

# Teaching & Learning Lab, Activity Report 2019

**Utrecht University**



May 2020

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Utrecht University

**TLL** Teaching &  
Learning Lab

## Executive summary

The Teaching & Learning Lab (TLL)<sup>1</sup> of Utrecht University (UU) is an experimental learning space aimed at inspiring teachers and students to redesign and rethink their teaching and education, with a strong focus on the physical learning space. Equipped with a new and flexible set-up, the TLL implements the Utrecht educational model: small group learning, active and student-centred learning. While using the facilities of the TLL, teachers develop a mind-set focused on redesigning and strengthening of their teaching.

TLL consists of two learning spaces for innovative teaching practices and a studio for recording educational clips. During the 2019 academic year, the occupancy rate of the TLL lecture/experimentation rooms was – as in 2018 - around 70%. TLL hosted a total of 13 higher education courses, including one student challenge. In addition, a summer course, over 40 training sessions and workshops were held as well as an escape room for teachers (three weeks). For secondary education, TLL has hosted 40 U-Talent classes. The lecturers used TLL's flexible floor plan and furniture and tools such as interactive whiteboards, an interactive wall, short-throw beamers and 360 degrees-cameras.

In November, the virtual classroom was opened by Annetje Ottow, vice-chair of the Executive Board and Isabel Arends, dean of the Faculty of Science. In this classroom, teachers can engage live with up to 36 distant learners. The virtual classroom provides all technical facilities for sessions with a high degree of interactivity.

In the recording studio, 39 knowledge clips were recorded using the transparent light board, 29 clips without a screen and 7 with a greenscreen. These recorded knowledge clips have already proven to be rather valuable for teaching online during the Corona-closure of the university. The studio is also used for live webinars, media training sessions, and student projects.

In nine monthly inspiration cafés, professionals with an interest in education innovation gathered and in November, over 200 visitors participated in the TLL Autumn Festival. TLL attracted high-level national and international delegations from a variety of education institutes, policymakers and researchers.

TLL's experiences - as well as experiences from other projects - have paved the way for the Future Learning Spaces project. This UU-wide project of Educate-it has developed a two-hour workshop in which teachers build their own learning space using LEGO. Activities include the use of eye tracking for research purposes, introduction of equipment for distance learning and set-ups for augmented and virtual reality. On November 27<sup>th</sup>, 2020, the fifth TLL Autumn Festival is scheduled.

TLL is initiated and hosted by the Freudenthal Institute<sup>2</sup> of the Faculty of Science and supported by the Faculty of Science<sup>3</sup>, the Centre for Academic Teaching<sup>4</sup> and the Educate-it program<sup>5</sup> of Utrecht University. In addition, TLL cooperates with suppliers of equipment, including the companies Ricoh and Barco.

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<sup>1</sup> <https://teachinglearninglab.nl/en/>

<sup>2</sup> [www.freudenthalinstituut.nl](http://www.freudenthalinstituut.nl)

<sup>3</sup> [www.uu.nl/en/organisation/faculty-of-science](http://www.uu.nl/en/organisation/faculty-of-science)

<sup>4</sup> [www.uu.nl/en/education/centre-for-academic-teaching](http://www.uu.nl/en/education/centre-for-academic-teaching)

<sup>5</sup> [www.educate-it.uu.nl/en](http://www.educate-it.uu.nl/en)



## 1. TLL, a short tour

### 1.1 Lecture/experimentation rooms

The TLL has two lecture/experimentation rooms, also known as Active learning Classrooms (ALCs). ALCs are student-centred, technology-rich classrooms. They contain large student tables and moveable seating, designed to facilitate and promote active learning.<sup>6</sup>

#### Large room (BBG 3.22)

The large lecture/experimentation room (30 to 40 persons) is suitable for a variety of educational activities and pedagogical research. The set-up of the floor can be rearranged using mobile scrum tables (6-8 persons) that are adjustable in height, small two-person tables and chairs. Along the windows folding benches are placed. An interactive wall (*Nureva span*) accommodates teamwork. On request, a lecture or lesson can be recorded using either fixed observation cameras on the ceiling, or 360 degrees-cameras.



Large lecture/experimentation room

#### Small room (BBG 3.19)

The small lecture/experimentation room (up to 25-30 persons) is used for workshops, trainings, lectures and inspiration cafes. In addition, it can serve as break-out room for the large room. Similar to the large room, it can be furnished with mobile scrum tables, small tables, and chairs.

In both lecture rooms, additional equipment can be placed, such as one or several interactive whiteboards (IWBs), learning tables (horizontal multi-touch tables), short-throw beamers and laptops.



Small lecture/experimentation room

In addition, two of five IWBs are equipped with a Polycom video bar – containing camera, microphone and speakers - to promote remote interaction. In this way TLL offers possibilities for interaction with distant teachers / learners, for example for international master's programs with students and instructors from all over Europe (or beyond), who then do not have to travel. More information is available on the website.<sup>7</sup>

### 1.2 Studio

#### Virtual classroom

In the virtual classroom, students can attend a live lecture while sitting at home behind their laptops. During the lecture, the teacher stands in front of six screens, each with a maximum of six online visible participants, so a maximum of 36 students can attend the virtual classroom.

