

## Various challenging students assignments : cases of creations realized on festivals and events

**Citation for published version (APA):**

Veeger, T. T., & Moonen, S. P. G. (2016). Various challenging students assignments : cases of creations realized on festivals and events. In S. Emmitt (Ed.), *Building our Future : Proceedings of the Integrated Design Conference ID@50, 29 June - 1 July 2016, Bath, United Kingdom* (pp. 154-169). University of Bath.

**Document status and date:**

Published: 29/06/2016

**Document Version:**

Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

**Please check the document version of this publication:**

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

**General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

[www.tue.nl/taverne](http://www.tue.nl/taverne)

**Take down policy**

If you believe that this document breaches copyright please contact us at:

[openaccess@tue.nl](mailto:openaccess@tue.nl)

providing details and we will investigate your claim.

# VARIOUS CHALLENGING STUDENTS ASSIGNMENTS: CASES OF CREATIONS REALIZED ON FESTIVALS AND EVENTS

Veeger, T.T.; Moonen, S.P.G.

*Published in:*  
Proceedings of the Integrated Design Conference ID@50

E-pub ahead of print: 29/06/2016

*Document Version*  
Publisher's PDF, also known as Version of Record (includes final page, issue and volume numbers)

**Please check the document version of this publication:**

- A submitted manuscript is the author's version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

*Citation for published version (APA):*  
Veeger, T. T., & Moonen, S. P. G. (2016). VARIOUS CHALLENGING STUDENTS ASSIGNMENTS: CASES OF CREATIONS REALIZED ON FESTIVALS AND EVENTS. In S. Emmitt (Ed.), Proceedings of the Integrated Design Conference ID@50: Theme: Building our Future. (pp. 154-169). Bath: University of Bath.

**General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

**Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

# VARIOUS CHALLENGING STUDENTS ASSIGNMENTS: CASES OF CREATIONS REALIZED ON FESTIVALS AND EVENTS

Veeger<sup>1</sup>, T.T., and Moonen<sup>1</sup>, S.P.G.

<sup>1</sup>Department of the Built Environment, Eindhoven University of Technology, Eindhoven, the Netherlands

**ABSTRACT:** A most effective way of learning is to intrinsically motivate students by challenging concrete tasks; this paper describes a number of cases (11 in total) in which students were challenged to design, elaborate technical and practical features, and actually built, too. All cases have a similar approach: the initial development of a concept is an individual assignment for all students (to generate as much ideas as possible), then the most promising concept is selected (often part of a competition) and continued with technical and practical elaboration by a group of students. This group becomes in most cases a wider group when the actual realization takes place.

A valuable source of challenging assignments can be found in contributions to festivals and events. Festivals offer ample opportunities, because most of the festivals are developing activities in addition to their core business of "music and food". Contributions to festival are preferred because it really doesn't require much to inspire and motivate students for this kind of assignments. The demand for a distinctive structure, that stand out in a festival is motivating in itself, the intention to actually realize the project helps a lot, too. There is also an additional opportunity, offered by the limited duration of a festival (1-5 days). This provides a great scope for experiments and innovations. Combined with the challenge to develop an integral object within technical and pragmatic constraints provides a good basis for attractive education to students.

**Keywords:** design-based learning, DBL, proof of concept, integral design, teamwork

## 1. INTRODUCTION

Learning effects are much stronger by offering challenging concrete assignments that foster the intrinsic motivation of students. And a task that is aimed to deliver a tangible outcome (learning-by-doing) makes the effect stronger. A valuable source for assignments is found in contributions to festivals and events. Many festivals are developing nowadays various activities to entertain visitors in addition to their core business of "music and food"(Double2, 2012) offering a wide range of opportunities for assignments for students from design up to realization.

The context of making an object for a festival or event requires a good deal of inventiveness, as the ultimate goal is to come up with a conspicuous mark that stands up in a bewildering complexity of crowded spaces. This content-related aspect is already challenging in itself, in terms of motivating students.

A benefit that comes with the limited duration (often 1-5 days) of a festival or event is that the focus shifts from a traditional implicit design position of building for infinity towards a temporarily installation, providing a great scope for experiments and innovations. However, of course, the real challenge is to develop an integral object that is emphatically positioned within technical and pragmatic constraints of safety regulations and that takes requirements coming from fast and practical assembling into account, too.

In these integral assignments we involve student teams in the design process (“*research through design*”), in making prototypes (and the effect of details on different scale levels: “*learning by doing*”) and for assembling the pavilions on a festival (support during construction: “*learning by precedent*”). The extrinsic reward of being the designer of a contribution of a festival has a great impact on a student’s intrinsic motivation that helps them acquire in-depth knowledge.

In this paper we describe a number of cases in which students designed, built and exposed their results to a larger audience as part of the design curriculum. The cases have in common that all were started as part of a studio assignment.

