

BodyVis: E-textiles for Body Learning and Scientific Inquiry

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What if our clothes revealed how our body's **functioned**?

How could this **change** the way **children learn** about and understand their bodies?

Could a t-shirt be a **platform** for **experimentation** and **inquiry**?

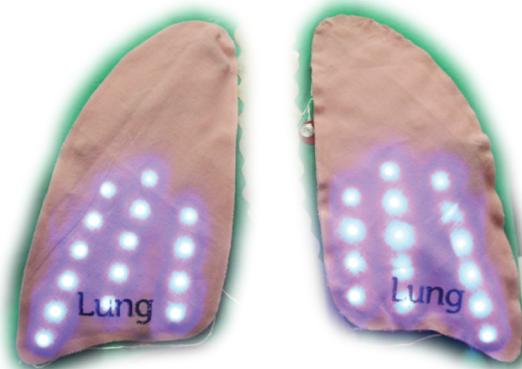
Live Physiological Sensing & Visualization

LPSV

Two LPSV tools

Real-time sensing and visualization

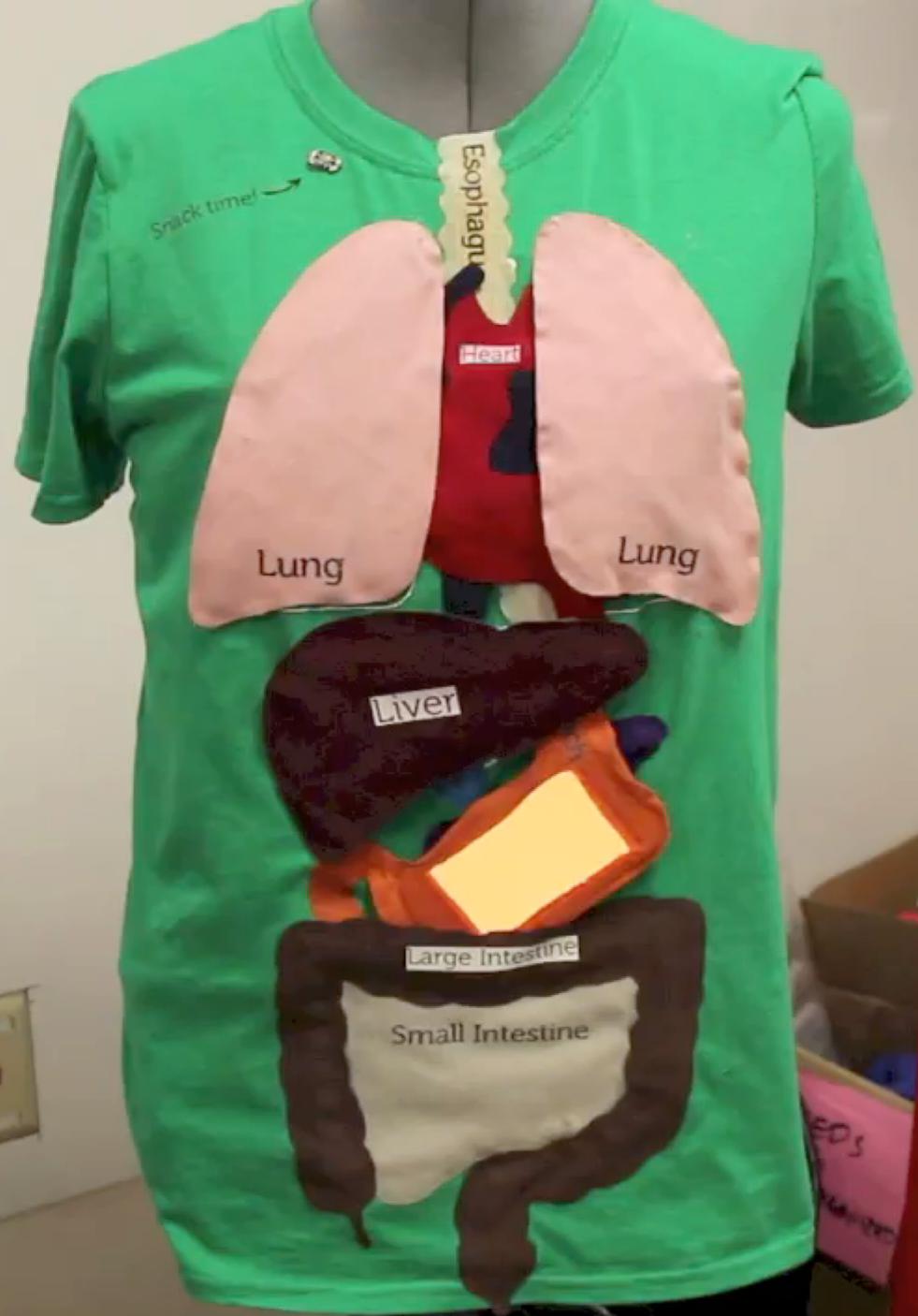




BodyVis

E-textile display

Norooz et al., 2015; Norooz et al., 2016



Snack time! →

Esophagus

Heart

Lung

Lung

Liver

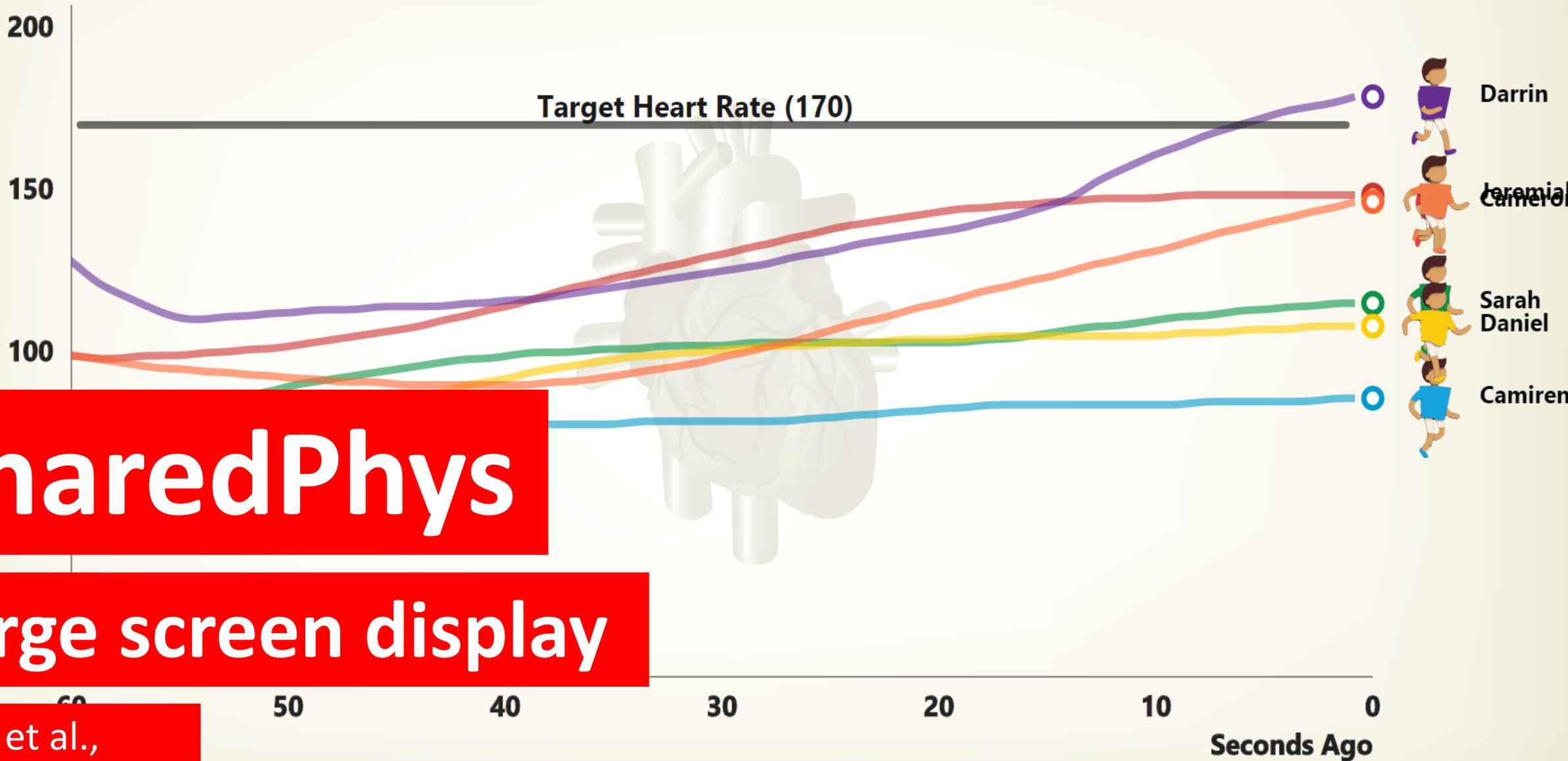
Large Intestine

Small Intestine





Heart Rate



SharedPhys

Large screen display

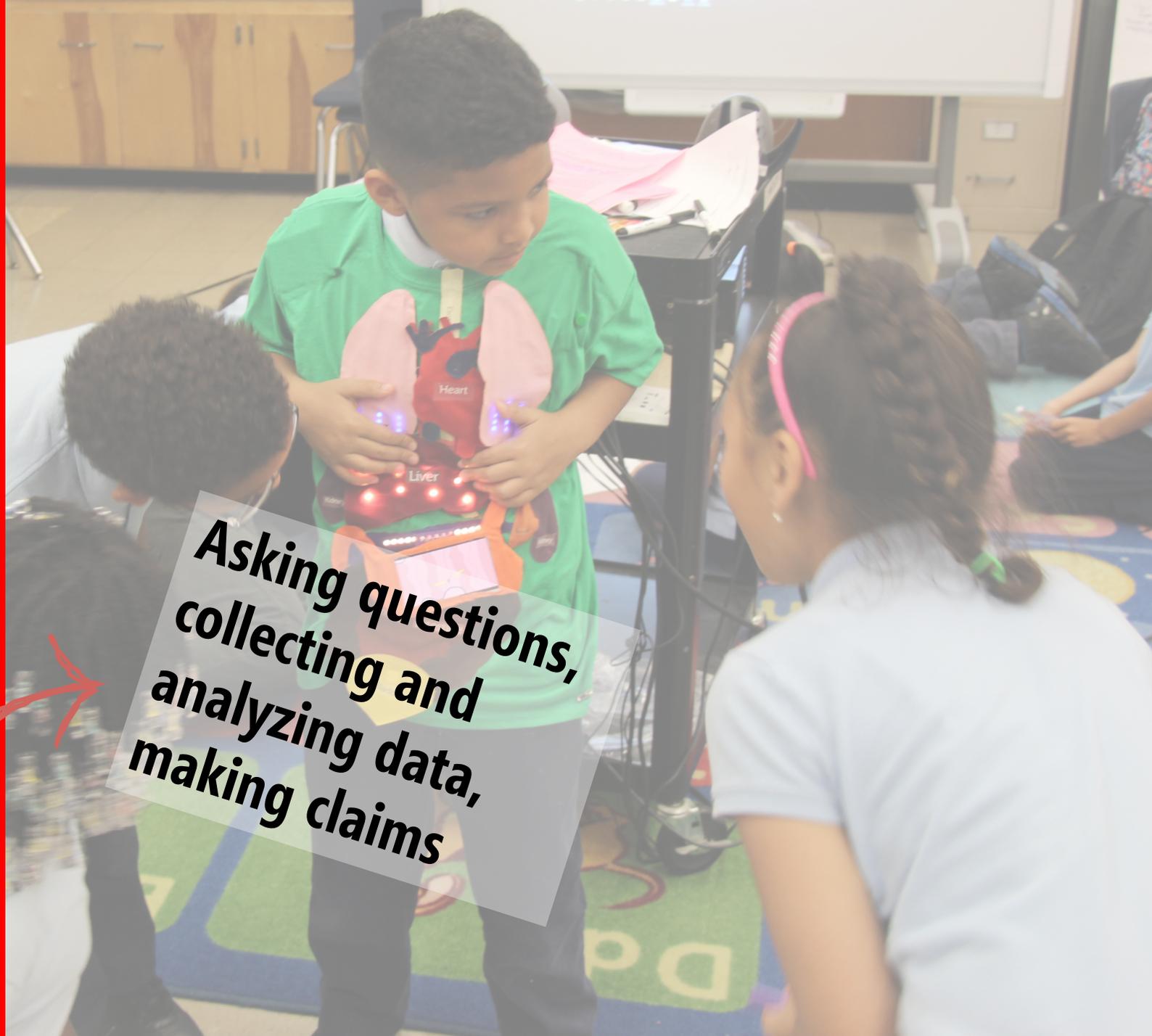
Kang et al.,

Moving Graphs

