

pulse

MOVEMENTS IN ARCHITECTURE

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Education as a challenge

A sculpture for learning in Cologne

by Architekturbüro Paul Böhm

Things one just has to capture –
interview with Prof. Eckhard Gerber

The open-plan classroom

Campus for medical technology
by Günter Hermann Architekten

ABB



Architecture sets an example: Marc Oei, Arno Lederer and Jórunn Ragnarsdóttir have already received a brace of awards for their educational buildings

The topic: Education as a challenge

pulse in conversation with Arno Lederer, Jórunn Ragnarsdóttir and Marc Oei

Nowadays, does an architect that designs school buildings inevitably have to address educational questions and debate?

Indeed, absolutely. There is a big difference between designing a Waldorf School or any other form of private school, a state school or a Christian one. It goes without saying that assignments such as these presuppose as knowledge of the respective educational system.

Given the trend to all-day education, school is going to enjoy a greater standing in German society. What opportunities does this open up to architects?

Architects can look forward to lots of new projects. In terms of content all-day schools mean a broader view of things, as their responsibility with regard to social integration will assume a significantly greater role.

Are clients now ascribing due importance to the influence a setting can have on the success of knowledge transfer and education?

Yes they are, but there is still a lack of awareness of the fact that schools are also there to help student's acquire social skills. By this you mean the areas that are not necessarily reserved for teaching – ergo, areas that until now have essentially been subsumed under communal areas. This is where social interaction takes place: Conversations about lessons combined with different questions and problems. Learning general manners, which are too a part of the educational canon, is also very closely associated with these communal areas.

We repeatedly hear that dwindling student numbers in Germany are reducing the chance of innovative school buildings.

This change in education is definitely encouraging people to reflect on how to use available space. This of course also includes dealing with existing structures in the event of dwindling numbers.

Is school architecture subject to contemporary trends and fashions?

Yes, bad school architecture. What is bad school architecture, though? Schools built on too tight a budget, or projects where the architect overindulges in his own formal notions. We also reject a one-sided consideration of end-user's wishes at the expense of durability: The possibility of educational requirements changing over the course of time should always be entrenched in the building.

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Individual learning as a result of forms of working being organised in a variable way: At the Müller-Guttenbrunn School in Fürth, the access area is at the same time a work area. (Design: Trapez Architektur, Hamburg).

From a teaching to a learning institution

For anyone involved with innovative educational architecture there is no escaping the current debate about schooling. It calls for doing away with the teacher standing in front of the class, making a case for individual, team-oriented learning structures. The following provides an outline of a school that with this in mind would be considered fit for the future, and explains how architects can support and promote these ideas in their work.

By **Dr. Otto Seydel**

At the same time as all-day schooling is gradually becoming established, a new perception of the role schools can, and indeed should play in the development of coming generations is emerging in Germany. It is becoming evident that, in contrast to the 1970s, the physical and sensory presence of schools as a place for learning is certainly attracting interest. The Italian education expert, Loris Malaguzzi expresses this sentiment in a nutshell: “Each student has three teachers: the other children, the teacher and the space.” A fundamental shift to be seen in educational theory is the evolution from a “teaching institution” to a “learning institution”, from “learning in step” to teaching that gives individuals greater personal freedom. This has consequences for school architecture.

That said it is worth first of all pointing out findings from brain research: Successful learning requires not only the mind, but the rest of the body too. This refers to simple factors such as “getting sufficient exercise”, “hearing correctly”, “having good eyesight” and “breathing freely”. These have, however, often been sorely neglected: Insufficient lighting, bad ventilation, over-heated rooms, cramped conditions in classrooms and terrible acoustics, all of which can prevent students from learning or at least make it much more difficult, and all of which can be avoided. For

new school builds, extremely high standards now apply, standards that can facilitate attentive handling of the learning environment. Old school buildings, however, pose serious problems. The consistent reduction of noise, including that on stairs, more light and fresh air, as well as sufficient space for movement, inside and outside the building should have priority over all other measures.

Learning “workshops”

Nowadays, our cell phones can tell us almost anything we could possibly need to know at any time and anywhere. The key word with being able to conduct one’s life is not “knowledge” but “ability”. This refers to activities such as: “independently procuring information”, using it to “solve problems”, “critically question” and “convey it in a comprehensive way”. Of course there will be no getting around the need to just practice vocabulary, terms and formulas – and to be able to ask the right questions. However, learning as the basis of education also includes:

- the amazing discovery of shapes and patterns, regularity and deviation, cause and effect
 - depicting something in a scene, image or text
 - learning from past mistakes and imagining new things
- Learning is an active and interactive process. Children and



Adam Monk



young people become aware that they are learning when they change perspective: in the one instance as listener, in the other as speaker. Cramped instruction rooms need to be transformed into large “workshops”, supplemented by exhibition areas and storage space. Outdoor areas extend this space, providing room for experimentation and inspiration, for a school garden, for example.

Changing organisation models

No child can learn alone. Learning requires role models, recognition and discussion. Yet at the same time: Each child, each teenager learns in a different way. Learning takes place in one’s own mind, in one’s own body. “Inclusion” is the current buzzword here, implying that each school should respect the uniqueness of each of its students and likewise use this diversity for mutual support. No one should be excluded. It is a matter of different manifestations of personal development, of physical and intellectual strengths as well as weaknesses. Thus “inclusion” not only aims to promote the integration of disabled students, but of students who could be subject to any kind of discrimination – due to their social or migratory background or their sex, to name just a few. There is one prerequisite for a constructive approach to such diversity: In order to facilitate learning and promote social skills, the way in which forms of working are organised must be variable. The rule of thumb for the allocation of time, to

which the spatial dimension should also respond, is

- 30% alone, students work by themselves – though they are not left alone, but are given supervised activities to complete.
- 30% in small groups, providing an introduction to collaborative work.
- 30% front of class, with the teacher or students presenting to the class.
- 10% in class, with students actually able to speak to one another.

Semi-autonomous sub-units

If a unit grows to have more than 120 members, the chance of everybody knowing one another decreases dramatically. Anonymity, diffusion of responsibility and vandalism all encourage one another. For larger schools the solution to such obstacles lies in semi-autonomous sub-units, which provide the students with a “home” base and are organised by fixed teams of teachers. This new kind of learning is, however, not possible with just two square meters per student and the conventional schoolroom layout with rows and rows of desks. The solution is “clustering”, a method which, among other things by using communal areas, creates additional space in a highly cost-effective way. Two to six classes can be combined in semi-autonomous units, giving students a “home base” and at the same time facilitating teamwork. Each unit has its own “identity”.

Micro areas that provide students with a “home-base”: Relaxation and concentration areas at the Tangen Polytechnic School (Norway), design by Danish architectural firm 3XN (above). Educational buildings – neutral “theatre stages” with a strong presence: the Rolex Learning Center at the University of Lausanne design by Sanaa (right).



Roland Halbe

The challenge of all-day schooling

In “old” schools the aim was to optimise instruction in lessons lasting 45 minutes. In today’s all-day schools, new timetables are beginning to emerge:

- Arrival subject to flexitime: reading, practice, playing, chatting
- Instructional lessons: students actively participation or front-of-class
- Eating and drinking, exercise and rest
- Individual time: development of personal interests and disposition
- Collaborative projects
- End of the school day, also subject to flexitime.

All-day schools require playgrounds and exercise areas, quiet work areas, football pitches and climbing walls, hang-outs, cafeterias with games and internet stations and much more. At the same time, these new areas can also be used for teaching elements for which the traditional classroom has no facility.

Tablet PCs and cultural learning

Tablet PCs will soon replace the contents of students’ bulging school bags, while self-correcting learning programs will put an end to the flood of worksheets. Even now, video material and computer simulations far excel teacher presentations, attaching even more importance to the teacher’s

function as a personal role model in their selection and interpretation of these virtual worlds. Media can only provide the students with “secondary experiences” and are not able to deliver the personal interaction required with other people and objects. This is where the “teacher” figure comes into play. Schools even need to “take one step backward” in order to facilitate the use of modern technology in a humane way. Technology offers support. Prior to, and when using perfect technological tools, one must develop one’s own senses, one’s own hands, and one’s own body. As such, given the tremendous rates of acceleration that are now possible, schools need to slow things down, allowing the sensory impressions time to develop, permitting a second and third look and awaiting that inner human impulse.

The introduction of tablet PCs will also render computer rooms obsolete. Making provisions for Wi-Fi points, projector brackets and cable conduits is enough. However, the rooms mentioned above – workshops, art studios, stages and (even in the age of the Internet) libraries – will retain their importance for this systematic deceleration and rediscovery of one’s own two hands.