### **1.1 Developing a distinctive appearance as part of a studio assignment**

In most architectural education, students learn how to design in a kind of studio setting (Goldschmidt, G.; Hochman, H.; & Dafni, I., 2010). As a general rule, a student accumulates essential knowledge in courses, lectures, small exercises, et cetera, while the studio is meant for application and interpretation of the knowledge acquired. So, students are trained in the studio to gain experiences in designing and acquire specific additional knowledge, too. In order to challenge students, assignments in design studios are practice based projects, as a general rule, using Design Based Learning (DBL). Design Based Learning is developed to teach students to integrate and apply knowledge (Wijnen, 2000). Design Based Learning elaborates on educational principles of Problem Based Learning (PBL) (Graaff & Kolmos, 2003). Problem Based Learning supposes that students develop skills and integrate knowledge by solving ill-defined problems (Kolodner, et al., 2003). In a design studio, desk critics are given by a tutor and this is the major pedagogical method: Criticism is the act of making judgments and evaluations from tutors to students (Graham, 2003) to communicate design knowledge, and to bridge the gap from theory to practice (Salama, 1995). In our projects, set out in the following sections, a next step towards a deeper understanding is set by actually realizing the design on full scale. Here, students learn a lot from successes as well as failures, especially if the success or failure is analyzed and investigated. And others students learn too, if results are shared and above all if people are willing to talk about both failures and successes.

The design assignment in a studio is often a simplified issue that corresponds to the specific learning goal. This issue shall be challenging and realistic, each student is asked to make an individually design with the same context as the basis for elaboration. The studio setting, with students who are all working in the same context on different concepts, offers students to deepen knowledge by discussing and sharing information.

Though to really challenge students it is advisable to use an issue that is based on a realistic problem that resonates very close with the experiences of students. In all cases described in this paper, we were continually pleased to see that young designers have engaged in the assignments so enthusiastically and that they have spend so much additional time on top of the time the curriculum asks for. Another major point of particular interest in the cases described below is the setup with individual assessments as well as group activities. In this setting, students learn to cooperate in a team.

## 2. CASE STUDIES REALIZED ON FESTIVALS AND EVENTS

A number of examples of motivating assignments are discussed in the following six sections. All examples showed have in common that it starts by a number of students making individual designs followed by selecting concepts in a kind of competition. In the next phase, a selected concept is elaborated in a group who develops detail solutions, deals with processes and strategies, and finally is strongly involved in the execution of the construction works, too.

### 2.1 Introduction of the “sPectakel” for freshmen (1995-2013)

For many years, first-year students of the Dept. of the Built Environment worked in a studio setting for 2½ days/week on assignments in clusters of 60 students (Moonen, et al., 2013). Assignments varied in length between one and several weeks in which students tackled different subjects, using various design processes: “positive about this method of teaching is the great diversity of results. This diversity is favorable, because of the cultural and economic demand for creative and unique design products” (Proveniers & Westra, 2009)

Each year included a two-three day workshop, called sPectakel, involving an intensive design/building assignment. A sPectakel involved ±250-300 first-year students working on the same assignment at the same time in the same place.

This sPectakel is an intensive assignment where students work in groups with real materials, at a scale of 1:1. The main learning objectives are: learning to work together, to think quickly, to make fast decisions, to deliberate and to produce conceptual ideas. A major issue is to explore manipulability. This is why every sPectakel is based on a combination of an unexpected material and a surprising function as opportunity to challenge students. This unconventional assignment in fact requires a thorough investigating of material possibilities and asks for solutions in unexpected, creative, and unorthodox ways. The sPectakel offers for many of the students a first and unique opportunity to actually build their design. So in many ways the sPectakel corresponds to the idea that “architectural designing is a continuous acting on and testing of opportunities as a result of the design process itself.” (Schön, 1984)

The 2-3 day sPectakel is subdivided into three blocks. The first block (one day in general) starts with an inspiring lecture that gives students a sneak preview of a non-traditional way of using a specific material. After that, all students start with making individual designs in order to generate as much ideas as possible. There are two very important features in this first block that organizers of a sPectakel needs to keep close track of: 1) the specific material needs to be present in the design studios from the very beginning of the assignment; ready for the students to be held, bent, felt, connected on the real scale, and 2) other materials with the same characteristics but with a smaller scale should be present too for making scale models (3D) in addition to sketches.

Students are expected to make an individual design in a short time and to make a model in which their first ideas are presented. They are required to describe the main idea of their design in one word or short sentence. After that, the best ideas are selected and like-minded designs are put together into a group of 3-4 people. In the next block (often the first part of the second day), the group further elaborates on the initial idea. This can be seen as experimental learning: “concrete experience, observation and reflection, the formation of abstract concepts, testing in new situations” (Kolb, 1984)

In the 2<sup>nd</sup> block the design evolves, construction and connections are thought out further, an action plan is formulated and tasks are distributed in the group. The last block is meant for building the prototypes on its actual scale. This often requires students to improvise since connections on its actual scale differ a lot from connections in scale models. Tutors walk around to help, to inspire, to explain and to support the students. After the students have finished their objects, a jury selects 3-5 objects (out of about 80 designs), points out special and ingenious aspects of the chosen designs and selects a winner (Swagten, et al., 2010). The subchapters show examples of sPectakels. A selection is made from over 20 sPectakels, all with combinations of unusual material and surprising function.

### 2.1.1 Chair made of PVC pipes and tie-wraps only (2002)

A combination of PVC pipes (the well-know yellow electric installation pipes) and tie-wraps have lead to surprising results in an assignment to make a seat. Students were free to select the type of seat in this design. PVC pipe is an inspiring material to build things in this kind of exercises (Figure 1). Yet, it is very much a material with its own character. Tie-wraps offer different simple ways of connecting. Making a chair from this floppy material is not that simple, especially since students had to make an object that can bear the full weight of a person.



