UT nieuws SPECIAL

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Twente Academy

Foreword

Capable freshers who complete their studies successfully. That's the goal the UT's Pre-University College Twente Academy wishes to contribute to. Having capable students at university begins with a sound primary and secondary education. Inspiring teachers and practical experience for pupils are crucial prerequisites to this. Fortunately, the UT can help this process by educating and professionalising, and by inspiring pupils and their teachers as well as challenging them!
Our ideal picture: A successful UT student who already has had frequent contact with the UT throughout his primary and secondary schooling . Naturally, pupils should experience the beautiful UT campus themselves. In our Pre-University College Twente Academy we offer students hands-on educational, design and research experience. Twente Academy connects UT expertise with the school curriculum of secondary and primary schools.
In this special issue, we would like to inform you of our activities and the set-up of our projects. As a pre-university college, we always do so with a strong focus on subject matter, together with UT'ers, students, teachers and experts, and a long-term vision. The close collaboration with the secondary teacher training college ELAN is pleasant and necessary for both the schools and ourselves. Hopefully , you will conclude that we are working on beautiful and meaningful projects with a highly motivated team, whose enthusiasm is highly contagious!
Twente Academy is the bridge between basic education and UT: we help prepare pupils and their teachers for successful studies and successful careers. And we are happy to assist those UT employees who wish to work in future with great students/ PhD candidates.
We invite you to take a tour with us of the aspiring student's school career and the projects she/ he will encounter throughout the UT-wide experience: beta with gamma and a high tech human touch. To stay with the phrases of the latest campaign: Made by the University of Twente Academy.

Pieter Boerman
Director, Twente Academy –
The University of Twente's Pre-University College

colophon

This journalistic, independent, special issue of UT News Magazine was developed on behalf of, and in cooperation with, Twente Academy.

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Table of Contents

5

Twente Academy's student employees

8-9

At the Zabuki science café

15

Science on Tour

16

The online learning environment success story

18-19

At the Bonhoeffer College

TEXT: SANDRA POOL | PHOTO: ARJAN REEF >

“Stimulating an interest in technology and science”

He’s a man with a message. Pieter Boerman, Director of Twente Academy, wants to show what his organisation can mean for the University of Twente. ‘We, as a pre-university college, have a vision: educate those smart problem-solvers that society is waiting for. This requires time though.

The ultimate goal of this exercise is to raise ‘good citizens’, says Boerman. To put it even more concretely: to turn out excellent engineers, that can be either science-oriented or social science-oriented. “Society needs people who solve problems, we educate those here”, Boerman starts off. “However, for us to get those smart problems solvers, it’s important that prospective students choose correctly and end up at the right place within the university. This is a long-term trajectory, which starts with a solid primary education followed by high-quality secondary education.” He adds: “Teachers also play an important role in this.”

Twente Academy supports three groups. “We call them young, pre and pro,” says Boerman, thereby referring to the youngest pupils in primary education, secondary school pupils and teachers respectively. “It’s an umbrella that covers all sorts of projects and is meant to introduce pupils to the UT, science and technology at an early stage. In addition, we have a program to inspire teachers about science and technology and to help them professionalise further, including by developing appropriate teaching material.”

Projects range from a mathematics relay to the pupil’s lab, and from master classes to teacher development teams.’ Together with Universities of Applied Sciences Saxion and Windesheim, other universities and the whole chain of primary, secondary and higher education we develop these initiatives. A good example constitutes TechYourFuture, an expertise centre for technology education in which all parties play a role.

An other project is the Talent Development Chair. “A present that the regional education sector and municipalities gave to the UT to celebrate its 50th anniversary. It’s very special.. It matches the collaboration that we picture at the regional level, nation-wide and internationally perfectly.”

Service desk

Besides this external role, Twente Academy also has a role to play within the UT. “We can act as a service desk for academics and departments.” Boerman mentions the example of pupils working on a research paper. “Sometimes the answers can only be found outside of standard teaching material and they come knocking, whether or not through the networks of the teacher involved, at the doors of the UT. The Twente Academy director prefers to give a structure to all those questions that are directed at the UT. “We appoint a student, who filters the questions and connects them to UT expertise. So, please know where to find us.”

The public knows Twente Academy for sure. “We receive funding from, among others, the platform Bèta Techniek and the Ministery of Education. That shows that we do good stuff. They see the point of our approach.” The effects require time, however. “Someone who attends as a seven year old the Science and Technology Cafe Zabuki, will only enter the labour market fifteen years later.” |

TEXT: SANDRA POOL | PHOTO: ARJAN REEF >

YOUNG

“Teachers need to recognize that technology isn’t scary”

When it comes to Science and Technology (S & T), you can’t start early enough. Twente Academy Young, one of the National Science Nodes, acquaints primary schools and their pupils with Science and Technology. And they have to give it a go: from 2020 S & T must be a part of the curricula in elementary schools.

Twente Academy Young is working with teachers to develop teaching materials in which design and conducting research have a central focus. The node will contribute to a positive image of science and technology. Themes are about the social problems of the future. “What will Glanerbrug look like in about two hundred years, is an example of a research question,” says Jan Haverkamp, Project Manager of Platform Engineering Stedendriehoek (‘City Triangle’ and involved in Twente Academy Young. “How are we going to work in the future? And what will we do with waste? Around such questions, we create lectures for kids.”

The project’s coordination is in the hands of Twente Academy, in the form of Anne van den Bos. “We want to connect primary school kids with the world of science and technology,” says Van den Bos. “We do this in such a way that it lasts. We are not an events agency. We ask an active, engaged attitude of teachers, and also of parents. At home they can also work, in a playful way, with their children on meaningful little projects. In our magazine Zaboekie we explain how to approach a variety of topics and how to carry out experiments with stuff that you can typically find in kitchen cabinets. It is important that teachers and parents understand that technology is not difficult and scary. “

There is still a world to gain in this area, thinks Haverkamo en van den Bos: “Our mission has not finished. Teachers are often unsure how to deal with science and technology in the classroom. More and more schools ask us for help, though. We are in a flow and the image of S & T is changing slowly, but surely.” I

TA-STUDENT TEAM

Freedom and confidence

VINCENT VERHAGEN (25), studies European Studies. As a team leader, he is the link between the management and the operational teams, which have students who actually set up Twente Academy’s activities.

“I’m actually between the management and the operational team. It’s primarily my job to know the state of both the finances and the staff. We have a great, fun team totalling twenty people. Together we organise our activities. These twenty employees all have their own groups of students who run projects. That makes Twente Academy an employer with around 200 students.

I work here around twenty hours a week. The nice thing about Twente Academy is that they give you a lot of freedom and trust you no matter your position. That ensures that you go the extra mile, I think. It’s great to work together as a team and then to find that your joint activities were also successful.”

TEXT: PAUL DE KUYPER | PHOTO: GIJS VAN OUWERKERK >

YOUNG

“Primary schools should be more innovative”

If you want to make children enthusiastic about science and technology, the first person you need to enthuse is their teacher. According to UT Professor of Talent, Science and Technology Walma Juliette van der Molen, the primary education sector should be more creative and innovative.

