SCIENCE STRATEGIES/PLANS: NEXT STEPS

BACKGROUND

One of the SBE's strategic planning goals is to promote effective strategies to make Washington's students nationally and internationally competitive in math and science. In order to accomplish this goal, the SBE is providing system oversight for math and science achievement and strengthening science high school graduation requirements. Being competitive in science and math nationally and internationally is also a goal of the draft Washington State Education Reform Plan.

At the September 2010 meeting, the SBE received a report on state leadership for a Math Systems Improvement Framework. At the November 2010 meeting, the SBE will receive a report on science.

The Office of Superintendent of Public Instruction (OSPI) has recently produced a "state of the state" description of science education. The report, "Science Education in Washington State," is still in draft form. The executive summary is included as Attachment A in this packet; the full report will be in members' "FYI" folders distributed at the meeting.

OSPI staff will use the report as a jumping off point to discuss the following three questions:

1. How are we leveraging current resources to make a positive difference in the system now?
2. How are we learning from past initiatives to inform systemic improvements in science?
3. What are we learning from new research in science to inform systemic improvements in science?

The principal and a teacher from Hearthwood Elementary School in the Evergreen School District (Clark County) will join the OSPI staff to report on their successful efforts to improve science achievement.   Hearthwood Elementary School has 445 students; 52.3 percent of them are on free or reduced lunch. Tables based upon the SBE accountability index[1] show the improvements Hearthwood made in science achievement from 2007-2008 to 2009-2009 (See Attachment B). Preliminary data from 2009-2010, not yet available publicly, indicate that the science improvement trend continues to be strong.

EXPECTED ACTION

None; information only.

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[1] See the SBE Accountability Look Up Tool at:
http://www.sbe.wa.gov/documents/Accountability%20Index%20Look%20Up%20Tool.xls.

Executive Summary

The purpose of this report is to describe the current state of science and STEM education in Washington State and the policies and programs supporting science and STEM education. Key findings include:

Science Teachers and Teaching

In Washington State there are currently 7,482 valid teaching certificates with a science endorsement. 3,620 of these are associated with secondary teacher employment. This past year, 704 teaching certifications with one or more science endorsements were issued in Washington State.

Survey data of Washington fourth grade teachers obtained from the 2005 NAEP (National Assessment of Educational Progress) showed that twenty-one percent of teachers self-reported teaching science less than one hour per week. Sixty-two percent of eighth grade teachers on the same assessment self-reported teaching science for an average of 3 – 4.9 hours per week. Using information gleaned from course enrollment data, the most commonly taught science classes in Washington State include biology, chemistry and physical science.

State and National Assessment Results

A review of assessment results indicates that thirty-four percent (34%) of students met standard on the 2010 5th grade Measure of Student Progress (MSP) state science assessment. Fifty-four percent (54%) of students met standard on the 2010 8th grade science assessment (MSP) and forty-five percent (45%) of students met standard on the 2010 10th grade science assessment (HSPE).

NAEP test results showed that twenty-eight percent (28%) of Washington 4th grade students performed at the proficient or above level on the 4th grade 2005 science assessment. Thirty-three percent (33%) of Washington grade 8th grade students performed at the proficient or above level on the 8th grade 2005 NAEP science assessment.

In 2010, forty-one percent of Washington's ACT-tested high school graduates met the science College Readiness Benchmark. Nationally, only 29 percent of ACT-tested high school graduates met the science College Readiness Benchmark. Of the students taking the 2009 SAT Subject Area Biology and Physics tests, more than 50% of Washington's test takers scored above the national averages. In four of the six 2009 AP science tests, the mean for Washington's test-takers was higher than the national mean scores.

Standards and Materials

In 2009 the Washington State K-12 Science Learning Standards were revised and adopted. At the national level, the National Research Council (NRC) of the National Academies of Science published a draft of a Conceptual Framework for Science Education which will be used to inform the development of the next generation national science standards. *Achieve* will develop the new science standards that are expected to be completed in 2012.

The English Language Arts Common Core standards include Reading and Writing Standards for Literacy in Science and Technical Subjects for grades 6–12. Standards for K–5 reading and writing in science and technical subjects are integrated into the K–5 Reading and Writing standards.

