2014 Exhibition of School Planning and Architecture

Buford Engineering Design Academy at Buford Middle School

Charlottesville City Schools

Charlottesville, Virginia

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1. BUILDING ENTRANCE LOBBY
2. TYPICAL SCIENCE LAB SUPPORTS LIFE SCIENCE, EARTH SCIENCE, AND PHYSICAL SCIENCE
   - FIXED INFRASTRUCTURE LOCATED AT ROOM PERIMETER ONLY
   - MOVEABLE & ADJUSTABLE HEIGHT TABLES
   - MOVEABLE TEACHER DESK
   - PORTABLE DEMONSTRATION STATION
   - PORTABLE DUCTLESS FUME HOOD
   - BACKPACK STORAGE IN EACH ROOM KEEPS PERSONAL ITEMS OUT OF LEARNING AREA
3. SHARED LABORATORY PREP ROOM
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4. SCHOOL GARDEN COORDINATION OFFICE
5. STORAGE
6. EXTENDED LEARNING AREA

HIGH PERFORMANCE & HEALTHY ENVIRONMENT

- LAB CHAIRS PROMOTE HEALTHY POSTURE & STIMULATE BLOOD FLOW
- ADJUSTABLE DIRECT/INDIRECT FLUORESCENT LIGHTS PROVIDE OPTIMAL GLARE-FREE LIGHTING
- FORMALDEHYDE-FREE & LOW voc PRODUCTS THROUGHOUT
- DURABLE, LOW MAINTENANCE, EXPOSED CONCRETE FLOORS

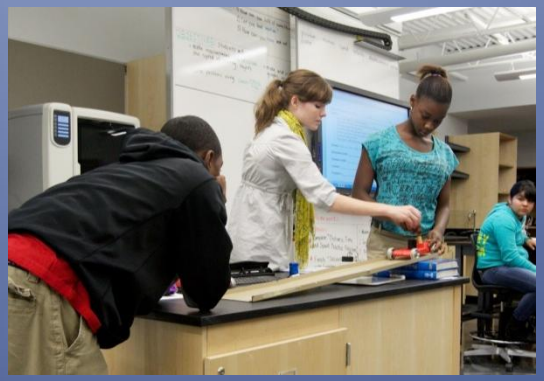
STEM Collaboration

Community Environment:

Buford Middle School is the first public school to be part of **the Commonwealth Engineering Design (CED) Academy**, the nation's first laboratory school for advanced manufacturing technologies.

Dedicated to incorporating 21st century manufacturing technologies into classrooms and curriculum, **the Buford Engineering Design Academy (BEDA)** represents a unique partnership between the architect, the University of Virginia's Schools of Education and Engineering, and Charlottesville City Schools.

Teachers in the BEDA work with University professors and students to integrate engineering concepts into their lessons, while the University uses feedback from the program to better prepare future science instructors. The result is a dynamic, community-centered promotion of STEM learning and teaching, expressed in ways that are engaging and memorable for students.



Local Connections, Local Materials

Community Environment *(con'd):*

To celebrate the local connections of the BEDA, the architect specifically chose local materials to reflect the unique Charlottesville-based partnerships of the STEM project and connect students to the natural world around them.

Feature walls and exhibit spaces at the entrance to each lab incorporate a unique combination of local wood and stone, as well as exposed metal. These three materials represent the different science courses offered at the school: life science (wood), earth science (stone), and physical science (metal).

Wood in the hallway panels comes from salvaged or re-claimed wood sources found locally in Charlottesville. Stone panels featured at classroom entrances represent different rock types and were quarried within a 40-mile radius of Charlottesville.

WHITE OAK

Buford Middle School was once a part of Oak Lawn plantation. The main house, built in 1822, still stands adjacent to the school at the corner of 9th Street SW and Cherry Avenue. The White Oak boards (interspersed with some Red Oak) along Room 208 were reclaimed from 'rejected' stair treads at a local building materials supply store.

HEMLOCK

The Eastern Hemlock is a majestic tree that can grow as high as 173 feet tall and survive for over 500 years. The Hemlock for Room 206 comes from a reclaimed local tree that fell in a storm during the design phase. Hemlocks have been almost completely destroyed by the woody adelgid and are the "ghost" trees you commonly see in Shenandoah National Park.

