Executive Summary

Fueled by discovery. Powered by exploratory learning, STEM education is transforming typical teacher-centered learning spaces by encouraging curriculums focused on interdisciplinary problem solving. The new Math and Science Building creates engaging and flexible spaces geared to the latest pedagogical concepts in STEM (Science, Technology, Engineering, Math) education. The guiding principle for the building design is based on the scientific concept of gaining understanding of the physical or material world through observation and experimentation, that leads to discovery.

Project goals:
- Improving the educational experience for students and faculty
- Creating a “buzz” for the Math and Science programs
- Providing safe lab spaces for students and faculty to work
- Designing a building that instills a sense of pride for the college
- Creating spaces for students to socialize and collaborate

The three-story building is located along the southwestern edge of the campus and presents a fresh face to the local community along a major city boulevard. Functioning as the new home for the college’s mathematics and science programs, the building consolidates the STEM programs into one facility, providing a much-needed expansion of laboratory, classroom, office and support spaces tailored to the specialized needs of each discipline.

The facility is noteworthy for the transformative impacts on the:
- Enhanced social behaviors of students
- Positive psychological effect on faculty/staff
- Emerging campus environment
- Community perception and workforce relationships

“The design team was really creative, truly a give and take throughout the phases in managing expectations while guiding us to contain costs. They exhibited professionalism across all elements of a really complex project.”

-Wes Bryan, President (Retired)
Scope of Work & Budget

- **121,000** GSF New Space
- **1.41** Acres Redeveloped
- **59M** Dollars Invested
- **3** Stories Tall
- **32** New Learning Spaces
School & Community Engagement

Structure
To ensure diverse input from the college community, campus leadership implemented a three-level committee system to keep communication flowing and provide feedback opportunities for stakeholders at all levels that shaped the design.

The Executive Leadership team included campus leaders to guide the overall vision:
- College President
- Vice-Presidents
- Campus Directors (Maintenance, Operations, Technology, etc.)

The Departmental Leadership team included the program experts to guide functional requirements:
- Dean of Math/Science
- Chairpersons of Mathematics, Physical Sciences, and Biological Sciences

The Building User team included future occupants to provide detailed functional expertise:
- Science Faculty
- Technical Staff
- Students

Designers led building users on tours of science facilities within the region to experience lessons learned from peers prior to programming.
### SUSTAINABILITY BASIS OF DESIGN

Sustainable strategies for the Golden West College Math and Science project have been organized into 6 categories: Energy, Water, Indoor Environmental Quality, Waste, Durability, and Culture. Within the categories, the various strategies that can be implemented to help achieve high-performance design are listed. The items listed identify potential strategies that will be considered throughout design development. Strategies that prove to be beneficial to the overall building performance and are achievable within the project budget will be implemented with authorization from the college.

The following chart will be used to track the project’s progress, and to ultimately help the project team arrive at an outcome which has a reduced environmental impact. This is explained further on the following pages.

#### Strategy

An eco-charette workshop brought stakeholders together with building designers and engineers to explore sustainable design strategies that would be appropriate for the facility. Interactive exercises with image maps and flashcards helped identify high-performance strategies that were important to the campus leaders and building users.

As a result, goals relating to energy performance, water use, indoor air quality, and the like were vetted and established as a group before design solutions were developed. These “metrics for success” are listed in the adjacent table.