Figure 1. Electric installation pipes used for making seats.

### 2.1.2 Stairway to Heaven made from cardboard (2007)



Figure 2. stairs made of cardboard perform much better than initially expected

Another example, “stairway to heaven”, shows results of an assignment where students had to build a stair from maximum 4 m<sup>2</sup> cardboard with masking tape as the only allowed connection material (Figure 2). The stair had to be as high as possible and strong enough to carry a student who had built this object. The properties of cardboard were used in many different ways adding beauty of the structure in many designs. Some stairs could be used to sit upon.

### 2.1.3 Private Space (2009)

Another sPectakel that showed unexpected results is the assignment where students had to build their own private space, made of PVC-pipes and rope. In “From Chair to City; A Story of People and Space” Bakema (1964) explains the relation and transition from small surroundings (of a chair) to the big world (the city) and describes the fluent transition of private to public space (Ibelings, 2000). This sPectakel started by a presentation in which ideas behind transition of spaces were set out. On this basis, students also had to deal with transitions by building their own private space.



*Figure 3. Students showing their interpretation of private space on a catwalk*

This resulted in a show where student showed ideas on a catwalk (Figure 3), while explaining their concepts of defining and realizing private space such as moveable structures, combinations of pulling and pushing, types of connections.

### 2.1.4 Chair from linoleum (2005)

Linoleum was used in another workshop that asked to make an object to sit on. The only additional materials that were allowed to use for making connections were tie-wraps (max 100). Linoleum, also called Lino, is normally used as floor covering. The upper layer is made from linseed oil and pine rosin with aggregates (cork dust, wood flour, and mineral fillers) applied on a canvas backing. Linoleum is available in a wide range of bright colors (Figure 4). In this assignment only vivid colors were selected, making the contrast even bigger.



*Figure 4. Linoleum is a tough material to use, yet results makes up for a lot*

The linoleum made this assignment one of the most difficult sPectakel; students were really forced to use the material in an unusual way. However, the results were surprisingly good with many different seats varying from stools, to hammocks, and even chaise longues.

A major requirement of this assignment was to make an object that can bear the full weight of a person. A principle that many students groups choose was making rolls of linoleum as load transmitting elements (Figure 4). Braiding techniques were used quite often too, as well as using strips of linoleum as pulling elements.

### 2.1.5 Entrance gate (1997), bus stop (1998) and brick-table (2010)

Throughout all the years, there were sPectakels that used brick as a composition material to make all kinds of objects. The first time was based on sand-lime bricks with the assignment to design an entrance gate that could direct visitors coming from the railway station toward the central porter's lodge on the campus (left photo in Figure 5). This design was reconstructed afterwards on the proposed site (after all permits were organized) and remained in this function from 1997 until 2005.



Figure 5. Entrance gate (left hand side) and bus stop (middle and right hand side)

A second time that bricks were used in the sPectakel was in the assignment to develop a students' meeting point for excursions. So a kind of landmark on the TU/e campus had to be designed with the function of a bus stop that is easy to describe where to meet. Figure 5 shows a result (photo right examples during the sPectakel, photo in the middle the bus stop that is actually realized). The winning bus stop was built afterwards and is still used as meeting point for excursions (in use since 1998).



Figure 6. Assignment to design a table made from bricks and ropes only

The most challenging sPectakel with bricks was the assignment to make a table out of bricks and ropes only. Although this seems beforehand a very difficult mission, yet this went very well. As the project was completed, the result was quite a number of interesting tables (Figure 6). All tables were built in a meandering row; the sPectakel ended by having a diner with students sitting at their own large table (Edtv, 2010)



### 2.1.6 Paper-clip-chair from newspapers, paperclips and tape (2008 - 2009)

Paper is also a material that challenges students to realize exceptional creations. In the assignment, called paper-clip chair, students had 50 newspapers, 1000 paperclips and 66 meters of tape at their disposal for making a chair. There were strict requirements, such as the height of the seat surface had to be at least 45 cm and a backrest was required. The main given material: old newspapers seemed an impossible construction material. Yet, it proved that this material released a lot of creativity for freshmen to make chairs out of this.



*Figure 7. first assignment of the paper-clip-chair (2008)*

Just like the chairs made of linoleum (Figure 4), many students groups choose to use rolls of the sheets of newspapers to make the structural parts of the chair strong enough to sit upon.

But also braids of paper were used, as seen in Figure 7. Most chairs used a lot of tape to make the paper strong enough to withstand the load of a person's weight. Paperclips were also used in different ways, such as to hold sheets of newspaper together. Some groups used paperclips to make chains.



*Figure 8. Variety of amazing chairs resulting from 2<sup>nd</sup> paper-clip-chair assignment*

The sPectakel of the paper-clip-chair from newspapers, paperclips and tape was considered that successful that this sPectakel was repeated the next year with slightly renewed criteria and with even more surprising and eye-catching designs (figure 8).