Making: scientific investigations with e-textiles & wearables



**Leveraging
the body
as a
platform
for inquiry**



*Asking questions,
collecting and
analyzing data,
making claims*

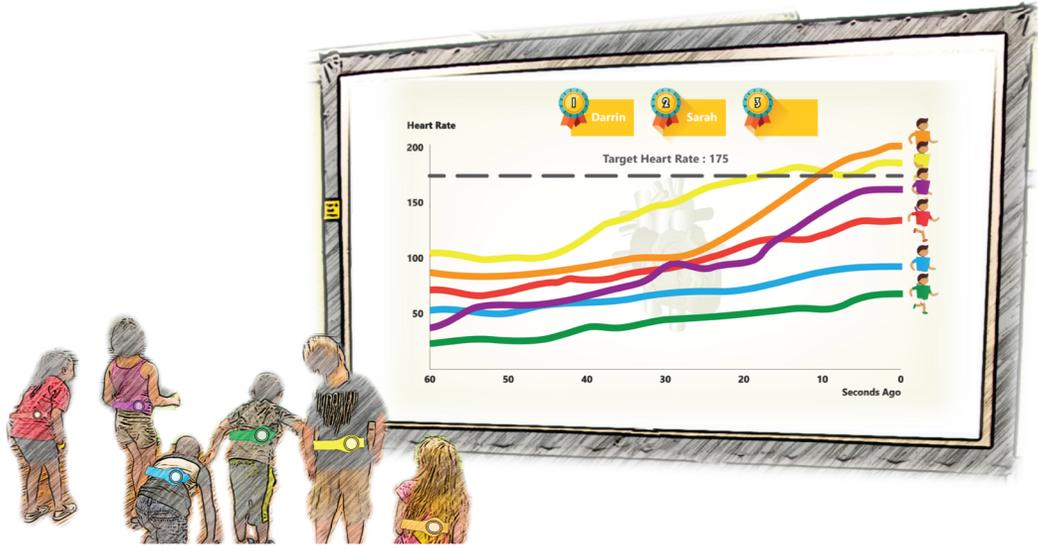
Informal after-school
and summer camps

Formal elementary
school classrooms

Iteratively designing
learning activities

**Implemented in
diverse settings**





Four Day Evaluation

1st Grade

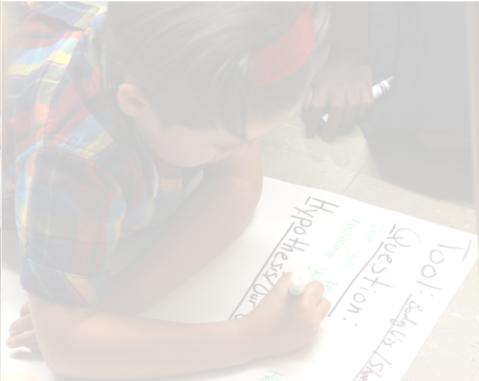
2nd Grade

4th Grade



Day 1: Play and Discovery

Children **discussed questions** and engaged in **free-form exploration** with the tools in a scavenger hunt.



Day 2: Exploring Physical Activities

Children **brainstormed physical activities** with BodyVis. They then **tested their hypotheses** with SharedPhys.



Day 4: Presentations

Children **presented** their choice-based investigations.

