NSTA PRE-CONFERENCE

Science: Creating District Level Policies and Professional Learning Conditions for ALL Students to Thrive in Science!

April 10, 2013

OAKLAND UNIFIED SCHOOL DISTRICT

Community Schools, Thriving Students

The OUSD *Community Schools, Thriving Students* Model

Source: OUSD *Community Schools, Thriving Students* Strategic Plan (June 2011)

Agenda

1. Staging

2. Strategic Levers
   - Policies
   - Professional Learning
   - Instructional Resources
   - Assessments
   - Family and Community Engagement

3. Key Principles for ELL Instruction

4. Supporting ELLs with NGSS

5. Actions 2012-2013

High Quality Science Instruction - Staging

2011-2013 → Awareness

2013-2015 → Transition

2015 → Implementation

High Quality Science Instruction - Staging

2011-13 Awareness

•Overall focus on NGSS Practices K-12, with an emphasis on literacy connections.

•Support K-12 teacher leaders to work with their principals to implement a strong science program and quality professional learning sessions.

•Lay a strong foundation for elementary science that includes FOSS curriculum implementation, cohort schools, site based professional learning, and teacher leadership.

•Implement Science Writing Task three times a year for grades 3-5.

•Secondary monthly professional learning focused on NGSS practices

2013-15 Transition

•Deepen understanding of NGSS.

•Work with K-12 principals to support NGSS at all sites.

•Continue elementary cohort work, FOSS implementation, and Science Writing Task.

•Pilot elementary science content assessments in grades 3-5 three times a year covering NGSS practices and key content standards.

•Create and pilot secondary curriculum units aligned to NGSS.

•Align the elementary FOSS curriculum with NGSS.

•Secondary monthly professional learning (20 hrs) and summer institute (30 hrs) focusing on NGSS practices and content standards.

2015 -> Implementation

•Implement elementary science content assessments in grades 3-5 district-wide.

•Pilot and implement secondary assessments in grades 6-8 and key high school courses.

•Continue secondary curriculum development and implementation.

Strategic Levers

Policy
Professional Learning
Instructional Resources
Assessments
Family and Community Engagement

Strategic Levers - Policies

•2009-2010, Board Policy mandating weekly science minutes in elementary programming. Standardized expectations for instructional time on a daily and weekly basis

•Stable funding streams for curriculum, materials and professional development for teachers

•High quality, on-going professional learning for teachers and principals

•Integration of technology(electronic textbook adoption, use of student devices for learning during the school day) as an instructional/collaboration tool for teachers and students

•Strategic regional partnerships with universities, informal science institutions, businesses, and funders

•June 2011, Board adopts Community Schools, Thriving Students, A Five Year Strategic Plan which includes a strong STEM strategy

•Adoption of Common Core State Standards and the Next Generation Science Standards

•Adoption of new graduation requirements (three Lab sciences) aligned to college eligibility requirements

•Adoption of STEM priority in facilities plan

Professional Learning is Critical

- Understanding the science practices deeply
- Inquiry into problems of practice in science
- Use data, tools, expertise, and resources to examine and shift practices
- Collaborate with educators within and across schools to include

  Executive Officers

  - Yearly Action Plans
  - Instructional Rounds
  - Consultancies

Professional Learning Communities

Leadership

- Regional and High School Executive Officers- Monthly
- Principal Professional Learning (Elementary -30 hours yearly, Secondary – 10 hours yearly)
- Teacher Leaders (K-5, 6-12)– over 50 hours on science content, science practices and leadership practices

Teachers

- Teacher Leaders Inquiry/Learning Professional Learning Communities/Cohort (15 Elementary) - 30 hours yearly
- Secondary Science Professional Learning communities
- 20 hours minimal for all elementary and secondary teachers
- Team Science- New Teachers receive hours of support

THINK
in Deep & Complex Ways
SEYMOUR SIMON

Practices for High Quality K-12 Science Education

The Next Generation Science Standards (NGSS) define eight scientific and engineering practices for students as they engage in science learning. Not all practices will be evident every time, in every activity. Evidence of the practices exists through student activities and interactions. See reverse for student behaviors.

