Santiago High School

Education Success Story

AutoCAD®
Revit® Architecture
Autodesk® Inventor™ Professional
Autodesk® 3ds Max®

Building a better future.

Students at Santiago High School prepare for college and beyond with the help of Autodesk® 2D and 3D tools.

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>
> —Bill Brown, Instructor
>   Santiago High School
>   Corona, California
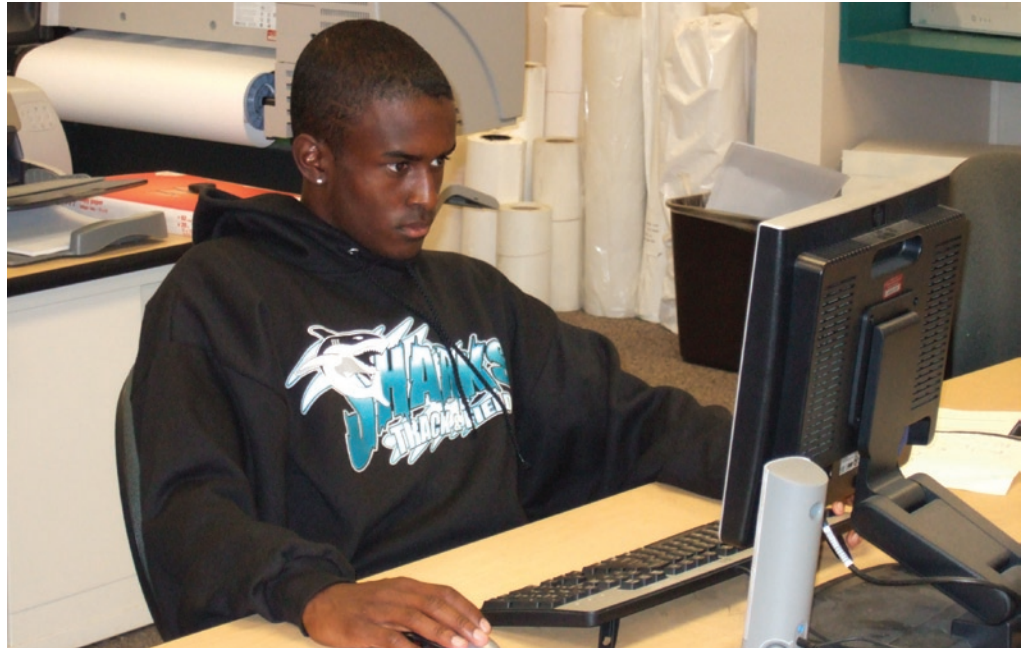
Project Summary

Santiago High School instructors have ignited a passion for lifelong learning among their students, particularly in the areas of science, technology, engineering, and math (STEM) education. Santiago High School students participate in project-based courses and exciting competitions that provide valuable exposure to student versions of the same tools used by practicing architects, animators, and engineers. Santiago students are prepared for future academic and professional success because they graduate from high school with a solid foundation of design and problem-solving skills.

Santiago High School, about 45 miles southeast of Los Angeles, is one of four comprehensive high schools in the Corona-Norco Unified School District. Santiago High School provides its 4,000 students with rich experiences in several career pathways, including an award-winning, state-of-the-art computer-aided design (CAD) engineering, architecture, and design program.

Each day, about 350 architecture, engineering, and design students at Santiago learn to apply their math and science skills to the design of buildings, homes, bridges, transportation systems, and cars. Santiago instructors are integrating Autodesk 2D and 3D design software into instruction, giving students direct experience starting with beginning courses in AutoCAD® software and advancing to classes in animation and 3D design. The objective is to simulate real-world challenges and solve them with student versions of the same tools used by professional architects, animators, and engineers.

The Challenge

Architecture pathway instructor Bill Brown and engineering pathway instructor Glen Stevenson are determined to demonstrate the value of pre-engineering and architecture courses to students, their parents, and school administrators who feel core curriculum instruction in STEM subjects is sufficient for students' future success.

"Math is abstract until you apply it to an actual problem," says Stevenson. "While it is important for students to demonstrate competence in core curriculum areas such as math and science, our courses show students the real-life applications of their math studies."

The Solution

Santiago High School uses Autodesk 2D and 3D design software to take advantage of the proven efficacy of project-based learning, while mapping to national standards. Both Brown and Stevenson strive to give their students compelling projects that integrate cutting-edge applications such as Revit® Architecture, Autodesk® Inventor™ Professional, and Autodesk® 3ds Max® software products.

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"Providing students with hands-on exposure to Autodesk technology gives them the skills they need for future academic and professional success in design-related fields," says Brown.