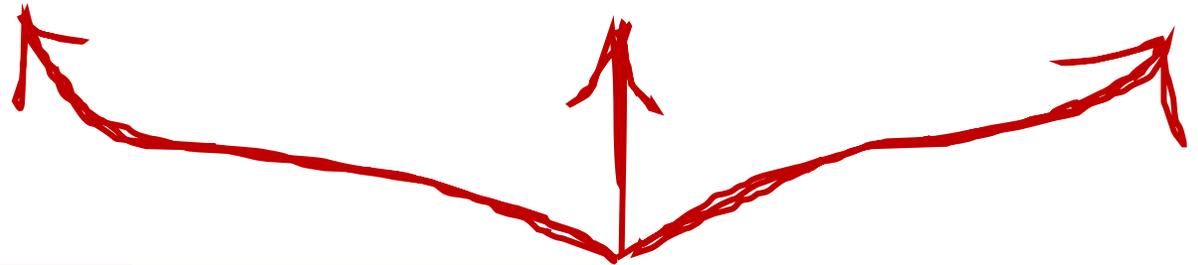


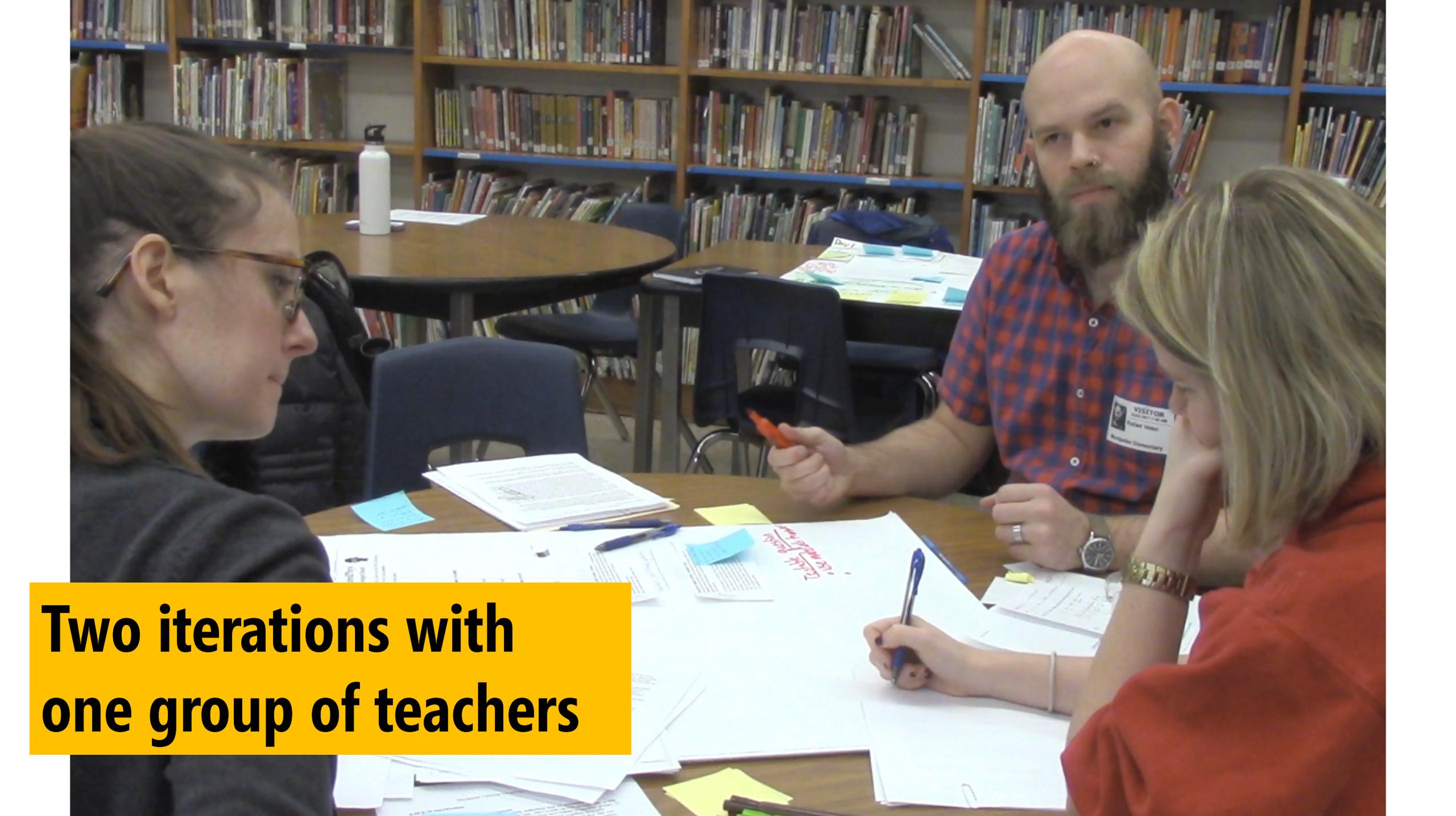
4-Day Workshops

1st Grade

2nd Grade

4th Grade





**Two iterations with
one group of teachers**

Participants

Urban public
elementary
school

68% African-American

