Engineering, see Notes, Section E.

2. Average of data from California, New York, and Texas.

3. Average of data from 10 states with highest NAEP scores (average of 4th and 8th grade scores from 2009 Math and 2005 Science; Massachusetts, New Hampshire, Vermont, North Dakota, Montana, Minnesota, South Dakota, Maine, Wisconsin, New Jersey).

Data Source: 4- 2006 Data. 5- Calculated using doctorate holder data for 2006 and publication data for 2008. 6- 2008 Data. Original Source: a- National Science Foundation, Division of Science Resource Statistics, b- Thomson Reuters, Science Citation Index and Social Sciences Citation Index, and c-The Patent Board™. Reported in: National Science Board. (2010). *Science and Engineering Indicators 2010.*

STEM Florida

According to the Washington Economic Group, Inc., **a $1 billion investment in higher education in Florida:**

- would **directly result in a total economic impact** estimated at just over **$1.937 billion**.
- would generate potential income from a higher-educated workforce, which would **directly generate another $289 million.**

-Washington Economic Group, Inc. (2008). *The Critical Role of Enhanced Educational Investment and Outcomes on the Economic Development of Florida: The Social Return on Investment (ROI) of Increased Public Funding of Higher Education.*

STEM in Business

Florida has a relatively high percentage of high-technology businesses compared to most other states. However, these businesses employ fewer people and produce fewer patents, on average, than other states.

Florida has the fourth largest economy in the nation. When compared to the other economic powerhouses, New York, California, and Texas, the discrepancy in STEM innovation is particularly large. Compared to Florida, those states:

- Produce more than twice as many patents per 1,000 scientists and engineers
- Employ about 50% more individuals in high-technology establishments.

Indicator	Florida's Quartile (1=highest, 4=lowest)	Florida	US Average	States with largest economies[1]	States performing higher on NAEP[2]
Patents awarded per 1,000 individuals in S&E[3] occupations	3rd	8.2	13.4	17.2	14.6
High-technology[4] share of all business establishments	2nd	8.46%	8.35%	8.79%	7.39%
Employment in high-technology establishments as share of total employment	3rd	8.21%	11.45%	12.29%	10.61%

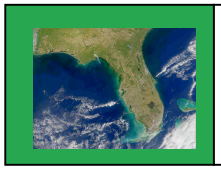
1. Average of data from California, New York, and Texas.

2. Average of data from 10 states with highest NAEP scores (average of 4th and 8th grade scores from 2009 Math and 2005 Science; Massachusetts, New Hampshire, Vermont, North Dakota, Montana, Minnesota, South Dakota, Maine, Wisconsin, New Jersey).

3. For the listing of fields included under Science & Engineering, see Notes, Section E.

4. For a definition of high-technology industries, see Notes, Section G.

Data Source: 2006 data used for high-technology indicators. 2008 data used for patent indicator. Original Sources: a- Patent and Trademark Office, b- Bureau of Labor Statistics, and c- Census Bureau. Reported in: National Science Board. (2010). *Science and Engineering Indicators 2010.*



R&D Funding

STEM florida

Florida spends far less on research and development (R&D) than do most other states in the nation, in both the business and academic sectors.

"U.S. R&D is dominated by development expenditures, largely performed by the business sector, and most basic research is conducted at universities and colleges."

"Universities and colleges historically have been the main performers of U.S. basic research, an estimated 56% of total U.S. basic research in 2008. The federal government has been the prime source of basic research funding, accounting for 57% of the nation's total in 2008."

"Development in the United States is chiefly a business sector activity, which performed 90% of the total development in 2008 and provided 84% of the funding. Most of the rest of the development funding is provided by the federal government."

- National Science Board. (2010). *Science and Engineering Indicators 2010.* p. 4-4.

