SENATE STAFF ANALYSIS AND ECONOMIC IMPACT STATEMENT

(This document is based only on the provisions contained in the legislation as of the latest date listed below.)

BILL: CS/SB 896

SPONSOR: Education and Senator Sullivan

SUBJECT: Math/Science Education

DATE: March 29, 1999 REVISED: _____ _____ _____ _____

	ANALYST	STAFF DIRECTOR	REFERENCE	ACTION
1.	White	O'Farrell	ED	Favorable/CS
2.			FP	
3.				
4.				
5.				

I. Summary:

This Committee Substitute creates a program to improve the teaching of mathematics and science in Florida, especially in kindergarten through grade 8. It requires a science component to be added to the Florida Comprehensive Assessment Test, beginning statewide in 2003.

The bill creates sections 231.6015 and 240.149 and amends sections 229.57, 229.592, 231.600, 232.245, 236.08106, and 236.685 of the Florida Statutes.

II. Present Situation:

Florida has long acknowledged the need to improve student achievement in mathematics and science. Only recently has that acknowledgment focused its sights so clearly on teacher preparation and student assessment.

In 1989, the Florida Department of Education published *A Comprehensive Plan: Improving Mathematics, Science, and Computer Education in Florida*. That report recommended strong action to:

1. Strengthen Curriculum
2. Revitalize Learning
3. Prepare more Qualified Teachers
4. Reach out to Students with Special Needs, and
5. Get Results: Adjust the Statewide Testing Program

In the 10 years since that report was published, Florida has received nationwide recognition for its achievements to revitalize learning through technology and to strengthen curriculum through the recently adopted Sunshine State Standards and the proposed Subject/Content Standards for Teachers. However, reports based on research still regularly identify the other three areas as lacking in Florida -- teacher qualifications, special needs students, and student assessment.

STUDENT ASSESSMENT/SPECIAL NEEDS STUDENTS

When the results of the 1996 National Assessment of Educational Progress (NAEP) were linked with those of the Third International Mathematics and Science Study (TIMSS), Florida's children measured lower than those in the United States average for all grades, and the gap widened in the upper grade levels. In mathematics, 45 percent of Florida's 4th grade students are below basic (lowest) achievement levels, compared to 39 percent nationwide. On international comparisons, achievement of students in the United States was high in grade 4, below average in grade 8, and almost last by grade 12.

In science achievement, the disparity among ethnic groups is alarming (see Table 1).

Table 1: 1996 NAEP* Test in Science: Grade 8 Students who Scored "Proficient" or Better

	All	White	Black	Hispanic
United States	29 percent	37 percent	5 percent	11 percent
Florida	21 percent	32 percent	4 percent	9 percent

*NAEP is a national program that has tested a sample of students periodically since 1969. Its purpose is not to assess every student but to provide a national report card.

FCAT (Florida Comprehensive Assessment Test)

The 1997-1998 school year is the first year all public school students took a statewide assessment test. The FCAT test questions and performance tasks are written to measure the Sunshine State Standards benchmarks in reading for grades 4, 8 and 10 and mathematics for grades 5, 8 and 10. The Sunshine State Standards are a statewide consensus of what Floridians believe their children should know and be able to do at each stage of their education. The test does not contain a component for science, although science is included in both the *Sunshine State Standards* and the proposed *Subject/Content Standards for Teachers*.

TEACHER QUALIFICATIONS

The connection between teacher qualifications and student learning is a popular topic of recent research. Recent studies focus on the level of courses teachers took in the content area and on the proficiency of the teacher in advanced courses. These studies show a clear link between the teachers' preparation, the ways teachers manage the classroom, and the achievement of their students as measured by scores on tests.[1]

Florida's requirements for teacher preparation programs in approved colleges of education are as rigorous as those of most other states. Since the so-called "Gordon Rule"[2] in 1982, colleges of education must concentrate on content over pedagogy. Florida also imposes comparatively strong requirements for certification. But Florida allows over 14,000 teachers to work with temporary certificates, and many if not most of Florida's teachers were educated in other states.

[1]For example, see: Chaney, B. 1995. *Student Outcomes and the Professional Preparation of Eighth Grade Teachers in Science and Mathematics* and Carlsen, W.S.1991 *The Construction of Subject Matter Knowledge in Primary Science Teaching*.

[2]Rule 6A-10.030, F.A.C., named for Senator Jack Gordon.

These facts elevate the need for professional development programs for teachers already employed in Florida's classrooms. At the state level, Florida has a comparatively strong policy framework for professional development and a sound fiscal commitment, but without much evidence of success.