<table>
<thead>
<tr>
<th>Energy</th>
<th>Water</th>
<th>Indoor Environmental Quality</th>
<th>Waste</th>
<th>Durability</th>
<th>Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun shading of windows</td>
<td>Greywater reuse from building</td>
<td>Access to outdoors with nanawalls</td>
<td>Recycling bins</td>
<td>Ease of cleaning</td>
<td>Building as a learning tool</td>
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<tr>
<td>Large slow moving fans</td>
<td>Permeable paving</td>
<td>Access to natural light and views</td>
<td>Landfill/compost/recyclables bins</td>
<td>Concrete floors</td>
<td>Demonstration garden/courtyards</td>
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<tr>
<td>Thermal mass for passive heating/cooling</td>
<td>Condensate recovery from AHUs</td>
<td>Natural ventilation</td>
<td>Construction waste management, 95%</td>
<td>Durable finish materials</td>
<td>Water conservation signs in building</td>
</tr>
<tr>
<td>Radiant flooring</td>
<td>Bioswales</td>
<td>Operable windows</td>
<td>More durable materials</td>
<td>Enhanced commissioning</td>
<td>Local materials</td>
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<tr>
<td>Natural ventilation</td>
<td>Mechanized shading-glare control</td>
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<tr>
<td>Operable windows</td>
<td>Native/adaptive/drought tolerant landscaping</td>
<td>Walk off mats for pollutant source control</td>
<td>LED lighting</td>
<td>Active indoor environment</td>
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<td>Motion sensors</td>
<td>Soil erosion prevention</td>
<td>Access to views</td>
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<td>Cool roof</td>
<td>Rain gardens</td>
<td>Skylights</td>
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<td>Submetering for plug loads, lighting and process loads</td>
<td>Dual flush toilets</td>
<td>LOW VOC materials</td>
<td>Rooftop garden</td>
<td>Bike racks</td>
<td></td>
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<tr>
<td>Efficient appliances and fixtures</td>
<td>Drip irrigation</td>
<td>Indoor planting</td>
<td>Plug load reduction</td>
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<tr>
<td>Exterior insulation</td>
<td>Soil building</td>
<td>High MERV filtration</td>
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<tr>
<td>Interactive monitoring system</td>
<td>iSave water fixtures</td>
<td>Lighting controls</td>
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<td>Projector-light-window shade control</td>
<td>Rain water harvesting</td>
<td>Indoor environmental quality survey</td>
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<td>Low-e glazing</td>
<td>LED lighting</td>
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#### School & Community Engagement

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School & Community Engagement

Exploration
Numerous workshops were held to explore a wide range of design topics. Detailed lab programming sessions dove into the details of layout and equipment storage with the laboratory planner where staff lab technicians worked out flow patterns and equipment operations. **Hands-on** space adjacency exercises were conducted to develop a functioning building diagram where faculty and staff used foam program blocks to "build" the ideal building diagram assisted by the architects.

Student interviews were held to assess spatial amenities they valued. It was revealed that informal study space was a must while views out of teaching spaces were not as important (to the dismay of the designers).

Throughout the conceptualization phase of the design process presentations were made in response to session outcomes and an open, unfiltered feedback loop helped shape a design solution that truly reflects the functional needs and cultural values of the stakeholders.

“The team was focused and paid attention to budget while working with the users to get them what they needed. They were great listeners and the results speak for themselves.”

-Janet Houlihan, Vice President
Student Life & Administrative Services
Hub
The division office, STEM resource center, and faculty offices are connected to the lobby creating a hub of activity at the main entry.
Educational Environment

Program
The spaces within the building are organized into four groups related to the physical sciences, the biological sciences, mathematics, and shared amenities. The ground floor hosts spaces designated for mathematics, including faculty offices and computer labs. It also includes the facility's shared amenities such as lecture spaces, the division office and the new STEM resource center. The division office, STEM resource center, and faculty offices are connected to the main lobby, creating a hub of activity at the primary entry. The faculty office areas incorporate informal break-out areas immediately adjacent, allowing impromptu study and learning sessions to occur out in the open. The second and third floors of the building include spaces designated for the biological and physical sciences including faculty offices, laboratories and prep rooms.

Program Diagram
Educational Environment

First Floor Plan

1. Commons
2. Classroom
3. STEM Center
4. Division Office
5. Laboratory
6. Office
7. Utility
The Social Impact
Each common space is multi-functional and provides opportunities for social engagement and mentorship. Areas along corridors throughout the building expand and contract to provide spatial variety and play host to small-scale study groups or retreat areas for casual socialization. Common “sticky spaces” keep students on campus and promote relationship building that help them grow academically and socially. This further the curricular goal of promoting connectivity and integrating all STEM disciplines, enabling academic and interdisciplinary innovation. Informal post-occupancy discussions have revealed that these spaces are consistently filled with students and is helping increase retention rates.
Educational Environment

Second Floor Plan

1. Commons
2. Classroom
3. STEM Center
4. Division Office
5. Laboratory
6. Office
7. Utility

"Peek-a-boo window"
Educational Environment

The Social Impact
Smashing barriers and accommodating the various ways students learn is the hallmark of STEM curriculums. STEM activities that were once taught in isolation now overlap in ways where the lines between them are blurred and flexibility is maximized. This **connectedness** considers more than just the building’s layout, but also how every space is designed so that students passing through can see fellow classmates experimenting, studying, or engaging with one another.
1. Commons
2. Classroom
3. STEM Center
4. Division Office
5. Laboratory
6. Office
7. Utility
Educational Environment

