

RETROFITTING EXISTING SCHOOLS FOR A GREEN GENERATION

In 1998, the average public school building in the United States was 42 years old.

OBJECTIVES

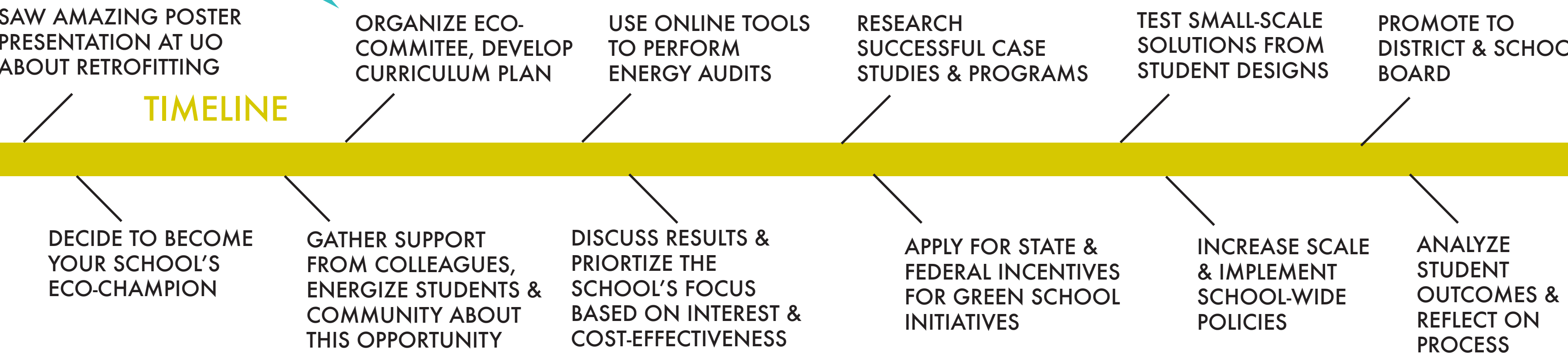
OUTLINE

We are currently preparing students for jobs that don't yet exist, using technologies that haven't yet been invented, in order to solve problems we don't even know are problems yet.

- KARL FISCH, educator quoted in *The Third Teacher*

SCHOOL-WIDE INITIATIVE SCENARIO

Starting in 1st grade, children will learn the basics: principles of ecology, systems, networks, interdependence. By 3rd grade students will understand the issues and their roles in the system. Students feel empowered to make change and begin to clarify the needs of their specific building to achieve these important relationships. In 4th grade, the class will choose an issue and design a solution. By 5th grade the children are designing experiments to test their hypotheses about the environment and the building. 6th graders spend time building the case/movement for full implementation of a successful strategy school wide. By the time children reach middle school, they will have seen the long-term process of change, and been a part of a multi-level effort. Middle and high schoolers could propose and test their own designs.



- EDUCATIONAL**
- + Empower students to affect change in their own school
 - + Teach all subject areas with an environmental perspective: Ties social, moral, behavioral principles with concrete, real-life examples, promoting learning transfer
"All education is environmental education." David Orr, Oberlin College
 - + Increased interdisciplinary studies- understanding interdependence, collaboration, and human symbiosis in all systems: industrial and natural
 - + Get students to identify their needs, design experiments to test their hypotheses and implement successful strategies school or district-wide

- ARCHITECTURAL**
- + Reveal how things work: literal transparency, living & moving parts transform the school into a learning laboratory
 - + Let students interact with the facade, change the filter through which they see the world, i.e. manipulate the building envelope
 - + Let the building change over time: with participatory design, the building is a symbol of school pride

Ecological design- the practical application of the concepts of interrelatedness, systems, and long time horizons- is changing how we think, and how we think about thinking.

