

ThreeC – Creating Competencies
for a Circular Economy

Circular Economy and Education

Conference Report | Porto, June 6 2016



Erasmus+



Creating Competences for a Circular Economy

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Introduction

In 2014, a group of secondary and vocational schools, educational organizations and teacher training institutes, started a European project about Circular Economy and education. The project was called ThreeC: Creating Competencies for a Circular Economy. For those who are not familiar with the concept of Circular Economy: it's an economy where products are made to be made again. Resources can be reused in cycles and production takes place without harming the environment. More about circular economy you'll find in this [video](#).

“ Creating Competencies for a Circular Economy”

ThreeC started from the need of the participants to find out what kind of didactical strategies are effective to prepare young people for an active role in a circular economy.

And how should this kind of education be assessed? To figure out, an inquiry had to be made on circular economy competencies and didactics. Following that inquiry, 15 schools in 5 European countries started with pilot projects as part of the ThreeC project.

On June 6 2016, the consortium of ThreeC organised a conference in Porto, hosted by the [Universidade Portucalense Infante D. Henrique](#). Around 100 participants from six European countries shared this day their experiences and ideas on circular economy and education.

This document is a summary of this conference, with short reports on the presentations and workshops. First part of the day was a plenary session with three keynote speakers.

The second part took place in parallel sessions, where teachers presented the outcomes of their school projects. In the afternoon, five workshops were organised about specific topics on circular economy and education.

More information on ThreeC can be found on the following two pages, on the website www.threec.eu and in [an article about ThreeC in Circulate News](#).

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And how should this kind
of education be assessed?”



ThreeC – Creating Competencies for a Circular Economy

ThreeC formulated mainly three objectives to achieve during the project period: a) to identify circular economy competencies; b) to develop a didactical approach for circular economy education; c) to create an assessment toolbox.

Circular Economy Competencies

After desk research and interviews, it was clear that circular economy competencies had to be about systems thinking and designing. Multiperspective thinking was added to that shortlist as well, because of the fact that no single solution exists for complex transitional processes. Which means that learners need to be aware of the fact that there are always other viewpoints, opinions or perspectives, based on different values.

Based on the standard framework of the LEVEL5 approach, developed by one of the partners of the ThreeC consortium (**BUPNET GmbH**), a competence matrix for Circular Economy Redesigning was developed. The matrix consists of five learning levels,

comparable with the Bloom taxonomy. In the LEVEL5 approach, three dimensions of learning are integrated in one framework: knowing, doing and feeling. Within the competence matrix for Circular Economy Redesigning, systems thinking is used for the knowing and doing dimension, systems designing is used for the doing dimension and multiperspective thinking is used for the feeling dimension (**figure 1**).

Didactical approach

Based on the competence matrix and learning principles of some well-known pedagogical concepts, a didactical approach was developed for ThreeC, comprising some requirements and nine steps (**figure 2**).

As the same with other didactical models, these steps leave a lot of space for teachers to choose their own teaching strategies. The nine steps are simply a roadmap to ensure that learners will meet relevant aspects of the learning process, related to the competence matrix Circular Economy Redesigning (**figure 3**).

The aim of the 15 school projects was, to see how teachers would apply this didactical approach to their own ideas and how they would assess the learning outcomes of the students.

Assessment strategies in pilot projects

Several schools in Belgium, Finland, the Netherlands, Portugal and Spain started with school projects, based on the ideas, as described above. Students of a secondary school in Tilburg (the Netherlands) were challenged to analyse the production of chewing gum and to come up with ideas for circulating chewing gum.

At another school in the Netherlands, students made study of a regional economic transition, from sugar production to bio based materials. After students understood what happened in that regional transition, they were asked to think about relevant and circular applications for biobased materials, guided by an expert on that subject.

In Portugal, students of a secondary school were introduced to the challenges of the cork region. They received the assignment to redesign consumer goods by the principles of circular economy, with cork as their main material.

In these examples, students worked on case based projects, with subjects that are closely related to their life or their environment, in most cases together with a contractor or an expert. They analysed the specific matter and thought about alternative designs, from the perspective of a circular economy. Teachers applied different assessment strategies to their projects, to determine the learning outcomes of the students. No single multiple choice exam was used. Students delivered oral presentations, factsheets, prototypes and reflections on their learning process. Teachers developed different kinds of assessment rubrics with indicators, based on the competence matrix. Some students reflected on this: “We learn more from these kind of projects, than from modules with traditional exams”.