DEODAR CEDAR

Deodar Cedar is a large coniferous tree native to the Himalayan mountains. The Deodar Cedar used for Room 204 was locally milled from a huge tree that once dominated the eastern end of Charlottesville's downtown mall, prior to construction of the concert pavilion. Some of its wood was originally used for the Downtown Transit Center; leftover wood was used in the Buford project.

AMERICAN CHESTNUT

The American Chestnut was once one of the most common trees in the eastern United States. Prior to a devastating blight, it accounted for 25% of the trees in the Appalachian Mountains. The Wormy Chestnut boards featured near Room 202 were salvaged from old barns. These boards showcase chestnut's warm character while highlighting the worm-holes and nail-holes that, together, are unique to this disappearing species.

Flexible Learning Environment

Learning Environment:

The architect worked collaboratively with the University of Virginia and Charlottesville City Schools to design four innovative STEM laboratories that make use of every space and surface to optimize teaching and learning. The previous existing labs featured multiple prep rooms, fixed lab stations, and dedicated teaching and lab spaces. Initially, science teachers requested a similar spatial arrangement. However, student focus groups pointed to the redundancy and rigidity of this layout and called for a different configuration, which is depicted below.

Flexible Learning Environment

Before: Previous labs featured multiple prep rooms, fixed lab stations, cumbersome, inflexible seating, and separate teaching and lab areas.

After: A flexible classroom concept centralizes lab prep space while increasing in-class storage, flexible seating, and display areas for student work.

Flexible Learning Environment

Learning Environment *(con'd):*

With guidance from the *Next Generation Science Standard*s and University of Virginia advisors, the design team developed a flexible classroom concept that centralized lab prep space while increasing in-class storage and display areas for student work. The labs accommodate each of the current middle school science courses. Movable teacher desks and demonstration stations, as well as height-adjustable student desks, allow for rapid reconfiguration of the classroom layout. This adaptability supports the current science block scheduling and potential longer-term unforeseen changes in science instruction.

Flexible Learning Environment

Before: All display walls, teacher desks, and lab stations were rigid and immovable.

After: The flexible teaching wall features two touch-screen SMART boards and two dry-erase boards, each mounted on a rolling assembly. Teacher desks, demonstration tables, and all lab stations are completely moveable and support rapid reconfiguration.

AFTER

Building as a Teaching Tool

Physical Environment:

The aesthetic of the physical environment is characterized by a restrained approach that balances crisp, modern detailing with an authentic industrial simplicity. This sensibility highlights sustainable materials, such as local wood and stone, while maximizing opportunities to engage the building (and building systems) as a teaching tool. A clear spatial hierarchy is reinforced by the use of wood slat ceilings in the public spaces and fully exposed structural systems in the classrooms. All technology as well as building and structural systems are exposed, rather than hidden, to encourage further learning about engineering processes and functionality.