<sup>6</sup> Center for Educational Innovation, University of Minnesota, <https://cei.umn.edu/teaching-active-learning-classroom-alc>

<sup>7</sup> <https://teachinglearninglab.nl/en/lecture-experimentation-rooms/>

The virtual classroom has a number of functions that stimulate engagement. Each group of six students watches the teacher through a dedicated camera. This ensures that, when the teacher looks at the screen displaying one of the teams, they make eye contact. In addition, students can ask questions via an app function and can respond to questions, propositions and quizzes. The teacher can also divide the students into teams, and then have them consult with each other. The Virtual Classroom is an initiative of the UU Future Learning Spaces project, aimed at making education more sustainable. In addition, teachers who share their courses with students from other universities, e.g. in the UU alliance with the WUR, TU/e and UMC Utrecht, will make use of the virtual classroom.<sup>8</sup>



Virtual classroom screen (Barco)

At the TLL Autumn Festival on November 22<sup>nd</sup>, the virtual classroom was opened in front of over 200 participants. From January 2020, teachers can book the classroom for their course with an online audience. In this way, they can simultaneously teach students from different universities. For example, a Faculty of Geosciences lecturer will teach a course on sustainability for the universities of Utrecht, Eindhoven and Wageningen.

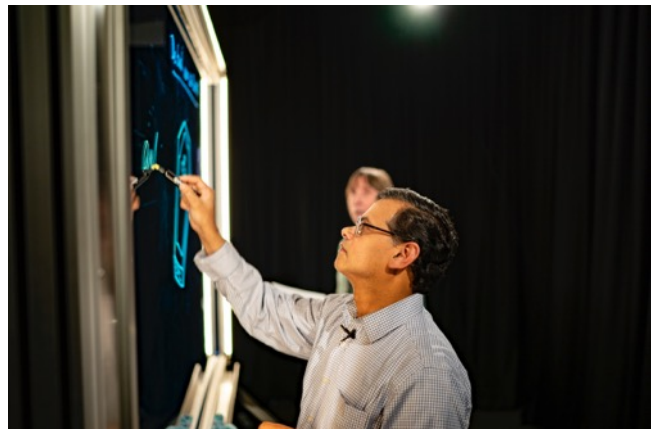
Live distance learning contributes to sustainability objectives. Students can be reached far away, even abroad, without having to travel. And the interaction in the virtual classroom brings them closer.

*"It really feels like you're in front of a class, but then all 36 are in the front row."*  
(Science lecturer)

### Professional operator-supported recordings

For making recordings, an operator supports the lecturer in all stages, from technical preparations, to the actual recording and the editing of the video material. In addition to a recording in front of a standard background, users can choose to use a greenscreen, lightboard or interactive whiteboard.

In a greenscreen video, any picture, illustration or movie can be integrated in the background, during editing. The lightboard acts like a traditional blackboard – the lecturer speaks while writing and drawing – except that he is filmed through a glass plate: the lightboard. As a result, those who watch the clip see the lecturer facing the camera. To read the text written on the lightboard properly, it is mirrored in post-processing. The lecturer can use an interactive whiteboard for his presentation and is filmed next to it. Occasionally, the studio crew films on location, e.g., in lecture rooms, in corridors or in the open air<sup>9</sup>.



Lightboard recording

<sup>8</sup> <https://www.uu.nl/en/news/utrecht-university-opens-first-virtual-classroom>

<sup>9</sup> <https://teachinglearninglab.nl/studio/>



### **Do-it-yourself recordings**

The TLL studio also contains a set-up for Do-It-Yourself recordings, which can be reserved by lecturers who want to make a clip themselves and store it in MyMediasite. The Do-It-Yourself set-up is one of five<sup>10</sup> at UU (campus and city centre) installed by the Educate-it program. For a quick overview of the possibilities that TLL DIY offers, watch this clip<sup>11</sup>.



Do-it-yourself studio

### **Collaboration with Ricoh**

Utrecht University cooperates with Ricoh company in innovating educational tools. The TLL can make use of Ricoh equipment, including interactive whiteboards, short-throw beamers, 360° cameras, learning tables and communication software. The whiteboards and short-throw beamers are used in the lecture/experimentation rooms, the learning tables in master student projects and the 360° cameras in the Monkey Reality project in which recordings of monkeys are made for educational purposes. The tools are tested in various projects, including distance learning and daily use in the lecture rooms.

### **Collaboration with Barco**

The Virtual Classroom uses Barco's WeConnect platform for synchronous (live) distance learning. This system ensures optimal online contact between teacher and students and among students. Barco supports the set-up of the virtual classroom and UU will provide Barco with feedback aimed at improving the design of the platform.