Many indicators point out that professional development may be a low priority among local school districts. The 1997 Department of Education study of staff development[3] found a contrast between the state policy and local implementation. Although the policy and framework of support exist, in practice, staff development:

- is not supported by local funds,
- is not built into school schedules,
- does not conform to student needs, and
- lacks focus: "workshops are at an awareness level only and do not provide for substantive changes in curriculum, instruction, or technology."

That report also concluded that the effect of staff development on student achievement is "virtually unstudied."

Professional Development: Mathematics and Science

According to data provided by the Division of Public Schools in the Department of Education, mathematics and science professional development is provided through three employees of the department and through federal Eisenhower Title II funds paid to local school districts. Until recently, approximately $11 million provided through that federal program were earmarked for science, mathematics, and technology, but the funds are no longer restricted. Programs are available through a network of six area Teacher Education Centers.

Despite this network and funding, few teachers participate in activities with a focus on mathematics or science. Table 2 presents a sample from several districts.

Table 2:*

District	All In-Service Hours	Math & Science Number	Math & Science Percent		District	All In-Service Hours	Math & Science Number	Math & Science Percent
Alachua	6,567	244	3.7		Bay	5,150	235	4.6
Broward	58,120	4,187	7.2		Calhoun	434	3	0.7
Charlotte	3,050	330	10.8		Citrus	9,407	283	3.0
Collier	4,775	151	3.2		Columbia	6,727	-0-	-0-
Dade	47,041	4,244	9.0		Desoto	1,899	1	0.1
Duval	1,5761	631	4.0		Hillsborough	39,505	3,380	8.6
Orange	22,016	275	1.2					

*1996-1997 Inservice Report, Florida Department of Education. Includes instructional, certificated staff only.

[3]Florida Department of Education. *The 1997 Staff Development Evaluation Study*, presented by Frank T. Brogan Commissioner, September 30, 1997.

In summer of 1998, the National Alliance of State Science and Mathematics Coalitions convened a national group to discuss the need for improvements and to recommend action for states to take. The Florida contingent of that group is named "Coalition for Improving Mathematics and Science in Florida." Their major recommendations were to:

- Focus professional development through a statewide assessment;
- Coordinate the state's efforts through a nongovernmental organization with considerable autonomy to define, implement, and evaluate a statewide plan;
- Use improvement in student performance to evaluate the program's success.

III. Effect of Proposed Changes:

The Committee Substitute will place into law the findings and recommendations of the Coalition for Improving Mathematics and Science in Florida. The following section by section analysis is a summary of those initiatives:

Section 1. (Creates s. 231.6015, F.S.)
Creates a grant program to fund in-service professional development activities to improve mathematics and science teaching, with an initial emphasis on kindergarten through grade 8. A school district may not divert funds provided for this program to supplant current activities.

The program has a specific description to require a focus on content sequences aligned with the state-adopted Sunshine State Standards and the content standards developed for teachers by the Education Standards Commission. The bill specifies that the program is supposed to be intensive enough to improve a teacher's command of content knowledge and teaching skills.

If the program funds are insufficient to reach all teachers, it must allocate resources to produce a measurable change in the ones it does reach. This provision appears to counter a familiar criticism that professional development is spread too thin -- "A mile wide and an inch deep."

The program's evaluation must include a component that measures student achievement. The evaluation will be designed by the Alliance to Improve Mathematics and Science, which is created in section 2 of the bill.

The bill states that teachers may be compensated for their participation and may use successful participation to extend their certificates or add a new certification area. Section 7 of the bill authorizes a salary bonus to teachers who successfully complete the program, and this section stipulates that the program's design must define conditions under which the bonus is earned.

Delivery sites for the program are defined as joint-use facilities and may be on property belonging to a school district, a public or independent university, college, or community college.

The bill requires the program to involve the expertise of contemporary research and higher education institutions. It prohibits state colleges or universities from reporting full-time equivalent students for state funding as a result of providing instruction for the program.

The Legislature will determine in an appropriations act the extent of the program and the number of delivery sites.

Section 2. (Creates s. 240.149, F.S.)
This section creates a quasi-autonomous nongovernmental organization called the Alliance for Improving Mathematics and Science (AIMS). The organization will be operated by a board of directors and must be registered and incorporated as a not-for-profit organization under chapter 617, F.S., and section 501(c)(3) of the Internal Revenue Code.

Although independent of state government, the organization is subject to the state's sunshine laws and is assigned to the Office of the Commissioner of Education for administrative purposes. Such an assignment is to provide a fiscal agent for a nongovernmental group to receive state funds. The arrangement gives the department no authority over the decisions of the alliance, nor any credit or blame for its accomplishments or failures.

The board of directors is appointed by the Commissioner of Education from recommendations requested from any public or private organizations with expertise in education or technology. Three of those organizations are mentioned in the bill: The Postsecondary Education Planning Commission, the Education Standards Commission, and the Jobs and Education Partnership of Enterprise Florida (called in statute the Workforce Development Board).