EXPOSED STRUCTURAL SYSTEMS

WOOD SLAT CEILINGS

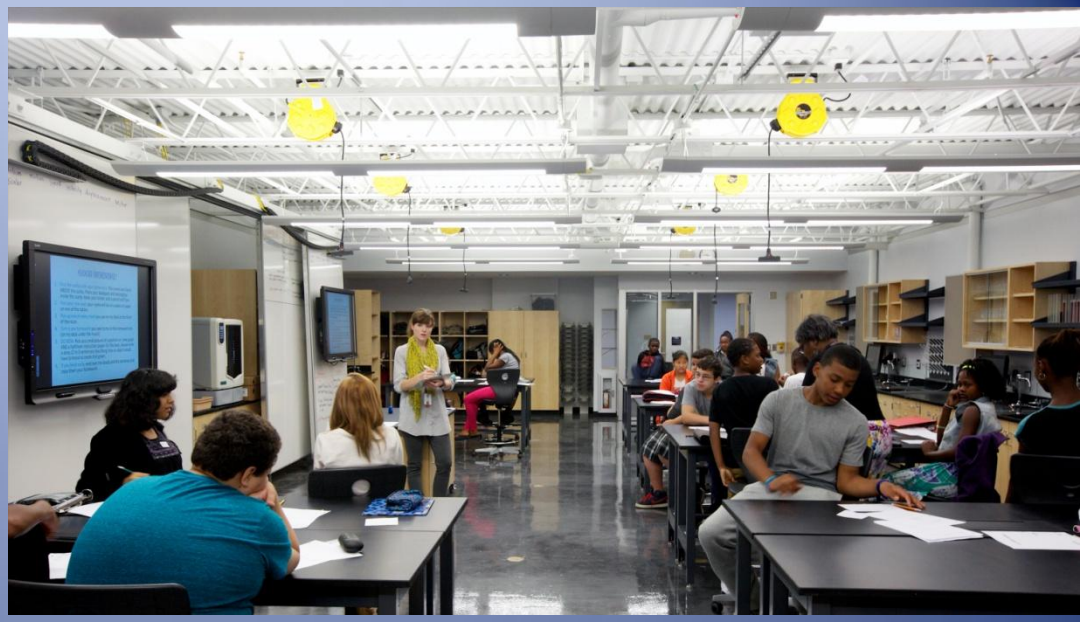
Technology-Rich Environment

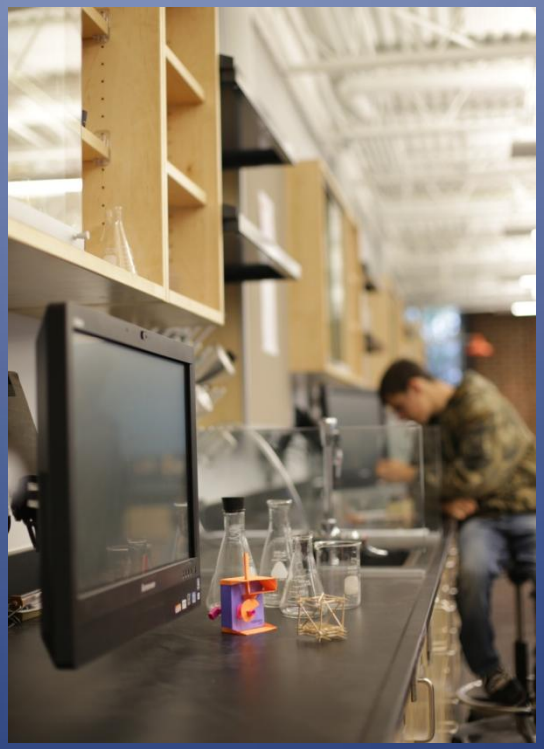
Physical Environment *(con'd):*

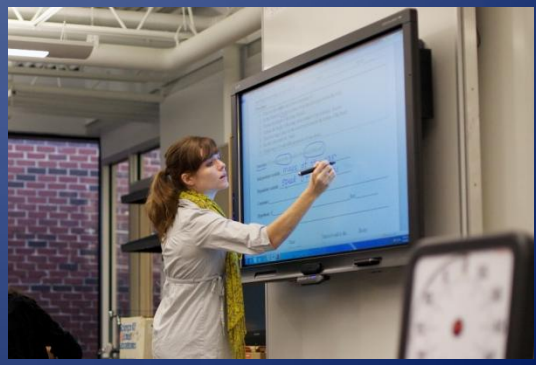
The six lab stations found in each of the four labs feature a digitally-controlled die-cutter, 3-D printer, and an all-in-one, wall-mounted computer that pivots in three directions for optimal support of student collaboration.

The flexible teaching wall features two touch-screen SMART boards and two dry-erase boards, each mounted on a rolling assembly which saves space while fostering dynamic teaching and learning arrangements. Students are able to pick up wireless tablets in the morning and return them to space-saving "Power Towers" for overnight re-charging.

Overall, technology is made visible and celebrated, and students noticeably relish opportunities to engage not just with each other but also with STEM concepts.







Connectivity & Collaboration

Physical Environment *(con'd):*

Almost all technology found in the labs is wireless to promote interactive, mobile learning. Cameras and monitors facilitate several modes of distance-learning and online collaboration, allowing students to connect with partners at the University and with students and teachers from all around the world.