## 2.2 Ice-Dome at Juuka - Finland, (2014, 2015, 2016)

The “Ice- or Pykrete Dome” is a students’ project based on research on fiber reinforced ice. Adding fibers of, for example wood or paper, increases the strength of ice. This fiber-reinforced ice is called Pykrete and it also turns ice into a slow-to-melt material that is more suited for building in an extremely cold climate. The ice shell structure made by students was built in Juuka, Finland, in a region where winter temperatures are far below 0°C.



Figure 9. spraying water and fibers on an inflated mould (photos by TU/e, Joep Rutgers)

The dome was built on an abandoned agricultural landscape near the small town centre. Two graduate students arranged help from 50 students who travelled to Finland for several weeks and with support from a number of local enterprises, too. The dome was completed in January 2014, measuring an internal span of 30 meters. This made this dome the world’s largest ice dome. To create such a large span by an unusual material needs an innovative method of building. This construction method as well as the actual realization of the dome was part of a research project. And since the period with low temperatures was still rather short, the construction method developed to construct the dome had to be relatively quickly. This was found in a system based on a big inflated mould, in fact just a big balloon. After inflating, the air-pressure was kept on a continuous level in order to reduce deformations.



Figure 10. inside and outside of the ice dome (photos by TU/e, Joep Rutgers)

The textile of the mould was forced into shape by a number of ropes. These ropes are important, since the impress of ropes in the balloon created a kind of grid over the shell of the dome. This made that the structure of the dome is in fact a grid-shell, as ice becomes thicker at the locations where the ropes were situated. Next, water mixed with fibers was pumped through tubes to the surface of the big balloon where it was sprayed by hand (Figure 9). Each layer was just a

couple of millimeters thick. If the water of this layer had frozen up, the dome reached the strength needed and a grid-structure was established with enough strength and stiffness to stand on its own. At this stage the balloon was deflated and as a result the mould was removed(Pykrete-Dome, 2014a)

With this construction method, ice becomes a challenging building material(Pykrete-Dome, 2014b). In 2015 and 2016 there were new students' projects at the ice festival in Juuka; building a tower in ice resembling the Sagrada Familia (2015) and building a bridge following the principles of Leonardo da Vinci's design for a bridge over the Bosphorus (2016)

Design Team:	Jorrit Hijl and Roel Pluijmen, with Remy Houben and Frank Janssen
Supervision:	Arno Pronk
Location:	Juuka, Finland, province of Eastern Finland (North Karelia region).
Area:	710 m <sup>2</sup>
Project Year:	2014

### 2.3 Sustainable hikers cabin, 2012

The Trek-in started as part of a competition celebrating the 25 anniversary of Bouwkundewinkel of TU/e (Moonen, et al., 2010). This competition was won by a team of two students, and next a team of six students was put together to elaborate on their concept. In the first weeks the collaboration in this group was rather problematic, since the winning students didn't accept involvements of the others. However, the fact that they needed each other to create this real object helped the students to overcome the initial arguing. After some intense meetings, all students expressed their ambition to cooperate and to elaborate the concept into a final design. After this design was made three of the six students further elaborated on drawings for realization, in close cooperation with industry, and supported by a government grant (STIRR, 2011). This resulted in a prototype, presented at the Dutch Design Week 2012 (Moonen & Hermans, 2013).



*Figure 11. three Trek-ins on different camping site and different seasons*

The concept of Trek-in came from combining the traditional architecture of a tent with a home. Trek-in cabins are characterized by its large windows at the front and back of the cabin. The size combined with the uninterrupted view through the cabin makes it light and spacious. At the moment, Trek-In cabins can be rent on nine campgrounds located throughout the Netherlands. All ideally suited for a short holiday for those seeking solitude in beautiful natural surrounding and combined with a sustainable luxury accommodation.

A unique feature of the prototype of Trek-in is that the building itself is made of "demolition waste", although this is not visible at first sight. The main building material comes from reclaimed floor joists (Hermans, et al., 2012). Old wood can be well reused by removing all staples, dowels, screws, nail fixings, etc to enable re-sawing of these beams. With new clean saw-cuts, wood from demolition becomes a building material of the same quality as new wood(2Life-Art, 2013).

All insulation of the prototype too, is reclaimed from demolition by combining old ceiling tiles until the required thickness is achieved (Hermans & Moonen, 2013). Ceiling tiles are made from mineral wool thus suited for insulation buildings and are scrapped in large quantities when offices are dismantled. And also interior parts as light switches and curtain rails can be re-used, too. Hardly any new materials are needed (Moonen, 2014) apart from two large glass plate, heating equipment and waterproof layer. The materials history of each Trek-in is now a characteristic feature by its personal story. The origin of all materials is documented in a certificate of origin for each Trek-in. This certificate adds an educational slant to a stay in a hikers' cabin: especially for young visitors.



Figure 12. the Trek-in is made out of materials from demolition and fully prefabricated

The Trek-in is prefabricated in two modules. These ready-to-use- modules are transported to the site, where construction (including foundation and connection to the local grid) takes just one day. With this design, the students won the Wood Challenge (Hout-Centrum, 2011), a national competition for innovative designs.