When Juliette Walma van der Molen founded Twente Academy Young five years ago, the UT found it a little strange that she was going to focus on primary schools. After all, it was not where her target group could be found. But those UT-ers soon changed their minds, says the professor in talent development, science and technology. Because by the time pupils leave primary school, their image of science and technology can already be negative. That’s why it’s especially young children that need to be stimulated and enthused.

Walma van der Molen’s special chair investigates theoretical models of creative skills and attitudes of pupils and teachers. Scientists then translate these models into educational programs for primary schools and the lower secondary education sector.
According to the professor, both pupils and teacher need to adopt a different attitude. “They need to position themselves as learners. They should ask questions that lead to analysis and creative and innovative thinking. There should be fewer questions aimed at reproduction, with only one correct answer.”
She gives an example of a simple question that allows children to consider the theme of energy from different angles. “Sports takes energy, so why do we say that it makes us energetic? This type of question enables pupils to learn a lot about combustion, but also about emotions and other topics.”

Creative knowledge transfer

Teachers should look for ways to transfer knowledge in a creative manner, thinks Walma van der Molen. Rather than stuffy sums, wonderful stories that linger are important just like projects in which kids can collaborate and show their creativity. “Regular teaching materials can still be used, since the maths, language and biology are all part of the project. But by setting it up in this way you will discover new talents. A child who does not score well on standard tests might make a very creative poster of a project, for example. “
Children get excited quite easily about creative and innovative teaching methods, says Walma van der Molen. It’s crucial that teachers feel the same. They often find it scary to deviate from the standard curriculum. “It’s still not yet apparent to everyone that we really need a different type of education.”
It’s imperative to change this, says Walma van der Molen. “Emerging economies threaten to outrun us, the turnover rate of new technologies is very high and job security is low, meaning that employees should be able to switch projects or jobs easily.”
Fortunately, Walma van der Molen finds that a lot has been gained over the past 5-6 years: “The fact that science and technology are high on the agenda of primary and secondary education is particularly a huge advancement. From 2020, science and technology should be included in the curricula of primary schools. But change is slow, it will take some years before we will have reached our destination.” I

TEXT: DITTA OP DEN DRIES | PHOTO: GIJS VAN OUWERKERK >

YOUNG

Bringing back the sparkle in pupils' eyes

Erik Groot Koerkamp is a talent developer. He is affiliated with the Knowledge Centre Science and Technology East (KWTO) and also recently with Tech Your Future. He coaches schools to make the transition from result-oriented teaching to inspiring education. Besides this, he has his own company, Denkenkunjeleren. Through his company, he is closely involved with Twente Academy. He provides training, coaching and advice to teachers, looks out for excellence and promotes learning through research. All because of that one goal: "The eyes of students should sparkle again."

Captivating education, that's what children deserve, thinks Groot Koerkamp. "At least a quarter of students are regularly bored at school. They are insufficiently challenged. That's sad, isn't it? We need to guard our talented youth much more."

Of course, there's already a lot happening in schools. But according to Groot Koerkamp, it's time for a shift in the educational sector. "There is still a strong focus on literacy and numeracy in (primary) schools. The teaching staff are busy recording results. They do so under great pressure from the Dutch Inspectorate of Education. But things need to change. Now that we have made great strides in result-oriented education, it is time for inspiration. Keywords are: developing people's talents, creative thinking, flexibility, perseverance, collaboration and learning through research.

In a society that is constantly changing, we owe it to our children to prepare them well for their future. Do you know how many questions teachers fire at their pupils per day? A Thousand! And those are mostly closed questions: How much is .....? Where is.....located? etc. And often there is only one correct answer. That answer sits at the back of the mind of the teacher. We can do much better. Students need to learn more about how they can apply existing knowledge. Challenge them. "What would happen if Erasmus entered the classroom now? What would you ask him?"

Every child has talents. Not everyone has to be a professor. Certain talents reach higher or are differently oriented than others. But in teaching, we have the noble obligation to make children's talents flourish as much as possible. Captivating education supports this. The professionalization package, which was developed with, among others, UT'er Walma Juliette van der Molen (see page 6) can offer teachers a lot of inspiration and guidance. I

TA-STUDENT TEAM

Professional busy body

INGE HOOGLAND (24), who recently graduated in Educational Sciences, is a General Staff and Personnel Affairs Coordinator.

"'Having been a general employee first, I moved on to this position. General staff are the organization's first point of contact. They take calls, keep an eye on the mail and take care of visitors. I coordinate all these activities. That means, for instance, that I make timetables and ensure that procedures are clear. In addition, I coach and guide the employees. I assess someone's strengths and then decide where that person would be best placed to work.

In addition, I am involved in personnel affairs. I put up vacancies and sit in with job interviews. The other day I was dubbed a 'professional busy body'. In my position, you get an insight into a wide range of things. The fact that you work with a young team and advance together makes working together within Twente Academy lots of fun. Everyone is open to learn, which is great. Also, you are allowed to make mistakes. Every motivated student, regardless of the topic of their studies, can find a home here."

YOUNG

TEXT: RENSE KUIPERS | PHOTOS: ARJAN REEF >

A Hundred mini scientists at Zabuki

Cautiously, children from 7 to 12 years old drop in on a gray Wednesday afternoon close to 3 o'clock. Some almost cling to to their parents' hands, others act tougher and find the way themselves. The way to where? Well, to the The Zabuki Children Science and Technology Cafe in Enschede's Polaroid Performance Factory.

At the entrance of the former Polaroid factory, a dozen school children change into white lab coats. Some of the smaller participants seem to be hanging in the coats, the even smaller ones nearly drown. Fortunately, the Zabuki staff, led by coordinator and industrial design student Annelies Tielenburg (aged 26), are ready to roll up sleeves and to tie knots at the back of the coats. The purpose of Twente Academy's monthly Zabuki afternoons is to make young children interested in science. The lab coats seem to do this almost straight away.
In anticipation of what is to come, around a hundred children in rows watch the TV program Checkpoint, with bated breath. "Fortunately some kids were reported ill," sighs Annelies while she takes a look at the noisy group in the packed factory. "We started off with groups of about thirty children, but soon that number grew. Many children return each month and then also bring their friends."

On a deserted island

The subject of this Zabuki afternoon is Film & Sound. Today's curriculum has been developed in collaboration with ArtEZ art academy students, who manage to silence the audience by raising their voices a little after 3 o'clock. Children slide toward the edge of their seats and remain as quiet as mice when they get to see a movie about a man stranded on a desert island, who is fishing on a rock. The fish bite, but at the same time a cruise ship sails along honking. After shouting "Wait for me!", the man runs after the ship, that is already disappearing beyond the horizon. In desperation, the man collapses to the ground shouting: "NOOOOO!". After that the children get to see the same movie five times. First without sound, after which the sound effects, music, voices and percussion are added one by one. The children recognise the reason for this straight away: they will be responsible for managing the sounds in the movie this afternoon.