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<sup>10</sup> <https://educate-it.uu.nl/zelf-aan-de-slag/>

<sup>11</sup> <https://www.youtube.com/watch?v=BNnxnvd33-k&feature=youtu.be>

## 2. New Active Learning Classrooms at Utrecht University

Following the Teaching & Learning Lab, more new Active Learning Classrooms (ALC's) have been created at Utrecht University by virtue of the Future Learning Spaces project. These ALC's vary according to purpose, size, furniture and technology used. The ALC's listed below have been initiated by several faculties and departments across the university.



Teaching & Learning Lab

### **Teaching & Learning Lab**

*Facilities:* Interactive whiteboards, Nureva interactive wall, observation camera's, sit-to-stand tables, studio with greenscreen, light board and auto cue.

*Faculty/dept:* Science, but available for all faculties

*Location:* Buys Ballotbuilding 3.19 (Cap: 24), 3.22 (Cap: 36), 3.25 (studio)

### **Active Learning Classroom - Bolognalaan**

*Facilities:* Sit-to-stand group tables with screens, whiteboards, teacher operates from the middle of the room, screen management.

*Faculty/dept:* Science, Social Science and Geo Sciences, available for UU after 'exchange date'.

*Location:* Bolognalaan 101, room 2.049 (Cap: 48)<sup>12</sup>



Active Learning Classroom - Bolognalaan



Flexible seminar room - Bolognalaan

### **Flexible seminar room - Bolognalaan**

*Facilities:* Steelcase node chairs, whiteboard wall

*Faculty/dept:* Science, Social Science and Geo Sciences, available for UU after 'exchange date'.

*Location:* Bolognalaan 101, room 1.202 (cap: 30)

<sup>12</sup> <https://teachinglearninglab.nl/en/2019/03/08/active-learning-classroom-from-pilot-to-new-university-classroom/>

### **Dynamic room - Drift**

*Facilities:* Steelcase node chairs, screens, mobile whiteboards.

*Faculty/dept:* Humanities

*Location:* Drift 23, room 0.20



Dynamic Room - Drift



Coll@b - UMC Utrecht

### **Coll@b**

*Facilities:* Interactive whiteboard, different kinds of flexible furniture.

*Faculty/dept:* UMCU

*Location:* Hijmans van den Berg building, 3rd floor

### **Teaching Lab – University College Utrecht**

*Facilities:* Steelcase node chairs, three screens, smartboard, webcam.

*Faculty/dept:* University College Utrecht

*Location:* Locke D

### **Governance Lab – high tech & low tech**

*Facilities:* Flexible furniture, room dividers, pin board, whiteboard.

*Faculty/dept:* USBO

*Location:* Bijhouwerstraat 6, rooms 202, 220



Governance Lab (Hightech room)



Governance Lab (Lowtech room)



### **Hybrid Active Learning Classroom**

In 2020, UU will develop a Hybrid Active Learning Classroom. This classroom will facilitate the combination of face-to-face and distance learning. UU student scan be physically present, while students from other universities attend online.<sup>13</sup>

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<sup>13</sup> <https://teachinglearninglab.nl/2020/03/09/afstandsonderwijs-vormgeven-op-basis-van-de-ideale-didactische-situatie/>

### 3. TLL and higher education

#### 3.1 Courses for ECTS

A number of regular courses (for ECTS) was staged in the TLL. In 2019, a total of 87 teaching sessions (ranging from 2 hours to full days) of ECTS-courses were taught in the TLL. Lecturers are very positive about the TLL; most say they appreciate the flexibility of the rooms.



In 2019, the following regular courses were taught in TLL:

| Month   | Course                                       | Target Group                | Nr of students | Nr of sessions | Faculty / organisation                    |
|---------|--|-----------------------------|----------------|----------------|---|
| Jan     | Techniques of Futuring                       | Geosciences masters         | 20             | 2              | Geosciences                               |
| Feb     | <i>Profieldeel Wereldoriëntatie</i>          | ALPO / HU students          |                | 2              | HU  |
| Feb     | The imprinted brain                          | Pharmacy bachelors          | 30             | 10             | Science                                   |
| Feb-Apr | Applying Mathematics in Finance              | Mathematics / Economics     | 60             | 20             | USBO / Science                            |
| Feb-Apr | <i>Wetenschappen en Techniekcommunicatie</i> | Science bachelors           | 20             | 10             | Science                                   |
| Apr     | Co-challenge                                 | Students Biomedical science | 20             | 10 days        | Medicine                                  |
| May     | <i>Communicatie in de wiskunde</i>           | UU                          |                | 1              | Science                                   |
| May-Jun | <i>Digitale farmaceutische zorg</i>          | Pharmacy students           | 6              | 7              | Science                                   |
| Sep     | History & Philosophy of Science              | Science masters             |                | 2              | Science                                   |
| Sep-Oct | Meet your brains                             | Pharmacy bachelors          | 25             | 6              | Science                                   |
| Sep-Nov | Living Past                                  | Bachelor                    | 5              | 10             | Science, GEO, Social Sciences, Humanities |
| Nov-Dec | The imprinted brain                          | Pharmacy bachelors          | 30             | 5              | Science                                   |
| Dec     | Mixed classroom                              | Geosciences masters         |                | 2 days         | Geosciences                               |