23% Latino/Hispanic

3% Asian

2% Caucasian

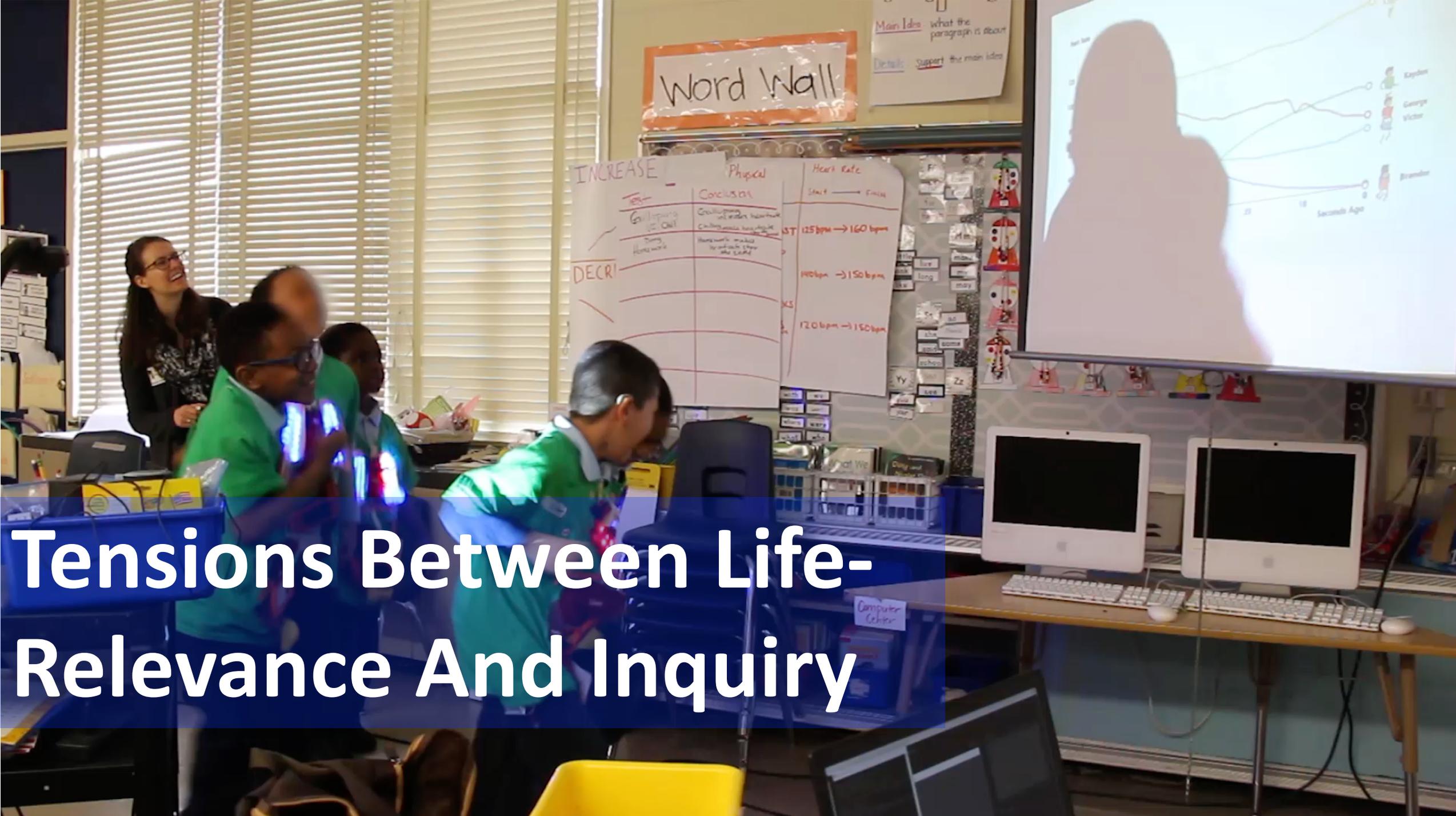
3.5% Mixed Race

65.6% Free & Reduced
Lunch



**Ways e-textiles offer
a disruptive corner
for engaging girls and
minority students in
scientific thinking
conversations?**