In 2009, OSPI led the development and adoption of the Washington State K-12 Integrated Environmental and Sustainability Education (ESE) Learning Standards. OSPI developed and adopted K-12 Education Technology Standards in 2008.

In 2009, OSPI conducted a science instructional materials review and recommendation of three basic science curricula each for elementary, middle, and high school grades. Approximately, 70% of school districts surveyed are using science materials in the elementary grades that are aligned with the 2009 science standards. A smaller number of school districts surveyed are using materials in the middle and high school grades that are aligned with the 2009 science standards. LASER alliances developed an "At a Glance" summary for teachers and administrators. Where curriculum gaps were identified, LASER alliances provided teacher support tools.

Graduation Requirements

In September 2010, the State Board of Education provisionally adopted the *Washington State Graduation Requirements: Career and College Ready* requiring three credits of science, two of which must be a lab science. Students in the class of 2013 and beyond must pass the science High School Proficiency Exams (HSPE). As a result of new legislation, beginning in 2012 the HSPE will be an end-of-course (EOC) test in biology.

Capacity Building Programs and Support

Beginning in the 2008 – 2009 school year, each of the nine Educational Service Districts (ESDs) has one science coordinator who provides regional professional development and technical assistance related to science curriculum and instruction. Additionally, the Mathematics and Science Instructional Coach Program provided funding in the 2007-09 biennium for 25 math coaches in 2007-08, and 25 math and 25 science coaches in 2008-09. With reduced funding the program continues and coaches provide site based professional development.

Since 1999 LASER has provided and continues to provide financial, professional development, and technical assistance to individual classrooms, schools, school districts and to consortia of school districts, called LASER Alliances. Through June 30, 2010, educators in more than 200 Washington school districts have received science education products, services and technical assistance from the LASER network.

Federal grant support has been received for programs including the Mathematics and Science Partnership (MSP) Program. The MSP Program supports partnerships between the mathematics, science, and/or engineering faculty of institutions of higher education and high-need school districts. Currently, there are ten funded MSP projects in Washington, seven of which are focused on science and/or STEM.

The legislature allocated funding to designate up to three high schools and three middle schools in Washington as STEM lighthouse schools to identify, share, and promote best practices in STEM education. The legislature directed OSPI to develop a STEM Plan detailing goals and strategies for improving STEM education.

Since June 2008, the Partnership for Learning has been coordinating the design of a STEM Initiative, including the launch of the Washington STEM Center. The Washington State Mathematics,

Engineering, Science Achievement (MESA) Program provides enriching opportunities for underrepresented students in grades K-12.

Issues for Further Consideration

Issues for further consideration identified in the report include: addressing time for and the quality of instruction of science in elementary school; opportunities to integrate science and STEM education through relevant learning experiences; funding and support for teacher professional development focused on science content and effective teaching practices; addressing the "opportunity and access gap" (i.e. achievement gap) in science; and developing scaffolding strategies to bridge state standards to anticipated Next Generations Science Standards.

School		District		Grade Span	
Hearthwood Elementary School		**EVERGREEN (CLARK)**		**K-5**	

2008-2009

INDICATORS	OUTCOMES					
	Reading	Writing	Math	Science	Extended Grad Rate	Average
Achievement of non-low income students	6.0	6.0	5.0	5.0	.	5.50
Achievement of low income students	4.0	4.0	3.0	3.0	.	3.50
Achievement vs. peers	4.0	7.0	5.0	7.0	.	5.75
Improvement from the previous year	7.0	7.0	7.0	7.0	.	7.00
Index scores	5.25	6.00	5.00	5.50	NA	5.44 Tier: Very Good

2007-2008

INDICATORS	OUTCOMES					
	Reading	Writing	Math	Science	Extended Grad Rate	Average
Achievement of non-low income students	5.0	6.0	4.0	2.0	.	4.25
Achievement of low income students	3.0	4.0	2.0	1.0	.	2.50
Achievement vs. peers	2.0	6.0	2.0	1.0	.	2.75
Improvement from the previous year	4.0	7.0	2.0	1.0	.	3.50
Index scores	3.50	5.75	2.50	1.25	NA	3.25 Tier: Fair