Overhead cameras project the work being done onto any monitor in the lab, enabling students to closely follow lab demonstrations and better retain technical training.

Ceiling-mounted, retractable power cords enhance flexibility in the labs, allowing students to deploy equipment and technology in almost any location.

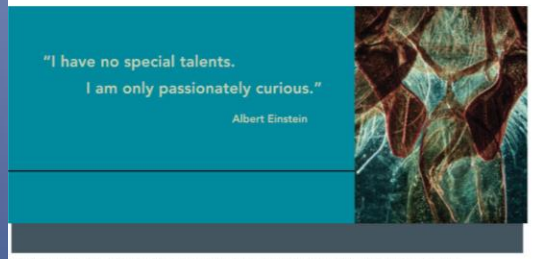
Graphics & Wayfinding

Physical Environment *(con'd):*

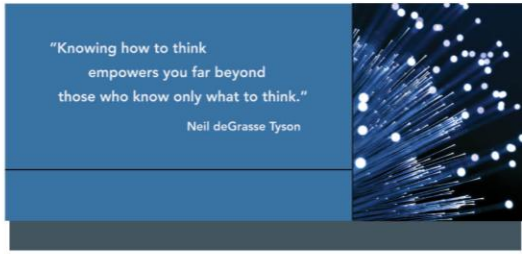
Each classroom features its own identifiable accent color both in the entrance-way and inside the classroom on a large graphic wall panel.

Each panel includes a macro- or micro-scaled photograph paired with an inspirational science-related quotation. These panels reinforce the labs' aesthetic of discovery and are intended to motivate and inspire curiosity and investigation.

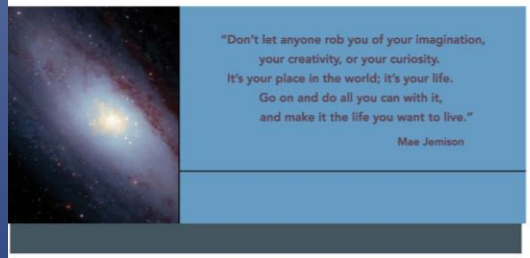
The back of each numbered room sign includes information about the respective room's feature photograph.



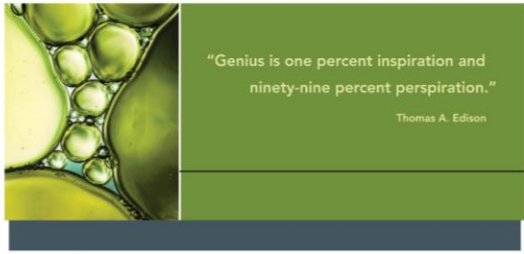
ROOM 206: HONEY BEE MOUTH UNDER A MICROSCOPE



ROOM 202: FIBER-OPTICS



ROOM 204: CHANDRA X-RAY IMAGE OF THE ANDROMEDA GALAXY



ROOM 208: MIX OF OIL AND WATER

Technology & Pedagogy

Planning Process:

Advanced technologies are revolutionizing the ways in which students comprehend information and communicate ideas. More and more, there is demand for school facilities to accommodate such technology and support STEM learning.

In order to support shifts in instruction and pedagogy that empower teachers and support STEM learning, the architect and Charlottesville City Schools teamed up with the University of Virginia's Schools of Education and Engineering to envision a collaborative planning and design methodology that meshed the latest advances in technology with the latest advances in teaching as well as design.

The result is the Buford Engineering Design Academy – which features a customized curriculum and dynamic lab facilities that support 21st-century STEM learning and sharing.

Preparing Students for the Future

Planning Process *(con'd):* :

Continual collaboration, research, and sharing were completed and coordinated to ensure that the final environment met the goals of the visioning process. From an architectural perspective, the goals were two-fold:

1) Prepare students for the future with smartly designed STEM spaces;
2) And, empower teachers with robust design details that support shifts in instruction and pedagogy as well as advancements in technology.