The children divide themselves into six groups, which are spread across the various areas. In addition to four assignments by ArtEZ students, there are two parts led by Zabuki employees in the factory. We begin this Zabuki after one of the students has started the timer on the video screen. The time counts down from 15 minutes. At zero, places need to be changed.

From Frankfurters to balloons

"How can we hear each other?" asks Zabuki employee and technical medicine student Samantha Noteboom (aged 21). 'Ears',' Eardrum!" The children shout. "True," she confirms. "But how does sound move?" The children are stuck. Sound travels through vibrations in the air, "she explains. Then it's time to make those vibrations tangible. First by means of homemade phones consisting of two empty cans of Frankfurter sausages connected by a rope. Then by stretching an elastic band with pegs between two chair legs. If you hit the elastic, the pegs on the outside vibrate less than those in the middle.

Strumming a ukulele

The quarter hour has ended and the groups move on to the next assignment. Time to start working on percussion. After everyone has gotten an instrument, including a cowbell, tambourine and 'thunder tube', ArtEZ student Erik Schenkel explains the plan. When he keeps his arms low, the children are to play softly. When he raises his arms, the volume can be higher. After a few tries, everyone is happy and the children start the music lesson.

"Who can play a little guitar?," asks ArtEZ supervisor Thomas Mouse. A modest girl raises her hand. She's allowed to strum meritoriously on a ukulele during the movie. "No wonder, she attends guitar lessons," says a boy jealously. He assists her by playing a violin, together with a girl playing panpipes. When the man in the movie is running, the flute sounds, and when he falls to his knees the violin is scraping hard.

'NOOOOOOO!'

Time for the next assignment: create the voices. The children not only supply the lyrics ("You will be on a hook!"), they also record these verbally. Eventually they reach the climax of the movie: the cry of despair as the man collapses to the ground. They scrape their throats and all roar together: 'NOOOOOO! ".

The last part of the afternoon is devoted to creating sound effects. Salt in a bowl is crushed with a cube to simulate the man's footsteps. Meanwhile, the children's eyes wander off to the air horn lying on the table. Because well, the boat should honk, and who wouldn't want to do that? At 5 o'clock, most parents are already waiting to pick up their children. Unfortunately, there is no time left to show their films, but Annelies promises to send the films out as soon as possible. Tired, but happy, the kids go home, perhaps a little disappointed that it takes one more month before the next Zabuki will take place. I

TA-STUDENT TEAM

Sparring to create new ideas

KIM VISSERS (22), studies psychology. As Marketing Coordinator she is responsible for all of Twente Academy's external communications.

"Marketing is very broad, but in any case I take care of the posters, flyers, emails to the deans, letters with posters and the distribution of information about our projects. I also organise school visits, where we promote Twente Academy by organising conspicuous demonstrations. The Twente Academy coordinators turn to me for just about everything to do with marketing. That can be pretty busy, but it's also fun. I particularly enjoy generating new ideas by working together. On your own you can easily come to a dead end, but sparring with a partner works great. Our common goal is what I love most about Twente Academy. Together we are committed to helping elementary school students, high school students and teachers. We offer support, inspire, promote science and technology and aim to improve access to that technology."

Experimenting in the Pupils' lab

How do you distil water? How do you create an aspirin? What contains more vitamin C: an orange or goji berries? In a special laboratory at UT, the Pupils' lab, school kids look for answers. They experiment and conduct lab sessions. White coat and glasses are a must!

On the fourth floor of the Carré building, pre-university student Birgit swirls a conical flask. In it is a green liquid. Classmate Danique pours another substance in it. Birgit continues to swirl. The content turns blue.
The two pupils from the Rietveld Lyceum are doing their final assessment essay in the Pupils' lab today. They determine the amount of protein in milk through the biuret method. Biuret is a reagent, and changes colour when protein is present in the solution.
"We were looking for a university that could help us with this experiment. That's how we ended up at the UT," says Birgit.
They enjoy visiting and working the university and to take a look around. That's the strength of the Pupils' lab, thinks laboratory coordinator Rianne Sweet too. "Secondary school pupils work a whole day in the laboratory. They get acquainted with the UT at a time when the university is open and operational. It is certainly not a getaway. They seriously work on assignments. Thus, they get a good picture of what it means to do experiments."
That experience helps pupils to decide what studies they ultimately wish to embark on. "At school, often just one hour is devoted to doing practical experiments. At UT we have all kinds of facilities and the right equipment to keep them busy for a whole day. It all means just a little more than in the classroom."

Extension piece

Many schools in the region are already using the lab. "They have a kind of subscription and are joining per school year. On an annual

The success of Twente Academy's contests

Each year, Twente Academy organizes four contests: the Math Race Twente Mathematics Relay, the Final Assessment Essay Contest and the RED Engineers Challenge. Besides this, Twente Academy plays a substantial role in the organization of the Eureka! Cup.

"The contests are successful. Why? I think it's because we try to take the lifestyle of pupils into account. We wonder what they would like to do. We also turn to their teachers for inspiration," says project coordinator Laura Morren, student Communication Studies and International Business Administration." Twente Academy tries to both support and challenge pupils. The latter we mainly do by means of the contests and master classes (see page). "
"The final assessment essay contest is perhaps the most popular one. Pupils may be rewarded with considerable sums of money ' says Morren. "Besides the final assessment essay contest we also have one for their mastery test this year. The Mastery Tests are undertaken by Technasium pupils for a real client."
Morren continues: "The Eureka! Cup is also nice. Students must solve problems of major organisations such as the Ministries of Public Works and Defines. The organisations take the solutions with them, very cool! "
Morren does not know whether Twente Academy's activities increase the number of applicants to the university. "I expect that the contests will at least favour such an outcome. We want to start monitoring more closely where pupils end up in any case. Especially regarding the 6 VWO pupils who joined the Final Assessment Essay Contest."

basis, we also welcome ‘loose’ groups. Together these account for fifty visits per year. And there are visiting parties such as Birgit and Danique that work on their assessment essay. Sometimes a HAVO class comes while we also see a growing amount of 3-VWO classes (The completion of HAVO allows pupils access to attend Universities of Applied Sciences. VWO pupils may upon completion also enter universities. ed.). There is always something to do here. Think of it as an extension of the experiments at school.”

The laboratory has six fume cupboards and three big research tables with hoods hanging above them. “A lot of equipment we own ourselves such as a 3D printer, but we also use infra-red devices from departments for infra-red measurements. We offer practical classes in chemistry, physics and biology.”

The research curriculum on offer ranges from cutting a DNA molecule to controlling robots with sensors. “The exercises are consistent with the curriculum at school. Pupils who are working on their final assessment essay, take their research question, which sometimes goes beyond their own curriculum, to the UT. “As Twente Academy we mentor them. Before they enter the lab, they must first create a roadmap and think carefully about what exactly they want to examine.”