Indicator	Florida's Quartile (1=highest, 4=lowest)	Florida	US Average	States with largest economies[1]	States performing highest on NAEP[2]
R&D as share of gross domestic product[3]	4th	0.96%	2.62%	2.43%	2.74%
Business-performed R&D as a share of private-industry output[3]	3rd	0.70%	2.20%	2.16%	2.24%
Academic R&D per $1,000 of gross domestic product[4]	4th	2.14%	3.66%	3.46%	4.11%

1. Average of data from California, New York, and Texas.

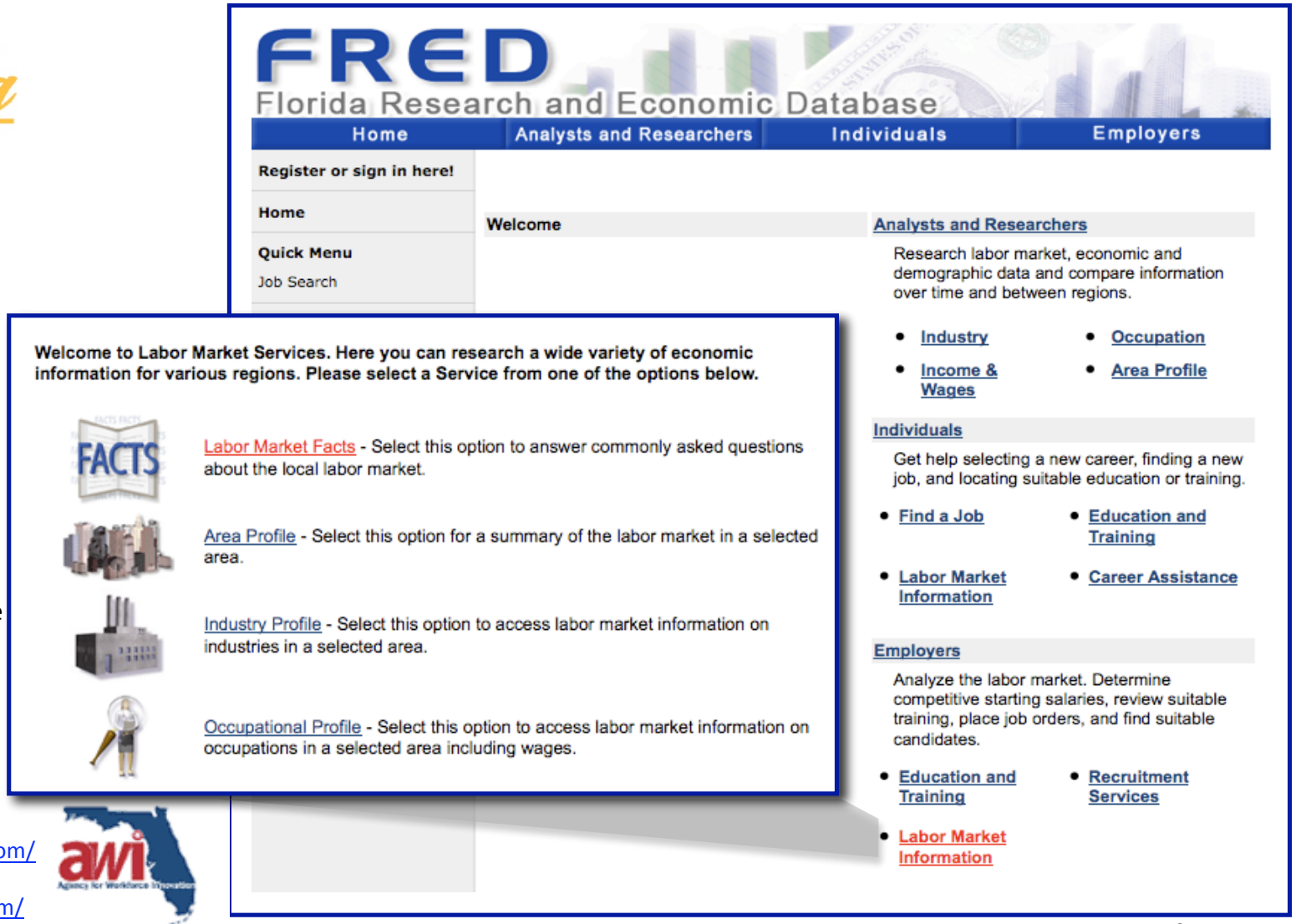
2. Average of data from states with highest NAEP scores (average of 4th and 8th grade scores from 2009 Math and 2005 Science; Massachusetts, New Hampshire, Vermont, North Dakota, Montana, Minnesota, South Dakota, Maine, Wisconsin, New Jersey).