Visualising the approach to resources

Learning is not reduced to a single dimension in terms of linguistics and mathematics but includes musical, kinaesthetic



Jörg Hempel, Zoëy Braun

Designed by Lederer + Ragnarsdóttir + Oei, the Walldorf school in Freiburg welcomes its pupils with a self-confident gesture (top). For the Science College in Jülich the architects at Hahn Helten conceived the main forum as a multi-functional space that can also be used for exhibitions and concerts (center). Playing and learning looking out over the roofs of Hamburg: The HafenCity School by Spengler-Wiescholek counters scarce urban space with a light roof terrace (below).



Florian Holzner

and spatial approaches. The more effective the links between these activities, the more comprehensive the retention of the material covered. Aesthetic education should not, however, be reduced to a supporting role that is supplementary to what is allegedly “real learning”. Culture is much too precious to be given such a function. The school’s architecture itself should contribute to the student’s aesthetic education. The interplay of light and colour, the sensory quality of the materials used, the spatial proportions; these are elements which can transform architecture into art. During the 10-15,000 hours any one student will spend in school in their lifetime, these buildings have a formative effect that goes beyond any formal instruction on art history. The school architect is therefore faced with a dual task. Classrooms must be subject to similar planning procedures as theatre stages: a neutral atmosphere offering diverse possibilities in terms of visual presentation. Just space, light and air. In turn, other parts of the building require all the more creative force: the school’s own “appearance” in the form of assembly hall, cafeteria, staircase.

The resource-saving use of building materials and heating energy in school architecture should be able to be experienced. Several technical processes are no longer visible. This should be an elementary subject in education – one that goes further than simply learning about sustainability. Displaying photovoltaic measurements from the school roof in the foyer is not enough. Even the largest display screen will go unnoticed within a few days. Student-led experiments should be used to make those processes which enable the school building to “function” comprehensible to them and the ecological balance based on three key components: Production, operation and disposal. Furthermore, the building’s structure should allow for uncomplicated changes of use.

The democratic school

These institutions must be a forum for the whole school community and need to be able to open up to them as a place for exhibitions, celebrations and the presentation of its results. Fields of learning outside school are penetrated, bringing in people from the “real world” as experts and critics. At the same time it opens up its own resources and facilities to the district as part of an “educational landscape”. “Building a school” is the touchstone for a “democratic school”, where representatives from each of the user-groups are involved in the planning.

Dr. Otto Seydel spent 25 years at the Schloss Salem School as teacher and principal. In 2001 he founded the Institute for the Development of Schools and has penned numerous publications on the subject of educational theory. He is currently an active voice in the discourse on school architecture, conducted by architects, education experts and members of management at the Montag Foundation, and soon to be documented in a book.

Cramped classrooms become large “workshops”, in which learning becomes an active and interactive process – youth and cultural center by Dorte Mandrup architects in Hellerup, Denmark (right).





Transparency and a high level of visual contact: Grouping different classes in a single cluster creates what are known as “learning islands” that provide interactive hubs and points of interaction.

The open-plan classroom

The change in teaching and learning concepts is already manifesting itself in new spatial concepts for tomorrow's schools. The traditional classroom is continuously being extended by additional space to accommodate increasing student numbers and promote individual learning, the key words here being “schools within a school” and “clustering”. However, architects are also thinking about “digital classrooms”.

By **Dipl. Ing. Florence Verspay** Photos **Jörg Hempel**

Students working independently enjoys an increasingly high standing among present-day educational concepts. These encourage individual advancement and advocate integrated instruction across classes and age groups. The implementation of this inclusion principle in integrative school concepts necessitates a change in our concept of schools and their spatial requirements. This change in teaching and learning concepts and the associated expansion of all-day schooling call for very specific spatial policies. Aspects such as free time, movement, relaxation and quiet must become an integral part of the structure of day-to-day school life. Taking as an example Heisenberg High School in Bruchsal, which was designed by Hausmann Architekten, these aspects will now be considered more closely.

The “Open-plan Classroom” research project conducted by Professor Frank Hausmann at Aachen University of Applied Sciences formed the basis for this particular venture, which was completed in November 2010. The theoretical findings with regard to the redefinition of learning space the project delivered were put into practice for the first time in Bruchsal, the main focus being on the educa-

tional orientation of Heisenberg High School. Workshops with teachers, students and parents served to define the key criteria for the individual spaces. This enabled the areas envisaged in the spatial to be examined with regard to the school's concept and be correspondingly configured and implemented in the design. Several individual areas were combined to create larger spaces, such that the new ‘center’ of the school is a cafeteria, recreational area, teaching room, foyer and events venue at one and the same time. Heisenberg High School was designed as a U-shaped building with a protected school yard in the middle. The single-storey side with its own library is reserved for senior classes, while the two-storey wing houses classrooms for specific subjects and administrative rooms, and on the upper storey classrooms for the lower and middle school. The interactive center of the school is located between these two sides, right by the main entrance.

Small, manageable learning units

Given the numerous demands made on classrooms, zoning them and relocating individual activities in other spaces seemed a sensible approach. Concepts featuring the linking of available rooms and the formation of



clusters, create new teaching areas, which can be adapted to suit varying student numbers. This idea of developing “schools within a school” – ergo smaller teaching and learning units – where students can feel at home lends itself particularly well to larger schools. Which particular units are combined depends both on the size of the school and its educational concept. Some newer schools combine forms in different academic years in a single unit, with appropriate work facilities for the teaching staff. Some schools, as a rule smaller ones, only pool the class units in clusters, reserving a central place for the teaching staff. In schools that teach predominantly at secondary level it is more common to form clusters in line with the subjects being taught and/or work in accordance with the staff room principle. There are various approaches with regard to the positioning of teachers’ facilities. There is a basic tendency to abandon the central staff room in favor of separate work and communication areas.

The creation of clusters requires a central point of communication which enables independent work in groups, and inter-class models. Transparency and a high level of visual contact assume an important role here; not least because they create a communal spirit and social control,

which is imperative for the cluster system to function. Depending on the size of the available areas the separation and designation of loud and quiet areas is also a sensible approach in satisfying different requirements. Each individual area also requires its own corresponding lighting concept; space intended for retreat and concentration, for example, needs different lighting from a classic workstation.

Acoustics solutions and network access

Learning areas in a school can also be extended by using communal areas for activities in the class schedule and by furnishing them with this in mind. However, this is something that must be taken into special consideration with regard to the fire prevention concept and be clarified on a case-to-case basis considering local fire regulations. As a rule, solutions can be found to enable access zones to be used as learning space. One possibility, for instance, would be to combine larger, self-contained units measuring 200 or 400 sqm, to avoid having to design corridors to meet the specific requirements.

Acoustics represent another, very important aspect when it comes to using access areas, in particular because there

Heisenberg High School in Bruchsal was designed as a U-shaped building with a protected schoolyard (top). On the upper storey, four classes are grouped in a single cluster (right).



Layout of ground floor



Layout of upper floor



were previously no stipulations for them in terms of acoustic requirements. Acoustic measures are indispensable when it comes to extending teaching space into this area and with regard to project planning and cost compilation should be taken into account from the outset.

With regard to lighting and electricity and network connections the access zones must also be fitted out appropriately. The trend toward providing classes with their own sets of laptops, which can be used at different workstations, goes hand in hand with the extension of learning areas. In addition stationary, networked workstations, where documents can be printed, are required. In this context fitting out computer work rooms intended for this purpose alone becomes superfluous, making the space earmarked available for other uses.

On the first storey of Heiseberg High School learning clusters comprising four classes at lower and middle school level are grouped around a shared learning island, which is regarded as a quiet working space. This is in the middle of the building and is illuminated by patios affording a variety of vistas. The four classes all have direct access to their respective learning island. One cluster accommo-

dates a total of four classes from two consecutive academic years. Glass doors make for a high degree of transparency throughout the building, promoting a sense of togetherness. Each cluster can be accessed via three internal open stairways. In the event of fire, the building can be exited via an outdoor emergency exit balcony, making the access zones more flexible in terms of use and furnishings. They are each grouped between the patios and with fitted seating offer copious space for learning and interaction, thus forming a loud alternative to the learning islands. Each of the clusters features a teacher's base which provides the teaching staff with suitable work facilities within easy reach of the students, in turn facilitating teacher-student interaction.

Florence Verspay has a degree in Engineering and was a research assistant on the "Open-plan Classroom" research project headed by Professor Frank Hausmann at Aachen University of Applied Sciences. Since 2008, she has been working at Hausmann Architekten where she is responsible for the conception and implementation of school projects.

A sculpture for learning in Cologne

Somewhat hidden behind the large buildings on the campus of Cologne University stands the new seminar building designed by the architect Paul Böhm. The sculptural edifice made of light, bush-hammered exposed concrete provides students with an inviting environment, as well as reduced walking distances. Clear lines and materials characterize the building. The architects' design vision is manifested in the smallest details – as demonstrated, for example, by the panels adorned with philosophical quotations.