In a course on financial algorithms for students from both the School of Economics and the Science Faculty of Utrecht University, students train their programming skills. The course is given in the TLL by Dirk Gerritsen (coordinator of the Master's program, School of Economics) and Robbert Pullen (trainer at the Optiver company).<sup>14</sup>

<sup>14</sup> <https://teachinglearninglab.nl/2019/05/06/de-ideale-opstelling-om-studenten-te-laten-samenwerken/>

*The TLL made the necessary interaction between students possible, with a great deal of flexibility being offered to adapt the room to our own insight. It turned out to be the optimal setup that would have been difficult to achieve at other locations (Lecturer, USBO)*

In the Elective course 'Co-create: life's professional challenges' students attempt to solve societal problems in an innovative way. In 2019, the Municipality of Utrecht gave the assignment: find a solution for the increasing workload among students. The venue for this challenge was the TLL, where for two weeks, bachelor-, master- and recently graduated students collaborated in teams.<sup>15</sup>

### **3.2 Escape rooms & puzzle boxes**

The Mastermind Escape Room<sup>16</sup>, initiated by the Educate-it program and funded by the Utrecht Educational Incentive fund<sup>17</sup>, offers an array of educational tools that participants need to use in order to get out the room. By decoding the room's mysteries in 60 minutes, lecturers are introduced to these tools. In 2018, the Escape Room was developed and pilot-tested in the TLL. It travels around the campus (USP and city centre); the TLL hosts the Escape room three times a year for a full week, in 2019 in January, June and in September.



Testing puzzle boxes at the TLL Autumn Festival 2019

In addition, the TLL has been used for testing Puzzle Boxes, initiated by the Freudenthal Institute: small, portable escape rooms, that stand on a table in front of the team. By using knowledge and skills from mathematics, physics, chemistry or biology classes, teams of students need to open their puzzle box within limited time.

### **3.3 Summer & winter courses**

The TLL hosted parts of the annual summer and winter courses (*Versterk je onderwijs week*)<sup>18</sup> by the partners of the Centre of Academic Teaching, focusing on the use of IT Tools in teaching. In addition, the two-week international '[Summer school for mathematics education](https://www.uu.nl/en/education/centre-for-academic-teaching/utrecht-education-incentive-fund)' by Freudenthal Institute was held in TLL, for 35 international students.<sup>19</sup>

### **3.4 Workshops and training sessions**

In 2019, TLL hosted over 40 workshop and training sessions, organized by, amongst others, Educate-it, the Centre for Academic Teaching and Educational Consultancy & Professional Development. These workshops included training sessions for various IT-tools, educational approaches, and masterclasses on curriculum design.

<sup>15</sup> <https://teachinglearninglab.nl/2019/06/21/studenten-zoeken-oplossing-voor-werkdruk/>

<sup>16</sup> <https://mastermind.uu.nl/>; <https://teachinglearninglab.nl/2019/02/22/kennismaken-met-onderwijstechnologie-via-een-escaperoom/>

<sup>17</sup> <https://www.uu.nl/en/education/centre-for-academic-teaching/utrecht-education-incentive-fund>

<sup>18</sup> <https://educate-it.uu.nl/versterk-je-onderwijs-week/>

<sup>19</sup> <https://utrechtsummerschool.nl/courses/science/mathematics-education>

## 4. TLL & Secondary school teaching

### 4.1 U-Talent

Both lecture/experimentation rooms are extensively used by [U-Talent](https://u-talent.nl)<sup>20</sup>, a collaboration between Utrecht University, the University of Applied Sciences Utrecht and over 40 partner schools from the Utrecht region. Its objective is to strengthen regional science education in secondary education and in the bachelor of higher education, and to improve the transition from secondary to higher education. Next to science classes, U-Talent organises classes on language, culture, people and society.

In 2019, 45 classes have been organized, in which 26-30 vwo-students (aged 12-18) participated. In addition, TLL hosted three U-Talent workshops for secondary school teachers.

### 4.2 Girlsday

During [Girlsday](https://teachinglearninglab.nl/2018/04/19/girlsday-teaching-learning-lab/)<sup>21</sup> in April, 23 girls from Broklede school were introduced to the Faculty of Science and its possibilities. Venue: the TLL. As well as taking part in activities such as cooking proteins, glassblowing and solving mathematical pizza problems they programmed a hit song. Girlsday is organized by *VHTO, Landelijk expertisebureau meisjes/vrouwen en bèta/techniek*.

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<sup>20</sup> <https://u-talent.nl>

<sup>21</sup> <https://teachinglearninglab.nl/2018/04/19/girlsday-teaching-learning-lab/>

## 5. Research in TLL

The TLL accommodates research projects, including lesson studies and the study of actual classroom situations. The combination of flexibility, technical equipment and recording facilities makes the TLL the ideal setting for studying didactics.