Data Source: 3-2007 Data. 4-2008 Data. Original Sources: a- National Science Foundation, and b- US Bureau of Economic Analysis. Reported in: National Science Board. (2010). *Science and Engineering Indicators 2010.*

Workforce Information Sources

STEM florida

Labor Market Statistics (LMS), under the Agency for Workforce Innovation (AWI), provides "timely and reliable labor statistics to improve economic decision-making." These statistics are located in the online, searchable Florida Research and Economic Database (FRED). Information within this site can be viewed by labor market, area, industry, or occupational profile.



Websites:

http://www.labormarketinfo.com/

http://fred.labormarketinfo.com/

Highest Wage Occupations

STEM Florida

1

What jobs are currently listed for an area?
What are the highest paying jobs in an area?
What are the lowest paying jobs in an area?

What are the fastest growing jobs in an area?
What are the slowest growing jobs in an area?

What are the fastest growing industries in an area?
What are the slowest growing industries in an area?

2

Please select an option below for Labor Market Facts in an area.


Florida Statewide


A Workforce Region


A Metropolitan Area


A County

Nine of the 10 highest paying jobs in the state of Florida are within STEM fields, according to the below search on FRED.

3

Highest wage occupations in Florida

Occupation Title	2009 Annual Median Level Wage
Psychiatrists	$158,897.40
Pediatricians, General	$154,165.65
Dentists, General	$151,654.41
Airline Pilots, Copilots, and Flight Engineers	$119,023.54
Air Traffic Controllers	$116,802.01
Sales Managers	$115,851.13
Engineering Managers	$113,338.26
Computer and Information Systems Managers	$113,044.54
Podiatrists	$110,255.21
Optometrists	$107,829.96
Pharmacists	$107,668.21
Physicists	$106,959.78
Natural Sciences Managers	$102,303.32
Marketing Managers	$102,109.87
Public Relations Managers	$101,717.90
Financial Managers	$100,903.57
Compensation and Benefits Managers	$99,917.06
Lawyers	$98,138.18

Website: http://fred.labormarketinfo.com/

Florida's Economic Dashboard

Florida's Economic Dashboard is provided by the Florida Chamber Foundation as an ongoing monitor of the state's economy. Indicated within the dashboard are the state's positions for each of the six drivers. The screenshot of the dashboard to the right was retrieved on December 22, 2009.

