

BOISE-ELIOT/HUMBOLDT SCHOOL
STEM Investment Plan

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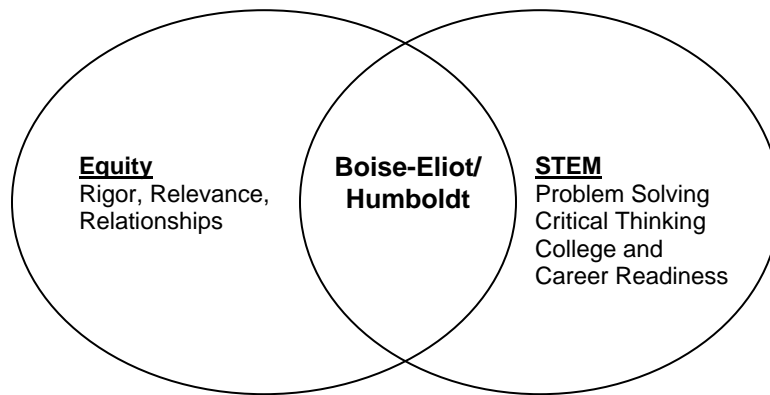
BOISE-ELIOT/HUMBOLDT SCHOOL

STEM Investment Plan

WHO WE ARE:

Boise-Eliot/Humboldt School is a Portland Public PreK through 8th grade neighborhood school in North Portland. We are a very diverse community in an ever-changing part of Portland. In 2012, Boise-Eliot School merged its campus with Humboldt School creating a new unified school that offers a comprehensive program including music, PE, enrichments for middle school students, and now a focus on Science, Technology, Engineering and Math (STEM).

Boise-Eliot/Humboldt School is known for its work around equity. Over the last several years we have grown our PreK-8th grade programs by focusing on culturally competent teaching pedagogy in line with our role as a Beacon Equity School in the Portland Public Schools. Our teaching practice is centered on a framework of rigor, relevance, and relationship. We are now excited and motivated to merge our equity work with our focus as a STEM school.



STEM education creates an integrated learning environment that encourages problem solving and persistence, critical thinking, and team work across the subjects. At Boise-Eliot/Humboldt we are focused on building a program that uses STEM to inspire and excite students as they prepare for college and 21st century careers. Our students will apply rigorous STEM content while engaging in learning activities that investigate the natural world and demonstrate a connection between themselves and the environment. We want our students to see themselves as capable problem solvers that can adapt and strategize in the face of challenges, both academic and personal. Our vision for Boise-Eliot/Humboldt students is to have a passion for learning and activism that extends beyond the classroom and to believe that they have the capacity to make change in their community.

Through our participation in the Portland Metro STEM Partnership we hope to build a STEM program that will dramatically transform student engagement, teacher practice, and Boise-Eliot/Humboldt school culture as a whole.

WHERE WE WANT TO GO:

Vision Statement:

To understand and foster the development of human communities and the environment, through the lens of Place, Race and Justice.

Mission Statement:

Our mission is to educate all children to their highest potential to be productive, respectful, self-reliant, and responsible citizens who value the richness of diversity. In partnership with families and the community, we are committed to creating an environment where students engage in rigorous learning opportunities that challenge them to think critically about their place in the world.

STEM education is active and has student-centered learning at its core. Through a focus on inquiry based instruction we seek to build a STEM program that focuses on integrated units of study that are place-based and relevant to our students and community. We will use experiential learning opportunities to ignite curiosity and provide an opportunity for reflection, challenging students' initial beliefs and guiding them in the formation of deeper questions from multiple perspectives. And through this work, we hope to build a program that connects the classroom to stewardship empowering Boise-Eliot/Humboldt students to take action and educate others as they move along the path toward college and 21st century careers.

OUTCOMES:

At Boise-Eliot/Humboldt we understand that the change in thinking and achievement we want to create for our students is a layered process. At the heart of the process are students who will be continually challenged to develop higher-order cognitive skills as they apply a deeper level of conceptual knowledge. Through this change in student thinking we most seek to impact their academic identity and motivational resilience in the face of challenging STEM coursework, shaping our students and preparing them for college and careers. But to create this type of change for students, we must also challenge our staff's collective efficacy beliefs and teachers' personal efficacy beliefs as we shape the new STEM-focused climate of our school. Instructional practices must evolve as teachers create inquiry-based, student-centered learning environments by building on their own pedagogical knowledge and beliefs that they are capable STEM educators. Our school leadership, district, and community support will be critical in this process as we seek out learning experiences for both students and teachers that challenge our current thinking and fit with the overall vision and mission of STEM at Boise-Eliot/Humboldt.