By **Ralf Johnen**

A student pores over his books in an empty seminar room. And in the foyer on the first storey, two freshman have set up their laptops and are looking pensively through the glass façade onto the fall campus. It is ten past nine on a Friday morning.

Paul Böhm smiles as the scene is depicted to him. He is asked whether the architecture may have something to do with the fact that students voluntarily get to the university before the day's lectures even begin. The 52 year old doesn't hold back with his answer: "Yes, I think it does. After all, with our design we tried to make the building as attractive as possible, creating a place to spend time." This begins with the seminar rooms, flooded as they are with natural light, and continues out into the corridors, whose facades are made entirely of glass and which Böhm conceived as communicative transition areas, thus creating a self-evident function. Böhm also paid particular attention in his choice of materials. This building's qualities did not escape the notice of the Federal Chamber of Architects, which selected the new edifice as one of Germany's 20 entries into this year's International Architecture Biennial in São Paulo.

An inviting environment

Those familiar with Böhm's architectural language know that he has a special penchant for one particular building material: concrete. In this case light, bush-hammered exposed concrete, which he has used for the seminar building's entire façade. The use of chisels attached to electric or air hammers to finish the concrete surface reveals the raw charm of this particular variety of concrete, the façades taking on the appearance of natural stone. In structural terms this choice of material meant that all thermal insulation had to be installed on the interior.

Böhm appears to have taken something of a risk in using his favorite material on the university campus, for even in Böhm's eyes the arts faculty, library and other nearby buildings make the campus into a concrete jungle. Built 50 years ago to, as the saying goes, suit the prevailing tastes of the time, it is now almost unanimously looked upon with a certain abhorrence. So Paul Böhm took on the assignment with the aim of dividing up and structuring the spaces so as to lend the buildings an inherent cadence. The transition between narrow and wide spaces was

Several self-contained edifices together create the new seminar building. In order to make the light, bush-hammered exposed concrete façade, the entire thermal insulation had to be installed on the interior.





Helko Heinemann

intended to create new areas, where interaction was also possible – above and beyond the boundaries between different academic disciplines. Böhm's complex design consists of a number of self-contained buildings, between which the expansive glass façades transform the resultant half-open spaces into junctures to the outside world, offering themselves as reading and recreational areas. Creating an inviting environment where students would want to spend time was of the utmost importance for all those involved in the planning. This was not only because in neighboring edifices some classes are held in rooms with no windows at all, but also because the new building was financed almost completely by tuition fees – from students for students. Thomas Mayland, project manager for construction at Cologne University also emphasizes that the 12-million euro being accepted by students and staff was of the highest priority for the university. Ironically, however, to a certain extent the building is yet another

relic of the past, as tuition fees have been abolished again in North Rhine-Westphalia. There will be no more projects like this one.

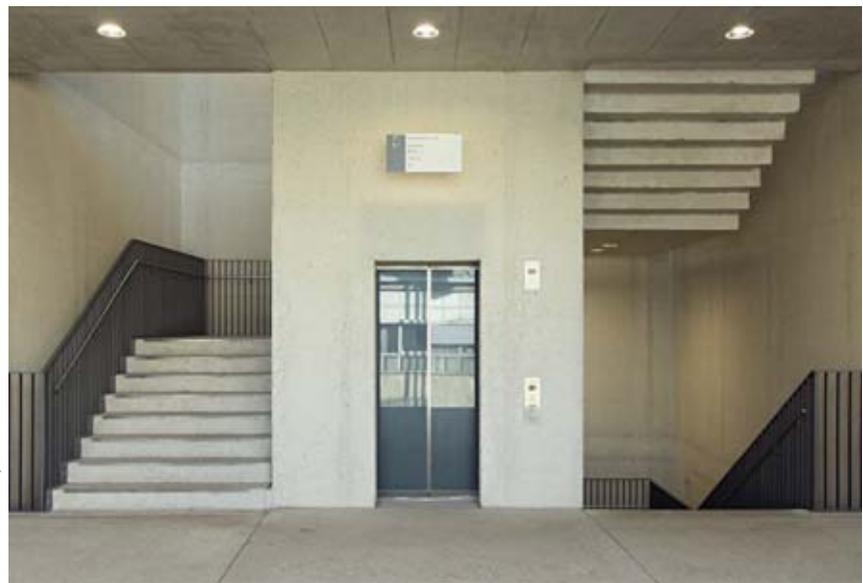
Academic pathos meets understatement

In the future, though, those in favor of tuition fees will be able to point to the Böhm building as a prime example of a successful implementation of a service philosophy. This begins with the plaza Böhm created in front of the seminar building. At the southern end of the ground floor the footprint of the edifice gradually retreats, creating a free space beneath the canopy, where, depending on the weather, chairs can be put out. On the other side of the glass façade there is an adjacent café, which students refer to as stylish. It is now a well-established meeting place. Approaching the entrance from the forecourt, one has to step through a solid larch-wood door, which makes entering the building a ceremonial act. A touch of aca-

Inside the light, bush-hammered exposed concrete surfaces give the impression of an outdoor space, and meet expansive wooden surfaces (top). Polished screed, benches that emerge from the concrete wall and upright tables make for an inviting setting (right).



Heiko Heinemann, Chris Schreiber-Heinemann



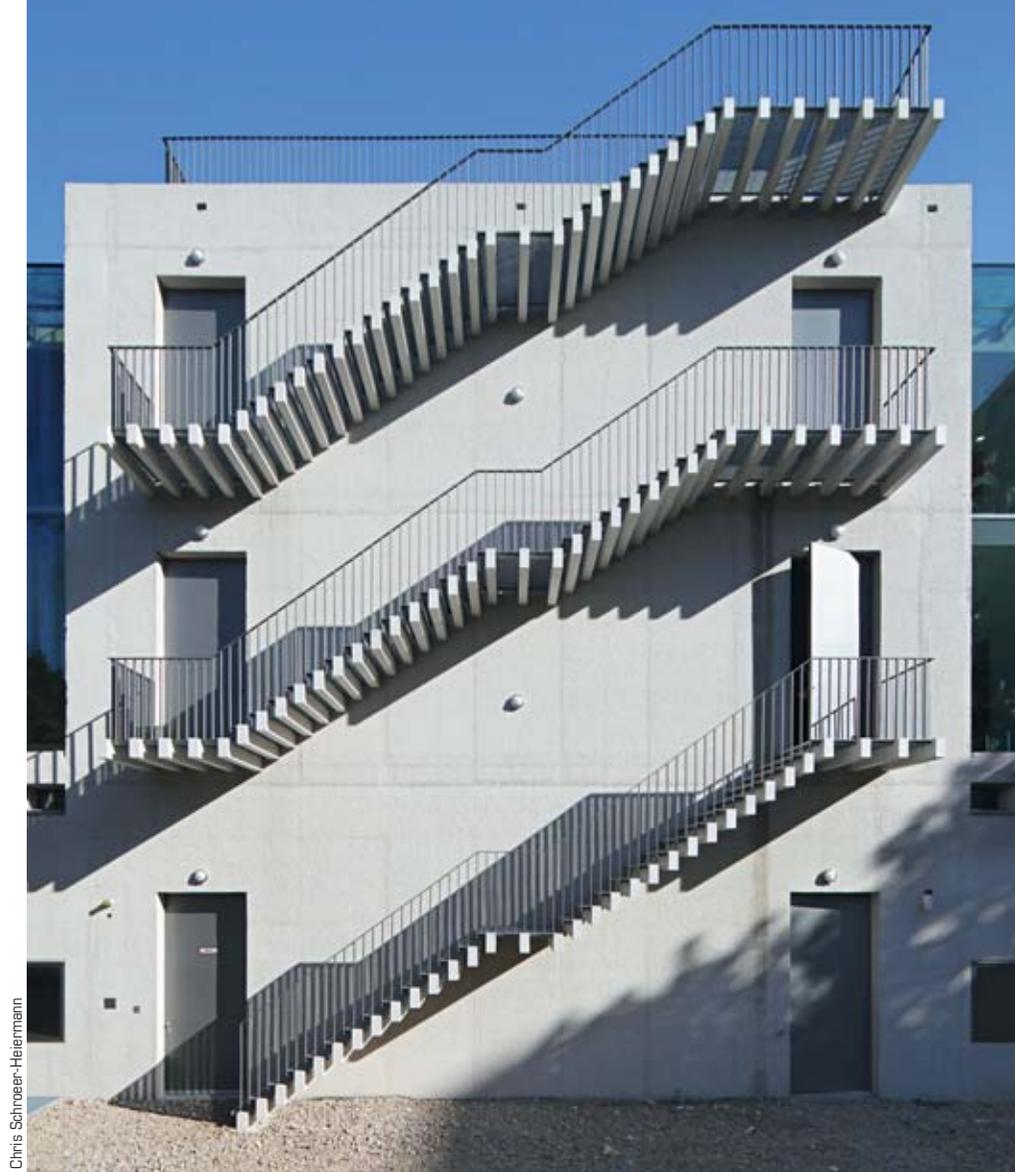
dem pathos that inside is quickly superseded by elegant understatement: The walls and ceiling are made of the same solid concrete as the façade; a hand-finished variety that according to Mayland “takes on a stone-like quality”. The polished concrete floor incorporates terrazzo elements, while the seminar rooms themselves – spread over four floors – are the only spaces with dark parquet flooring.