The board must include:
- Four employees of postsecondary education institutions who have expertise in science and science education, mathematics or mathematics education, or a related technical field.
- Four members who are employees of school boards. Two of these members must be teachers.
- Four members from the private sector or from another state and with expertise in professional staff development programs.
- One member to represent the Department of Education. This member does not have a vote, although he or she may participate in the alliance's deliberations.

The board will have a chief executive officer who may employ staff.

An advisory council is created to assist the organization and to apprise decision makers of its activities. The council has six members:
- One member of the Florida Senate,
- One member of the Florida House of Representatives,
- A representative of the Executive Office of the Governor,
- A representative of the Department of Education,
- A representative of the community college system, and
- A representative of the state university system.

The bill does not specify responsibilities of the council; presumably it will act as an oversight group to gather and disseminate information about the alliance's accomplishments, to give it visibility, and to penetrate governmental barriers when advisable.

The bill specifies guidelines about the program to be delivered. The guidelines again emphasize focus, concentration on content, and specific sequences designed around the Florida Comprehensive Assessment Test, the Sunshine State Standards, and the content standards for teachers.

The guidelines require the alliance to design the selection process for teachers who will participate, to provide for staff to implement the program's workshops, and to design the follow-up support for each teacher for at least a year in the classroom. The alliance either could conduct a centralized operation or could contract with personnel in each district. But the bill gives the responsibility to the alliance and does not authorize it to operate as a "funding stream" by delegating authority to each district.

By December 1, 1999, the board submits a budget proposal for 2000-2003. The proposal is to go to the Legislature through the Commissioner of Education and must include alternatives for providing the program to all, half, or a quarter of the state's elementary and middle school teachers. The implication of this funding procedure is that the program should be implemented fully to the number of teachers involved, not that it should be spread out among so many teachers as to reduce its ability to effect a change.

Section 3. (Amends s. 229.57, F.S.)
This section requires science to be added to the Statewide Student Assessment Program beginning in 2003. Currently the program includes reading and mathematics, and writing. It took 3 years to design, write, and test those components.

Section 4. (Amends s. 229.592, F.S.)
This section requires the State Board of Education to require each school to report the number and percentage of teachers who have successfully completed the program to improve mathematics and science teaching.

Section 5. (Amends s. 231.600, F.S.)
This section assigns to the teacher education centers the responsibility to assure that teacher education programs will be fully aligned with the content of science tasks included in the FCAT beginning in 2003. This provision requires each teacher at least to know the skills that will be included in the FCAT, whether or not the program designed by the Alliance to Improve Science and Mathematics reaches every teacher in a district.

Section 6. (Amends s. 232.245, F.S.)
This section adds science to the subjects upon which pupil progression is determined.

Section 7. (Amends s. 236.08106, F.S.)
This section authorizes a salary bonus to teachers who successfully complete the program to improve the teaching of mathematics and science. The Alliance to Improve Mathematics and Science will adopt criteria to define "successful completion," but the bill requires those criteria to include improvement in student achievement.

Section 8. (Amends s. 236.685, F.S.)
This section requires the annual report for education funding accountability to include the number and percentage of teachers who have completed the program to improve mathematics and science.

Section 9.
Provides an effective date of July 1, 1999.

IV. Constitutional Issues:

A. Municipality/County Mandates Restrictions:

None.

B. Public Records/Open Meetings Issues:

None.

C. Trust Funds Restrictions:

None.

V. Economic Impact and Fiscal Note:

A. Tax/Fee Issues:

None.

B. Private Sector Impact:

None.

C. Government Sector Impact:

According to a proposal by the Coalition for Improving Mathematics and Science, the program will cost about $1,800 per teacher. To reach 8.2 percent of Florida's elementary school teachers, or 4,500 teachers annually, it would cost $3,524,227 million in the first year and $7,994,096 annually thereafter.

The cost to create and field-test the science component of the FCAT will be about $650,000 per test. That is, if the science component were to be given in the 3rd, 5th, and 7th grades, the developmental cost would be $1.95 million. The administration cost will depend on the type of test -- a test that includes hands-on experiments costs about $50 per child to administer; a test like the other components of FCAT, with 20 percent performance items and 80 percent machine scored multiple choice items, will cost $8.50 per student to administer; and a test with all multiple-choice items will cost $3.00 per student to administer.

As of this date, SB 2500 does not have a line item appropriation for the program.

VI. Technical Deficiencies:

None.

VII. Related Issues:

On March 22, 1999, the Senate Education Committee adopted an amendment to SB 1756 to require a science component of the Florida Comprehensive Assessment Test, beginning in 2003.

In one state that developed a hands-on, experiential science achievement test, test security became a problem.

VIII. Amendments:

None.