- DAVID ORR, Professor at Oberlin

OPPORTUNITIES

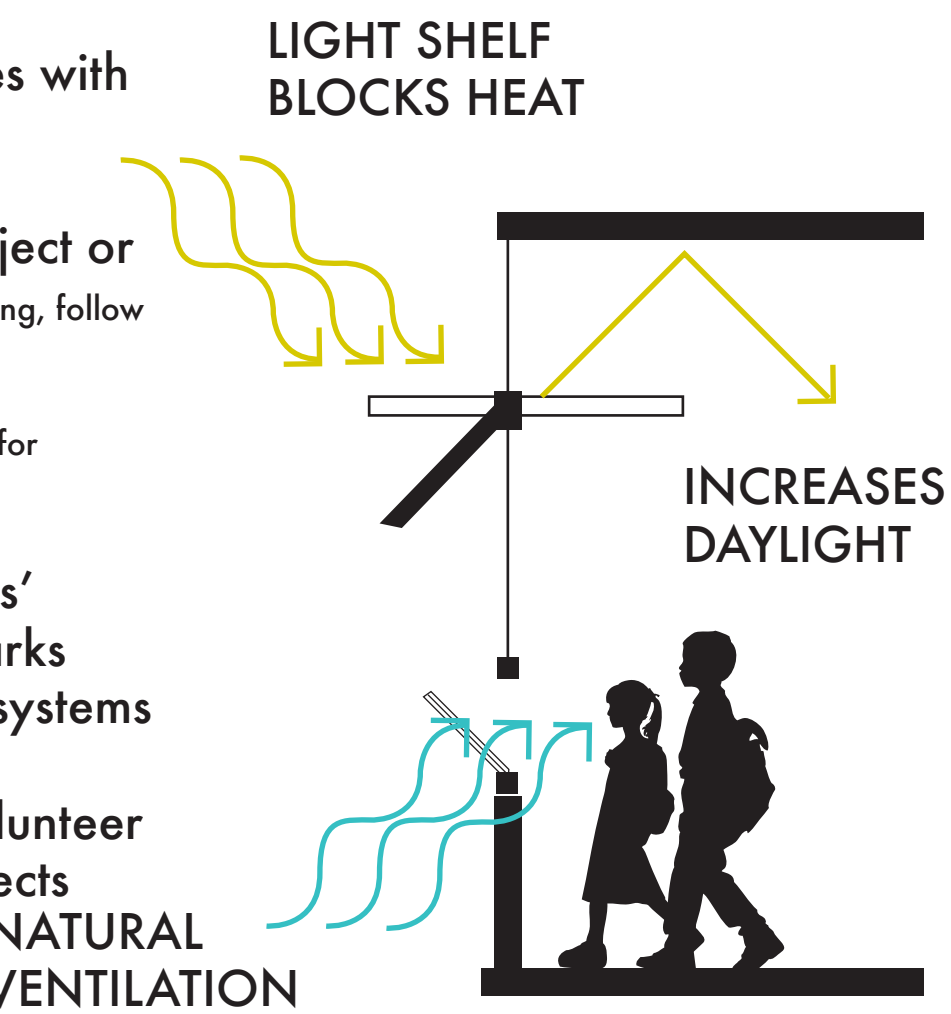
POLICY & CURRICULAR

- + Spend a professional development day centered on environmental education: will help identify what tools are needed, what learning environment is most important to the school, what funds are available for environmental initiatives
- + Provide teachers with environment-based lesson plans that meet curriculum standards
Many relevant plans are available from Earth Day Network, Alliance to Save Energy, National Energy Education Development, Green Education Foundation, Eco-Schools USA

An environment-based education movement-at all levels of education-will help students realize that school isn't supposed to be a polite form of incarceration, but a portal to the wider world.

RICHARD LOUV, author of *Last Child in the Woods: Saving our Children from Nature-Deficit Disorder*

- + Highlight the site and its geological features with extensive signage
- + Let students lead their own afterschool project or community initiative, e.g. monitoring waste, energy auditing, follow waste, water, resource streams
- + Change the school food system, see the Center for EcoLiteracy's Re-Thinking School Lunch
- + Take students out to wildlife refuge, farmers' markets, local farms, community gardens, parks and other living spaces to trace closed-loop systems
- + Hire a garden coordinator or request a volunteer to manage the maintenance of new eco-projects