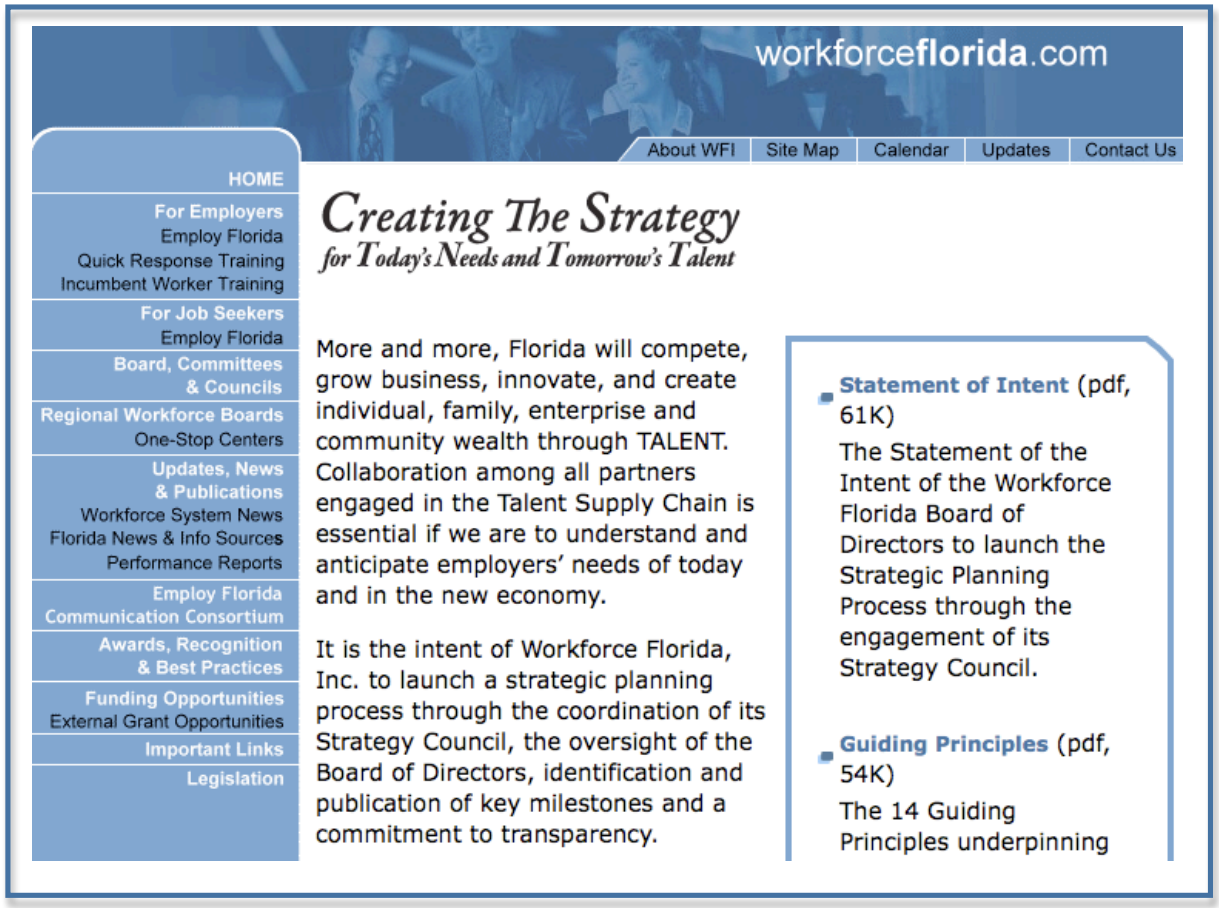
Website: http://www.fldashboard.com/

Florida's Talent Supply Chain

STEM florida

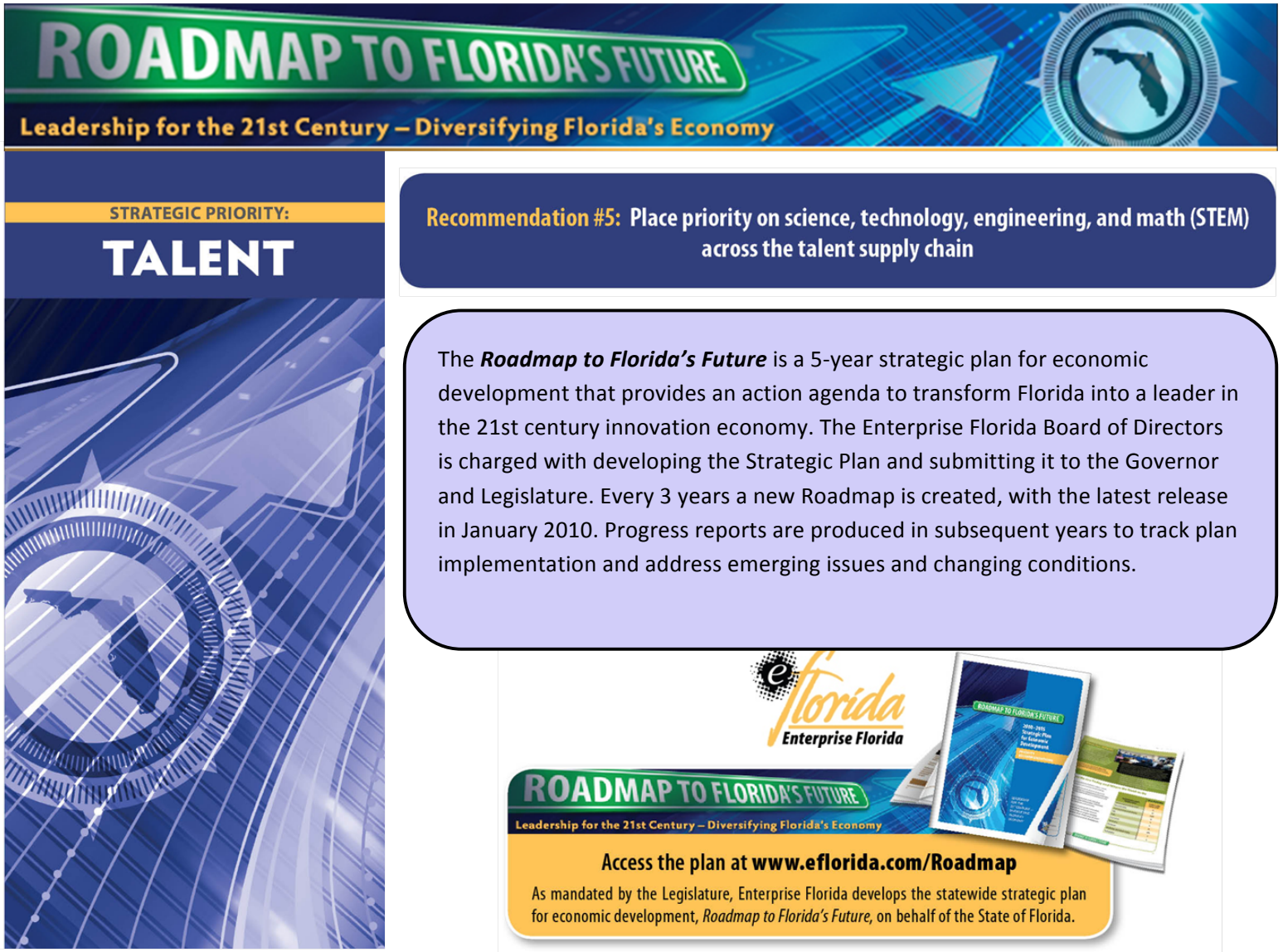
Workforce Florida, Inc., (WFI) has created a plan to develop Florida's Talent Supply Chain. The WFI Board commissioned its Strategy Council, chaired by David Armstrong, to manage the process and prepare the plan released in January 2010. The Statement of Intent, Guiding Principles, information about the process, and updates can be found on the website to the right.

Creating the Strategy for Today's Needs and Tomorrow's Talent



Website: http://www.workforceflorida.com/strategy/index.htm

Roadmap to Florida's Future



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Notes

Section A: NAEP Science data for Florida are available only for 2005 and are reported on page 10 of this report. For Florida, longitudinal data for NAEP Mathematics are available for 2003, 2005, 2007, and 2009. National averages and Florida's scores are as follows:

NAEP Math Scores	2003	2005	2007	2009
4th Grade				
Florida	234	239	242	242
National Average	235	238	240	240
8th Grade				
Florida	271	274	277	279
National Average	278	279	281	283

Data Source: http://nces.ed.gov/nationsreportcard/naepdata/

Section B: Linking is a statistical procedure that provides a "cross-walk" for expressing the results of one test (NAEP) in terms of the metric of another (TIMSS). TIMSS was intentionally designed to be linkable to NAEP. For example, both tests are administered in the same grades (4 and 8), use the same sampling techniques, and cover similar content standards. By expressing TIMSS and NAEP in