The short walkways between rooms make for an impressive division of space in the building. On the left-hand side just a few steps lead to the open-plan café. The large lecture hall can be found on the right, and if needed can be combined with a small antechamber to create a formal setting. Behind it are the new offices of the university’s General Student’s Committee, whose move here was a condition for the funding of the project from tuition fees. As Böhm emphasizes, alongside functionality and minimalist design, a further requirement shaped the project: student

comfort. The locker areas are just a few steps away from the seminar rooms, the building is equipped with WLAN, and is barrier-free. There is Braille script on the bottom of the banisters underside for the visually challenged.

Light larch wood makes for high-quality acoustics

Böhm explains all of this sitting in a bay-window at his family-owned home in the exclusive Cologne district of Marienburg. His father Gottfried, the renowned architect of Catholic churches, who is now 92 but still comes to the studio every day, worked here too. It was in this very studio that Paul Böhm designed the new central mosque in the Ehrenfeld district of Cologne. The architect was also commissioned with the construction work as well, until in October 2011 there was a clash with the developer, since when there has been an on-going dispute between the two parties. The mosque was intended to be ready for use in May 2012.



Chris Schreier-Heilmann

Sharp edges and clear lines

Böhm stresses that he prefers to plan all aspects of a building with his team. However, the task of coming up with a concept to ensure that the seminar rooms, with their vast amounts of concrete and glass were duly resonant, was left to the acoustics experts. Their solution was to cover the walls with larch wood featuring precisely calculated special acoustic perforations. The result is dumbfounding. The installation of sophisticated technology may be extremely important in terms of functionality but tends to prove incompatible with lucid design. However, at least the switches by Busch-Jaeger enable Böhm to continue his architectural language. “They are very precise, simple, and austere. That suits me down to the ground.” Böhm’s signature is evident in a particularly attractive way in the stairwell, where the handrail is embedded in the concrete and the requisite recesses above it create clear lines. The steps are also distinguished by their sharp edges, finished with steel fittings, which lend the struc-

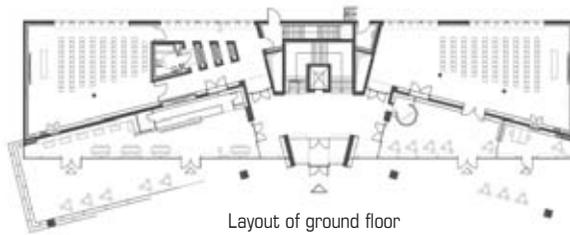
ture elegance and increase their durability – another essential requirement for the building, where hundreds of students crowd the corridors by late morning. With more than 45,000 students enrolled at the university things are not going to get any quieter.

Some have referred to an affinity to Peter Zumthor’s 2007 Diocese Museum “Kolumba”, also in Cologne, and a building that Paul Böhm holds in very high esteem on account of Zumthor’s innovative approach to concrete and his use of materials, and because the architect was highly successful in opening up spaces, drawing clear architectural lines, and manipulating natural light so as to create an interplay with the colors of the external façade.

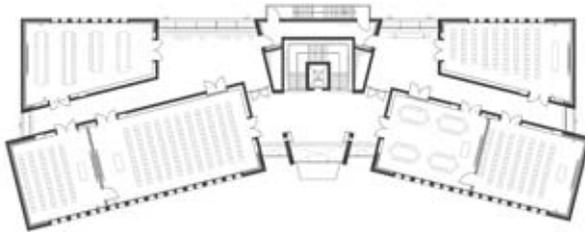
Lao Tse quotation on the banister

In conclusion, Böhm confesses that coincidence sometimes takes on an inspirational role in his work. The bench on the first floor, for example, met with some skepticism dur-

A new forecourt has been created in front of the seminar building. Here the footprint of the edifice gradually retreats, creating a free space beneath the canopy, where, depending on the weather, chairs can be put out (top). The building has four storeys. The emergency exit staircase is at the rear of the building’s access core.



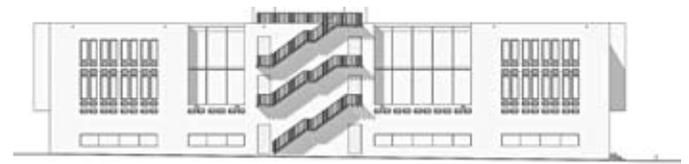
Layout of ground floor



Layout of second floor



Site plan with university campus and the new seminar building



View from the west



View from the east



Section

ing the building's final inspection: In theory, a child could have got onto it and climbed over the banister. So new ideas were needed. "I was reading a book on the philosopher Laozi at the time," Böhm says. One particular quotation caught his attention, which would be very fitting in an academic building. It begins: "To know that you do not know is the best. To pretend to know when you do not know is a disease." These lines by the Chinese philosopher were engraved in a panel, screwed into a frame and used to break up the barrier they were required to install. On the other side there is also a quotation by the German intellectual and philosopher of the Enlightenment Albertus Magnus. Two pleasant aperçus that of course come across as anything but improvised.

Project partners

Client

University of Cologne

Architect

Architekturbüro Paul Böhm, Köln

Construction Phase

2009-2010 (2008: 1st prize in competition)

Integrated products by Busch-Jaeger

KNX System to control heating and lighting;
future® linear switches

Vorarlberg federal state gets new school

The Austrian federal state of Vorarlberg is known not only as a tourist destination but also as the home of sophisticated and ecologically sustainable architecture. Broger Architekten, for example, who were commissioned to refurbish a secondary school, demonstrated that good insulation and the use of certified, local products and materials can achieve astonishing things when it comes to carbon footprints and energy efficiency.

By **Lasse Ole Hempel** Photos **Adolf Bereuter**

The Bezaun community in Vorarlberg sits at an altitude of 650m. The region in the depths of Bregenzerwald lives off agriculture and tourism, and with less than 2,000 people living in an area of 34.3km², is relatively sparsely populated. The three-storey building housing the secondary school and polytechnic school buildings has stood in the center of Bezaun community, right next to the village church, since the early 1970s. The school itself and the adjoining gymnasium were reinforced concrete constructions, whose basements suffered considerable damage from flooding in August 2005. Furthermore, the existing building was outdated in terms of thermal insulation and fire prevention, and with regard to size the gymnasium no longer corresponded to the criteria for a standard school gymnasium.

As part of the alterations it was also decided to demolish the neighboring music practice pavilion, replacing it with a new edifice that satisfied the need for additional space. The basement of the building's southern section was so badly damaged by the flooding that only the building carcass remained, meaning that it had to be completely rebuilt. The first construction phase of the project began in summer

2006, and the new secondary school in Bezaun was opened in 2008. The cost of the project totaled approximately six million euros.

Multipurpose hall complete with a small stage

In Austria's rural regions, the secondary school is the prevailing form of school. In contrast to Germany, for example, pupils do not necessarily complete their education here but rather have an opportunity to switch from secondary school to the higher Oberstufengymnasium level, or a vocational school. The Bezaun secondary school's catchment area encompasses five communities and has room for 300 pupils.

The alterations to the secondary school in Bezaun were the first major contract for Ralph Broger's architectural firm. Having graduated from the University of Graz, the architect worked as a project manager for the highly successful firm of architects Dietrich-Untertrifaller in Vorarlberg, before founding his own in 2005. Having designed a number of exclusive private homes and refurbished luxury hotels in the Vorarlberg region, Broger Architekten have now es-

As part of the refurbishment work the secondary school in Bezaun was given a new exterior façade made of insulated wood, while on the inside the conference room was redesigned.





established a good reputation. For the secondary school in Bezaú the architect envisaged extending the gymnasium to the north and west. To this end he had the north-facing external wall moved. Lengthwise the existing stage was shortened, providing more space in the auditorium, and the school janitor's apartment, previously located above it, was demolished. These measures enabled the old gymnasium to be converted into a multipurpose hall with a small stage and north-facing balcony, which also serves as a venue for events and concerts.

Multi-use

A new three-story, multipurpose reinforced concrete construction replaced the makeshift music practice pavilion. While the existing building is characterized by a wooden façade, the new edifice features a black eternit exterior; the pitched roof likewise stands in contrast to the new building's flat bitumen roof. On the ground floor, the new

edifice, which an articulation links with the school building and gymnasium boasts a spacious foyer, from which a seminar room can be created by means of a mobile wall system. The music practice area has been relocated to the upper floor.

