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**STEM (Science, Technology, Engineering and Mathematics)****BACKGROUND INFORMATION:**

A STEM focus in Teaching and Learning professional development supports the Beaverton School District full-option graduate plan, the Strategic Plan, Teaching and Learning's College and Career Readiness (CCR) Framework and the District goal of: *All students will show continuous progress toward their personal learning goals, developed in collaboration with teachers and parents, and will be prepared for post-secondary education and career success.*

Over the past 6 years, the District has taken strategic steps to increase the level of teacher content knowledge and pedagogical practices in the areas of science, engineering, technology, and math. Creating "High-quality empowered teaching staff" as part of the strategic plan, involves teacher preparedness in STEM. The goal of Teaching and Learning is to provide supports for the implementation of effective STEM practices by providing teachers with effective professional development experiences. The outcome is teachers implementing these effective practices to create an engaging, focused STEM learning environment for students. The outcome is to increase the quality and quantity of STEM instruction to students. A variety of activities and programming have focused on this goal, but the partnership with Portland State University (expanded now to the Portland Metro STEM partnership), along with the Elementary STEM Professional Development Release program have resulted in measureable progress toward this outcome.

**BSD/PSU STEM Partnership:****History:**

- In 2006, a collaborative relationship was formed between Steve Day and Dr. William Becker, Director of the Center for Science Education (CSE) at Portland State University. Their work together facilitated the formation of the Health Science School in Beaverton.
- The partnership expanded to a formal role in the district filled by Melissa Potter, and then Carol Biskupic Knight as the Beaverton/Portland State Science Partnership TOSA during school years 2007-2010. This position was a half time appointment with the CSE. This cost shared position supported professional development opportunities for teachers of science to improve their ability to meet the needs of diverse learners and strengthen K-12 student achievement. Portland State University College of Liberal Arts and Science provided the funds to support .25 FTE, and the District provided the funds for the other .25FTE.
- During school year 2010-11 five cost-shared .5 FTE STEM TOSAs were added to support the partnership/district focus on STEM education in BSD high schools. This school year, there are three high-school STEM TOSAs, and one elementary STEM TOSA.

**Goals and Programming:**

- The needs of the partnership districts and key issues in STEM research drive the program. In Beaverton, this has included the focus on learning targets, so that every student has a clear pathway to college and career readiness, and on effective instruction so that every student demonstrates mastery of these K-12 learning targets. Beaverton's work has been a springboard and guiding force for the STEM Partnership work.
- Teacher professional development programming needs are based directly on the District's goals, objectives, and initiatives for increasing student achievement. Grant work within the partnership and this summer's upcoming coursework (15 courses for

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K-12 teachers) focus on the continued work of the District for high-quality empowered staff.

- The following programs were possible in Beaverton School District through this partnership and the role of the BSD/PSU Science TOSA: Oregon Teacher Scholars Program, Connect2Science Elementary Methods Course, Secondary Content Courses, 6<sup>th</sup> Grade Science PLC-Transitioning to the New Standards, Our Cosmic History Lecture Series, ODE Science Scoring Guide Panel, Regional Science Fair, High School-University Vertical Articulation of Math and Science, and Connect2Math-Connect2Science grant work.

**Looking Ahead:**

- Beaverton School District is a core partner in the Portland Metro STEM Partnership, a collective impact partnership with other school districts, higher education, businesses, and community STEM educators.
- Portland Metro STEM Partnership and Beaverton School District Goal 2012-16: As part of the District's focus on all components of the THRIVES strategic plan, and to have all students College and Career Ready, Beaverton School District and the Portland STEM Partnership will:
  - Engage in transformational change in STEM in two networked schools: Chehalem and Highland Park (with two cost-shared Networked School TOSAs)
  - Coordinate STEM Center Partnership programming that supports the District's K-12 STEM priorities and needs
  - Access research-based professional development content and pedagogical practice coursework provided by the STEM Center
  - Continue the Partnership Teacher on Special Assignment model (with two cost share Partnership TOSAs) to further implement the District Strategic Plan in STEM.

***Elementary STEM Release Model:***

The Professional Learning Community model implemented in Beaverton School District during school year 2008-2009 for 4<sup>th</sup> and 5<sup>th</sup> grade and for the Title Schools during 2009-2011 was an extremely successful model. This program provided a much-needed support for elementary teacher to focus on the Strategic Plan goal of high-quality empowered staff. Teachers benefited from that professional learning community time, and students benefited from the science specialist instruction. Much was learned about this model over the last three years. Two key "needs" were identified from this model:

1. Time was needed for elementary classroom teachers to have an opportunity to know what science instruction was being done in the classroom by the science specialist, and be able to observe a portion of the instruction in order to increase teacher science content knowledge and pedagogical practices.
2. A release of science instruction "responsibility" from the science specialists to the classroom teacher.

With resources for professional development within schools and the District at an extreme low, it was critical to take an effective model and identify ways for more schools to have access to a highly qualified team of science specialists, but, also, tie the professional development time directly to school improvement plans and the District Career and College Readiness Framework. A modified model connected to the Arts4Learning grant was implemented in school year 2011-12.

**Purpose:** This plan focuses on four goals and supports the CCR Framework goal of learning targets providing the pathway to CCR and effective instruction to support mastery goal of the Framework.

1. To implement the science professional development framework as outlined in the Science Project Team report to support classroom teachers with providing a standards-based learning approach to science. (CCR Framework goal of learning targets providing the pathway to CCR.)

2. To improve classroom teachers' instruction in science inquiry and engineering design by engaging teachers in observations of model lessons of exemplary instruction from science specialists.
3. To increase student achievement in all content areas through the increased use of SIOP within science and math instruction by classroom teachers.
4. To provide differentiated professional development directly aligned to individual School Improvement Plans related to connecting literacy to math and science.

**Activities:**

1. Each trimester, Elementary Science Specialists provide two back-to-back 90-minute instructional sessions to third, fourth and fifth grade students in science inquiry or engineering design. The science topics taught are aligned with the Oregon State Learning Targets. This gives a total of 180 minutes of release time for teachers at those grades each trimester to work on focused professional development with the District Elementary Curriculum Specialists. Thus, professional development is embedded during the instructional day without the use of substitute teachers.
2. During PD sessions teachers engaged in the following work:
  - 2 days of Science Standards and Effective Practices (Required)
  - 4 days of Choice Sessions (With support of SIOP practices)
    - Literacy-Science Connection
    - Math Content
    - Differentiating Science and/or Math
    - Additional Science Content
    - Engineering Design and/or Science Inquiry

**Looking Ahead:**

- The Elementary Advisory Committee and the Elementary Principals support continuing this release model to support implementing a Standards Based Learning System in Science and Math for school year's 2012-15 at the elementary level and achieve a K-12 seamless pathway for students.

**RECOMMENDATION:**

It is recommended that the School Board receive the above as a report item.