Students:

The STEM transformation of Boise-Eliot/Humboldt will be accomplished by striving towards the following student goals/outcomes:

1. Motivational Resilience: Constructive Coping
Students will demonstrate proficiency in adaptive strategizing skills and persistence in the face of academic challenges, obstacles, and setbacks
2. Motivational Resilience: Academic Engagement
Students demonstrate high quality participation in academic work, including effort and enthusiasm
3. Cognitive Skill: Metacognitive Skill
Students will know a variety of problem solving strategies and tools and be able to choose and strategically use these tools
4. Cognitive Skill: Problem Solving
Students will be able to identify, frame, and solve complex problems and apply knowledge and skills to novel problems and/or situations across STEM subjects
5. Academic Identity
Students will feel a sense of belonging, competency, autonomy and purpose as they view themselves and their potential to enjoy and succeed in STEM classes and careers

Teachers:

To achieve the above student outcomes we have identified teacher outcomes that lead to effective classroom environments:

1. Effective Instructional Practice:
Teachers will facilitate active engagement of students in their learning
2. Effective Instructional Practice:
Teachers will emphasize deep content knowledge and higher-order cognitive skills by addressing learning goals in both areas
3. Effective Instructional Practice:

Teachers will use frequent formative and summative assessments to facilitate diagnostic teaching and learning

4. Effective Instructional Practice:

Teachers implement learning activities that students find to be relevant, important, worthwhile, and connected to their cultural and personal lives outside the classroom

5. Supportive Teacher-Student Relationships:

Teachers foster caring relationships with students, provide challenging learning activities with high expectations and clear feedback, and explain the relevance of learning activities

HOW WE WILL GET THERE:

The transformation of Boise-Eliot/Humboldt is process that will be carried out over the next four years. In year 1 we have built our investment plan by carefully analyzing the current state of our school while comparing it to the outcomes we want to achieve in the future. We focused our efforts on identifying current assets and strengths in our school community while also analyzing current areas of underperformance or lack of support through the use of asset mapping and driver diagrams.

Driver Diagrams:

In support of our outcomes-based approach to identifying investment opportunities, we used driver diagrams as a tool to help our school-based Inquiry Team identify and describe appropriate solutions and classroom interventions. The process helped to describe the relationship between a STEM education outcome, the primary causes for underperformance, and the proposed solutions for increasing achievement of that target, thus allowing us to marshal existing assets and identify new investments necessary for our STEM transformation.

Upon completing our driver diagrams in October 2012 (Appendix 1) trends were identified amongst both the teacher and student barriers. For all desired outcomes, the need for collaboration time between teachers was evident. To create new integrated units and impact current teaching practice it was determined that teachers need more time than they currently have to create scope and sequences, develop units that are specific to our students and community, and to access resources and partnerships that compliment their instructional goals. They also need access to a wider array of materials including curriculum programs, student work examples, and consumables. A recurring barrier to student-centered learning environments is the need for clear and consistent behavior expectations. For student centered, inquiry-based instruction to take place, classrooms need to have established expectations and consistency. Students will need time to adjust to this new way of learning and have explicit instruction on expectations. By engaging in professional development focused on creating supportive teacher-student relationships, we will be able to address this barrier.

Asset Mapping:

The Portland Metro STEM Partnership has adopted an assets-based approach to school transformation based on the rationale that, contrary to a needs-based approach, strategically aligning existing assets and leveraging assets will result in the development of policies and activities that are based on the strengths and abilities of the school community. Asset mapping is a positive approach to community development that allows a diverse array of stakeholders to collectively brainstorm the social, economic, and physical aspects of the school and community environment and begin to think about using them strategically to achieve their outcomes.

At Boise-Eliot/Humboldt our initial Asset Maps (Appendix 2), completed in November 2012, revealed common threads amongst our assets. We have several partnerships, both existing and new this year, which support our PreK-5th grade Ecology units. Our merger with Humboldt provided us with a long-time partnership with the City of Portland Clean Rivers Education group that complimented our new partnership with the Department of Fish and Wildlife. These partnerships and ecology themes also extend into the professional development our teachers have received both on their own and through the Portland Metro STEM Center's Teacher Academy. We have staff trained as certified garden coordinators, trained in using learning gardens, and in Project Wild. We also have several contacts with OSU master gardeners. Physical spaces on our campus, and at the existing Humboldt School garden, are also potential ecological assets that we are already pursuing.

