Kids Making Sense®

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Petaluma, CA

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Outline

• What Is Kids Making Sense?
• Why Kids Making Sense?
• Kids Making Sense History
• Successful Implementations
• Package Options
• Future Plans
What Is Kids Making Sense?

Kids Making Sense – An educational program to teach youth how to measure pollution using air quality sensors and to interpret the data they collect.

Learn Measure Discover Interpret
Why Kids Making Sense?

1. Public Adoption of Low-Cost Sensors
2. Community Air Monitoring

- **Example: California Air Resources Board AB617**
  - Enhanced community-level air monitoring
  - Emphasis on community participation
  - Statewide strategy to reduce emissions, especially for disproportionately impacted communities

- Air districts are in a position to educate communities about small sensor capabilities and limitations
3. Curriculum for STEM education applications

• Provides an opportunity to engage middle and high school students with a hands-on STEM experience

• Helps students be a part of solving air pollution problems in their community

NGSS = Next Generation Science Standards
CCSS ELA = Common Core Science Standards English Language Arts
Components of KMS

• Training materials
  – Student Workbook (soon to be K-12)
  – Teacher’s Guide
  – Labs and experiments
  – Aligned with STEM

• Small sensors
  – Particulate matter

• Website
  – Data exploration
  – Online resources
Teacher’s Guide

• Each chapter has
  – Pre-Lab Guiding Questions, Potential Sources of Error, Cautions and Adjustments
  – Materials Needed and Time Required
  – Introduction, Procedure, Data, Observations, Calculations, Making Sense of Your Results, Going Further, On a Personal Note
  – Post-Lab Discussion

• Full program takes 10 50-minute class periods
  – There are recommendations for what to cover if you have 2, 4, or 6 hours of class time
Kids Making Sense Kits

KMS Components
Labs and Experiments
The AirBeam Sensor

**Known Issues**

<table>
<thead>
<tr>
<th>Issue</th>
<th>Details</th>
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<tbody>
<tr>
<td>Light sensitivity</td>
<td>Does not work at high humidity (greater than 90%)</td>
</tr>
<tr>
<td>Upper detection limit</td>
<td>(between 300 and 400 µg/m³)</td>
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<tr>
<td>Sensor lifetime and reliability</td>
<td>unknown</td>
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<tr>
<td>Sensor maintenance</td>
<td>unknown</td>
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Website

maps.kidsmakingsense.org
Website
Chat with a Scientist

• Provide opportunity for students to talk directly with an air quality expert
  – Answer questions about air pollution, pollutant sources
  – Discuss study design, controls, findings
  – Describe how we became scientists

• Provide teacher support
Typical 1-Day KMS Workshop

• Half-day lecture/training on air quality concepts
  – Sources of pollution
  – Particle sizes
  – Health effects

• Half-day air pollution measurements
  – Hands-on activity using handheld air sensors
  – Discover pollution sources and cleaner areas
  – Data collected by students sent to a website
  – Guided discussion and data interpretation
KMS History

- Six-year history with over a dozen pilots and projects
- Support and involvement from EPA’s Office of Environmental Education and air districts (e.g., Sacramento AQMD and Maricopa County AQ Department)
- Several international workshops (Taiwan, Thailand, and South Korea)
- Started in classrooms and expanded to air district training
- New community education kits based on feedback
Successful Implementations

• Maricopa County, AZ
  – Two-day training for educators and air agency outreach personnel
  – Curriculum customizations by Maricopa staff to meet AZ standards

• Dana Middle School, San Pedro, CA

• John North High School, Riverside, CA

• Bay Area Air Quality Management District, San Francisco, CA
  – Staff training on KMS kit
  – Set up public lending library
Standard Package Options

Classroom Package
Sensors, supplies, and support for multiple classes of 10-35 students.

- 10 air sensors, 10 mobile phones, and access to the KMS data-viewing website
- Teacher’s Guide and Student Workbook©
- In-person teacher training workshop
- Google Hangouts with an air quality scientist
- Phone support

Small Group Package
Sensors, supplies, and support for groups of 5-20 students.

- 5 air sensors, 5 mobile phones, and access to the KMS data-viewing website
- Teacher’s Guide and Student Workbook©
- In-person teacher training workshop
- Google Hangouts with an air quality scientist
- Phone support
New Options

**Classroom Package**
Sensors, supplies, and support for multiple classes of 10-35 students.
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- In-person teacher training workshop
- Google Hangouts with an air quality scientist
- Phone support

**Air Quality Action Kit**
Sensors, supplies, and support for 3-15 students at a time.
- 3 air sensors, 3 mobile phones, and access to the KMS data-viewing website
- Teacher’s Guide and Student Workbook®
- Phone support

**Citizen Scientist Kit**
A single kit that can be shared and reused.
- 1 air sensor, 1 mobile phone, and access to the KMS data-viewing website
- Citizen Scientist Curriculum®
- Phone support

**Backyard Kit**
A complete air quality and weather sensor kit.
- 1 hand-held air sensor, 1 stationary air sensor, 1 outdoor weather station, 1 mobile phone, and access to the KMS data-viewing website
- Teacher’s Guide and Student Workbook®
- Phone support
Benefits of Kids Making Sense

• Increases awareness of air pollution exposure within communities
• Empowers youth to drive positive change during a time when they are forming their own transportation and consumption habits
• Provides students and community groups with opportunities to interact with air quality scientists
• Includes information on recommended actions and interactions with policymakers
• Helps build capacity among air district staff
The Future

- **New sensors** – AirBeam2, PurpleAir, other?
- **New parameters** – gases such as ozone, meteorology
- **New lessons** – meteorology
- **Expanded reach** – K through 6
- **Additional teaching approaches** – Maricopa County updates
- **More collaborators**
Contact Us

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