the same metric, we can compare states not only to other states, but also to other countries. Technical Appendix A in Phillips, G. W. (2007), *Chance Favors the Prepared Mind,* provides a detailed description of the statistical linking procedure (see http://www.air.org/publications/documents/phillips.chance.favors.the.prepared.mind.pdf).

Section C: The National Assessment of Educational Progress (NAEP) provides a common metric for comparing how high different states set the bar. NAEP "Proficient" is defined as "competency over challenging subject matter." NAEP "Basic" is defined as "partial mastery of the skills necessary for Proficient performance." Each state's proficiency standard was "mapped" onto NAEP by finding the NAEP scale score above which the estimated percentage of students with higher NAEP scale values matches the percentage of students reported by the state as achieving the

state's standard. Specifically, the following steps were followed. First, for each school in the NAEP sample, the percentage of students meeting the state proficiency standard on the state assessment was identified. Second, the percentage of students meeting the state proficiency standard was estimated from the NAEP schools, using NAEP school weights. Third, the weighted distribution of scores on the NAEP were estimated for the state as a whole, based on the NAEP sample of schools and students. Fourth, the NAEP equivalent score for each state proficiency standard was identified by finding the point on the NAEP scale above which the percentage of students equals the percentage of students in the state who meet the state proficiency standard.