Asset mapping also revealed curriculum, physical materials, and partnerships that we can connect with further as we begin our work of creating new integrated units. Boise-Eliot/Humboldt has had a long-time partnership with the Oregon Writing Project (OWP) and many of our teachers have gone through OWP classes and served as Demonstration Lesson teachers. The development of the middle school food equity unit began at the OWP summer curriculum camp and has now evolved to include new partners like Kaiser Permanente. Utilizing our OWP training, and building on the curriculum camp model, we will be able to facilitate the creation of new STEM units with greater ease. We also have access to Picture Perfect curriculum and Project Wild curriculum, both of which integrate writing and STEM content.

Not mentioned in the Asset mapping documents, but certainly of great support to our STEM transformation, is the Boise-Eliot/Humboldt history of a focus on equity and using the motivational framework of relevance, rigor and relationships in all our work. Our staff is comfortable talking about issues of equity and has numerous protocols in place for this work. All teachers have worked on the development of Place, Race and Justice units unique to our campus that incorporate inquiry with social justice issues appropriate to their grade level. This work will guide us in meeting the teacher outcome of relevant and connected learning activities for students.

Implementation Plan:

Appendix 3 outlines how Boise-Eliot/Humboldt plans to address each of our student and teacher outcomes. We see the transformation of our learning environment as an adaptive process that will evolve over the course of the Portland Metro STEM Partnership as we build new partnerships, teachers experience professional development opportunities, and we adopt the Common Core and Next Generation Science Standards. We want to design our program with an intentional focus on flexibility that allows teachers to adapt curriculum to the interests and needs of their students, maximizes on the field experiences and opportunities that new partnerships may provide, and is driven by the place-based equity discussions our community is continually engaged in. With an understanding that our process will be continually evolving, we have prioritized several strategies that will have an impact on all of our outcomes and incorporate that flexibility.

With the release of the Next Generation Science Standards (NGSS), and adoption of the Common Core State Standards (CCSS), grade level teams have started to generate new curriculum maps and design units that integrate STEM disciplines with CCSS. Teachers are analyzing district curriculum adoptions including Scott Foresman reading and Bridges math curriculum guides to align units as much as possible. Both the Inquiry Team, and staff at large, are also analyzing the scope and sequence of units across grade-levels to maximize connections and build partnerships that multiple grade levels can benefit from.

Expository writing will be a focus for teachers as students develop their content knowledge through writing instruction. In year 1 we started using Science Notebooks in PreK-8th grade as a place to document STEM content, inquiry projects, and integrated units. Teachers explored what types of notebook organization worked for their students as well as how to best integrate writing instruction with notebooks. In year 2 teachers will intentionally build Science Notebook documentation in to their integrated units. Grade levels will also analyze the district provided writing curriculum notebooks to realign units and/or substitute lessons with more STEM specific instruction.

During the summer of 2013 staff will participate in a STEM Curriculum Camp where teachers will engage in professional development in the areas of project-based work, inquiry, and content integration. They will also have curriculum planning time to create a STEM focused integrated unit of study that is place-based and includes elements of integrated learning, experiential learning, and stewardship. The explicit connections between STEM disciplines, CCSS, and supporting organizations and partners will all be addressed through the unwrapping of each standard during the Curriculum Camp.

To support the implementation and teaching of units created during the Curriculum Camp, one staff meeting a month will be dedicated to STEM professional development throughout the school year. During these meetings teachers will receive professional development for the first half of the meeting by the TOSA on a selection of inquiry and STEM topics. Grade level teams will then have the other half of the meeting to plan or reflect on units. By having time to debrief with teams and problem solve throughout the course of the year we feel teachers will have the time to deepen their own understanding of STEM content and have an opportunity to discuss the best practice for instructional delivery at our specific school. Teachers will also have time to contact community partnerships and build in experiential learning opportunities for their students.