Tensions Between Life-Relevance And Inquiry





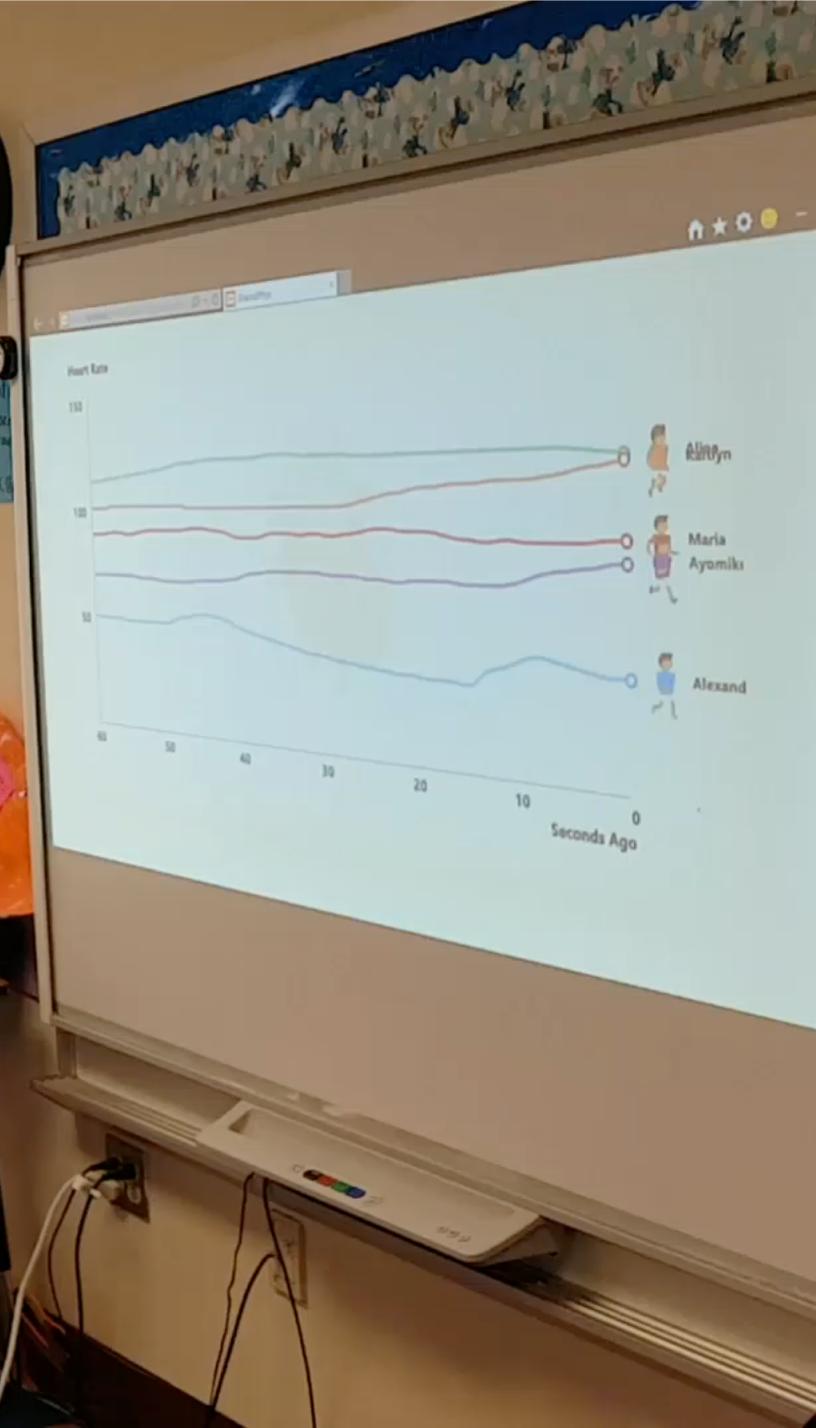
Younger learners needed more explicit inquiry scaffolding