Paracetamol in boiling water

In the pupils’ lab, a student assistant is on stand-by to offer guidance. Today that’s Chiel Mosterman, a chemical engineering student. “I receive the school children, answer questions and make sure that everything runs smoothly and safely.” Pupils Dennis and Sander of the Grundel Lyceum in Hengelo observe what happens when a paracetamol tablet encounters boiling water. They’ve never been in a real laboratory before “When I came in, I thought: wow, this is cool,” says Sander. His classmate nods. “I am thinking of studying chemical technology at University of Applied Sciences Saxion. Spending a day at the UT will certainly help me to make the right choice.” |

TA-STUDENT TEAM

New and pretty exciting

MARLEEN HELVOORT (25), studies technical medicine and is the Tutoring Days, Brush up Camps and Theme Camps coordinator.

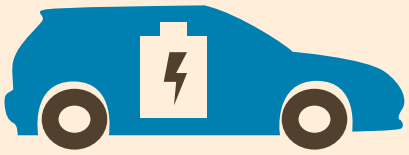
“As a coordinator, I particularly facilitate things, for example by attracting tutors and by managing registrations. Once a month, there are tutoring days at UT. During these days, students help pupils. It is very accessible and everyone participates enthusiastically. Teachers often explain subjects in a certain way for a long time. Students can often help students by using a slightly different approach.

We organise final revision camps just before the exams. Students are then really prepared for one subject. To that end, our counsellors have developed a variety of modules.

The theme camps are fairly new. Students really immerse themselves into the material; they start a little project and see what happens when they start taking measurements or conduct experiments. In late February, there is a technical medical camp. Because it is new, organising that one is pretty exciting. We develop the whole program ourselves. In the evening we also do activities on campus so that students get introduced to the university.”

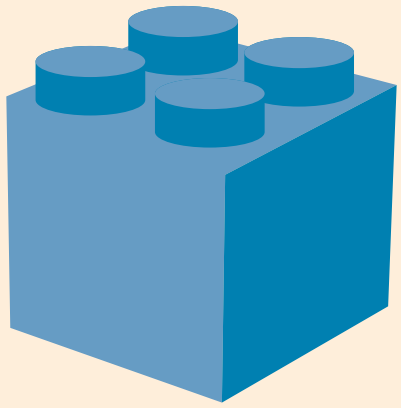
Road map

A visualisation of the Twente Academy approach



Science and Technology at primary schools
"How will we travel to work in future?"

RED Engineers Challenge
"How can we transform wind into energy?"



Life & Science
"How does hydrogen power a car?"

YOUNG 4-12yrs.

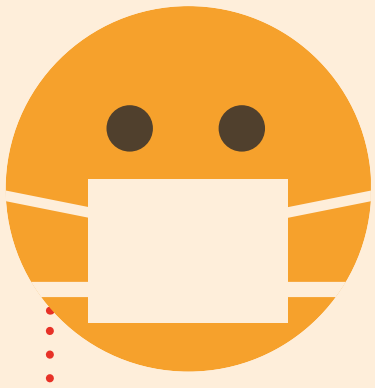
Time to put on the lab coats at the Zabuki Kids Science and Technology Cafe
"How can we hear one an other?"

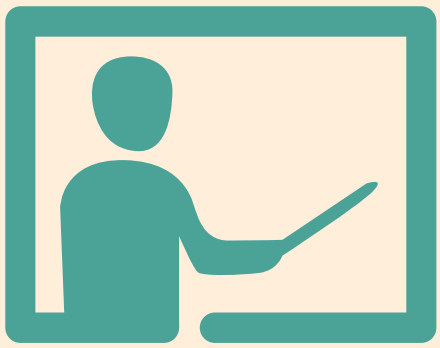
Science on Tour
"Lift your teacher. How do pulleys work?"

Busy experimenting in the Pupils' lab
"What happens when an aspirin tablet touches boiling water?"

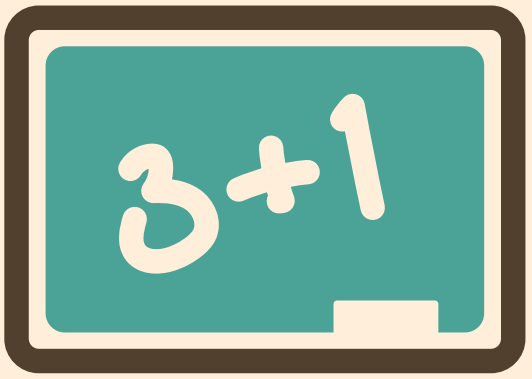
Twente Academy uses a chain approach, which requires a long-term vision. After all, primary school pupils that learn about science will only be entering the labour market fifteen years later. Twente Academy also offers continuing professional development to teachers. Altogether, it covers all stages of life.

Follow a Master class
"What does the operating room of the future look like?"





Personal assistant to the teacher (PAT)
"Students are closer to my pupils' age"



Post-graduate secondary teacher training institute ELAN
"Continuing professional development to create better mentors"

PRE

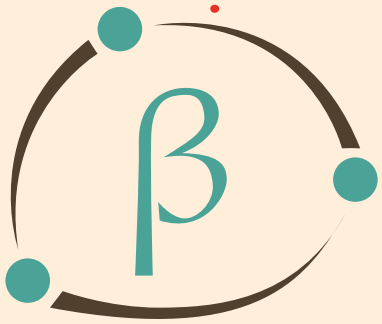
12-18yrs.

PRO

18yr.- end of career

Me? Technology? Join the Girls Camp Engineering
"Which companies hire engineers?"

Science Support Centre East
"We aim to improve science education"



Teacher development teams
"Jointly improve the subject we teach"

Taking 'master classes' for an extra challenge

Would you, as a pre-university student, like to have some extra challenges? Do you feel like exploring a given subject even more? Or would you already like to experience what it's like to do research at a university? Twente Academy aims to offer pupils challenges and to prepare them for a university education.

Master Classes are scientific educational programs for VWO students who want to delve into a specific topic. Participating pupils experience virtually every aspect associated with university education. For example, pupils from 5- and 6-VWO can attend a master class and use the generated knowledge to help them set up or, explore their compulsory end-of-year final assessments or mastery tests.

The Master Classes are suitable for three groups: VWO 2/3, VWO 4 and VWO 5/6. The trajectory varies from three weeks and the same amount of contact sessions (VWO 2/3), to ten weeks with six contact sessions (VWO 5/6). UT professors or departments teach the lessons together with students. The master class 'The clinic of the future' is one example. Some master classes are solely taught by students, 'Hacking' for VWO 2/3, for example.

Stimulate pupils

"We have three objectives," says coordinator Martijn Crichton (Department of Communication Studies). "We want to stimulate the pupils, ease their transition between secondary school and university and show what the UT has to offering a meaningful manner."