### 5.1 Lesson Study

A Lesson Study is an approach for studying and strengthening teaching, in which small groups of teachers and researchers collaborate, discussing learning goals, designing lessons, and carrying them out in the classroom lesson (the 'research lesson'). During a Lesson Study, a team of educational researchers designs lessons, gives the lessons, and observes specifically selected students, after which they reflect on the lessons, redesign and go through the whole cycle again with another class.

The TLL facilitated science education research for the NRO project of Michiel van Harskamp, Christine Knippels and Wouter van Joolingen (Freudenthal Institute, UU). This project aims to foster science teacher competence for citizenship education on sustainability issues at lower secondary level. To do so, a team of six secondary school teachers and three science education researchers collaborates over the course of four years, by means of Lesson Study. The lesson design-sessions took place in the TLL, as it provides all required facilities. The observation cameras were used to record four groups of students and their dialogue during the research Lessons, which was very helpful and could not have been achieved easily in another way. Audio and video quality of the recordings are sufficient for research purposes.

### 5.2 Classroom study

Mathematics teacher and PhD-student Marianne van Dijke-Droogers used the TLL for an educational experiment. Observed by a team of international researchers, eight of her 14-15 year old high school students (3vwo) carried out statistics assignments using the digital environment of Tinkerplots. The advantage of this lab setting over a classroom environment was that detailed video recordings could be made of students' actions in Tinkerplots and accompanying conversations. These recordings were used as input for in-depth discussions within the team of researchers and, as such, they provided more insight into students' learning from and with digital tools<sup>22</sup>.



Researching statistics teaching

*"The advantage of this lab setting over a classroom environment was that detailed video recordings could be made of students' actions and accompanying conversations."*

Marianne van Dijke-Droogers, PhD-student and mathematics teacher

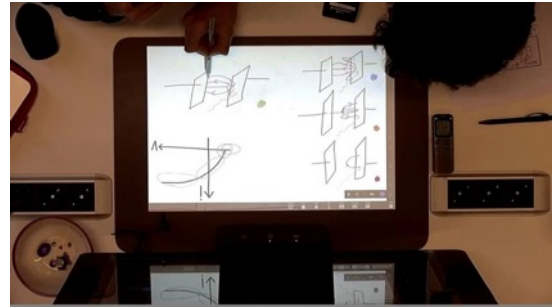
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<sup>22</sup> (Van Dijke-Droogers, M.J.S., Drijvers, P.H.M., & Bakker, A. (2020). Statistical modeling through the lens of Instrumental Genesis, Journal for Mathematical Thinking and Learning (submitted)



### 5.3 Stop-Motion Animation for physics classes

The TLL facilitated the production and testing of stop-motion animations for physics training. This is a technique that involves creating the illusion of motion through the physical manipulation of objects. Mohammadreza Farrokhnia, physics teacher and PhD-candidate from Iran, conducted research on student-generated animation as an approach for learning physics.<sup>23</sup>

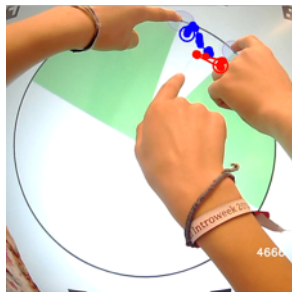


Testing stop-motion animation

*The teaching determines the setting rather than that the setting determines how the teacher will teach, like in usual classrooms.*

Mohammadreza Farrokhnia, physics teacher and PhD-candidate

### 5.4 Embodied mathematics learning with technology



For design-based research on mathematics learning, the large learning table serves as the perfect equipment. Its use enables post-doc Anna Shvarts to elaborate embodied tasks that offer students an opportunity to 'embrace' mathematical concepts, such as a parabola, area of a rectangle or a sine graph. The learning table provides continuous feedback on the student's movements along the table surface, thus allowing to establish new sensory-motor types of coordination that ground the target mathematical concepts. More on embodied mathematics learning.<sup>24</sup>

### 5.5 Eye tracking in mathematics learning

Anna Shvarts uses eye-tracking in studies on student's attention to the TLL Learning table. Eye-movements data brought evidence for new sensory-motor coordination, which students develop as they work on embodied designs for mathematics learning. For example, horizontal eye-movements appear to be critical for establishing the alignment of the sine values on a unit circle and a sine graph. The researchers could also distinguish which elements of the interactive designs used are attended by the students and which are missed. Eye-tracking research allows mathematics didacticians to ground their educational design decisions in knowledge about student's processing of visual display. More on Anna's research.<sup>25</sup>



Using the eye tracker on the learning table

<sup>23</sup> <https://teachinglearninglab.nl/en/2019/05/20/student-generated-stop-motion-animation/>

<sup>24</sup> <https://embodieddesign.sites.uu.nl>

<sup>25</sup> <https://teachinglearninglab.nl/en/2019/09/13/studying-mathematics-on-learning-tables/>

## 6. Events

### 6.1 Inspiration cafés

In 2019, the TLL organized nine inspiration cafés, shown in the table below. In these cafés, guest speakers present an educational approach, a tool, a new product etc. Over a drink, participants can interact with the speaker.