- FACILITIES**
- MINOR**
- + Annual energy auditing: facilities managers can use the Operations Report Card to evaluate their school's energy performance
Produced by the Collaborative for High Performance Schools www.chps.net/orc
 - + Install occupancy sensors and connect equipment to power strips to cut vampire loads while rooms are not in use
 - + Change purchasing policy to favor durable, nontoxic, sustainably harvested, high-recycled-content, and highly recyclable cleaning and classroom materials
 - + Expand the programmed HVAC comfort zone
By adjusting the temperature at which the heating or cooling system is initiated, schools can save thousands of dollars annually by tolerating slightly cooler temperatures in the winter, and slightly warmer in the summer.
- MEDIUM**
- + Replace asphalt with green schoolyard
butterfly gardens, vegetables, rainwater catchment, pond, outdoor classrooms, trellises, wildlife corridors
 - + Install individually operable, programmable HVAC system controls that
 - + Install light sensors and dimmable ballasts to automatically conserve energy when there is sufficient daylight in the room
 - + Install shading devices or climbing plants on the south and western facades
 - + Install an indoor edible wall for cafeteria use, maintained by students
 - + Add skylights and/or light shelves for natural daylight to reduce lighting costs
- MAJOR**
- + Green roof provides habitat & reduces heat island effect (need structural assessment)
 - + Investment in on-site energy generation: solar arrays or wind turbines
 - + Install super-insulated windows
 - + Replace boilers with high efficiency HVAC system
Most important is the heat exchanger, which collects heat from exhaust air before it is released from the building
 - + Add insulation to existing walls & ceilings, (see Passiv Haus standards)
 - + On-site wastewater treatment, (e.g. Living Machine)

Asthma is the leading cause of absenteeism, responsible for more than 20 million missed school days in the US per year

The greenest building practice is to adapt an existing building. Less resources, more benefits.

REGIONAL RESOURCES

- CORVALLIS SCHOOL DISTRICT, Corvallis, OR**
Strategies: Energy efficient, digitally controlled lighting, heating and cooling; program to turn off computers and lights not in use. Projected savings: \$1.5 million over 5 years
- CLACKAMAS HIGH SCHOOL, Clackamas, OR**
Strategies: Sustainable systems class at a public high school, hands-on learning to help overcome fear of nature. (LEED Silver school building)
- CENTER FOR ECO-LITERACY, Berkeley, CA**
Hosts workshops and conferences for teachers and administrators to get trained in environmental education programs and starting movements.
- ECO-TRUST FARM TO SCHOOL, Portland, OR**
Works with schools and farms to incorporate healthy, locally sourced products, nutrition-based curriculum; experiential learning
- COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS, San Francisco, CA**
Best practices manual, rating programs, energy audits adapted for student use, directories of green products and services.

POSTER REFERENCES

Bruce Mau Design/VIS Furniture/Cannon Design. (2010). *The Third Teacher: 79 Ways to Use Design to Transform Teaching and Learning*. 1st Ed. New York: Abrams

Danks, S. (2010). *Asphalt to Ecosystems: Design Ideas for Schoolyard Transformation*. Oakland, CA: New Village Press

Stone, M.K. (2009). *Smart by Nature: Schooling for Sustainability*. Berkeley, CA: University of California Press.

OUTCOMES

The financial benefits of greening schools are about \$70/sf, more than 20x as high as the cost of going green.

- Resource Demand Reduction
 - Visual Reinforcement of ecological principles address various learning strategies
 - Active Learning Experiences where concepts are enacted
 - Increased interdisciplinary studies, a holistic understanding of both education and place
 - Students' environmental attitudes
 - Practical skills for societal contribution regardless of college bound, technical school or further training
- Monetary savings
 - Regenerative School Buildings
 - Change School Culture
 - Revision of Educational Philosophy
 - Lifelong Learners
 - Environmental Stewards
 - Redefinition of Life Skills
 - Redefinition of Progress
 - Intergenerational Dialogue

The most important lesson you learn is that there isn't the environment out there and me in here. The environment is all around us; its in us.

DAVID SUZUKI, environmental activist