Martijn sees that there is a trend in secondary schools to provide programs of excellence, such as VWO +. The master classes seamlessly complement these. "They constitute something special for many pupils who feel insufficiently challenged in regular education. The participating pupils are very enthusiastic. They often indicate that they want to follow another master class, but that does not always fit their timetables."

Match with the UT

The current Master Classes have existed for around one and a half years. "Everything already in place, it's now important to optimize the Master Class and extend the curriculum. This school year we already expect 600 participants, "says Martijn, who feels that the Master Classes are increasingly starting to be a part of secondary education. VWO students, for instance, can now choose to partially follow the physics module at the UT.

Martijn hopes that the link between the Master Classes and UT courses will be further strengthened next year. "Then it is easier to match secondary school pupils with a course. Pupils could then let study advisers know if a certain field of studies suits them or not, based on their Master Class experiences." |

PRE

TEXT: PAUL DE KUYPER | PHOTOS: GIJS VAN OUWERKERK >

This fire tornado shows the effect of a vertical airflow, which is created by swirling the appliance around a small flame.

The test "Maglev 'is spectacular because of the nitrogen vapour, which is necessary to cool the magnets. Children learn about magnetism and superconductivity.

With their hair standing on end, the students accompanying this Van de Graaff generator explain all about electrical charge.

The latest acquisition of Science on Tour is called "Lift your teacher 'and explains to children how pulleys work.

Provocative experiments

With a fire tornado, a maglev with nitrogen fumes and some twenty more experiments, a team of UT students want to excite fifty children aged 8-18 years about science. Science on Tour visits schools and hosts events about forty times a year.

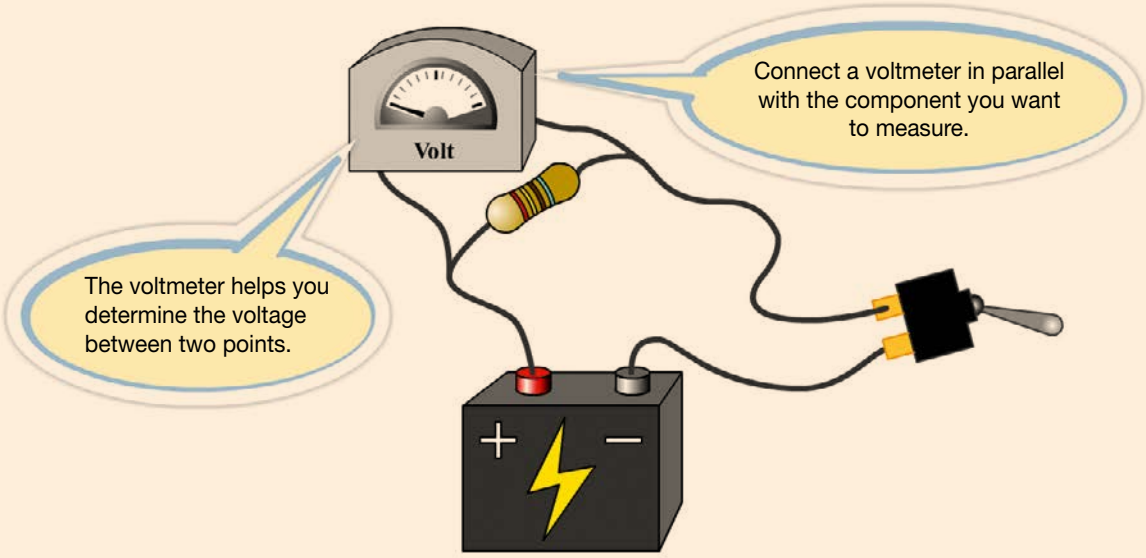
"Children often already have some theories of their own when they visit the experiments, which makes Science on Tour so much fun. The experiments excite curiosity. It is very special to see children watching with amazement. Almost always they are interested in the stories behind the experiments," says Franka of Velthoven, biomedical engineering student and Twente Academy of Science on Tour Coordinator.

Which is nice, because it's Science on Tour's goal to make children from 8 to 18 years enthusiastic about technology, Franka explains. The twenty science experiments are divided into three disciplines: chemistry, physics and electrical engineering. The fifty UT students who work for Science on Tour, are all science students. The experiments are taken to schools, markets, technology and science events; the students perform them altogether about forty times a year.

Most experiments are suitable for all ages. According to Franka, it is very important how you tell the story behind the experiment. "You have to gauge what children can understand and cannot understand. And adjust the level of explanation accordingly." |

TEXT: MAAIKE PLATVOET >

PRE



The online learning environment success story

How can you make pupils come back to you? By offering meaningful content, figured Jan Volbers, Project Manager at Twente Academy. Already back in 1998 he developed the first version of an online learning environment for students. "Soon we were the most visited website during the exam period."

"We offered pupils the solutions to final exam questions online during those early years. This became such a success that we were the most visited website during the exam period," says Volbers.

Over the years, the online learning environment - then still called the school site - increasingly developed. So–called school discs containing the solutions to the exams were also developed. Pupils could order a disc by supplying their address. Around 75,000 got sold. "That accomplishment made the market for final exam past papers collapse."

To offer something beyond exam revision, subjects from VWO 4 and 5 were also put online as homework practice. In 2008 everything was placed under Twente Academy, including the Brush Up Camps, Theme Camps and Master Classes. Nowadays, when a pupil creates an account on Twente Academy's online learning environment she/he can access all subjects except for art history. He can practice subjects, practice with different textbooks and also keep track of his grades. "The whole learning environment is both built and managed by students. A team of fifteen students run the online environment altogether. Some do the programming; others are occupied with creating content and answering questions from students," says Volbers.

While online learning is successful, Volbers and his team have further ambitions. "We want to increasingly go back to basics: the answers of final exams. Now that the site has become extended with all kinds of extras over the years, its foundation has started to crumble. And we want to do what we are good at. We also work on new designs and we want the website to be more mobile friendly. We have some catching up to do." I

Life & Science

Life and Science is the name of a secondary school subject aimed at talented students in the lower echelons of VWO. The course, of which all classes are organised by students of Twente Academy, is now running for the fourth year and is taught at three schools in the country, including the Bonhoeffer College in Enschede. (Natural) science skills such as designing, researching, evaluating and assessing are, together with the competence collaboration, offered as a main thread in grades 1, 2 and 3. Technical fields such as robotics and biomedical engineering are sources for inspiration. These subjects are put in a societal context. The curriculum incorporates ethics and philosophy of science. Life and Science was nominated for the Education Award Overijssel this year. They came third.

TEXT: SANDRA POOL | PHOTO: GIJS VAN OUWERKERK >

Support centres improve science education

The Science Support Centre East has set its sights on improving science education. The Centre is a partnership between eighty local secondary schools, Universities of Applied Sciences Saxion and Windesheim and the University of Twente. Twente Academy and secondary teacher training college ELAN coordinate activities. Nation-wide, there are ten science support centres.