Networked Improvement Community/Inquiry Team:

Networked Improvement Communities (NIC) are a cornerstone of the Portland Metro STEM Partnership's collective impact structure and approach. NICs have been identified by the Carnegie Foundation for the Advancement of Teaching as an effective means of bringing multiple practitioners together to engage simultaneously in local problem solving. A NIC uses a problem-centered approach to join academic research, education delivery, and business/community expertise and resources in sustained programs. The NIC is developed as a design community in which individuals from multiple sectors and backgrounds participate according to their interests and expertise, while sustaining collective attention on progress toward common goals. [1]

At Boise-Elito/Humboldt we have designed our NIC to have two components—the teacher-focused Inquiry Team, and the larger NIC comprised of the Inquiry Team and outside community members. The Inquiry Team is facilitated by the building STEM TOSA and consists of the principal, Literacy Instructional Specialist, and eight teachers from PreK-8th grade. The team meets between one and two times a month to work on the implementation of the STEM Investment Plan, plan building level STEM professional development, and brainstorm STEM related activities at the building level. The larger NIC includes members of the Boise-Eliot/Humboldt PTA, representatives from Self Enhancement Inc, the Oregon Writing Projects, and the Department of Fish and Wildlife. Other outside community members are invited as needed. The larger NIC meets as needed to work on SIP implementation and brainstorming.

[1] Bryk, A.S., Gomez, L.M., & Grunow, A.. (In press.) Getting ideas into action: Building networked improvement communities in education. In M. Hallinan. (Ed.), *Frontiers in Sociology of Education*, Dordrecht, the Netherlands, Verlag.

Investment Opportunities:

Our teachers, students, and school community have the motivation and drive to build a STEM program that will transform teaching and learning opportunities for Boise-Eliot/Humboldt students but we cannot do it alone. Resources and support are needed to put into place our implementation plan over the next four years.

They include:

- Funding to support teachers in the continued development of inquiry-based units that are grounded in the standards and also address issues that are relevant to our community
 - We need funds to pay teachers extended contract hours for summer curriculum camps and meeting for feedback throughout the year
 - We need funds to pay Inquiry Team members to meet monthly outside of the contract day

- Partnerships and funding that enable our students to engage in field experiences that spark their curiosity, anchor their learning, and provide numerous opportunities for reflection
 - It costs about \$700 to fund the transportation for a grade level of students to attend an all day field experience
 - In addition to transportation, many field experiences require fees for programming and guides

- STEM volunteers and mentors that look like our students and can help motivate and encourage their success
 - With over 500 students in our PreK-8th grade school we have many students who would benefit from a committed volunteer in their classroom for the whole year
 - Students need to hear about STEM careers and education opportunities from people they can relate to

**APPENDIX 1-
Driver Diagram**

**Outcome:
Students will demonstrate proficiency in adaptive strategizing skills and persistence in the face of academic challenges, obstacles, and setbacks.**

S- Student difficulty coping with change in structure/curriculum

S/T- Clear and consistent behavior expectations and student follow-through to allow for more open-ended learning

S- Lack concrete skills for knowing how to overcome challenges

S- Lack role models in and out of school that demonstrate persistence and adaptive strategizing skills

T- Lack time/skills to facilitate collaborative learning environments for kids

T- Access to curriculum and lesson ideas that encourage inquiry and problem solving

T- Consistency school-wide on the importance of inquiry instruction, problem solving strategies

Dedicated STEM PD Time and Staff Meetings to gather with grade levels

- TOSA provides teachers with research and resources related to inquiry instruction and problem solving strategies
- Grade-level teams meet regularly to build learning strategies in to their lessons

Curriculum Camp

- Teachers intentionally build challenging inquiry activities in to their unit

Year 1 Focus: Persistence

- School-wide explicit instruction on persistence
- Examples from read-alouds, real world role models, student examples
- Teachers will find applicable resources to share with students throughout all subjects

STEM Saturday and PTA Sponsored Summer Camps

- K-5 students and families can attend STEM Saturday event
- Students nominated to attend STEM related summer camps through PTA scholarships

**APPENDIX 1-
Driver Diagram**

**Outcome:
Students will engage in hands-on inquiry lessons throughout the year in addition to one in-depth unit of integration across the subjects.**

- S- Student difficulty coping with change in structure/curriculum
- S/T- Clear and consistent behavior expectations and student follow-through to allow for more open-ended learning
- T- Time to fit in an in-depth unit with a tight timeline of curriculum already established
- T- Having an entire grade level in agreement and on board so all students receive the same opportunities
- T- Time to create unit and plan with grade level team members
- T- Time to discuss scope and sequence with PK-8 teams and develop appropriate sequence of instruction
- T- Access to materials and curriculum beyond the PPS Science Kits
- T- Access to exciting and grade level appropriate texts for integration

Dedicated STEM PD Time and Staff Meetings to gather with grade levels

- One staff meeting a month divided with PD on a topic and time to meet/implement with grade level teams

Summer 2013 Curriculum Camp

- \$ to pay teachers
 - remaining Target grant \$
- Attendance by most teachers
- Materials available during planning time

Observation opportunities at other schools

- Knowing what schools to observe
- Release time and \$ for teachers

PD on integration of STEM with literacy and social studies

- Summer 2013 STEM Classes including: K-2 Literacy Class, Math/Science Integration Class
- Similar class for 3-8 teachers
- More teachers trained in various curriculums
 - Engineering is Elementary
 - Project Wild
 - ???

