

Promoting STEM Curriculum Through Innovative School Design

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Executive Summary

To accommodate the guiding ideologies of a Science Technology Engineering Mathematics (STEM) based curriculum at Clayton High School in Clayton, Missouri, Bond Wolfe Architects designed a new four-story, 65,000 SF, LEED Silver certified addition as well as a 100,000 SF renovation of the existing building. Multiple academic disciplines share adjacent spaces to promote an atmosphere for both traditional and casual dialogue between peers and educators. A wide, glass-walled multipurpose corridor acts as a functional path for circulation, as an organizing spine off of which classrooms are arranged, further encouraging continued and open conversation outside the classroom. By providing flexible classrooms, diverse groups of disciplines and readily accessible gathering areas, Bond Wolfe Architects have created a nurturing atmosphere in which students and teachers become agile communicators and inter-disciplinary collaborators.

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Chemistry teacher Mike Howe knew from the very beginning that communication was going to play an integral role in the new addition to, and renovation of, Clayton High School. Howe believed that the most critical aspect of the finished work would be how well students and teachers could communicate and work together in what would be the school's new science wing.

Clayton High School, like so many contemporary college-prep high schools, has incorporated the tenets of Science, Technology, Engineering and Mathematics (STEM) based education into their curriculum. This decidedly collaborative educational enterprise consistently produces students who score highly on standardized college admissions tests.

"Our kids go to college and we prepare them for it," said Clayton High School principal Louise Losos. But despite the impressive levels of classroom participation and academic success, the facilities in which students and faculty spent their time had become outdated, outgrown and insufficiently sized to host the types and variety of activities that a contemporary STEM curriculum requires.

Bond Wolfe Architects brought to the project both a client-driven approach and an understanding of what it means to design a school that serves current curricular requirements as well as accommodates growth and future pedagogical shifts.



One of the chemistry labs in Clayton High's new science wing.



The end result is a 65,000 square foot building addition that achieves a LEED-silver certification and 100,000 square foot renovation that promotes a collaborative, sustainable and stimulating learning environment for both the student body and the faculty.

In providing appropriate solutions to the issues presented at Clayton High School, classrooms were designed to be highly flexible. The large rooms feature both traditional lecture class areas and either wet or dry lab spaces in an arrangement that allows students and teachers to easily move between the two distinct settings during a single class period. Up-to-date technologies, including smart boards, wireless Internet availability and plotters, were incorporated into the classrooms and labs to further support an easy move from one side of the room to the other.

“The ability to move equipment and furniture into a lab and out of a lab is important,” said Mike Howe. “Our old biology labs had no flexibility in terms of movement of tables, for example. The old physics labs were not large enough get in and out without moving tables around, if you wanted to have two activities on the same day. In the third chemistry lab, we had the capability to be flexible, but the equipment was wearing out. One of the benefits of the new building is that everyone has the flexibility that we previously had in only limited areas. Another thing that the project does is gives us all permanent lab locations to call home. We aren’t using our energy moving our stuff back and forth between rooms.”

A series of doors located at the back of each classroom adds to the sense of openness and collaboration by allowing faculty to move from room to room during class periods.

“The new building will facilitate opportunities for teachers to communicate and interact with each other,” Howe noted. “The doors between the rooms allow teachers to slip through the back of each other’s rooms and confer between classes or during classes.”

“I felt that we had significant and appropriate input,” affirmed Mike Howe. “I appreciate the fact that Bond Wolfe Architects were going to the people that will be living and working in the classrooms to talk about issues that came up during the design and construction process. That line of direct communication is a real strength.” Taking initial cues from Mike Howe’s insights regarding a learning environment to encourage easy communication, the Bond Wolfe team designed a wide, single-loaded corridor to act as a functional hall that leads students from room to room, but that also operates as a series of interconnected sunlit spaces.

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This multipurpose corridor is wrapped in glass, offers an unbroken view into the student quad and features seating areas with café-style tables where groups of students can gather before or after class sessions to continue conversations that began in the classroom, or simply catch up with friends. Ample display space is provided to foster peer-to-peer learning and a sense of familiarity with topics and projects being studied in various classes.

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“We have a place for kids to hang-out,” Howe stated. “We have a spot right outside of the science office with some tables set up so the kids can work and the teachers can walk by and interact with them on an informal basis. The wide corridor plays a role in morale.”

“We have that on all three floors in the new building,” added Losos. “This will become a place that demystifies science. Students can be hesitant to pursue science, but if the new wing becomes a place where kids feel very comfortable, then science becomes very comfortable.” By offering a series of communal seating areas, students and faculty can gather to continue conversations begun during class, discuss on-going projects or simply relax.

“Bond Wolfe designed the corridor to create more meeting spaces,” offered Principal Losos. The goal was to implicitly encourage students to discuss class subjects anywhere, “not just in the classroom, but in the hallways as well,” Losos continued. “This makes the entire third floor, which is the science floor, a learning spot. Hopefully that will engage the students even more in the sciences.”

In an effort to steer away from creating three distinct departments, classrooms hosting separate subjects were located adjacent to each other. Bond Wolfe determined that the most efficient way to accomplish this strategy would be to unite the new and the existing buildings via contiguous floor plates and renovate the STEM classrooms located in the original structure. In keeping with the spirit of STEM education, and to maximize multi-curricular conversations, the chemistry wing of the new addition is located next to the biology wing, which has been outfitted with a small, shared walk-through greenhouse and is, in turn, situated adjacent to the physics wing.



“Little touches - student seating, floor patterns, lighting changes, glass walls - have created a space that is student-centered and conducive to learning.” - Dr. Louise Losos

"We don't want teachers going into their own rooms and shutting the door to do their own thing," said Howe. "I want teachers to interact and share their best ideas with each other and work toward better goals. That's the mentality of the department that we have here and the new addition helps to facilitate that."

Two of the four biology rooms are located in the addition while the remaining two, and the entirety of the physics wing, are located in renovated portions of the existing building. Further areas of the renovated third floor feature two flex labs, which may be used as a space for any STEM discipline in need of additional space, and two project rooms, to be used primarily as workshops for robotics and rocketry projects.

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A direct connection to the ground floor and the Career and Technical Education (CTE) classrooms, which includes pre-engineering rooms, was established by including an elevator. Howe believes that, "the new building will pull more engineering into the mix. My goal in the near future is to do more integration with the engineering folks."

Likewise, the elevator provides access to a 550 square foot rooftop greenhouse that will predominantly be used by biochemistry students, but may be opened to a broader population in the near future. "We have a person from the Danforth Plant Science Center coming to speak with us about ways to team with them, potentially, with the greenhouse," explained Howe. "We're hoping to get the community and maybe the elementary and middle schools involved in some way. We're building community loyalties."

In designing this expansive addition and renovation, Bond Wolfe Architects carefully considered the unique needs of Clayton High School's student and faculty population and drew heavily on the principles of STEM based education.

"Bond Wolfe worked well with science experts," added Principal Losos. "I think our science program here is excellent and the facilities have been brought up to meet the caliber of our teaching," Principal Losos went on to say. "The science department is highly collaborative, and we do a lot of cross-curricular education, but I think the new classrooms bring us up to speed where we've been lagging behind. We have a collegiate caliber program, and the facilities now match that."

Bond Wolfe Architects provides architecture, interior design and planning solutions to a wide range of educational and municipal clients. Their projects, practice and people have been recognized for their commitment to enhancing communities, advancing education and promoting sustainability. To learn more, visit www.bondwolfe.com.