"Our goal is threefold," says Ingrid Breymann, Subject Innovation Coordinator. "We want to promote and improve science and technology education. Therefore, we seek to create better links between secondary school and higher education. In addition, we contribute to subject innovation and teacher professionalism. "

Secondary schools approach the support centre among others when a new nationwide examination program is launched, says Breymann. "They then rely on the UT's expertise. The subjects physics, chemistry, biology and mathematics are offered in the new programs as context-concept education. This requires teachers to offer meaningful content that fits with pupils' social environment.

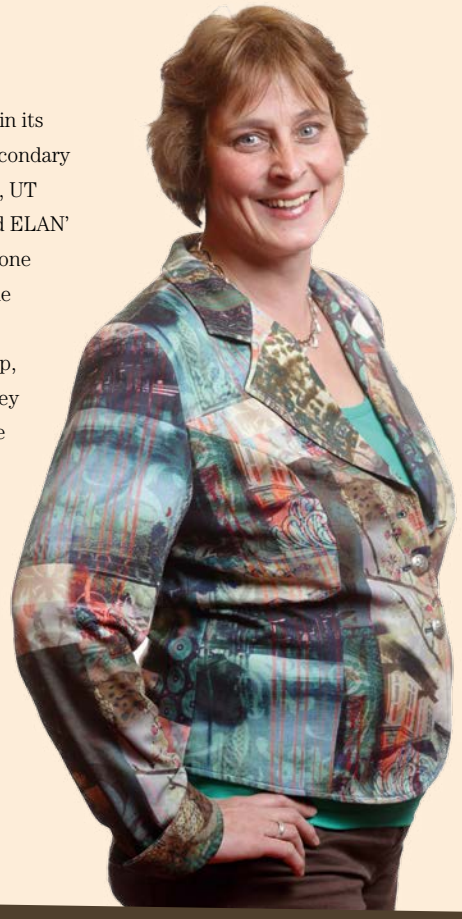
We help teachers to do this by offering them additional training. In three or four meetings we coach them up to the desired level. But there are also teacher development teams (DOTs) that run for the duration of the school year and we organise monthly meetings to develop, together with the teachers, new teaching material or to improve vocational education for primary school teachers.

Furthermore, UT lecturers assist in the development of new teaching materials such as for NLT: Nature, Life and Technology. "A new general school subject that aims to increase pupils' interest in science subjects."

Regular visitors

A major strength of the support centre lies in its ability to link and connect participants. "Secondary school teachers, higher education lecturers, UT researchers as well as Twente Academy and ELAN's (student) employees all contact and visit one another. The more we all stay in contact, the more we can assist each other. "

The support centres, with their broad set-up, have now been around for seven years. "They were founded in response to the nationwide need for more science students. With a well-tuned curriculum that focuses on science subjects, pupils take better decisions as to which subject they want to study at university. One nice detail is that the modules that UT developed are now used nationwide with the stamp 'Made in Twente.' We are a supplier for other support centres, which contributes to our national appeal." |



Weekend of science

Student teacher Ruby te Kiefte is well-acquainted with the fact that science is not the boring or overly complex exercise it is sometimes made out to be. She helped organise the weekend of science - co-organized by Twente Academy - which took place both at the UT and University of Applied Sciences Saxion in October. The student teacher invented, among others, a contest for children. At various stalls, they could obtain stamps with letters, which formed a sentence at the end.

During the Weekend of Science, Te Kiefte saw how kids got greatly enthused about technology. "A concept such as nanotechnology is rather puzzling to a child. But if they can apply it in an experiment, it suddenly becomes tangible." She wants to introduce "as much technology as possible" in the classroom. "But that's difficult because I don't have access to drones or other special technical equipment that can be used in the classroom. I believe that schools should have more technical appliances at their disposal. That way, pupils and teachers will quickly become enthusiastic about science."

TEXT: SANDRA POOL | PHOTO: ARJAN REEF >

PRO

“The best part-time job I know”

Alina van de Burgt (21, technical medicine student) and Wout Cijsouw (22, mechanical engineering student) are Personal Assistants to the Teacher (PAT); they help teachers organise activities related to science and technology. At secondary school the Bonhoeffer college, they go even further. “We enjoy a lot of freedom in developing teaching materials,” says Wout.

9.00 a.m. Secondary school Bonhoeffer college, location Waalslaan. The lesson Life & Science has been going on for an hour. Pupils Bruno, Daan, Camiel and Platon give a presentation on the Green Team. A week earlier their (third grade) class visited UT. The working of a hydrogen car was explained to them. The four boys in the class talk about hydrogen as a means to power vehicles. “You can use it unlimitedly,” says Camiel. Bruno adds: “It also has a high energy density.”

Sitting in the back in the classroom, Alina and Wout listen attentively. They are personal assistants to teacher Marcel van Adrichem, mentor of the Life & Science class and teacher of History and Philosophy of Life. Van Adrichem: “The Bonhoeffer has special programs for highly gifted children; it has a gymnasium+ division, on top of its normal pre-university education. We created the course Life & Science five years ago, together with the UT and the SLO’s (National Centre of Expertise for Curriculum Development) education and talent development division. We felt that hitherto the science and technology curriculum did not do justice to the talents of highly gifted pupils. We prepare the pupils to go to university and would like to teach them how to conduct research when they are still in the lower level.”

Alina and Wout develop the course largely themselves. “They have a lot of freedom to do so,” says Van Adrichem. “After all, they possess the expertise needed. As a teacher, I hold ultimate responsibility though. I consider myself as their supervisor, so to say. Wout and Alina keep me fresh and they are much closer to the pupils’ age than I am. That’s a win-win situation. Don’t forget that students often have the ambition to teach later on.”

Bamboo car

In Life & Science, the areas design, research, reflecting and assessing are a central focus. After the presentations Wout explains to the group: “Next Friday is the deadline for the design assignment. Arrange with your group and select what part you will design.” Alina continues: “Hand in everything via email. Make a scan or photo of your creation. And also mail the final report, please.”

Wout gives some feedback. “There lacked originality in your first concepts. Think outside of the box. For example, design a bamboo car or anything else out of the ordinary.” The class gets a little agitated. One pupil comments: “There’s very little time for this task.” Alina aptly deflects the questions by moving on to the need to reference sources. “Mention in your report who gave you which ideas. Cite your sources.” Bruno has one final question: “Sir, can you list the assignment in its entirety once more time by email?” The buzzer sounds. It’s time for the next lesson.

Fulltime chatter

Alina: “My roommate was a PAT and that’s how I became one too. It’s the best part time job I can think of. Along with Wout I organise Life & Science for the third grade didactically. We come up with new stuff. Like the trip to the university and the visit to the Green Team. The pupils learn how to present, discuss and write reports. The lesson takes two hours, but my preparation time is much longer. We make tests, plan, check the assignments and offer feedback. We have a lot of freedom to do so, which is great.”