Source: National Center for Education Statistics. (2009). *Mapping State Proficiency Standards Onto NAEP Scales: 2005-2007.*

Section D: The Board of Governors uses the Classification of Instructional Programs (CIP) for the reporting of their data. CIP was originally developed by the U.S. Department of Education's National Center for Education Statistics (NCES) in 1980 and has since undergone three revisions. It provides a taxonomic scheme to support the accurate tracking, assessment, and reporting of fields of study and program completions activity.

Health Professions and Clinical Sciences includes: health science (e.g., audiology), dentistry, health and medical administration, health and medical assistants, health and medical diagnostic and treatment services, health and medical laboratory technologies, health and medical preparation programs, mental health services (e.g., alcohol and drug counseling), nursing, optometry, pharmacy, podiatry, public health, rehabilitation/therapeutic services, veterinary medicine, miscellaneous health aides and professions (e.g., dietetics), alternative and complementary medical support services (e.g., naturopathy), and other health professional and related sciences (e.g., health policy research).

Psychology (including clinical and counseling psychology) and **social sciences** are **not** included in this category. Those comprise separate categories in the CIP code system.

Source: http://nces.ed.gov/pubs2002/cip2000/

Section E: As defined by the National Science Board:

"**Natural sciences and engineering (NS&E) fields** include the physical, earth, ocean, atmospheric, biological, agricultural, and computer sciences; mathematics; and engineering. NS&E fields exclude social sciences and psychology."

"**S&E (science and engineering) fields** include the physical, earth, ocean, atmospheric, biological, agricultural, computer, and social sciences; mathematics; engineering; and psychology."

- National Science Board. (2010). *Science and Engineering Indicators 2010.* p 8-40 and 8-42.

Section F: Curriculum Standards: Comparison of Florida with other states and high-performing TIMSS nations.

Mathematics curriculum standards in the 50 states, including Florida's former 1996 Sunshine State Standards, have historically been criticized as "a mile wide and an inch deep" with many topics per grade level and a high degree of repetition across the grade levels. According to a large-scale international study, curriculum standards in the highest performing countries on TIMSS have the opposite characteristics: few topics per grade level and little repetition across the grades. This study indicates that it is not the adoption of curriculum standards per se that is important, but rather the focus and coherence of those standards that is most critical to student achievement.

Florida's revised 2007 mathematics standards for grades K-8 have moved toward more focus, greater coherence, and alignment of topics with the world's highest performing nations. The numbers of topics and repetitions have been reduced substantially, particularly in the early grades. The 2007 standards emphasize mastery of the most important mathematical concepts at each grade level.

Grade Level	Number of Mathematics Topics			
	High-performing nation composite	U.S. State Composite	1996 Florida Standards	2007 Florida Standards
K	-	-	13	5
1	5	22	16	7
2	9	23	18	15
3	12	25	23	14
4	16	26	23	22
5	21	28	25	22
6	20	30	30	17
7	22	29	29	16
8	21	28	29	15
	Total repetition of topics in subsequent grade levels			
K-8	53	102	134	84

Data Sources:

Schmidt, Houang, & Cogan (2002). *A Coherent Curriculum: The Case of Mathematics.*

Schmidt, Wang, & McKnight (2005). *Curriculum Coherence: An Examination of US Mathematics and Science Content Standards from an International Perspective.*

Schoen & Erbilgin (2010). *Developing a Robust and Replicable Method for Comparing State and National Mathematics Curriculum Standards.*

Section G: According to the National Science Board:

"**High-technology industries** are defined as those in which the proportion of employees in technology-oriented occupations is at least twice the average proportion for all industries. States often consider such industries desirable, in part because they tend to compensate workers better than other industries do."

- National Science Board. (2010). *Science and Engineering Indicators 2010.* p 8-100.

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