Inspiration café 'E-learning environments - students' expectations'

| Date    | Speakers (all UU)  | Topic   |
|---------|--|---|
| 10 Jan  | Ralph Meulenbroeks, Freudenthal Institute                        | Intrinsic Motivation  |
| 14 Feb  | Christian Köppe, Freudenthal Institute                           | Design patterns in education  |
| 14 Mar  | Rianne van Lambalgen, Liberal Arts & Science                     | Interdisciplinarity   |
| 11 Apr  | Kristi Jauregi, Humanities Educate-it                            | The benefits of online collaboration                                      |
| 9 May   | Marit Wijnen, Educational Consultancy & Professional Development | Problem-based learning  |
| 13 June | Fred Wiegant & Karlijn Gielen, Biology                           | Deep-learning through online peer feedback                                |
| 12 Sep  | Ignace Hooze, Psychology   | Student participation in teaching: supervision of practicals by students  |
| 10 Oct  | Friso Bouman & Anneke Marien, University Council                 | Flexible study paths  |
| 14 Nov  | Wim van Velthoven, Freudenthal Institute                         | Numworx, a digital tool for students to monitor their mathematical skills |

### 6.2 Tours

A wide variety of institutes and delegations, totalling 14, visited the TLL. The visits included among others:

- KU Leuven
- Grafisch Lyceum
- University College London
- Maastricht University
- University of Amsterdam
- Boswell-Bèta
- WALs conference delegation
- Hogeschool Utrecht

- University of Southern Denmark
- Raad van Toezicht Utrecht University

### 6.3 Autumn Festival

Every year, the TLL organizes the TLL Autumn Festival. In 2019, a total of 200 university lecturers, partners from industry, policymakers, secondary school teachers and researchers visited the festival. They could attend three pre-festival workshops and fifteen workshops on topics such as active learning classrooms, new educational approaches, new tools, and AR & VR.

During the Autumn Festival, the Virtual Classroom was officially opened by Annetje Ottow (vice-president of the Executive Board) and Isabel Arends (dean of the Faculty of Science). [Impression of the 2019 festival.](#)<sup>26</sup>



TLL Autumn Festival 2019, plenary session

### 6.4 Design Thinking sessions

During the Autumn Festival, two Design Thinking sessions for teacher, students and others interested in teaching were organized. Design Thinking is an approach for solving problems, especially complex problems. Solutions are designed in brainstorm sessions and then a concept for a prototype is developed, such as an educational approach, a physical or online learning environment. The Design Thinking approach is also suitable for tackling educational problems or challenges.



Design Thinking-team presenting ideas

In one session, organized by the Freudenthal Institute, the participants developed teaching approaches for generating new scientific concepts in the classroom and the translation of these in concrete products, such as content and apps for the [Utrecht TimeMachine](#).<sup>27</sup>

In the second session, organized by UMC Utrecht, participants were challenged to think of new combinations of learning spaces and challenges.

Both sessions were supported by Educate-it. At the end of the day, the results were visualized and presented to the festival audience.

### 6.5 Other events

The primary aim of the TLL is hosting education-related events, such as courses, workshops, challenges and educational research. However, when available, the rooms are also used for research meetings (in 2019: 28), PhD meetings (5). In addition, organisations, including *VO-HO netwerken*, have organized conferences on biology didactics and regional networks of secondary & higher education.

<sup>26</sup> <https://teachinglearninglab.nl/en/2019/12/12/virtual-classroom-opened-at-autumn-festival-teaching-learning-lab/>

<sup>27</sup> <http://utrechttimemachine.nl>

## 7. Studio recordings

The studio crew built on the previous (pilot) year. A variety of videos was recorded, for both educational and promotional purposes, inside as well as outside the studio.

### 7.1 Lightboard recordings

Especially, the use of the lightboard has been a success. In 2019, a total of 39 clips have been recorded using the lightboard, by lecturers and for students' projects (listed below). Most of these clips have been used for educational purposes.