Wout: “Last year I minored in teaching. I found that was really great. Especially the humour that comes in. Teaching sometimes almost feels like fulltime banter. The beauty of it is that you transfer knowledge. It feels good to be here. When I step inside the school, I feel: I need to do something with this. I just have to become a teacher. Here you can think up anything. We develop the teaching material ourselves. When we were visiting the Green Team, I could apply my knowledge of fluid mechanics.” I

TA-STUDENT TEAM

More than just work

NICOLE ROMMENS (23) studies technical medicine and is a Decentralized Projects Coordinator. She coordinates and organizes various projects including the Red Engineer Challenge, Profile Essay Assistance, Specialisation Days and the Science Day.

“The Red Engineer Challenge is a competition for primary school pupils during which pupils build a windmill with Lego. We give lectures to the pupils so that they become aware of how they can create such a windmill. It ends in a fun match with a lot of schools participating.’ ‘I also organize the Beta day. On that day, 3 VWO pupils are invited to visit to the University for a day on technology. They can experience how fun technology can be, which can help them specialise in their clusters. I organize the entire trajectory: from the registration to ensuring that the day itself will run smoothly. Within Twente Academy there’s a nice working atmosphere. You can ask anything to anyone. Furthermore, it ‘s more than just work, you also build friendships here.”

TEXT: PAUL DE KUYPER | PHOTO: ARJAN REEF >

PRO

Life-long schooling

Post graduate secondary teacher training institute ELAN aims to not only give teachers a flying start in their careers, it wants to remain a continued support to them throughout their teaching careers.

Having annually about seventy students in its minor 'Learning how to teach' and about forty enrolments for the masters, the UT's teacher training college is by no means the biggest in the country. But it is the best. At least, according to the guide for master's degrees that was published at the beginning of 2014. Jan van der Veen, subject expert in physics and, until December 2014, Programme Director of ELAN (as the Institute for Teacher Education is officially called), naturally takes pride in this achievement. He believes that the appeal of ELAN's courses is partially the result of the transition that ELAN has made from being a vocational training institute to becoming a full university department, with its own PhDs, scientific publications ands so on.

The UT's relatively low influx of students compared to other teacher training colleges in the Netherlands can be explained by ELAN's niche position, thinks Van der Veen. General universities have high inflows of students from, for example, foreign language studies, biology and history. But these courses are not on offer at the UT. Twente offers (post-) graduate teaching courses in physics, chemistry, mathematics, computer science, design (new, see text box) and social sciences.

"We supply teachers for subjects in which there is a shortage of teachers,' says Van der Veen. He expects that the shortage of teachers will persist until at least 2020. "This shortage has created a favourable labour market, as we can see. For about four years or so our intake has doubled. What also plays a role is that the profession's status is on the rise.'

Better supervisors

The teacher-training institute not only wants to prepare students for a job in the classroom, it also wants to support them once they are teachers. "It has become increasingly important that we remain a partner to teachers throughout their career," says Van der Veen. The demand for such a service is on the rise, thanks to the trend that schools want more academics in the classroom. The creation of a national register for teachers in which teachers are required to keep track of their continuing professional development also stimulated demand.

To offer this additional schooling, ELAN collaborates intensively with Twente Academy, for example when it comes to creating workshops on teacher professionalization. According to Van der Veen, both sides benefit. "Providing teachers with additional training through Twente Academy creates better teachers, who will therefore be better mentors for our trainees."

Research Agenda

Van der Veen expects that the collaboration between the teacher training institute and secondary schools will intensify in the coming five years, especially in the area of research. He foresees the creation of an academic workplace in which teachers engage in academic research besides their jobs, from small projects to a PhD. "We will get additional research capacity and that way secondary schools win from having their pressing issues ending up on our research agenda." |

Leerlingen van het Bonhoeffer College Enschede krijgen uitleg van docent Marcel van Adrichem

Designers in the classroom

From this academic year onwards, industrial design students can also enrol in the secondary teacher training course. They will be trained to teach the subject Research & Design which is taught at technasia (gymnasia that strongly focuses on science and technology ed.) They also gain a qualified teacher status for the science subject NLT (Nature, Life and Technology).

At the eighty technasia that the Netherlands has, pupils take the subject Research & Design for six years. The students work on assignments given by companies. For example, they may need to design a daypack for getaways, or a monkey house for a zoo. By the end of the project, students present their designs to the client.

So far physics or mathematics teachers mostly teach the subject after having received some additional training. "This group is very knowledgeable about science, but know little about design skills such as sketching and creative thinking. Technasia therefore have a real interest in employing real designers to teach this subject," says Marieke Rinket, one of the initiators of the Designs track.

The Designs track of the teacher-training course is also open to students from other disciplines that specialise in design, such as creative technology, civil engineering and mechanical engineering. Architects and designers can be lateral entrants to the master. The track is a 3TU master and is therefore offered together with Delft and Eindhoven. During this, the very first year, there are four UT students following the specialisation course.

TA-STUDENT TEAM

Girls technology camp

FRANKA VELTHOVEN (24) studies biomedical engineering and is Decentralized Projects coordinator. Within this function, everyone has his own projects. Franka manages Science on Tour, Girls Camp Engineering, Mathematics Summer School, monitoring and evaluation, workshops and school visits.

"One of the biggest projects I organize is the Girls Technology Camp. From a societal perspective, there is a real need for more women in engineering at the university level. We will organize this year for the fifth time in a row a three-day camp in which forty girls from VWO 4, 5 and 6 can participate. We will then visit three different companies. Last year we went to visit Zeton, Siemens and Thales, for example. In addition, the pupils can participate in workshops at the university to get oriented to technical subjects. I take great joy in showing the girls a different image of technology. Needless to say, I hope they will end up majoring in engineering. "

TEXT: MAAIKE PLATVOET >

PRO

Working jointly within your subject area

In Teacher Development Teams (TDT's), secondary school teachers work together to innovate and professionalise the subjectsthey tea ch. Jan Jaap Wietsma supervises some of these teams from Science Support Centre East.

"There is now a TDT for every science subject taught at secondary schools " says Wietsma. Besides his work at the UT, he is also a grammar school teacher of nature, life and technology (NLT) and biology. "A development team consists of teachers who all teach the same subject and jointly aim to innovate it or improve it. A team meets at the UT once or twice per month, to try and realise that goal. Experts from the UT assist them. ' The initiative was developed by UT's teaching training institute ELAN, which received governmental funding in 2010 to promote structural cooperation between schools, universities of applies sciences and universities. That goal resulted in the teacher development teams, which now runs for the fifth year. The teachers come from different schools in the region. Participation in the teams is formalised by means of a contract. "That way the hours are incorporated in the teacher's workload." By the end of the course, teachers receive a certificate.

It is ultimately up to the teams to set their targets, says Wietsma. "Meeting fellow colleagues is a central focus. Sometimes literature is studied and exchanged, and at other times the teams work on creating new teaching methods. "

Lab on a Chip module

Under the auspices of the TDT, the module Lab on a Chip was developed for science subject NLT. Wietsma: "It was the dream of professor Albert van de Berg that his research on Lab-on-a-Chip laboratories would be known at the secondary education level. Together with experts from other university departments, and the education and business sector , the Lab-on-a-Chip module and accompanying lab practicals were developed for VWO. The module got certified in June 2013."