The Psychological Impact
The original campus buildings, designed by brutalist architect William Pereira in 1965, used stout geometric forms made of concrete and exterior cement plaster. Building structures use concrete frames and coffered floor slabs that are expressed on the building exteriors. Glazing systems take the form of window walls that occur in limited locations and lack visual connection with the campus landscape and outdoor spaces. Views and exposure to natural daylight from the spaces within are scarce in the teaching spaces, resulting in building users feeling oppressed and disconnected from the outdoors. By contrast, the new building provides natural light and views to the lush campus landscape from every teaching space. Teachers and students catch glimpses of the outdoors continuously throughout the day creating feelings of connectedness that were missing in the old facilities. The daylight provides brighter, evenly lit spaces that is healthy for learning and psychologically beneficial for everybody.

“I wanted to thank you and your team for our lovely new building. I was an outspoken member of the chemistry department with many ideas, and I wanted to thank you for a job well done, with even small details given their due. My new lab space brings much joy.”

-Dr. Katherine Green
Chemistry Professor
Physical Environment

The building is organized in a “C” shape configuration with an open courtyard space at its center that is anchored by the STEM Center and provides an outdoor plaza space for students to study and socialize. Although it is primarily a three-story building, the mass of the facility shrinks to two stories along the southern leg allowing daylight to enter the courtyard in the morning hours while the three-story mass of the building along the west shades the court in the afternoon. Simple rectangular volumes offset by subtle curving elements define the architecture, making it visually compatible with existing campus buildings.
Anchor
The building is organized in a “c-shape” with an open courtyard space that is anchored by the STEM Center.
Physical Environment

Impact on the Campus Environment
The building site falls between two newer facilities, the Learning Resource Center and the Allied Health Building, which are visually unrelated to one another. A concept of “visual bridging” was developed to create harmony among the three newest buildings along the west edge of campus. Extracting the “DNA” of the existing buildings provided the architectural vocabulary for the Math/Science Building. A blending of massing and material applications that works like a gradient between the three facilities results in visual harmony and resolves the visual disparity that had started to develop.
Physical Environment

Implemented Sustainable Elements

1. Shading Devices
2. Cool Roof
3. High-Performance Glazing
4. Exterior Insulation
5. LED Lighting Systems
6. Condensate Recovery
7. Bioswales
8. Native Landscaping
9. Drip Irrigation
10. Natural Light and View
11. Skylights
12. Lighting Controls
13. Walk-Off Mat
14. Durable Finish Materials
15. Back Racks
16. Active Learning Courtyard
Results of the Process

Community Impact
The new Math/Science Building has had a positive impact on the community at many levels. Once taught in isolation in various facilities across campus, the science and mathematics programs now cohabitate and are experiencing new levels of cross-discipline collaboration that is indicative of a STEM community due to the scale and organizational model of the facility.

Outside of campus, the perception of the college within the local community has been elevated as well. Serving as the backdrop to a weekly swap meet held in the adjacent parking lot, the science programs are no longer hidden within the campus core and the transparency of the facility has brought the campus’ offerings in the sciences to prominence.

The building was designed to foster connections with local industry and is best illustrated through the development of the STEM Center. Relationships with industry partners such as Boeing, the city’s largest employer, have begun to create workforce transition programs in the STEM fields that begin on campus. The STEM Center is a flexible collaboration space that can accommodate exhibits and workshops led by local industry partners to educate and build bridges with future tech employees while they are still getting an education, thus creating a pipeline for businesses to train the future workforce.

The resulting educational environment is a testament to the values of all of those involved, and reflects the vision of the college - to welcome, inspire, empower, and transform its students.

“At the interview, the design team walked in, three people sat down, told us exactly what they were going to do, and then went out and did it. They worked hard to capture our needs and wants and designed a building that serves the student and faculty needs, not their own.”

-Jeff Courchaine
Dean of Mathematics and Science (Retired)
Curb Appeal
The building presents a fresh face to the community, emphasizing the importance of the sciences along a major city boulevard.