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## **“Look, see how the people smile...”**

**In Wolfsburg, you can learn science and technology by playing**  
by Manfred Lindinger

The white gowns are way too big for the twelve children in the little lab. But this doesn't seem to disturb them. With sleeves rolled up and the rubber gloves on, they shake the test tubes, pour liquid through filter paper, grind plant leaves in white pots or sit on the table and lean over a light microscope and watch the insides of plant cells. Deeply involved in the experiment, the seven girls and five boys listen to instructions which emit from computer screens which stand in front of them on the desk. The instructions tell exactly what to do next. Nearby you can see two teenage girls sitting at a table handling two big copper coils. They are experimenting with the mysteries of electromagnetic induction. Close by two boys plug in electrical cables and learn about the difference between alternating (AC) and direct current (DC). What's weird about these scenes is that the boys and girls are experimenting entirely on their own because they want to. School ended long ago on this particular Friday afternoon. No teachers stand nearby, just a young woman, with a red vest, who occasionally looks over the kids' shoulders.

These inquiring children are some of the youngest, and first, visitors of the biggest playground for inquisitive folks in Germany —phaeno, which is now in full operation since its opening in Wolfsburg last Friday. Inside of the futuristic, 16 meter high concrete building--designed by the Iraqi architect Zaha Hadid and close to the main train station – resides enough room for visitors to seek out and physically experience by themselves all kinds of science and technology phenomena at any one of the 250 “experiment stations.” The interior architectural design also encourages curiosity and discovery. It features a landscape with plateaus, caves and terraces with rolling craters.

While on the upper level of the 7,000 sq. meter building where children are experimenting, you hear a strange hiss from down below. Suddenly a “magnetized” group of visitors looks at The Fire Tornado, which rockets upwards 5 meters and rotates like a real tornado. The Fire Tornado is fueled by kerosene. Other exhibits require physical exertion. At the “crash test” exhibit (“Smack the Wall”) a visitor runs up against a cushioned wall. A sensor measures the force of the collision, while a monitor displays the appropriate impact/time gradient and 19 “smack factor” points. Suddenly a woman starts running. She has more power. Her courage gets rewarded with 22 points. More relaxed is the “mind-ball” experiment. Here two players sit at a round table while sensors in their headbands measure their brain waves. A small ball, which is held on a straight line by magnets, moves as if guided by ghost hand towards the player whose brain activity is higher. The more relaxed player wins.

Elsewhere block letters on a projection screen rain down on visitors' shadows which are also apparent on the screen. Instead of falling down through the shadows, the letters remain on the arms and legs, where they form words which make poetic sense. The trick: a camera/computer compares the contrast of the viewers with the background. Where there is contrast--the visitors' shadows--the letters gather. Elsewhere an elderly couple struggles together at the "giant arch" as they built an arch with blue plastic parts. Only if assembled in the right order will the building blocks make a self supporting arch. Just before the partial construction is about to collapse another helpful visitor comes running to assist. This giant arch fosters communication within its span.

The hands-on demonstrations and exhibits are roughly split in topics like weather, light, electricity, energy, sound and power. But even so there isn't a strong didactic concept. "phaeno should be approached playfully and in a "hands-on manner." says Wolfgang Guthardt, phaeno's founding director. "Nobody stands here directing with pedantic undertones trying to play the school master. That's why there isn't a start and an ending." says Guthardt. "You can start anywhere. Best is to be driven by your own curiosity." If visitors have questions, phaeno staff are nearby to help. But they only answer questions they have been asked. Indoctrination is totally taboo. Eventually everybody can encounter phenomena in their own way. Just looking is as welcome as concentrated experimenting. And then Guthardt starts telling the story about how the project began seven years ago. At that time, he served as the Manager of Culture, Sports and Schools for the city of Wolfsburg and was facing a difficult situation: how to create a city institution which could offer some balance to the enormous Autostadt project -- Volkswagen's huge "Auto City". The basic idea for phaeno came from a newspaper article about an American "science center", in which you could learn about science and technology while you played. After visiting Technorama, a science center in Winterthur, Switzerland, the decision was made: AutoStadt, "auto city," would have a "science city" built nearby which would also attract tourists from the surrounding region. Guthardt convinced the city of this plan and managed to secure funding and sponsors. Four and a half years ago was the ground breaking ceremony.