Scientific and Engineering Practices

1. Asking questions and defining problems
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (2011). National Research Council
http://www7.nationalacademies.org/bose/Standards_Framework_Homepage.html

K-12 Science Learning Principles and Actions

Principles (Practices)	Vital Student Actions
1. Questions guide inquiry *(1, 4, 8)*	Students **ask** meaningful **questions** relevant to the science topic or lesson.
2. Learning occurs through investigations *(1, 2, 3, 4, 5)*	Students use materials, tools, and texts to **explore**, **gather data**, and **answer questions**.
3. Explanations are evidence-based *(2, 4, 5, 6, 7, 8)*	Students use evidence to **interpret** observations, **support** ideas, and **construct** explanations.
4. Science is a community endeavor that evolves with new evidence *(4, 5, 6, 7, 8)*	Students **collaborate** to build understanding and **revise** their thinking when presented with new evidence.
5. Application is essential for building understanding *(1, 2, 3, 6)*	Students **apply** science knowledge *and* practices to respond to open-ended and novel problems.
6. Academic success depends on academic language	Students use discipline-specific **academic language**, **models**, and **mathematics** to communicate understanding **orally** and in **writing**.
7. ELs develop language through content	English learners produce language that **communicates** ideas and reasoning, even when that language is imperfect.
8. Equitable participation	All students are **engaged** in learning and **choose** appropriate **scaffolds** for learning.

Oakland Unified School District, Science Department

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CENTER

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STORAGE

Strategic Levers - Assessments

2012-13 Awareness

•Implement Science Writing Task three times a year for grades 3-5.

2013-15 Transition

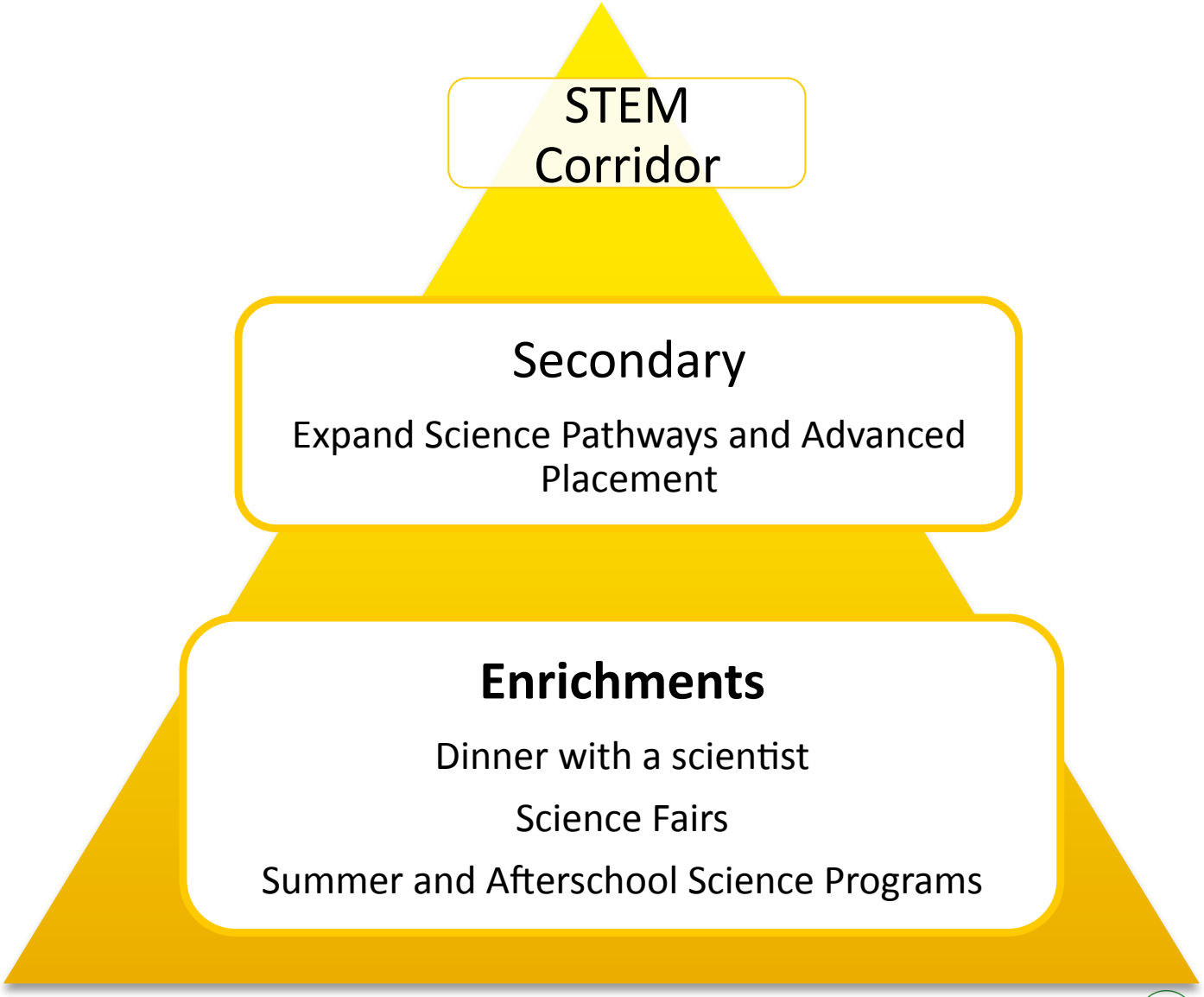
•Pilot elementary 3-5th grade science content assessments three times a year covering NGSS practices and key content standards.