APPENDIX 2

Asset Maps Compiled by Inquiry Team November 2012

Professional Development/Teacher-Based	
Current	Potential
Teachers who have taken STEM classes (garden, Private Eye, and literacy)	STEM classes will be offered again next summer
Mary Peake is certified Garden Coordinator	Integration of "soft sciences" with STEM (social studies, language arts, etc.)
Kylene leading PD on science notebooking	
Kylene/Inquiry Team leading PD on iPads	

Service and Partnership (community orgs, non-profits, etc)	
Current	Potential
SUN School Mad Science classes	Working on establishing partnerships with New Seasons and the Rebuilding Center
Multnomah County Books 2U	Family Engineering Night (partnered with SUN School)
OSU Nutrition Extension program	4 th graders at Humboldt had partnership established with Reed College for a salmon habitat study
Xerox partnership for 4 th grade science lessons	Humboldt had established relationship with Lower Columbia Estuary, working on establishing current 4 th grade classes
Franz Bakery	Timbers soccer team
5 th grade goes on overnight OMSI field trip	
Dept. of Fish and Wildlife starting Jan. 2013	
Oregon Writing Project	

Natural (gardens, outdoor spaces, etc)	
Current	Potential
Some planter boxes on campus	Lots of room for garden planters
Humboldt School has a learning garden	Neighborhood garden on campus
Audubon Society	Zenger Farm field trip
3 rd grade goes to Rice Museum of Rocks and Minerals	Whitaker Ponds field trip
Easy TriMet access from school	Portland Urban Tour

Stuff (computers, materials, books, etc.)	
Current	Potential
Tech bundle in every classroom	Science apps for iPads
iPad in every classroom	Student-friendly informational texts
Picture Perfect Science Curriculum	
2 teachers have incubators for hatching chickens	
4 teachers have classroom sets of Private Eye loupes	
1 teacher has a microscope that can project on a computer	
PPS science kits	
Picture Perfect science curriculum	
Scott Foresman units with science focus	
School library building informational text collection	

Student Outcomes 1, 2, & 5:

Students will demonstrate proficiency in adaptive strategizing skills and persistence in the face of academic challenges, obstacles, and setbacks (Affective: Constructive Coping)

Students demonstrate high quality participation in academic work, including effort and enthusiasm. (Affective: Academic Engagement)

Students will feel a sense of belonging, competency, autonomy and purpose as they view themselves and their potential to enjoy and succeed in STEM classes and careers. (Affective: Academic Identity)

	Description	Purpose/Articulation of Connection to Outcome	Timeline	Resources	Partners
Strategy #1: Teachers will intentionally build challenging inquiry activities in their units.	Teachers will create, and students will engage in hands-on inquiry lessons throughout the year plus one grade-level consistent integrated unit per year	High quality academic engagement will be achieved through student centered instruction (IP#1), activities of relevance to students lives (IP#5), and supportive teacher-student relationships.	Summer 2013 Curriculum Camp Begin implementing units in 2013-14	Existing: Funding from Target Grant Curriculum Resources and materials STEM Center courses	Existing: Dept. of Fish and Wildlife Kaiser Permanente City of Portland Clean Rivers Schnitzer Steel Industries
Strategy #2: STEM Saturday	Groups of K-2nd and 3-5th grade students and their families will rotate through a series of highly engaging learning experiences, each one collaboratively designed, but led by a different STEM education organization, that all focus on one age-appropriate science content strand.	Following this series of experiences, the student will demonstrate his/her application of conceptual knowledge to a new problem. It is also expected that the experience will positively impact students' academic engagement.	June 1, 2013	Existing: STEM Collaboratory Needed: Support from Collaboratory to continue in the future, one STEM Saturday event per year	STEM Collaboratory

Student Outcomes 3 & 4:

Students will know a variety of problem solving strategies and tools and be able to choose and strategically use these tools. (Cognitive Skill: Metacognitive Skill)