Currently seven schools use the module. Together with University of Applied Sciences Saxion, the curriculum will also be adapted for pupils at HAVO, the high school form from which Dutch pupils can enter Universities of Applied Sciences. "It's quite a challenge to locate the module in the existing curriculum. It's about micro technology, a new and difficult subject, which you don't just lay out as a teacher. What you see is that schools deal with it in their own, unique manner. We also found that students like to take a hands-on approach. We have now succeeded in offering pupils the opportunity to design and assemble their own labs on a chip. This makes the subject more accessible." |

TEXT: DITTA OP DEN DRIES | PHOTO: ARJAN REEF >

The inspiring dynamics of Twente Mastery

The organization of an event like Twente Mastery is quite a job, but certainly no burden. It's more like a party. "If you organize a party together, you end up talking to each other. And if people with a passion for their profession start getting to know one another, some great plans can emerge," summarises Jan van der Meij, program director of ELAN, the dynamics of the event.

Twente Mastery has just finished its seventh edition. Pieter Boerman, director Twente Academy, reflects on the origin of the event. "The first edition was held in 2009, one year after the University's Executive Board's support for ELAN. We were busy reflecting on ways to create stronger links between the educational sector and ourselves. Professionalization of the field is a priority for us. To ensure an influx of talented first year university students, high-quality primary and secondary education are key." During the event's first edition the Teacher Development teams came into being (see also page 22). "And well, we then had to organise a second edition, to evaluate the results of these teams, didn't we," Boerman grins.

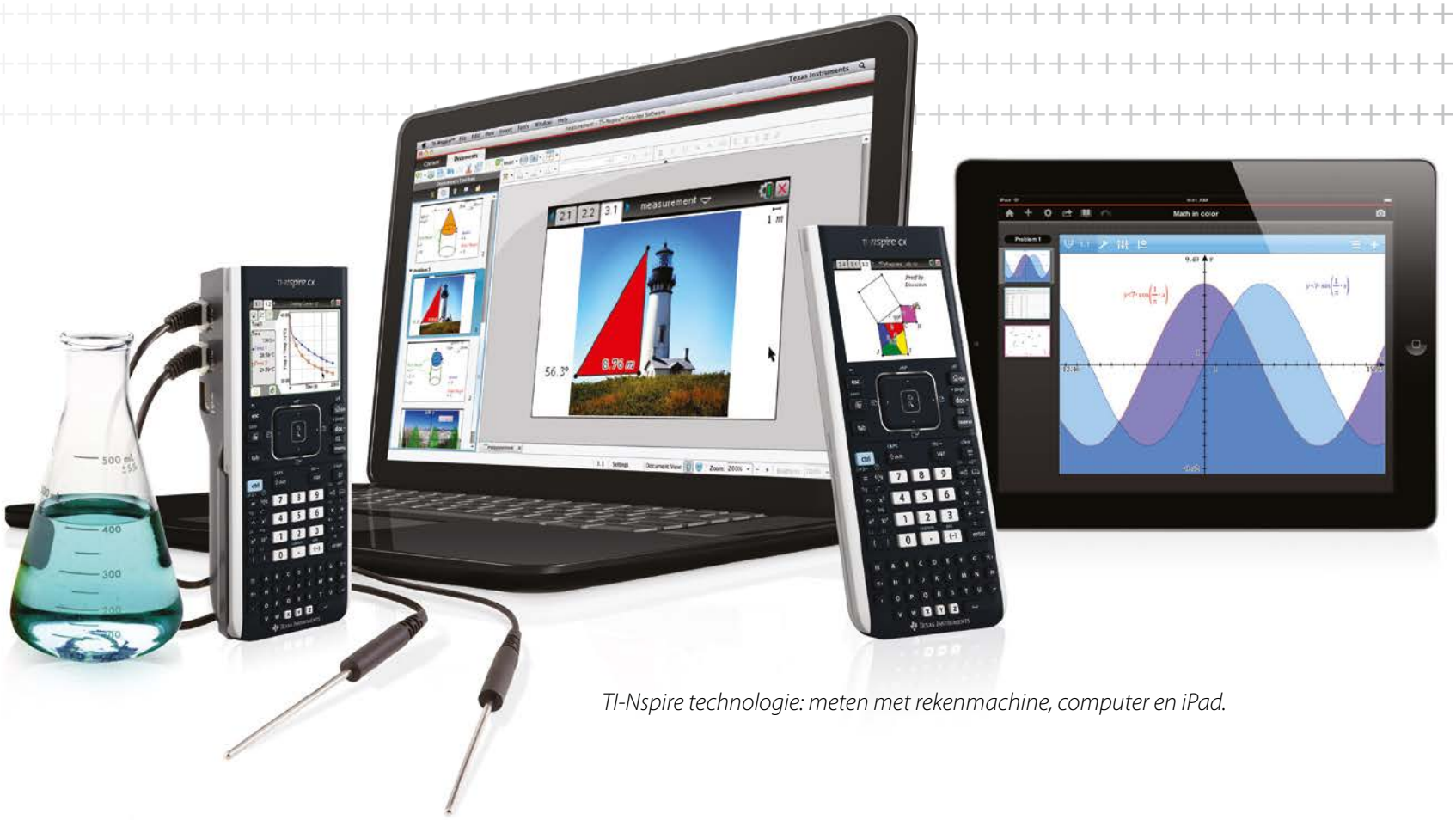
At the end of January, over 200 teachers from all over Twente gathered on the UT campus. They let themselves be inspired by the many workshops on offer. The program included: 'the use of iPads in the classroom', 'increasing the language proficiency of secondary school pupils' and global issues such as 'the Plastic Soup '. Keynote speaker Bram Nauta, Professor of Integrated Circuit Design played first fiddle, by taking the participants on a tour through a chip.

"Twente Mastery is not just any educational event," says Jan van der Meij. "Our goal is to inform and inspire teachers, including by highlighting relevant research and activities that are undertaken at the UT. Teachers should be able apply the acquired knowledge to their lessons. The latter is also our selection criterion for the workshops. They shouldn't be turned into lectures. The main concern is: how can teachers work with this?"

Twente Mastery may be organised by the UT, this year the event's organisers also approached the education sector to come up with ideas for workshops. Van der Meij: "Numerous spontaneous workshop announcements were the result. Eventually, we could choose from a list of 35 workshops."

Seven years on, Boerman and Van der Meij are still wildly enthusiastic about Twente mastery. The event energises them. "Twente Mastery is the event for a teacher. They get to leave their own school for a day, meet other driven colleagues and inspire one another. Even more importantly, they have the chance to discover what's new in science. If teachers can apply this new knowledge to their lessons, then we have done a good job." |

De rekenmeesters gaan samen met de Twentse meesters



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