Exemplary ecological profile

The level of the courtyard has been raised to that of the hall, creating space for underground parking for 16 vehicles. The courtyard itself is accessed via a ramp, and the construction of a lift at the interface between the old and new buildings makes the entire complex completely disabled-friendly. The old school building was given a new exterior sheath with an insulated wooden façade, new wood and aluminum windows, and insulation in the ceiling of the top storey. A controlled ventilation system was fitted for improved comfort and to prevent the loss of warm air. This had an extremely positive effect on the

From the classroom to the practice room: The music pavilion has several communal rooms (top). The consistent refurbishment work and the complete renewal of the electrical fittings has enabled the school to significantly reduce its energy consumption.



building's carbon footprint: Its specific heating requirements have been reduced by 162kWh/sqm of usable space, or 86 percent. The resultant CO₂ emissions were also reduced in comparison with the old school prior to refurbishment. The refurbishment work was conducted in accordance with ecological criteria; the architects used no PVC for the interior fittings and used low-emission varnish and adhesive. They also used local wood (white birch) and the insulation material came from renewable resources (wood and cellulose).

The materials used met ecological construction guidelines. Furthermore, the electrical fittings were completely renewed. The blinds and ventilation system are controlled by the new Busch-Jaeger KNX system, which ensures that even in summer the ambient temperature never exceeds 21°C.

Project partners

Client

The municipality of Bezau

Architect

Ralph Broger Architektur

Building services engineering planning

E-Plus, Egg

Integrated products by Busch-Jaeger

KNX System to control the blinds and ventilation technology throughout the building.

The “universal center of medical technology” and its campus

In recent years the town of Tuttlingen has rapidly become a popular choice for companies in the medical technology sector; and Günter Hermann Architekten are a part of that success story, having recently converted a former factory into a new university campus. Respectful of their history, two existing buildings were subjected to renovation work, and a new edifice added. The design concept was based on a dialog of opposites and offers medical technicians of the future a diverse learning environment.

By **Ulrike Nicholson** Photos **Zoey Braun**

The town in the upper Danube valley and “its” architect have always enjoyed a close relationship: After leaving school Günter Hermann, who grew up in Tuttlingen, moved to Stuttgart to study before in 1977 opening his first architectural studio. Yet he still maintained close contacts with his hometown, discussing, providing advice on, planning and completing over 30 buildings there.

The university campus, which was completed in 2009, is Günter Hermann’s contribution to ensuring Tuttlingen remains competitive and viable for the future. Given the fact that it is home to almost 600 companies in the medical technology sector, Tuttlingen now claims for itself the status of “universal center of medical technology”. As a new university center – an offshoot of Furtwangen University – Tuttlingen now offers students an opportunity to study, among other things, for a Bachelor’s in Medical Technology. The first students will graduate there in spring 2013. What could counter structural problems better than regularly producing new medical technicians? Even the location chosen for the new campus highlights the importance of the university’s presence in the town, for it is not –

as is often the case – on the outskirts of the town but can be found directly in the heart of Tuttlingen. The site of a former factory on Kronenstrasse, which had been empty for a few years, presented itself. The original edifice was built as a shoe factory in 1897 and later extended in 1954, when the old factory was converted into the premises of a high-tech company, which from then on manufactured medical instruments there. And two years ago, in a period of just five months for planning and construction, architect Günter Hermann transformed it into a university.

Entrance moved to inner courtyard

Today, the brickwork and 1950’s extension continue to dominate the street-side view of the building just as before. The condition of buildings, on the other hand, has undergone enormous changes: While the brick façades were restored with care and respect for their history, the sheath of the extension gleams with new aluminum panel cladding. The entrance to the building also underwent some changes. When it was a factory this was on busy Kronenstrasse, but Gunter Hermann decided to move the entrance to a quieter location, namely the building’s generous courtyard, which

Architectural eras side by side: The new building by Günter Hermann in front of the 1897 factory buildings still affords views of the old brick façade.

HOCHSCHULE CAMPUS







Facing the road, the old brick building and the 1950s annex dominate; the latter was finished with a new sheath of aluminum panels (left). Arched windows and a yellow coat of paint dominate the interior of the refurbished gründerzeit building (top).

he felt was the only way to create an entrance fit for a university. And that is not all: Hermann was also able to convince the developers of the need for an extension, which is now positioned in front of the Wilhelminian style building and among other things features an inviting foyer.

From the new entrance there is a fascinating view of the university, as three edifices from different periods engage in an architectural dialog: While the extension's newly clad façade does not deny the 1950's, the clearly-structured, exposed concrete front of the adjoining new edifice typifies contemporary architecture. Similarity in the color of the two buildings' fronts creates a pleasing, harmonious co-existence. From this particular perspective, though the factory dating from the turn of the 19th century is behind the new structure, it is still visible through the transparent grid of concrete and glass, and rounds the ensemble out.

Restrained colors and materials

On the inside of the new wing as well the high-contrast juxtaposition of the former brick external façade, which is now an internal wall, and the new layer makes Hermann's architectural concept clear. The architect consciously chose very restrained materials and colors for the extension: In contrast to the playfulness of the shaped parapets and arched windows, white paint for the ceilings, light linoleum and granite floors, glass and a wealth of sheet steel dominate the new, open-plan storeys, whose loads are dissipated by columns and the load-bearing interior façade. Spread over four storeys there is a reception area, a foyer with a secretary's office, and recreational areas for students, while the existing buildings now accommodate lecture theaters and seminar rooms, the library and administrative departments. As far as space was concerned the conditions for the conversion could not have been better: Given their

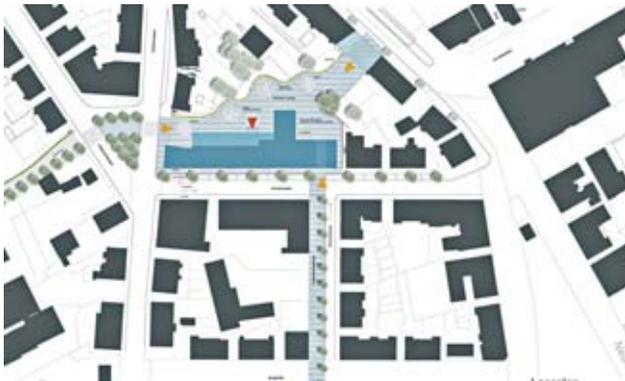




View from the factory on the street Kronenstraße



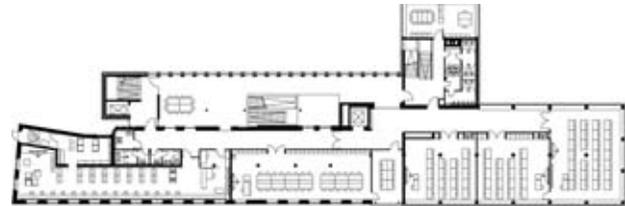
View from the new university campus



Site plan



Layout of the ground floor



Layout of upper floor

The extension is dominated by a white coat of paint on the ceilings, light linoleum and granite for the floors, as well as glass and a lot of sheet steel for the new levels. The former brick façade of the old building has become an inside wall (left).

dimensions and proportions, the halls, where in former years the production line would have been, were best-suited for use as lecture theaters. Lightweight dividing walls were erected to partition off smaller rooms such as individual offices. The cafeteria is now located on the ground floor of the 1950s building, looking out onto the spacious courtyard and affording a view of the new green space designed by Berlin-based landscapers, W+P Landschaften, as well as of some of the aging neighboring houses.

The campus marks the beginning of a transformation for the entire district, which is a designated refurbishment area, for which the urban developer Albert Speer Jr. is currently working on a pursuant master plan. There are plans for a second construction phase in the near future which envisage further extension of the university campus to include additional lecture theaters and a student residence. Günter Hermann has already produced a preliminary draft.

Project partners

Client

The town of Tuttlingen

Architect

Günter Hermann Architekten, Stuttgart

Size

Gross surface area: 6,250 m²

Gross volume: 22,340 m³

Integrated products by Busch-Jaeger

Building control using Busch Comfort-Panel®



Die Baupiloten

Inspiring educational worlds

Learning is increasingly being seen as an holistic activity and the demands on education buildings are changing accordingly, surrounding expanses of greenery and urban areas are taken into account, and campuses turned into animated, communicative places.