Design Team:	Tim van der Grinten, Kristel Hermans, Xaviera Burón-Klose, Wendy van Kessel, Paul Kemme and Luuk de Kluiver
Supervision:	Faas Moonen, John Swagten, Gert Boxem
Customer:	de groene koepel, te gast in de natuur
Construction:	2Life-Art, materials re-used from demolition: A.van Liempd Sloopbedrijven
Location:	Dutch Design Week 2012, Eindhoven, for rent: 15 Trek-ins at 8 camping sites in the Netherlands (it DREAMlân -Kollumerpomp, Beerze Buiten-Beerze, de Flint -Fochteloo, Barendonk -Beers, Lemeler Esch -Lemele, Vreehorst -Winterswijk, Marnemoende -Jsselstein, Voscheheugte -Mantinge).
Area:	21 m <sup>2</sup>
Project Year:	2010

## 2.4 Seeker

Seeker is a worldwide series of co-created starship sculptures, started by artist-scientist Angelo Vermeulen (TEDx, 2015). "At its core, Seeker is a community art project that invites people to fundamentally rethink the future of human habitation and survival. Instead of keeping the various functions connected to life support, work and leisure separated, the Seeker community sets out to create integrated, closed systems that favor hybridization and encourage sustainability (TEDx Talks, 2013). This makes the Seeker project a collaborative project that evolves over time. The project gets a new meaning at each new location due to the cooperation of an interdisciplinary team of artists, designers, engineers, students, sci-fi fans, DIY enthusiasts. Designing and creating Seeker [EH3] was a mutual contribution (Figure 13) of the artist together with enthusiastic volunteers of which architecture students of the TU, as part of a Master design project (Veeger, 2013). Seeker [EH3] was on display in October 2013 during the Dutch Design Week in Eindhoven, as part of the exhibition Play the Future: Scenario City (MadLab, 2014).

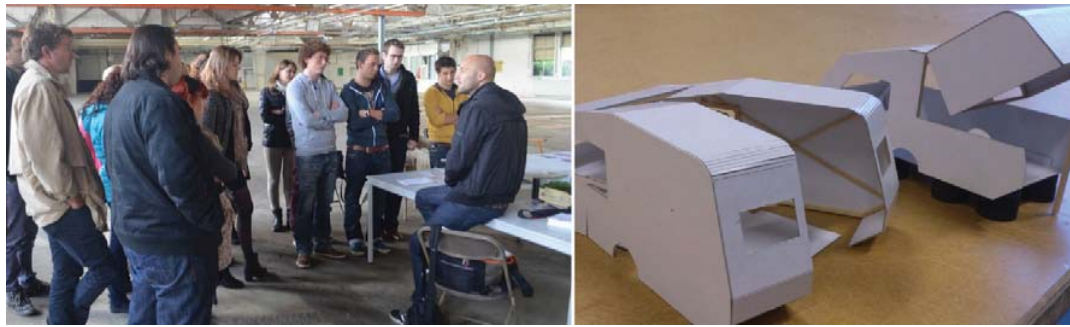


Figure 13. Students and Vermeulen in a design meeting

Seeker [EH3] seeks to realize a closed environment that is as independent as possible from the outside world. In a semi-autonomous system, Angelo Vermeulen considers different technological solutions (regarding supplying and stocking energy, water, food, as well as furniture, plumbing, etc) and ecological solutions (experimenting with systems to grow food, such as hydroponics, aquaponics, germs, etc.). The research by doing experiment in Eindhoven relates to integration of technological, ecological and social systems for long-term survival in a spaceship.



Figure 14. Preparing caravans: students work in a vacant production shop (left) and during the 'two-day isolation mission' at DDW 2013 (middle and right)

In Seeker [EH3], a caravan was used as standard module (Figure 13), because a caravan is an archetype of an independent discovery vehicle. Cost-effective space architecture was brought to life by altering the shape and by linking a series of caravans. Starting point for Seeker [EH3] were concepts of existing space stations, the container art of Luc Deleu and the architecture of the Metabolists from the 1950-70.

During the Dutch Design Week 2013 the 'two-day isolation mission' was carried out by artists and designers: Velia Genovese, Danielle Roberts, Hanneke van der Werf, and Angelo Vermeulen (Figure 14)(Seeker-Community, 2013).

Design Team:	Velia Genovese, Danielle Roberts, Hanneke van der Werf, Angelo Vermeulen, Riccardo Carlo Radaelli, Zoé Merchez, Miranda Marta Duarte Silva de Braga, Patrycja Pustelnik, Peyvand Yavari, Fatma Aslan, Roland van Deelen, Leonie, Engberink, Anne Gähler, Gwenda Harmsen, Daan Hens, Laura Jansen, Rias Jansen, Mia Joguncic, Moniek Kamphuis, Jeanne Mattheij, Pieter Schreuder, Lennart Visser, Nikkie Westervoort, Leonique Winnen, Gijs de Wit, Lizzy van Zon, Martijn Schutte.
Supervision:	Tom Veeger, John Swagten, Angelo Vermeulen
Construction:	students of TU/e (design team with help of students/friends)
Location:	Dutch Design Week 2013, Eindhoven
Area:	30 m <sup>2</sup>
Project Year:	2013, this design was 9 days on display: Saturday, October 19 <sup>th</sup> until Sunday, October 27 <sup>th</sup> , 2013.