**Disrupting
classroom artifacts**

Supporting Artifacts

Teacher: Access to Resources





Disrupting Space



4th
Grade:
Limited
Space

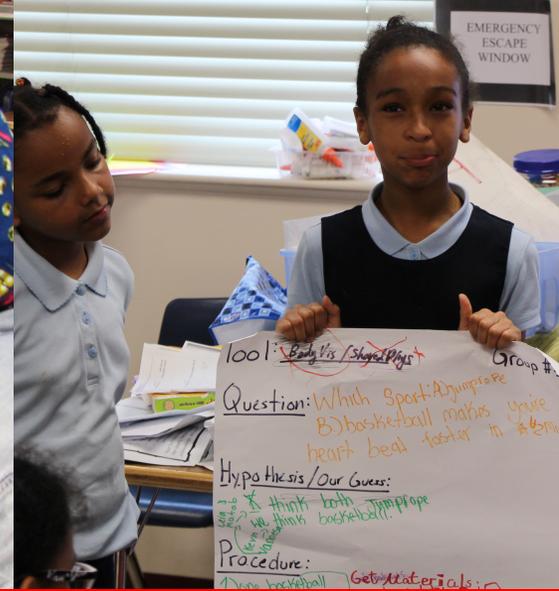
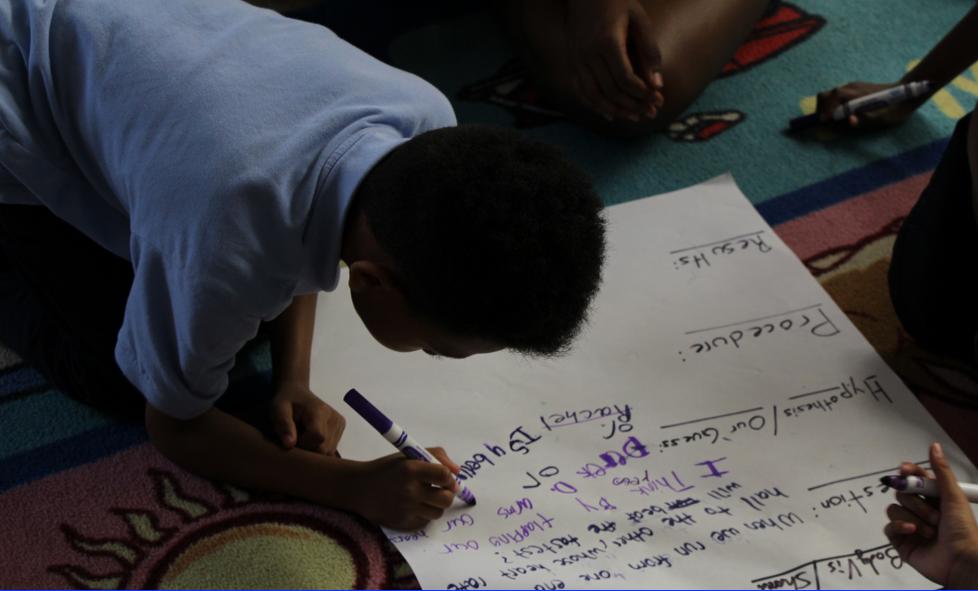
1st &
2nd
Grade:
Free
Space



“... rather than everyone standing in the back watching, specific seats. You’re going to sit in your normal seat unless you’re wearing a [bioharness].”

2nd Grade Teacher

More work needed



How Teachers Perceive LPSV Tools

How Kids Perceive LPSV Tools



ADVANCING SCIENCE LEARNING & INQUIRY EXPERIENCES THROUGH WEARABLES

BODYVIS & SHAREDPHYS TEAM

PROFESSORS



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HIGH SCHOOL STUDENT



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Participatory Design



Learning activities for LPSV tools

Ways to leverage space



Access to supporting artifacts