Students will be able to identify, frame, and solve complex problems and apply knowledge and skills to novel problems and/or situations across STEM subjects. (Cognitive Skill: Problem Solving)

	Description	Purpose/Articulation of Connection to Outcome	Timeline	Resources	Partner
Strategy #1: Integrated Inquiry Units	Teachers will create, and students will engage in hands-on inquiry lessons throughout the year plus one grade-level consistent integrated unit per year	High quality academic engagement will be achieved through student centered instruction (IP#1), activities of relevance to students lives (IP#5), and supportive teacher-student relations.	Summer 2013 Curriculum Camp Begin implementing units in 2013-14	Existing: Funding from Target Grant Curriculum Resources and materials Grade-level collaboration	Existing: Dept. of Fish and Wildlife Kaiser Permanente City of Portland Clean Rivers Schnitzer Steel Industries
Strategy #2: Science Notebooking and Expository Writing	Expository writing will be a focus as students develop their content knowledge through writing instruction. Notebooks will continue to be used PreK-8 th grade as a place to document STEM content, inquiry projects, and integrated units.			Existing: Already collect on-demand writing samples each quarter District provided writing curriculum Needed: Continued professional development in notebooking strategies	

Teacher Outcomes:

Teachers will facilitate active engagement of students in their learning. (Instructional Practice #1)

Teachers will emphasize deep content knowledge and higher-order cognitive skills by addressing learning goals in both areas. (Instructional Practice #2)

Teachers will use frequent formative and summative assessments to facilitate diagnostic teaching and learning. (Instructional Practice #4)

Teachers implement learning activities that students find to be relevant, important, worthwhile, and connected to their cultural lives. (Instructional Practice #5)

	Description	Purpose/Articulation of Connection to Outcome	Timeline	Resources	Partner
Strategy #1: Curriculum Camp	Teachers will create this integrated unit during a summer curriculum camp led by the TOSA. Understanding and designing inquiry instruction around the CCSS will be the focus.	These units will be designed to be student-centered and focused on both content and cognitive skill learning goals. The activities will be designed to be relevant and connected to student lives. Teachers will implement frequent formative assessments that monitor student progress toward learning goals.	Summer 2013 curriculum camp. Begin implementing units in 2013-14	Existing: Funding from Target Grant Curriculum Resources and materials Needed: Funding to continue Curriculum Camp the following years	
Strategy #2: Science Notebooking/ Expository Writing Professional Development	School led PD on notebooking ideas, scoring rubrics and reflections. Lessons modeled by STEM TOSA, integration of notebooks during unit creation. TOSA provides on-demand prompts	Science notebooks will be used by teachers as a tool to implement frequent formative assessments that monitor student progress toward learning goals.	Ongoing	TOSA	

<p>Strategy: #3</p> <p>STEM Teacher Professional Development</p>	<p>Teachers will attend the summer course work offered by the STEM Metro Teachers Academy. They will have the opportunity to continue their work on integrated units while increasing their STEM content knowledge and gaining access to ideas, resources, and partnerships.</p>	<p>The teachers' academy professional development courses are designed to address the PMSP common outcomes, including the instructional practices that are prioritized in this plan.</p>	<p>Ongoing</p>	<p>Existing: PPS Tuition Reimbursement for 6 credits TOSA</p> <p>Needed:</p>	
<p>Strategy 4:</p> <p>STEM School-Based Professional Development</p>	<p>One staff meeting a month will be dedicated to STEM professional development. Teachers will receive instruction for half the meeting by the TOSA on a selection of inquiry/STEM topics and teams will have the other half of the meeting to meet and plan/reflect on units.</p>	<p>The focus of this professional development will rotate through the teacher outcomes that have been prioritized by our school.</p>	<p>2013-14: 1 Monday each month for 1.5 hours</p>	<p>Needed: Funding to pay extended hours for Inquiry Team Commitment to continue meeting time in subsequent years</p>	
<p>Strategy 5:</p> <p>STEM Saturdays</p>	<p>Teachers act as observers of student learning and monitors of student misconceptions while groups of K-2nd and 3-5th grade students rotate through a series of highly engaging learning experiences.</p>	<p>Teacher observations will be structured in a way that focuses on student prior knowledge, misconceptions, and current understanding. After observations, teacher will be provided with a structured opportunity to reflect on their observations with peers. This experience is expected to advance teachers knowledge of assessment for learning.</p>	<p>June 2013</p>		<p>STEM Collaboratory</p>