## 2.5 Stage for Extrema Outdoor Music Festival

Organizers of the Extrema Outdoor Music Festival (an electronic dance festival at the shores of the recreational lake Aquabest near Eindhoven) contacted the Dept. of the Built Environment (TU/e) in 2015, asking whether students could develop one of the stages. About 15 students of a master studio started this assignment as small exercise in a larger design project. After all students had made a concept, a winning idea was selected in coordination with the festival organizers. In order to make the assignment more challenging, the supervisors of the festival added an extra challenge: students had to create a stage by using pallets only. This idea was elaborated by four students of the studio. These four students not only have designed the stage called “Ensuite” at the 20<sup>th</sup> Extrema Outdoor Festival, but also have built the structure with the help of students/friends at the shores of Aquabest.



*Figure 15. Stage of just pallets (photos Mattia Inselvini)*

The result is a stage composed of 600 pallets, that embraces visitors and provides an intimate environment within the crowded festival. The DJ booth is placed in the center, making this tactile and experiential for visitors (Figure 15). Ensuite is a semi-circle with a diameter of 20m and height of 4.5m, similar to an arena. The semi-circle has three main layers (Figure 16). The first is a base of horizontal pallets, leveling irregularities in the ground and also providing ballast weight as stability means. The second layer consists of pallets in a honeycomb structure made of triangles. In this way the pallets frame the views to the nearby lake. The third layer is a crown of vertical pallets, used for lighting and sound equipment. The project was built in six days and dismantled in two, requiring tools only as advanced as an automatic screwdriver.



*Figure 16. honeycomb structure with a view to the lake (photo Mattia Inselvini)*

Despite the stage being built only of wood connections, the construction was quite a challenge because the stage had to be made to resist fierce gusts of wind. Clearing the highest safety requirements of a densely populated festival asked for unconventional means of connections. For the most complex joint, the honeycomb structure where six pallets meet, a single, general-purpose connection was designed and applied to all main load-bearing node (Figure 16). Due to the integral approach, the heavy structural connection could be worked out became at the end of the calculations an architectural feature that gives this stage an unmistakable look(archdaily, 2015).

Design Team: Mattia Inselvini, Habib Kaya, Joren van Jaarsveld, Frank Puijsten.  
 Supervision: Tom Veeger, Faas Moonen, Renato Kindt  
 Structural advisor: Marcel Mosterd (H4D Raadgevend Ingenieurs B.V., Dongen)  
 Construction: students of TU/e (design team with help of students/friends)  
 Location: recreational beach Aquabest for Extrema Outdoor 2015, Son  
 Area: 160 m<sup>2</sup>  
 Project Year: 2015,  
 this design was 1 days on display: Saturday, July 11<sup>th</sup>, 2015.

## 2.6 SummerLabb

“SummerLabb” pavilions are designed in a Master studio, where 12 students (Figure 17) developed concepts for an itinerant exhibition at festivals and events(summerlabb, 2015). These versatile pavilions are designed for and in cooperation with a third party, Stichting SummerLabb that provides exhibition spaces on festivals for frontrunners of sustainable innovations, start-ups as well as multinationals and educational institutions(Summerlabb, 2015). Within the envelope of SummerLabb, a considerable number of partners are offered exhibition spaces with either large or small set-ups to exhibit the newest sustainable innovations and to enthuse visitors of the festival with new ideas(Double2, 2014).

In analogy with earlier projects, the initial design was followed by a selection of most feasible concept. A group of three students was put together who elaborated on technical and practical issues of the concept for realization. In the next phase a group of in total 57 students was involved in the making 18 pavilions.



Figure 17. Master studio (left) that resulted in the SummerLabb pavilion (right)

Developing the concept into pavilions that can be build was more than providing exhibition space since the use of the pavilions in itself is also about creating a showcase on sustainability by the pavilions itself (Figure 19). So, it's an assembly of 18 pavilions, where each pavilion exhibits facets of sustainability on full-scale; bio-based materials, reusing waste, reducing transport, and more.



Figure 18. Stacked transport and fast unfolding on site

The pavilions are hinged to point out that building industry is a source for high volumes of traffic due to frequent moving materials with many people working on site. Developing a folding pavilion to reduce its volume during transport enables to discuss this aspect of sustainability on festivals in a playful means (Figure 18).



Figure 19. SummerLabb at Wereld Haven Dagen (left) and at Pukkelpop (right)

Making the pavilions was made possible by two Dutch NWO-KIEM creative industry grants (Click, 2014), and was awarded the STW Design price 2014(Schie, et al., 2014) and the Woodchallenge 2014(Hout-Centrum, 2014), too.

Design Team:	Floor van Schie, Alice Janssen, Marthe Doornbos.
Supervision:	Tom Veeger, Faas Moonen, Renato Kindt, Ralph Brodrück.
Structural advisor:	Hans van Helvoirt (Vervest constructief ontwerp & advies b.v., Volkel)
Construction:	students of TU/e (design team plus many students/friends)
Locations:	Several locations, f.i.: XO-Best, 12 7 2014; WereldHavenDagen Rotterdam, 5-7 9 2014; Eurosonic/Noorderslag Groningen, 14-17 1 2015; NL innoveert, Rotterdam, 13-14 3 2015; Pukkelpop Hasselt Belgium, 20-22 8 2015; WereldHavenDagen Rotterdam, 4-6 9 2015; ESNS Groningen, 13-16 1 2016.
Area:	960 m <sup>2</sup>
Project Year:	2014.