2015 -> Implementation

•Implement elementary science content assessments in grades 3-5 district-wide.

•Pilot and implement secondary assessments in grades 6-8 and key high school courses.

Family and Community Engagement



Key Principles for ELL Instruction

1. Instruction focuses on providing ELLs with opportunities to engage in discipline-specific practices which are designed to build conceptual understanding and language competence in tandem.

2. Instruction leverages ELLs' home language(s), cultural assets, and prior knowledge.

3. Standards-aligned instruction for ELLs is rigorous, grade-level appropriate, and provides deliberate and appropriate scaffolds.

4. Instruction moves ELLs forward by taking into account their English proficiency level(s) and prior schooling experiences.

5. Instruction fosters ELLs' autonomy by equipping them with the strategies necessary to comprehend and use language in a variety of academic settings.

6. Diagnostic tools and formative assessment practices are employed to measure students' content knowledge, academic language competence, and participation in disciplinary practices.

Supporting English Language Learners with Next Generation Science Standards

OUSD is supporting teachers around 3 focal areas: authentic use of language for making meaning, oral discourse, and writing in science. All of these have direct impact on conceptual understanding and language use within the Next Generation Science Standards by English Learners. Started in elementary professional learning sessions and growing into secondary sessions.

- ❑ **Using** language for meaningful purposes
- ❑ Focusing on **oral discourse** to support academic language development
- ❑ Using **Science Notebooks** during all science instruction

Using language for meaningful purposes:

- Planning and carrying out hands-on investigations in collaborative groups
- Talking, listening, and writing about the experiences
- Constructing explanations collaboratively
- Using language functions related to the NGSS Practices:
  - Compare and contrast
  - Predict
  - Summarize, etc.
- Developing vocabulary and concepts

Focusing on oral discourse to support academic language development

- **Structures for discourse:**
  - **Think, pair, share; group talk; science talk**
  - **Pencils in; discussion circles; inside-outside circles**

- **Academic Content of discourse:**
  - **Focusing on making meaning**
  - **Argumentation from evidence as core focus of Science practices**

- **Access to discourse:**
  - **Starting with concrete observations/experiences (comprehensible input)**
  - **Providing scaffolds for academic discussions:**
    - **I noticed…**
    - **I agree/disagree…**
    - **I infer…**

Introduction: rearrange the focus question

A chemical reaction happens when you mix reactants and get new products.

Process
What I Did

When I _____,
We _____, and
First _____.
Then _____
Next _____
Finally _____

Mixed
Combined

Observations
What I Saw

I noticed _____
I observed
According to the test _____.