The “Baupiloten”: Children’s research workshop, Hamburg

Children particularly enjoy researching natural scientific phenomena in play, that the environment is stimulating and the atmosphere right. The “Baupiloten” have long since known that design plays a special role in this. Each semester, this collaborative project between the Technical University in Berlin and architect Susanne Hofmann provides students with an opportunity to realize a genuine project in the education sector from scratch. Several Berlin schools have already benefited from the creativity and commitment of the students, who, despite tight budgets, achieve extraordinary results. For the Gut Karlshöhe Environmental Center in Hamburg the “Baupiloten” are now working on a design for a children’s research workshop together with the teachers there. They divided the historical stable into four areas that lead into one another and are named Earth, Fire, Water and Sky. In the sturdy “earth room” children can make and build things on their own. In the adjoining “fire kitchen” they can learn about mineral extraction, while boasting a cool design the water area serves as the research workshop’s laboratory. The little explorers are welcomed to the center beneath a “cloud in the sky”, a bright, scattered structure comprising lights, and when they are done experimenting they can relax on sheepskin-covered beanbags.

Molestina: Ruhr University Bochum

As a result of numerous conversions and extensions since it was founded, the Ruhr University campus has lost its original clear structure. A complete re-planning of the complex seemed inevitable. The centrepiece of the alteration work is the design of the central axis along the main building between the Uni Center and Audimax, which, the plans envisage, will also be partially refurbished or replaced by state-of-the-art new buildings. The consortium of Molestina and FSWLA emerged as the winner of the competition. Their concept defined the new “main thoroughfare” as a slanted level that not only links the existing structures with the new buildings, combining them as coherent whole, but thanks to the gradient also opens up unexpected perspectives of the surroundings.



Molestina

Cem kaptan architecture: Sisli High School, Istanbul

Sisli is on the European side of Istanbul, right next to the Bosphorus. A tranquil suburb until the 19th century, over the past century it has become one of the city's liveliest, most bustling areas. In the competition for the new Sisli High School the question of how to create an attractive learning environment that enhances students' concentration amidst the vibrant urbanity surrounding the planned location was of fundamental importance. In collaboration with Mustafa Tural and Yildirim Gigi, the Istanbul firm cem kaptan architecture came the closest to fulfilling the parameters outlined, and won the competition. With its iconographic U-shape and the ingenious stacking of the facilities, their design transforms the location in a difficult topographical situation in close proximity to a busy road into a place that simultaneously promotes learning and communication between students. An underground car park, with utility rooms above it, and the sports hall create an inner courtyard, which, with ground-level access to the cafeteria, offers students a variety of views of the surrounding corridors leading to the classrooms, and constitutes the communicative heart of the entire complex.



Cem kaptan architecture



Dorte Mandrup Architekten: Marthagården Kita, Copenhagen

Danish architect Dorte Mandrup has proved time and time again that she has a particular gift when it comes to creating environments for children and youngsters. In October 2011, together with Leth & Gori Architects, she won the competition for a new nursery to be built in the Frederiksberg municipality in Greater Copenhagen. The conversion and extension work will create a micro-cosmos of approx. 1,000 square meters. The free space between two historical villas is to be the setting for a new landscape that creates new relationships between inside and outside. Beneath the elongated, ramp-like structure there is a cavernous courtyard with an adventure playground on the roof. A series of underpasses create a network between the individual sections and are intended to inspire learning, playing, and relaxing. The design strives to create individual spheres for playing and learning, which provide a perfect compliment to the location's existing attributes. The competition jury praised the architects' "thorough analysis" of the space and their "sensitive coexistence" of old and new. The complex is scheduled to open in 2013.



Eight Inc: Malama Learning Center, Kapolei, Hawaii

A prize-winner at the World Architecture Festival in 2009 and honored with the AIA Unbuilt Award in 2007, the Malama Learning Center (MLC) was widely applauded even at the design stage. The charitable organization MLC, which is based in Kapolei, Hawaii has set itself the task of promoting sustainable lifestyles, an objective it duly pursued in this concept. With reduced energy consumption and the use of regional building techniques the architects aimed to protect both nature and their cultural heritage. In the design the natural surroundings appear to surround the building. Two wings linked by walkways span a path through the countryside. Along this axis transparent rooms kindle visitor's interest. The upper rooms, such as the amphitheater, can be extended to the outside. The MLC was to be open to school classes and the community. Due to a lack of funds, the celebrated design is yet to make it past the drawing board stage.

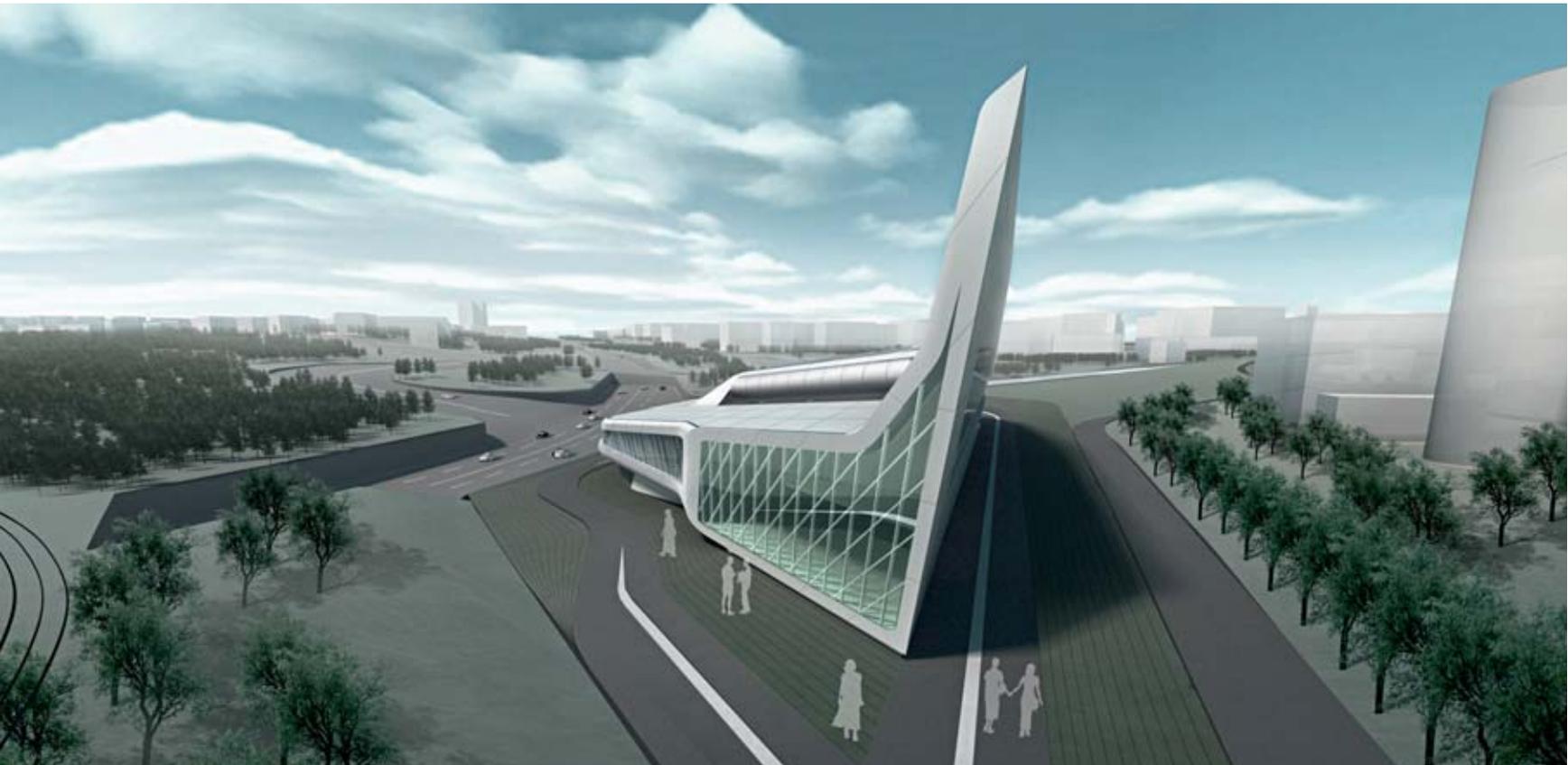
Zaha Hadid: E.ON Energy Research Centre, Aachen

The designs that won Zaha Hadid the competition for the new energy research institution at RWTH Aachen University certainly caused a sensation. Based on the topography of the section of the campus and the existing infrastructure, the dynamic, arrow-shaped design was intended to symbolically point to the center of the campus. Embedded into the sloping land, a footpath leads to the entrance and continues on the building's interior. The resultant interior passage provides access to the institute's two-storey teaching and laboratory area, as well as a number of seminar rooms, before seamlessly progressing into an open space, where ramps and stairs provide internal upward access.

Like an aircraft wing the end of the façade tapers to a vertical tip. Thanks to integrated wind turbines framed by spoilers, and transparent, high-efficiency solar cells the roof has natural ventilation, optimum natural daylight, and ensures the supply of energy. An underground channel, through which the air intake is heated or cooled depending on the time of year, ensures a pleasant ambient temperature. On account of the cost, in late 2009 Zaha Hadid's eccentric, energy-conscious design was scrapped and as such remains nothing more than a vision.