All together the City of Wolfsburg has paid 79 million Euro to build phaeno, with another million or so still to flow into the operating concern. "That's not peanuts." Guthardt admits forthrightly. He counts on 180,000 visitors a year, so about 500 a day. Wolfsburg has a large area to draw from. The ride by high speed train from Hannover, Magdeburg and Braunschweig takes about half an hour, from Berlin about an hour. Even from the Ruhrgebiet Wolfsburg is easy to reach for a day trip. Only from south of Frankfurt does Wolfsburg get harder to reach. Long distance visitors should plan on an overnight stay.

The experience of other science centers gives cause for optimism. The oyster shaped building of the 4,000 sq, meter Universum science center in Bremen is visited by about 500,000 people a year. Phänomena in Flensburg is also successful.

phaeno's exhibits were designed by the American Joe Ansel, who invented about 100 exhibits himself. After all, he has about 30 years of experience in the field. In the 70s this passionate and methodical inventor-builder helped to establish the famous Exploratorium which was founded by Dr. Frank Oppenheimer in San Francisco. Oppenheimer, the brother of the "father of the atom bomb", J. Robert Oppenheimer, understood how to fascinate children with the mysteries of the natural world. He understood immediately that the Exploratorium couldn't be a disciplined environment like a classroom. Rather children shouldn't "just" learn something, but should be allowed to play and explore as they please. In Ansel he found the man to realized his ideas. Nowadays nearly every major town in America has its science center. Worldwide there are about 1,000 such centers and Ansel has worked for about 30. In a couple of months he will leave phaeno. His work here is done, he said.

"Look how the people smile." Joe Ansel says with satisfaction, while walking through the exhibition and carefully observing the reactions of the phaeno's visitors. When people smile, the exhibit has served its purpose, whether or not the visitor understood the effect at hand, or just is happy that a beguiling effect has occurred at all.

Ansel himself loves the small, nearly inconspicuous exhibits at phaeno. Like the grey plate on the wall, in the middle of which hangs a "ponytail" made from unbraided nylon rope. Ansel lifts the ponytail up and all of a sudden the uniform grey surface turns into two different colored shades of grey, which are separated with a sharp line in the middle. "The eye-brain persistently judges similarity by comparison." Already he has left to dance at the edge of a mirror, which covers half of his body, but the other half gets reflected and accordingly one seems to see a whole "Joe Ansel. But if he lifts his leg he seems to float. He can make himself also thicker or thinner. "People always like symmetry." Ansel shouts and then he slides his hand, which was covered behind the mirror, over the head--now it looks like he has three hands. "This is one of my favorite pieces." he says and points over to a box. In an opening glows a well lit steel spring: "Touch it!" Ansel suggests to the visitor. But the visitor's hand touches nothing--even though the spring casts a shadow when you light it with the flashlight. "How do you explain that?" he asks, knowing quite well that nobody has an answer. The secret: The spring is hidden in the bottom of the box. A hidden concave mirror projects a real image of the spring.

"Amazing experiments like that make the visitor ponder." Ansel suggests and holds up a plastic disk. Air flows out of a tube which is open on the bottom, the air first pushes the plastic disk down. But suddenly, about one centimeter away from the tube opening, the disk sticks to the tube. "Ah, the Bernoulli effect." the physicist knows immediately. Underneath the disk the pressure is greater than above the disk, this layman learns, when he reads the panel next to the station.

But a lot of visitors don't read it – out of laziness or impatience? Ansel doesn't care. "Just look how the people smile."

Caption: Curator Joe Ansel loves the small experiments at Phaeno. In this tube, fluids oscillate because of sound waves. At resonance points, in the tube, the fluid spurts up.