



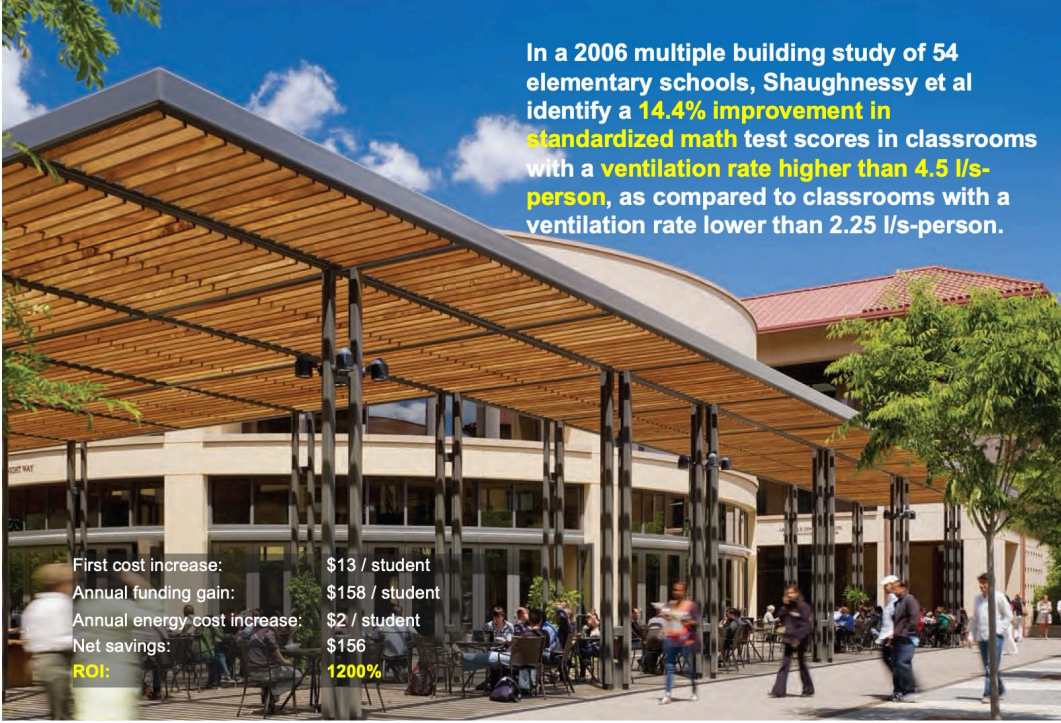
Carnegie Mellon University

School of Architecture

College of Fine Arts, CFA 201

Carnegie Mellon University

Pittsburgh, PA 15213



In a 2006 multiple building study of 54 elementary schools, Shaughnessy et al identify a **14.4% improvement in standardized math** test scores in classrooms with a **ventilation rate higher than 4.5 l/s-person**, as compared to classrooms with a ventilation rate lower than 2.25 l/s-person.

First cost increase:	\$13 / student
Annual funding gain:	\$158 / student
Annual energy cost increase:	\$2 / student
Net savings:	\$156
ROI:	1200%

Increase Outside Air

Research literature reveals the health and productivity of high performance buildings.

48-729: Sustainability, Health and Productivity to Accelerate a Quality Built Environment

Units: 9 or 12

Instructor: Vivian Loftness

Given the United Nations Sustainable Development Goals and the growing demand for sustainable design by federal and private sector clients, professional practices are “tooling up” all over the world to deliver high performance and environmentally responsible buildings, infrastructures, and communities. However, investments in “green,” high performance building solutions and technologies are still limited by first cost decision-making, and life cycle tools are still largely inaccessible to professionals. This course explores the relationship of quality buildings, building systems, infrastructures and land-use to productivity, health, wellbeing, and a sustainable environment. The course begins with a series of lectures on high performance enclosure, mechanical, lighting, interior, and networked building design decisions and extends to sustainable communities and infrastructures. The course engages students in the research literature that relates these building design decisions to multiple cost/performance impacts, including: energy, carbon, facilities management, organizational change, technological change, attraction/retention (quality of life) of employees, individual productivity, organizational productivity, salvage and waste (the circular economy), tax/ insurance/ litigation, and human health. Each student will develop 3-4 concise summaries of existing research as well as baseline cost-benefit data to illustrate the amazing return on investments of high performance building and urban systems.