Zaha Hadid Architects



The things one just has to capture in a building...

As a representative of classical Modernism, the name Eckhard Gerber stands for clear and – in the best sense – functional architecture. His oeuvre now spans four decades. His architectural firm is currently able to demonstrate its extensive know-how in educational architecture further afield, in Saudi Arabia. pulse visited Prof. Eckhard Gerber in Dortmund.

By **Lasse Ole Hempel**

After graduating from the Technical University in Braunschweig in the mid-1960s, Eckhard Gerber went straight from being a student to a self-employed architect. He initially worked from Meschede, a town in the Sauerland region, before moving to Dortmund after winning his first nation-wide competition. Here Gerber Architekten have shaped the city's skyline with projects such as the Harenberg Verlag building (1994), the RWE Tower (2005) and, most recently, the alterations to Dortmund's U-tower. From the outset educational architecture has been one of the firm's core areas of expertise. The good reputation that Gerber Architekten have built for themselves here now reaches as far as Saudi Arabia.

Herr Gerber, having become established at home, Gerber Architekten are now in demand abroad too, especially in Saudi Arabia where you have recently won several competitions.

And we were not even the instigators. The trigger was rather a project we had completed in Germany that proved to be a great success, namely the university library in Göttingen, in 1993. Talk of its high qualities got as far as Saudi Arabia. We were then asked if we wanted to take part in

an international competition for the King Fahad National Library. Ever since our design landed us the contract we have been invited to participate in several other competitions to the point where we are currently planning five further projects in Saudi Arabia.

When planning projects such as these is it imperative to try to adopt an Arab mentality?

The culture is indeed very different, but my life is far richer for addressing the Saudis' ideas.

The first thing that comes to mind is the strict separation of the sexes.

It goes as far as restaurants and local transport. This separation is present in all areas of life, even within families. And it is just the same in the National Library: Women have their own reading area, which is reached via specified entrances and exits. In the library's function room they sit up in a gallery, where they cannot be seen from the men's area, which also has its own entrance. This may seem strange to a European but I'm sure that in the future there are going to be lots of changes in Saudi Arabia as well. Women have far more opportunities in terms of

Studying on a slope: With raised edifices and new paths down the valley Gerhard Architekten integrated the building for Würzburg-Schweinfurt University of Applied Sciences in the surrounding countryside.





Gerben Architekten

education, are allowed to study and have recently even been given the right to vote, although this is restricted to local elections. In the future the important changes here will emanate primarily from women.

So a library could be an important vehicle for change...

Indeed, and we have already made provisions for such changes: The barriers between the men's and women's areas, for example, can easily be dismantled, creating a single reading and work area.

German architects have a reputation abroad as being particularly reliable, is this also the case in Riyadh?

Yes, we stand out for our rationality and reliability when it comes to executing major projects. With regard to aesthetics, however, they prefer things to be a little more poetic. It is not rare to receive requests that go as far as stylistic borrowings from Greek temples. However, I don't think that this discrepancy is restricted to the Arab world: What people are actually looking for and what they really want, the atmosphere of a building, that feeling, is something most do not find in purely rational architecture. This of course touches on the question of

the significance of architecture in our society. In my opinion, architecture still receives insufficient attention and is attributed too little cultural worth.

It is noticeable that in Saudi Arabia you dare to include more "poetry" than usual in your buildings.

In principle, the King Fahad National Library is rational in its design – a simple, almost facile building. What makes the design and the project attractive is its juxtaposition of old and new. We kept the existing building and framed it with a new square-shaped structure. This new edifice constitutes the new image of the National Library in the city, a modern building, whose sail-shaped façade gives the impression that in places it is almost dissipating, as such making it lighter in appearance. When you then enter the building, you are suddenly confronted with the Arabic building dating from the 1970s, which is certainly of interest in architectural terms and has a certain atmosphere. With the concept we are attempting to reference deeper cultural aspects derived from Arab tradition. At second or third glance the framing, and the way things are observed, create important elements of the local culture.

Not only is the original 1970s building concealed behind the "sail" façade of the new National Library in the Saudi Arabian city of Riyadh, but exhibition areas, a restaurant, and a book store as well. Official opening: 2012.

Which materials meet in it?

The old building's façade is made of marble, while the new structure is made of glass, which is shadowed by the outer sails, once again emphasizing the principle of veiling. The sail motif is our evocation, on a metaphoric level, of traditional Saudi-Arabian tents. Thus in the interstices that now emerge, the new building, with its highly transparent and open atmosphere, once again stands in contrast to the, if anything, self-contained old building. Its roof becomes a reading room, which in turn is covered by the new roof. The building as a whole is also extremely striking in its dimensions – 144 meters in both length and width.

In Germany you are involved in several university construction projects simultaneously.

We have been successful in establishing ourselves in laboratory and institution construction, which is of course nice for us as they are interesting projects. They are, however, important assignments as well, supporting as they do education and research in Germany, and give us a basis for being able to remain competitive at all at an international level.

One example would be the new Würzburg-Schweinfurt University of Applied Sciences, where the first seminars were recently held.

The competition called for a new, spacious campus that would provide a new home for the Computer Science and Business Informatics departments, which were previously scattered across various locations throughout the city. The construction plot, a steep slope that fell 20 meters, presented a particular challenge. That said, the extraordinary location affords a spectacular view down into the valley and across to the distant hills. These are precisely the kind of details that one should capture in a design. We also endeavored to create paths down to the existing walkways and thus provide a geographical link between the new campus and the university buildings close by. With regard to our design the jury also commended our decision to embed the building in the surroundings.

It's true, future students will be able to look out on the countryside from their seminar rooms.

The building comprises two angled structures facing one another, which rise up above a two-storey pedestal and surround an inner courtyard. As the lower angle was in places mounted on pillars, the courtyard affords extensive views across the valley to the surrounding countryside.



Gerber Architekten; Hens Jürgen Landès; Christian Richters

In 2004, Gerber Architekten won the competition to design the Prince Salman Science Oasis in Riyadh: As of 2013, students will enter the "learning oasis" beneath a sculptural roof (top). The alterations completed, the U-tower in Dortmund opened earlier this year (left). The Harenberg high-rise designed by Eckhard Gerber has been a prominent feature of Dortmund's Sky-line since 1994 (right).



Hens Jürgen Landès

Gerber Architekten was founded in 1966 by Prof. Eckhard Gerber. The firm of architects currently has a payroll of 100 employees, spread across the studios in Dortmund, Hamburg, and Riyadh.

Natural stone

Materials are the soul of architecture. They lend character to buildings and atmosphere to rooms. But what do architects think of classic materials today? *pulse* sought their opinion.

Answers by **Brückner & Brückner Architekten**

What are the characteristics of natural stone that you have most come to appreciate over the years?

It is part of our philosophy that we look for the most suitable materials to be found in the location of the new-build. Natural stone always provides us with an authentic material that justifies itself.

It is for this reason too that natural stone appears to be experiencing a revival at the moment; it doesn't come across as uniform and contributes a particularly individual note.

This new interest in the material is extremely beneficial for us. As a natural product stone is a material that displays the diverse facets of nature in a highly impressive manner as well as reviving architecture in its strong regional connection. What we are seeing here is a product that has been grown.

Are there prejudices that natural stone must overcome as a material?

The archaic and rather heavy impression given by this material has been discredited by its use during the Third Reich and its monumental architecture. Fortunately a shift in attitudes has taken place in this respect. Of course, the material itself is innocent. We are also seeking to do away with the preconception that natural stone is expensive. In terms of cost, it is today most certainly feasible to operate in this area with the use of modern CNC technology or water-jet machinery. Whereas previously someone was required to stand and pry out a curve by hand, today one is able to ream out the desired elements and fit them together with great precision. These techniques open up an amazing array of opportunities.