In Brown's pre-architecture courses, one of the assignments is to design a four-bedroom, three-and-a-half bathroom home on a specific lot size and in a particular style—such as Tuscan, Spanish, or Craftsman. Students begin with drafting and architecture classes in which they use traditional paper and pencil to visualize and conceptualize their ideas. To make sure their drawings are realistic, students are required to research various architecture styles before the drawing process begins.

Students then learn how to translate those ideas into CAD drawings using AutoCAD software. Once they've mastered 2D drawing creation, Santiago students put their design skills to the test by creating complete 3D models of residential homes using Revit Architecture software. With early exposure to Autodesk technology, Santiago students gain a firm grasp of widely used design and engineering concepts, such as reverse engineering and building information modeling (BIM), which represent a building's structural performance in a visual and intuitive way.

Model Real-World Performance
When they have mastered AutoCAD and Revit Architecture software, students begin to apply their design and critical-thinking skills to solve problems and hone—through experience—better techniques for designing a home. They use applications such as Autodesk 3ds Max software to visualize their ideas and test virtual prototypes to understand the engineered aspects of their buildings, from the load-bearing capacity of the structural design to the function and efficiency of heating, cooling, electrical, and plumbing systems. In the process, they learn to anticipate challenges that might occur before construction even begins, from framing that interferes with building systems to placement of windows for maximum daylight.

Collaborate for Success
Once students have acquired the skills necessary to digitally model a complete residential home within given space and style specifications, Brown takes their training one step further: He asks students to team up to design an entire street of homes. "They

have to work together to create a real-world neighborhood setting," says Brown.

This exercise helps students explore the kind of teamwork and collaboration that is required when each team is responsible for part of a whole, as well as the technical requirements of integrating very different types of information, from geometry to engineered systems' capacity for things like ventilation and water pressure.

In the 2007–2008 school year, Brown is looking forward to teaching his students how to design mixed-used buildings, which combine residential and commercial space to enhance a particular neighborhood or city block.

The Result
Santiago students have achieved impressive academic and professional success, and consistently surpass district, county, and state averages on the Standard Achievement Test (SAT) exam. A majority of Santiago students also graduate with honors by earning a 3.0 grade point average or higher.

Academic and Internship Success
While many go on to pursue engineering degrees at colleges such as California Polytechnic State University, some are recruited by professional architecture and engineering firms immediately upon graduation. Many students with a passion for 3D animation also find work in Los Angeles's burgeoning creative community.

Four Santiago students recently completed summer internships at Friedmutter Group, a Newport Beach, California–based architecture firm known for its casino designs. "The students' experience using Revit Architecture definitely got them in the door," says Brown. "Friedmutter's project managers tell me they are hoping to hire more students from our school in the future."

Santiago students have also leveraged their exemplary design skills to compete in intensive national programs such as Skills USA, an applied method of instruction that prepares America's workers for high-performance public-sector careers and technical programs. Santiago students frequently compete and place first in several Skills USA competition categories, including Architectural Drafting, 3D

Visualization and Animation, and Robotics and Automation Technology.

Students Teaching Pros
To further inspire their students to pursue careers in design, Santiago instructors also coordinate frequent field trips to professional architecture and design firms. Brown and Stevenson say their students have even taught these professionals a thing or two during these outings.

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Looking Forward
The instructors also note the positive impact their design courses have had on students' outlook concerning the future. "We believe that by teaching students real design skills using Autodesk technology, we can open doors for them that would not normally have been opened," says Brown.

He recalls one young man who was an average student and disengaged in school. After taking pre-engineering and architecture courses at Santiago and spending hours visualizing his ideas using Autodesk software, he discovered his passion and talent for design. He graduated from high school with three job offers and chose to work for a design firm while attending a two-year college—something the instructor says he would have never considered before his high-school design experience.

To learn more about Autodesk's academic solutions and programs, visit **www.autodesk.com/education.**

To download free* student versions Autodesk 3D products, including Autodesk Inventor Professional and Revit Architecture, and access sample curricula, join the Autodesk Student Engineering and Design Community today at **www.autodesk.com/ edcommunity.**

To learn more about Santiago High School, visit **www.cnusd.k12.ca.us/santiago-hs.**
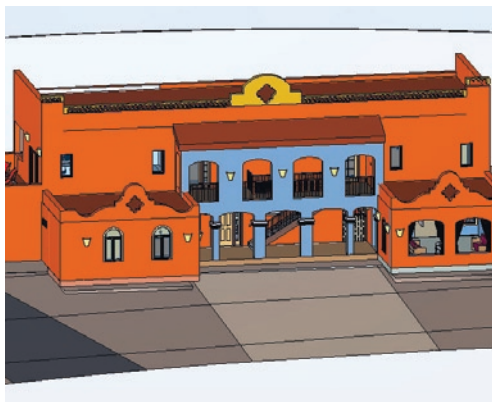
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