Claim
What I think

I claim _____
Therefore I claim
I claim this shows _____
This evidence suggests
Based on this evidence I concluded that

Explanation of evidence
How it Proves

because
This evidence shows _____ because _____.
This is evidence of a _____ because
because _____ shows _____
because _____ does not show _____
because their was no evidence of _____

Using Science Notebooks during all science instruction

- **Writing/drawing as a tool to make sense of experience**
- **Recording, analyzing, and interpreting data collaboratively**
- **Providing sentences frames, word banks, visuals as scaffolds**

Weather can be observed, measured & described.
1st
The Earth is
PRINCIPAL LEADERSHIP
Principal Leadership
Prin. supports LST by insisting on compliance with FOSS kit.
District mandate is good.
Teachers want authentic PD - teachers planning sci. lessons, sharing sci. programs together
Teacher talk IS prof. dev.
Prin. should provide time to invento kits
Prin. has to hold teachers accounta for teaching sci. - Prin. should "drop-in" classes when sci. is scheduled -
Prin. should have Notebooking pd at si
Prin. needs to support Science Fairs.
Prin. should rally teachers to form a leadership team around sci. - the LST and prin. need a team t support this -
Science PD
Challenges
· Will there be science PD time? (at my school, there hasn't been in the past)
· time for materials prep
Goals
· Immediate: one/kit rotation
· Long term: one/month
PD ideas:
Teacher led:
· Cross-grade curriculum progression
· FOSS training videos
· Share out science notebooks
· standards ID within a Science Lesson (cross-curricular)
District led:
· Science fair - prepping teachers/classes
· live organisms
Notebooks
Starting
Keeping it going
LST
Do it yourself Schedule FOSS PD
Science Depart
OSS PD
* Communication *
· emails with current information
· posters up in teacher's lounge
· announcements at faculty meeting & PDs.
· one to one contact
COMMUNICATION
Scheduling in Minutes
inutes is new for a
f teachers.
do we find these "extra"
es?

High Quality Science Instruction – Actions in 2012-2013

- In elementary science teaching and learning cannot be separated from language or literacy development. We use language to learn and communicate concepts; it is active, not passive.
- We have to break down the barriers between science (and other content areas) and ELA. It's not about integrating science and ELA; it's about converging both into one.
- Students are engaged in developing explanations of phenomena using discipline specific discourse (science talk) and science notebooks. They work collaboratively in making meaning of their experiences.
- Students are engaged in argument from evidence, using "thinking maps" and other graphic organizers to make claims based on their evidence. This sets the basis for the Science Writing Assessments.
- Academic vocabulary is introduced in the context of their activities, presenting science concepts as students experience the phenomena. Tier I, II, and III words are defined in this context.
- Language and literacy objectives are made explicit as part of the science lessons. These include the concepts to be learned (content), the processes to be used to learn this content (practices), and how students will communicate their learning (literacy).
- Literacy and language support strategies are part of the lessons, such as activating prior knowledge, using pictorials, charts, tables, to record data and explain phenomena, using writing to make their thinking explicit, and having students talk with one another or the whole class. Sentence starters and sentence frames are used as scaffolds to provide access.
- Reading strategies are used, such as analysis of complex text.

High Quality Science Instruction – Actions in 2012-2013

- District-wide secondary science professional learning focuses on explicit instruction of NGSS Practices through daily oral and written discourse leading to rigorous argumentation based on evidence/data: scientific questioning, academic discourse, representations and models, science writing, arguing claims, analyzing data, organizing content as narrative.
- Summer Teacher Institute focused on developing curriculum with embedded instruction of NGSS Practices and strong English language development.
- Professional learning materials (rubrics, protocols, strategies, resources, opportunities) are accessible on the science website.
- Alignment of TeamScience – new teacher mentoring to district science professional learning
- Recruited English Language Learner specialists as TeamScience mentors and ELL resources, and matched them to novice teachers facing greatest ELL challenges.
- Aligned Science Teacher Leader Team to district-wide science focus with the goal of strengthening site-based science Professional Learning Community work.
- Teacher NGSS Review Team submitted a detailed critique of NGSS public drafts to the national writing team for final edit reflecting the Oakland context including urban and ELL concerns.
- Science and ESL/Bilingual teachers engage in professional learning and in the co-construction of resources for ELLs.

Implementing The Next Generation Science Standards

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