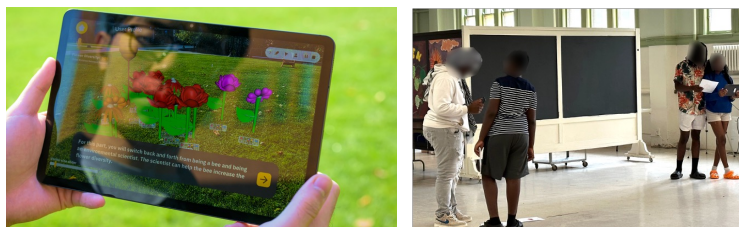


Demystify AI through Familiar Scientific Phenomenon

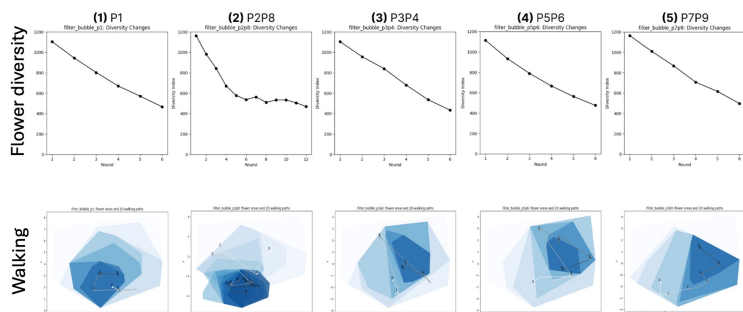
Insights from “Bee” and “Light”

#2238675: CAREER: Towards Embodied Learning for K-12 Machine Learning (ML) Education

BeeTrap: AI Filter Bubble



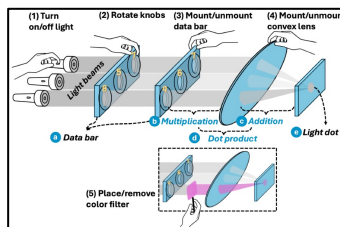
Analogy: Bee (user) pollinates (selects) flower (item); similar flowers grow (recommended); over time, bee is trapped with cluster of similar flowers (filter bubble of similar items).



Student quotes:

“(Filter bubble) limits my **imagination**.”
“I don’t want to be a **basketball player**, but the social media keeps recommending me basketball content.”

Briteller: Optical Recommender

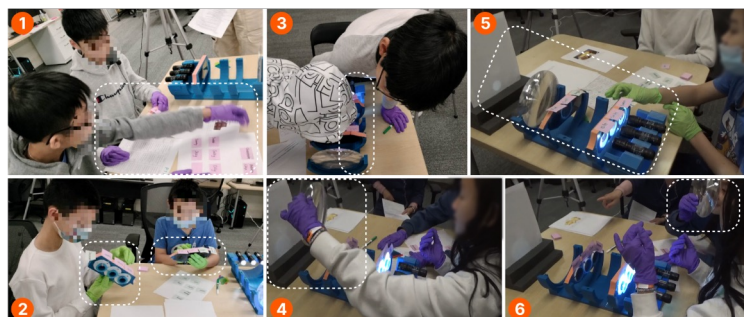


The Dot Product Definition

$$\mathbf{a} = \langle a_1, a_2, a_3 \rangle \quad \mathbf{b} = \langle b_1, b_2, b_3 \rangle$$

$$\mathbf{a} \cdot \mathbf{b} = a_1 b_1 + a_2 b_2 + a_3 b_3$$

Analogy: Light beam (blockage & merging) to simulate dot product – a math operation calculating similarity in AI recommendation.



Key findings: Hands-on interaction with light promotes collaborative exploration & sense making of abstract & complex AI concepts.

Methods

Embodiment

Analogy

- **Design embodied schema:** Connect unfamiliar AI concepts with familiar sensorimotor experiences.
- **Co-design with** K-12 teachers and students.
- **Measure:** Mixed methods design to obtain learning gains (pre/post-study survey, interview), learning process (movement tracking), and self-efficacy.

Challenge Overcome

Accessibility

- **AI+STEM integration:** Promote K-12 AI literacy through integration with STEM subjects.
- **K-12 outreach:** Offer “ROC AI” summer workshop to local summer camps 2019-present.
- **Broaden impact:** How to make AR and tangible learning tools broadly accessible to students?



bit.ly/4vdtQne

bit.ly/4vPxRQj



Zhen Bai, PhD
zhen.bai@rochester.edu
<https://zhenbai.io/>



University of Rochester