Lightboard recording instructions

| Course / module / project | Audience                   | Nr of clips | Faculty         |
|---------------------------|----------------------------|-------------|-----------------|
| Mathematics online        | High school children       | 19          | Science         |
| Motivation                | General                    | 6           | Science         |
| Philosophy                | Geosciences                | 3           | Geosciences     |
| Chemistry course          | Chemistry students         | 1           | Science         |
| Pharmacy course           | Pharmacy students          | 1           | Science         |
| Mathematics course        | Mathematics students       | 1           | Science         |
| Childhood education       | Humanities students        | 1           | Humanities      |
| Dutch didactics           | Students of Dutch language | 1           | Social sciences |
| Various                   | Various                    | 8           |                 |

### 7.2 Recordings without a screen

In 2019, 29 clips without a screen were made (listed below). Recording included compilations, demos of practicals, pitches, impressions of conferences and workshops.

| Course / module / project        | Audience                  | Nr of clips | Faculty |
|----------------------------------|---------------------------|-------------|---------|
| Compilations                     | Visitors / events         | 5           | Science |
| Pitch various                    | Geosciences               | 5           | Geo     |
| Freudenthal courses (practicals) | Physics teachers          | 3           | Science |
| Media training                   | UU researchers            | 3           | Various |
| Pitch Breaking Science           | Various                   | 3           | UU      |
| Pitch Autumn Festival            | Festival visitors         | 2           | Science |
| Chemistry course (practicals)    | Chemistry students        | 1           | Science |
| U-Talent course (practicals)     | High school students      | 1           | Science |
| Pitch CSP course                 | MSc students (MSEC)       | 1           | Science |
| Opening Virtual classroom        | Autumn Festival visitors  | 1           | UU      |
| SIOO Conference                  | SIOO visitors             | 1           | NA      |
| Webinar Educate-IT               | Various                   | 1           | UU      |
| Freudenthal courses (practicals) | Chemistry teachers        | 1           | Science |
| Masterclass 'Program a hit song' | Secondary school students | 1           | Science |



The studio has recorded 20 lectures and events outside the studio at various locations, for the faculties of Science, Geosciences and REBO (listed below).

| Course / module / project           | Audience             | Nr of clips | Faculty            |
|-------------------------------------|----------------------|-------------|--------------------|
| Registrations of HOVO course        | Hovo students        | 9           | Science            |
| U-Talent workshop impressions       | High school students | 3           | Science            |
| Registrations of lectures           | Various              | 3           | Science            |
| Registrations of students' projects | Various              | 3           | REBO, GEO, Science |
| Conference impressions              | Teachers             | 2           | Science            |

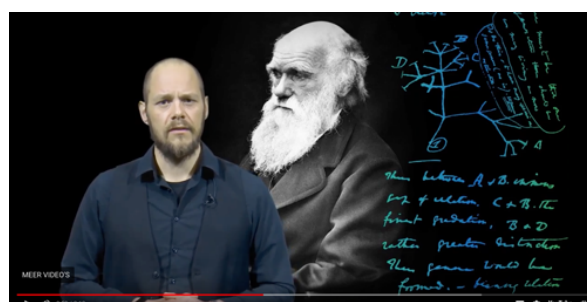
### 7.3 Greenscreen recordings

The studio facilitates recordings in which the lecturer is positioned in front of a greenscreen. A total of 7 greenscreen clips have been produced (listed below). [Example of a greenscreen recording](#)

| Course / module / project | Target Group         | Nr of clips | Faculty         |
|---------------------------|----------------------|-------------|-----------------|
| Freudenthal courses       | MSEC and CE students | 4           | Science         |
| Online didactics training | UU teachers          | 1           | Social sciences |
| Music by oceans           | Alumni               | 1           | Science         |
| Naturvation mode          | Various              | 1           | REBO            |

*It was a very nice experience for me, and I will also apply more knowledge clips in my courses. This brings certainly added value, but it is not a substitute for a lecture.*

Edwin Pos, Faculty of Science ([see recorded testimonial](#))<sup>28</sup>



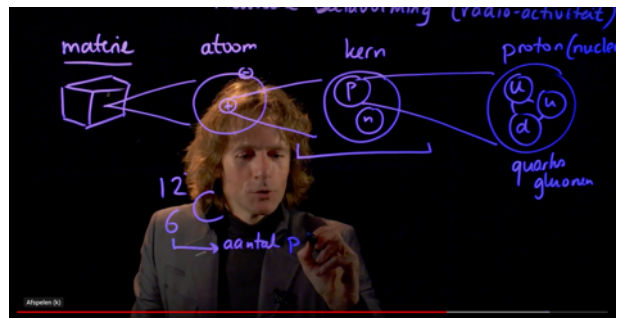
<sup>28</sup> <https://teachinglearninglab.nl/2020/03/11/edwin-pos-vertelt-in-een-filmpje-over-zijn-ervaringen-in-de-tll-studio/>



## 8. Projects

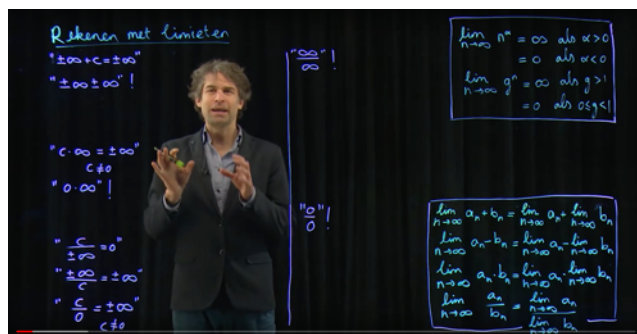
### 8.1 Online learning - Special Relativity online course

In 2019, three times, the blended course 'Special Relativity' has been taught to pre-service teachers. They highly appreciate the clips, which is explicitly mentioned in the course evaluations. The clips have even been used to follow the course fully online. Several new clips on specific subjects have been added in the last year. Full implementation of the available material into an online course is foreseen at a later stage. [Watch an exemplary clip](#)<sup>29</sup>.