## CONCLUSION

Assignments as described in the cases, in which students designed, and built, and exposed the results to a large audience as part of the design curriculum are applicable in various stages of the study. A number of cases in the bachelor are described demonstrating that there are great benefits to be gained in terms of time (extending well above the customary commitment from students) in terms of motivation, in terms of deepening knowledge and in terms of productivity. The cases that involved Master students, demonstrate that the same effects are seen at the end of the study, too. Yet, the cases in the Master concern tasks that are far more complex. For Master students there is an additional benefit; all



cases show a striking exposure of the design that enable students to add a salient feature to their CV, which leads to better job opportunities. So the extra effort pays back by offering a springboard into the labor market.

All cases demonstrate that the structure of the program works well; starting with individual designs (to produce as many possible solutions as possible), followed by a selection of feasible concepts (which can take the form of a competition) than elaborating the concept by a group of students. This cooperation runs a fair bit more smoothly in case every student takes responsibility for a specific domain (in particular with the intention that there will be an actual realization). As the actual making of the design begins, additional members can be added to the group of students, depending on the extent of work required.

This type of assignment is a very unifying activity that benefits the atmosphere in the group. A 2-3 day activity can improve the mutual social cohesion (team building) of a group of students in a short time. In the first year of the Bachelor we observed a noticeable positive effect on study and work attitude in the studio. An additional benefit is that students in a team solve problems more rapidly and working together is better, compared to student teams in a normal setting.

When setting up a program, one has to keep in mind that there is a strict limitation to the number of this type of cases. Maximum is once or twice per academic year; more frequent assignments of this type quickly show signs of fatigue, and are even counterproductive.

Combining of theoretical design and actual "making" of objects forces students to make an educational connection of getting a clear understanding of core ingredients of a concept and all type of practical requirements, needed to realize the object.

## REFERENCES

- 2Life-Art, 2013. *documentation - Trek-in (in Dutch)*. [Online]  
Available at: [www.trek-in.org/](http://www.trek-in.org/)
- archdaily, 2015. *TU/e Students Design Stage for Extrema Outdoor Music Festival*. [Online]  
Available at: [www.archdaily.com/771015/tu-e-students-design-stage-for-extrema-outdoor-music-festival](http://www.archdaily.com/771015/tu-e-students-design-stage-for-extrema-outdoor-music-festival)
- Click, 2014. *Consortium Reclaimlab gestart met NWO KIEM-financiering*. [Online]  
Available at:  
[www.clicknl.nl/built-environment/2014/07/01/consortium-reclaimlab-gestart-met-kiem-financiering/](http://www.clicknl.nl/built-environment/2014/07/01/consortium-reclaimlab-gestart-met-kiem-financiering/)
- Double2, 2012. *Succesvol LLowlab 2012*. [Online]  
Available at:  
[www.d2bv.nl/site/succesvol-llowlab-2012-bewijst-nederland-is-klaar-voor-duurzaam-sanitair-en-kweekvlees/](http://www.d2bv.nl/site/succesvol-llowlab-2012-bewijst-nederland-is-klaar-voor-duurzaam-sanitair-en-kweekvlees/)
- Double2, 2014. *Aftermovie: Summerlab op Wereldhavendagen 2014*. [Online]  
Available at: [www.d2bv.nl/site/aftermovie-summerlab-op-wereldhavendagen-2014/](http://www.d2bv.nl/site/aftermovie-summerlab-op-wereldhavendagen-2014/)
- Ediv, 2010. *Studenten maken tafels van baksteen en touw*. [Online]  
Available at: [www.youtube.com/watch?v=3SDwyh3dH8M](http://www.youtube.com/watch?v=3SDwyh3dH8M)
- Goldschmidt, G.; Hochman, H.; & Dafni, I., 2010. The design studio "crit": Teacher-student communication. *AIEDAM*, Issue 24 (03), pp. 285-302.
- Graaff, E. & Kolmos, A., 2003. Characteristics of Problem Based Learning. *International Journal of Engineering Education*, pp. 657-662.
- Graham, E., 2003. *Studio Design Critique: Student and Faculty Expectations and Reality*. s.l.:(Doctoral Thesis).
- Hermans, K., Burón Klose, X. & Grinten, T. v. d., 2012. Trek-in: WoodChallenge. *Archiprint*, 12 September, 02(01), pp. 22-24.