Granitmuseum Bayerischer Wald

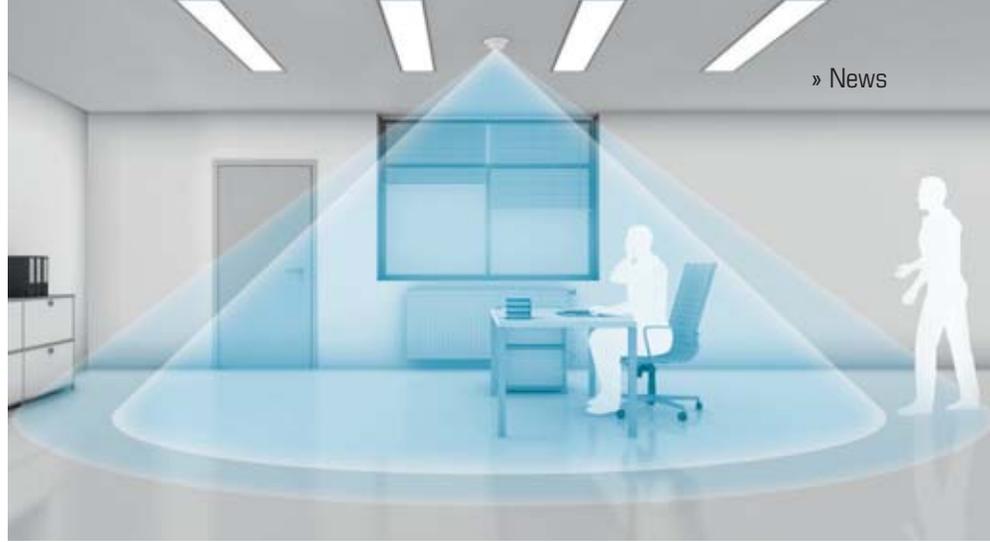




Busch Watchdog® Presence tech DualLINE – Controlling room climate and energy efficiency

A pleasant room climate, defined by optimum room temperature and illumination, raises the performance and motivation of pupils and students. At the same time, however, the energy costs in administration buildings, schools and universities are coming increasingly under scrutiny, since they place a heavy burden on the public sector. Yet it is precisely here that we find a large potential for saving costs: Through the control of lighting according to requirement, the consumption of electrical energy in schools can be reduced by up to 50 percent. The use of presence detectors such as the Busch Watchdog® Presence tech DualLINE is ideal for this purpose: Illumination is used only when there is someone in the room, and only when it drops below a pre-defined light intensity. Brightly lit hallways and

classrooms during the absence of people have been made a thing of the past with the presence Watchdog. Aside from the intelligent control of illumination, the Busch Watchdog® Presence tech models also offer additional options: Also heating, air-conditioning and ventilation systems can be controlled according to requirement. An integrated KNX bus coupler turns it into the ideal solution for KNX installations. The integration of lighting, heating, air-conditioning and ventilation into a system is an added potential for saving energy. Here the detection precision of the Busch Watchdog® Presence tech is far superior to that of all conventional movement detectors: It becomes active at the slightest movement, has a detection range of 360 degrees and a detection distance



The Busch Watchdog® Presence tech DualLINE safely responds to the slightest movement and can, aside from the lighting, also intelligently control the air conditioning in rooms.

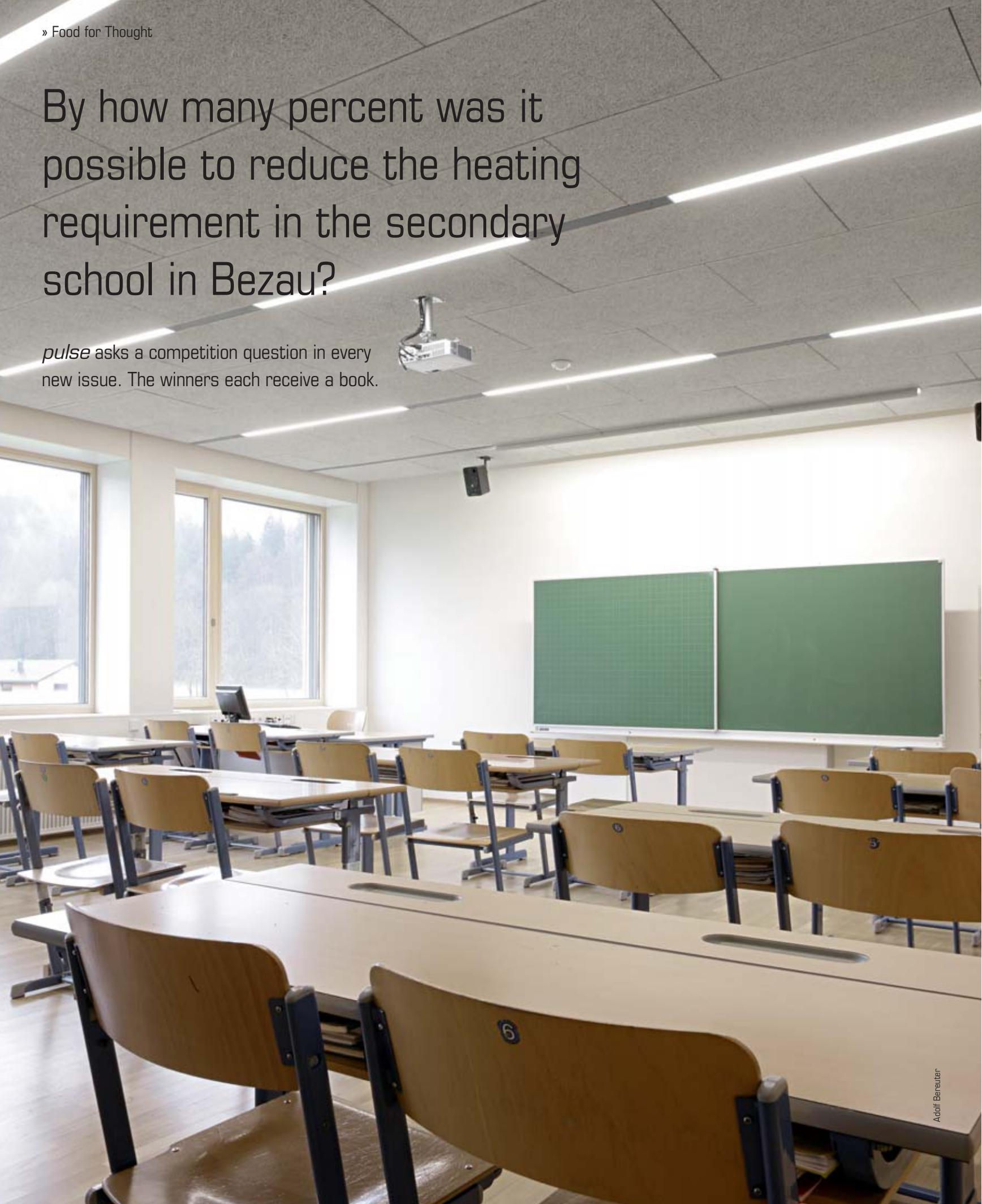
Especially in classrooms are the lights often left on – with Busch Watchdog® Presence tech DualLINE this is no longer a problem. It reliably detects movement and activates the connected consumers according to requirement. This makes it possible to save up to 50 percent in the cost of energy in schools.

of up to 8 meters at an installation height of 2.5 meters. The distance can be extended with additional devices that are connected in parallel. During commissioning the brightness values as well as the desired switch-off delay can be adapted to the prevailing conditions via the setting options. These values can also be easily adapted or adjusted at a later point in time. The Busch Watchdog® Presence tech DualLINE is equipped with an infrared remote control unit. It can be used to overwrite the current value and store the new value. The additional semi-automatic function – the light is switched on manually and switched off automatically by the presence Watchdog – meets the requirements for operation in school buildings. The automatic functions can be interrupted, and

connected consumers can be switched on or off directly via the conventional push-button or the infrared remote control. There is the additional option of adjusting the light to prevailing conditions in combination with a dimmer. Stairwell timers can be activated with a short-time pulse. The Busch Watchdog® Presence tech DualLINE now also makes logic functions as well as constant light control via two channels possible. The universal protective guard, which is available as an accessory for all models of the Presence tech range, safely protects against knocks and impacts, such as in sports halls, for example. The protective grid is discreetly adapted to the design of the presence Watchdog without affecting its function.

By how many percent was it possible to reduce the heating requirement in the secondary school in Bezau?

pulse asks a competition question in every new issue. The winners each receive a book.



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Yes, please. I would like to receive 'pulse' regularly, postage free.

Answer

It was possible to reduce the heating requirement in the secondary school in Bezauberg by percent.

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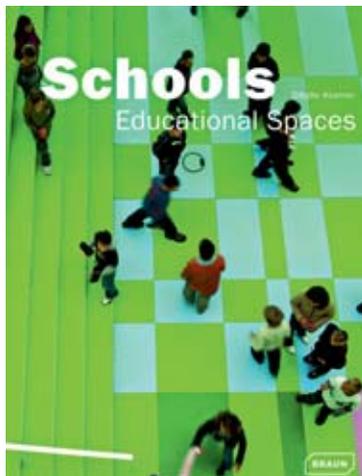
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The prizes:

Among all correct entries Busch-Jaeger will be awarding one copy each of the books **Schools**, released by Braun Publishing, and **Schulen planen und bauen. Grundlagen und Prozesse**, published by Jovis Verlag. The deadline for entries is February 29, 2012. The winner will be announced in the next edition. The winners of the last competition are Wolfgang Peters from Dessau and Detlev Heimann from Bargteheide.

Preview pulse 01/2012:

Hotels

Discover a world intended to remind guests of anything but home. pulse 1/2012 presents new, imaginative hotels.



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Movements in architecture

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