Clip from Special Relativity online course

### 8.2 Online learning - Mathematics D online course



Clip from Mathematics D online

Starting in May 2019, the mathematics (Wiskunde) D-program for 4 VWO (fourth grade of pre-university school) has been made online and is almost finished. The studio has been used for making 19 light board clips. [Watch an exemplary clip](#)<sup>30</sup>.

### 8.3 Future learning spaces

In 2019, the Learning Spaces project<sup>31</sup> (the Future Learning spaces project that started in 2018) has realized several learning spaces. Experiments in the TLL with a set-up based on the active learning classroom concept were proven so successful that Utrecht University decided to redesign two classrooms elsewhere on the campus into (hybrid) active learning spaces. Also, in collaboration with the FLS-project and financed by the project 'Inzet AV en Duurzamer reizen' the virtual classroom has been set up in the TLL studio. The experiences of teachers in the virtual classroom will contribute to the new educational vision on learning environments of the UU.

The LEGO workshop, developed by the Learning Spaces project, fosters the designing of more active learning spaces inside and outside the UU.



LEGO workshop for designing learning spaces, Autumn Festival

<sup>29</sup> <https://www.youtube.com/watch?v=12YbeHXwbuA&feature=youtu.be>

<sup>30</sup> <https://www.youtube.com/watch?v=TQrFeswbwWg>

<sup>31</sup> <https://educate-it.uu.nl/en/future-learning-spaces>

## 9. Preview on 2020

In 2020, various new initiatives are scheduled for both educational and research purposes:

### *Virtual classroom*

After the installation of the virtual classroom, it will be tested in practice in 2020, in regular courses. For this project, Karin Rebel (Faculty of Geosciences) and Frans van Dam (Science) have received a SURF grant. They will test an interuniversity and interdisciplinary online course in the virtual classroom. The course 'Sustainability Challenges' aimed at bachelor students will be taught as part of the strategic alliance of Utrecht University, UMCU, Eindhoven University of Technology, and Wageningen University & Research Centre. In the project the researchers will examine student involvement, feedback options, method of collaboration between students with different backgrounds, quality assurance when scaling up to more students and institutions. The project will start in September 2020. The virtual classroom will also be used for [Charm-EU<sup>32</sup>](#), an European alliance in which the university and other European universities develop a new joint master's program, aimed at challenge-based learning.



*The Virtual Classroom in the TLL studio*

### *New didactic tools*

TLL staff regularly scout new teaching tools. If needed and feasible, new approaches or tools will be acquired and implemented in the TLL. In 2020, the Interactive Whiteboards equipped with a Polycom video bar – containing camera, microphone and speakers – will be tested in hybrid classroom settings. For evaluating the added value of augmented & virtual reality for education, the TLL will design and start new projects.

### *Autumn Festival*

On 27 November 2020, the fifth TLL Autumn Festival is scheduled. The festival will pay special attention to the topics 'Education is everywhere', as well as the use of distance learning and virtual & augmented reality.

### *Distance / online learning*

As a result of the Corona crisis, the TLL will be closed for several months in 2020. Lessons learned from experiences with distance / online learning of secondary and higher education will be used to revisit TLL's activities for 2020 and further.

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<sup>32</sup> <https://www.uu.nl/en/news/launch-of-charm-eu-a-new-university-alliance-focusing-on-interdisciplinary-challenge-based-education>

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#### Photography

|                             |  |
|-----------------------------|--|
| Ivar Pel                    | 1, 3, 4, 7 (upper), 10, 21               |
| Studio                      | 5, 6, 15, 17, 18, 19 (upper, middle), 20 |
| Jasper van Winden           | 7 (middle)                               |
| Universiteit Utrecht        | 7 (lower), 8 (upper, lower)              |
| UM Utrecht                  | 8 (middle)                               |
| Thomas Fasting              | 11, 16, 19 (lower)                       |
| Marianne van Dijke-Droogers | 13                                       |
| Mohammadreza Farrokhina     | 14 (upper)                               |
| Anna Shvarts                | 14 (middle, lower)                       |

#### Staff

|                    |   |
|--------------------|---|
| Steering Committee | Toine Pieters, Jan Haarhuis                                       |
| Management         | Frans van Dam, Laurien Jansen, Ferdi Engels, Maarten-Harm Verburg |
| Studio             | Fridolin van der Lecq, Martin Cohen                               |
| Communication      | Miranda Overbeek, Letty Klumpers                                  |
| Logistics          | Mariozee Wintermans   |

Teaching & Learning Lab: [www.uu.nl/tll](http://www.uu.nl/tll)