- Hermans, K. & Moonen, S., 2013. *A challenging practical experience, The Trek-in; a durable and innovative hikers' cabin*. Eindhoven, s.n., pp. ID41.1-ID41.8.
- Hout-Centrum, 2011. *Houtblad: Zitsculptuur en trekkershut winnen WoodChallenge 2011*. [Online] Available at: [www.centrum-hout.nl/sites/default/files/u27/HB08\\_Woodchallenge.pdf](http://www.centrum-hout.nl/sites/default/files/u27/HB08_Woodchallenge.pdf)
- Hout-Centrum, 2014. *SummerlaBB - 1e Prijs Wood Challenge 2014 (in Dutch)*. [Online] Available at: [www.woodchallenge.nl/summerlabb](http://www.woodchallenge.nl/summerlabb)
- Ibelings, H., 2000. *Van den Broek en Bakema 1948-1988: Architectuur en stedenbouw*. Rotterdam: NAI.
- Kolb, D. A., 1984. *Experimental Learning: Experience as the source of learning and development*. Englewood Cliffs, N.J.: Prentice Hal.
- Kolodner, J. et al., 2003. Problem Based Learning meets case-based reasoning in the middle-school science classroom: putting Learning by Design into practice. *Journal of the Learning Sciences*, 12(4), pp. 495-547.
- MadLab, 2014. *Play the Future 2014, concepts 4 our future, Seeker project*. [Online] Available at: [www.puls.madlab.nl/ddw13/scenario-city/expo/seeker-project/](http://www.puls.madlab.nl/ddw13/scenario-city/expo/seeker-project/)
- Moonen, S., 2014. *Rapidly building with lightweight modules and a dry assembled foundation: used in a mock-up for home units made out of reclaimed materials*. Ostend Belgium, WIT Press, pp. 209-222.
- Moonen, S., Aerdt, F., Nieuwdorp, M. & Ludden, P., 2010. *SBIR-Grant, phase 2, ontwikkeling standaard duurzame trekkershut.*, the Hague: Min. EZ.
- Moonen, S. & Hermans, K., 2013. *Building with materials from demolition projects*. Kaohsiung, Taiwan, Tungfang Design Institute, pp. 9-16.
- Moonen, S., Swagten, J. & Arts, A., 2013. *How to organize design studios eligible for multidisciplinary: a case study of clustered design studios*. Eindhoven, The Netherlands, s.n., pp. ID41.1-ID41.7.
- Proveniers, A. & Westra, J., 2009. The Evaluation Carousel: an Assessment Tool for Interdisciplinary. *Science Innovation Education, Advances in Technology, Education and Development*.
- Pykrete-Dome, 2014a. *Building the Pykrete Dome; The making of*. [Online] Available at: [www.youtube.com/watch?v=hN7KYG3q354&feature=youtu.be](http://www.youtube.com/watch?v=hN7KYG3q354&feature=youtu.be)
- Pykrete-Dome, 2014b. *the Pykrete Dome - worlds biggest icedome - a movie by Bart van Overbeeke - Structural Ice*. [Online] Available at: [www.youtube.com/watch?v=W3w6jMR3crM](http://www.youtube.com/watch?v=W3w6jMR3crM)
- Salama, A., 1995. *New trends in architectural education: designing the design studio*. Raleigh, NC: Tailored Text & Unlimited Potential Publishing: (Doctoral Thesis).
- Schie, F. v. et al., 2014. *STW DesignPrijs 2014.*. Utrecht: Technologiestichting STW, [www.stw.nl/sites/stw.nl/files/jaarverslagen/Jaarverslag-2014\\_0.pdf](http://www.stw.nl/sites/stw.nl/files/jaarverslagen/Jaarverslag-2014_0.pdf).
- Schön, D. A., 1984. *The Reflective Practitioner: How Professionals Think In Action*. New York: Basic Books, The Perseus Books Group .
- Seeker-Community, 2013. *Seeker [EH3] isolation mission*. [Online] Available at: [www.facebook.com/media/set/?set=a.649600931747074.1073741840.456633821043787&type=1](http://www.facebook.com/media/set/?set=a.649600931747074.1073741840.456633821043787&type=1)
- STIRR, 2011. *Duurzaam investeren in recreatie en ruimte, 10 innovatieve ondernemers in beeld (in Dutch)*. s.l.:Stichting Innovatie Recreatie en Ruimte.
- Summerlab, 2015. *Partners*. [Online] Available at: [www.labbsessies.nl/summerlabb/?page\\_id=172](http://www.labbsessies.nl/summerlabb/?page_id=172)
- summerlab, 2015. *SummerLab: hét lab van festivalland!*. [Online] Available at: [www.labbsessies.nl/summerlabb/?page\\_id=727](http://www.labbsessies.nl/summerlabb/?page_id=727)
- Swagten, J., Moonen, S. & Wennekes, I., 2010. *The proof of the pudding is in the eating*. Birmingham UK. 6-8|7|2010, Higher Education Academy Engineering Subject Centre, Loughborough University, pp. 117 1-15.
- TEDx, 2015. *Angelo Vermeulen, Space researcher, biologist, artist*. [Online] Available at: [www.ted.com/speakers/angelo\\_vermeulen](http://www.ted.com/speakers/angelo_vermeulen)
- TEDxTalks, 2013. *Seeker - an art collaboration on grassroots space exploration: Angelo Vermeulen at TEDxNovaGorica*. [Online] Available at: [www.youtube.com/watch?v=l9nh-6qR24M](http://www.youtube.com/watch?v=l9nh-6qR24M)
- Veeger, T., 2013. *seeker-ehv3-eindhoven*. [Online] Available at: [www.slideshare.net/veeger/seeker-ehv3-eindhoven](http://www.slideshare.net/veeger/seeker-ehv3-eindhoven)
- Wijnen, W., 2000. *Towards Design Based Learning*. s.l.:Eindhoven University of Technology Educational Service Centre, Eindhoven, the Netherlands.