Building the Schools of Tomorrow: Germany’s Shift Toward Modern, Modular Education Spaces

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Germany’s school infrastructure has long struggled to keep up with growing student numbers, educational reforms, and modern teaching methods. Many buildings are outdated, too small, and poorly equipped for today’s needs. But local officials and educators agree: a good education requires good architecture. The concept of “space as the third educator” emphasizes that physical environments should support personal development and learning just as much as teachers and society do.

Modern education demands spaces that encourage collaboration, flexibility, and participation. These values aren’t new. Philosophers like Socrates, Humboldt, and Dewey all stressed dialogue, personal growth, and democracy as key educational pillars. Today, these principles are shaping a new generation of schools — and redefining what school architecture looks like.

The Cluster School Model

Traditional schools were designed around teacher-led instruction in isolated classrooms. Long hallways lined with identical rooms reflected this approach. But modern learning requires more than lectures. It needs open, adaptive spaces where students can work independently or in groups, engage with projects, and learn across disciplines.

Enter the “cluster school” model. Instead of fixed classrooms, cluster schools group learning areas with shared spaces for collaboration, quiet study, and relaxation. These layouts encourage social interaction, peer learning, and more personalized instruction. They’re also designed to evolve, accommodating future educational needs.

German architecture firm futur.drei, in partnership with modular construction company ALHO, has taken the lead in building these schools. Since 2008, their interdisciplinary team of architects, designers, and educators has focused on making educational buildings more sustainable, adaptable, and aligned with pedagogical goals. The idea is simple: students and teachers should feel at home, and the space should help—not hinder—the learning process.

Dortmund Leads the Way

The city of Dortmund exemplifies this new direction. Facing a growing population and rising student numbers, officials knew that conventional construction couldn’t keep up. So, they developed a long-term plan known as the “Dortmund Way,” which uses modular construction to accelerate school building projects.

According to Andreas Grosse-Holz, head of the city’s real estate department, Dortmund must build at least one new secondary school per year until 2035. To meet this challenge, they’ve quadrupled their annual school construction budget and leaned heavily into modular methods. Compared to traditional builds, modular schools take about two years less to complete, saving time, money, and resources.

ALHO’s process involves prefabricating 70-80% of each school’s components offsite, then assembling them quickly on location—even while classes are in session. This approach minimizes disruption and ensures high quality through controlled factory conditions.

Sustainability and Innovation

Dortmund’s modular schools aren’t just fast—they’re sustainable. The Heisenberg Gymnasium, for instance, is the first modular school in Germany built with “green steel,” which is made using 100% recycled materials and low-emission production techniques. This alone cut CO_2 emissions by 30% compared to traditional methods.

The schools are also designed for long-term efficiency: green roofs, energy-saving systems, and flexible learning environments that adapt over time. Teachers get spaces for quiet prep and collaboration, while students benefit from well-lit, well-ventilated, and inclusive environments.

A Model for Other Cities

Thanks to the success of these projects, Dortmund is now seen as Germany's modular construction capital. More than 200 school projects—new builds, renovations, and expansions—are planned, with most relying on modular systems.

Beyond the city, the impact is spreading. Dortmund regularly shares its strategies with other municipalities, helping to shift perceptions of modular construction from low-cost alternative to gold standard.

As ALHO's Sebastian Trautermann puts it, "Each project makes us better. We learn, we adapt, and we help cities build smarter." In Dortmund, that means faster schools, better environments, and a future-focused model that puts students—and sustainability—first.