Ultimately, the flexibility of the STEM labs were key to the project's success. Such flexibility enables learning to happen any time, anywhere and ultimately supports a new generation of learners and learning spaces that are tech-savvy, collaborative, and endlessly versatile. While upgrading facilities to feature the latest trends and technology may seem costly, strategic investments in dynamic, flexible spaces that respond to curriculum, engage students, and empower teachers can enduringly transform educational spaces while maximizing precious capital funds.

The University of Virginia and design teams maintain contact with the Buford Engineering Design Academy to monitor and assess progress. In particular, the new classrooms, which feature video-conferencing technology, allow education and engineering professors to participate in and observe instruction.

Designer Team: Todd Bullard - Principal-in-Charge/Project Manager; Steve Davis - Project Designer; Lorenzo Battistelli - Construction Administrator

University of Virginia Leadership: Dr. Glenn Bull - Professor of Instructional Leadership, UVA Curry School of Education, Dr. Haj-Hariri - Professor and Chair of UVA Mechanical and Aerospace Engineering Department

Buford Middle School Leadership: Dr. Rosa Atkins - Charlottesville City Schools Superintendent; Eric Johnson - Buford Middle School Principal; Libbey Kitten - Science Curriculum Coordinator

TIMELINE:

Floor Plans

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STUDENT LAB STATIONS

- L.E.D. MONITOR ON RETRACTABLE ARM AT EACH STATION WITH WIRELESS MOUSE AND KEYBOARD
- DIE-CUTTER & 3-D PRINTER WITH DEDICATED EXHAUST

TECHNOLOGY-RICH ENVIRONMENT

- CAMERAS & MONITORS SUPPORT AMBITIOUS DISTANCE LEARNING PROGRAM
- FULL WIRELESS CONNECTIVITY
- RETRACTABLE CEILING-MOUNTED POWER CORDS & TABLE GROMMETS SUPPORT RAPID RECONFIGURATION OF LAB SPACE
- INTEGRATED CHARGING STATIONS FACILITATE EASY TABLET STORAGE FOR EACH STUDENT

INNOVATIVE TEACHING WALL

- FOUR FULL-HEIGHT ROLLING DRY ERASE BOARDS
- DUAL INTERACTIVE WHITEBOARDS & TOUCH-SCREEN SMART BOARDS ON ROLLING ASSEMBLIES
- FULL-HEIGHT STORAGE & DEMONSTRATION SUPPORT BEHIND ROLLING TEACHING WALL
- OVERHEAD CAMERA AT EACH DEMONSTRATION STATION TIED TO INTERACTIVE WHITEBOARDS

Exhibition of School Planning and Architecture Project Data

Submitting Firm :	VMDO Architects
Project Role	Architect
Project Contact	Steve Davis, AIA, LEED AP
Title	Project Designer
Address	200 East Market Street
City, State or Province, Country	Charlottesville, VA
Phone	(434) 296-5684

Joint Partner Firm:	
Project Role	
Project Contact	
Title	
Address	
City, State or Province, Country	
Phone	

Other Firm:	
Project Role	
Project Contact	
Title	
Address	
City, State or Province, Country	
Phone	

Construction Firm:	Martin Horn
Project Role	Construction Manager
Project Contact	Joe Simpson
Title	Construction Manager
Address	210 Carlton Road
City, State or Province, Country	Charlottesville, VA 22902
Phone	(434) 2963-6171

Exhibition of School Planning and Architecture Project Details

Project Name	Buford Engineering Design Academy at Buford Middle School
City	Charlottesville
State	Virginia
District Name	Charlottesville City Schools
Supt/President	Dr. Rosa Atkins, Superintendent
Occupancy Date	August 2013
Grades Housed	6-8
Capacity(Students)	4 labs with 24 students each (500 total students)
Site Size (acres)	Interior Renovation / Not Applicable
Gross Area (sq. ft.)	9,600
Per Occupant(pupil)	Not Applicable
gross/net please indicate	gross
Design and Build?	No
If yes, Total Cost:	
Includes:	
If no,	
Site Development:	Not Applicable
Building Construction:	$1,428,195
Fixed Equipment:	Not Applicable
Other:	Not Applicable
Total:	$1,428,195


"Don't let anyone rob you of your imagination,
your creativity, or your curiosity.
It's your place in the world; it's your life.
Go on and do
and make it
want to live."
ae Jemison