Figure 1: Competence matrix for Circular Economy Redesigning

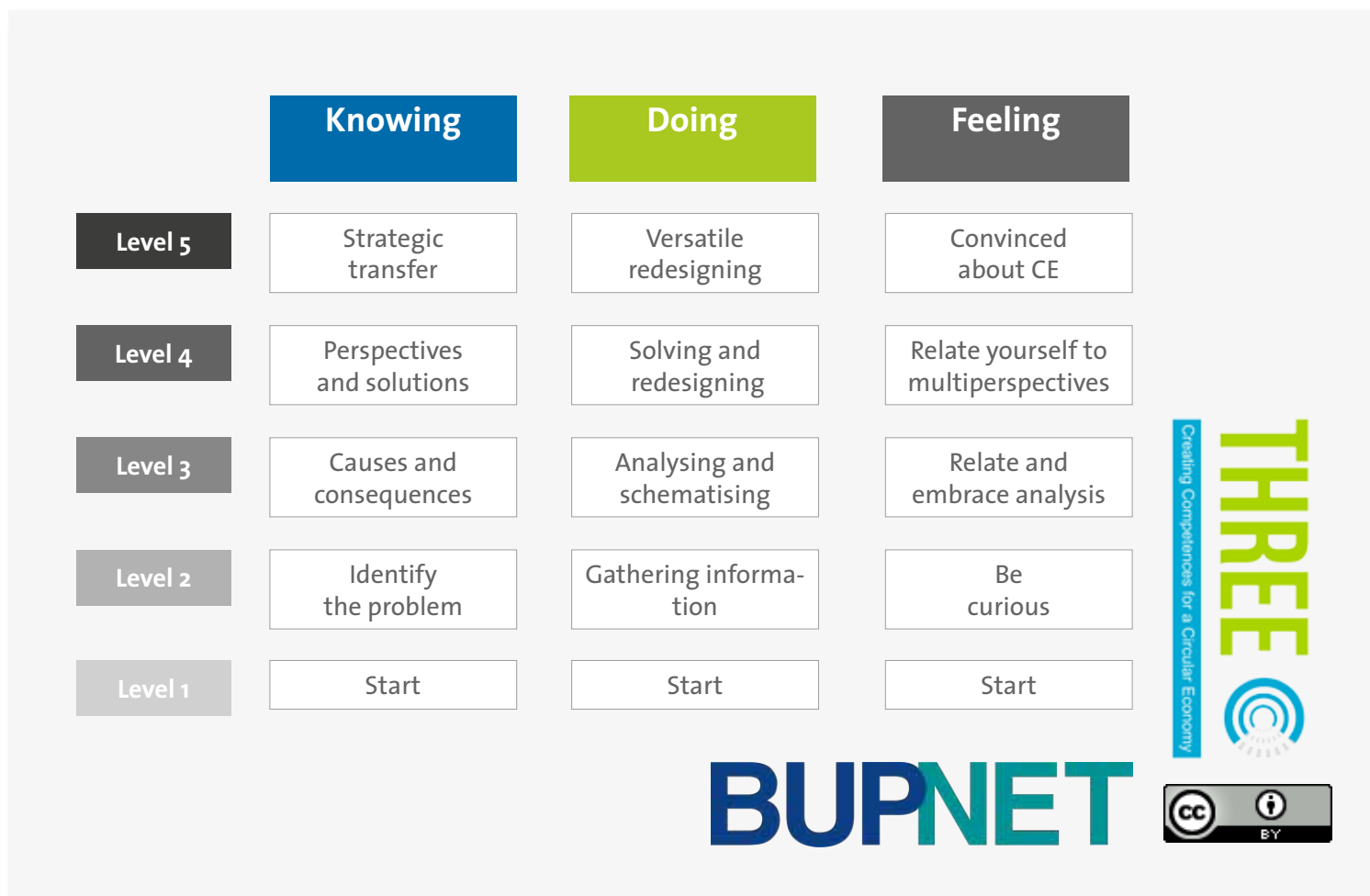


Figure 2: Nine steps as part of the ThreeC didactical approach

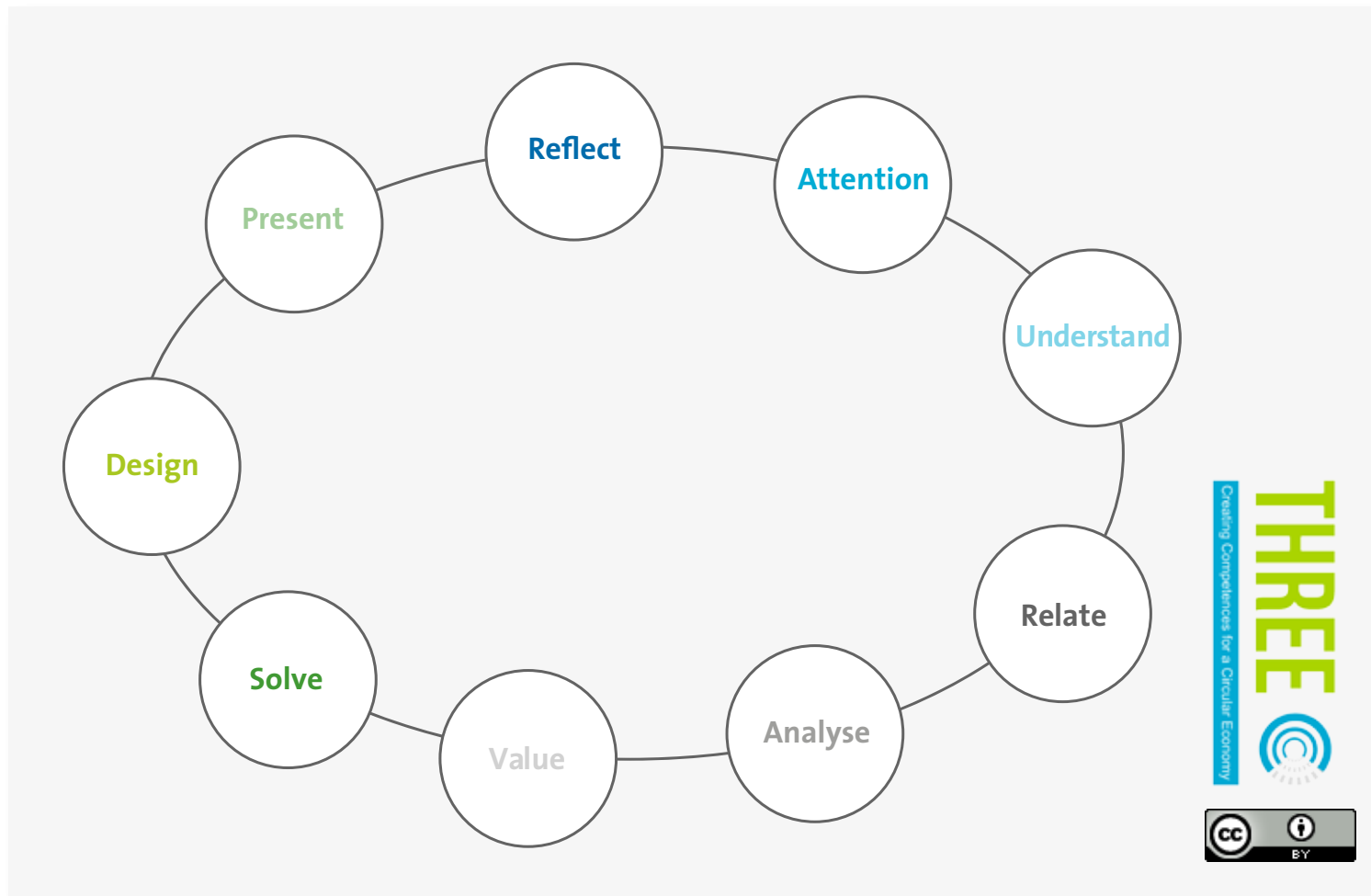
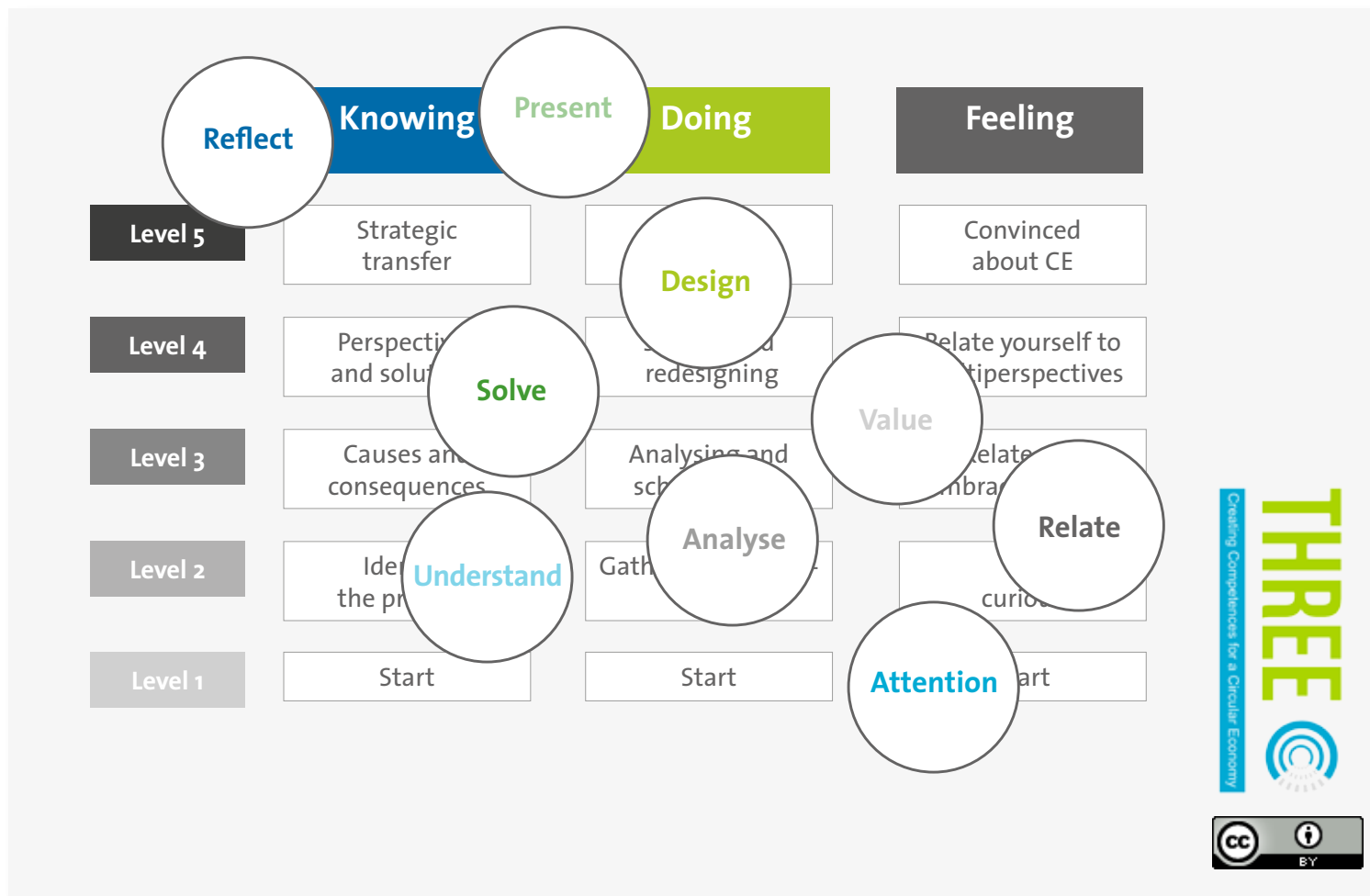


Figure 3: Nine steps related to competence matrix



Summary of the conference: plenary session

During the first part of the conference, three speakers were invited to present their ideas. Rafael Campos Pereira (vice-president of the **Association of Industrial Metalworking**, Portugal) reflected on circular economy in Portugal. Sara Heinrich (Schools & Colleges Programme Manager at **the Ellen MacArthur Foundation**) presented some essentials on circular economy and education. And Martin de Wolf (teacher trainer at **Fontys University of Applied Sciences**, the Netherlands) explained the importance of some learning outcomes of the ThreeC Project. The plenary session was moderated by Sabine Wiemann, on behalf of Landkreis Kassel, coordinator of the ThreeC Project.

Circular economy is our future

Rafael Campos Pereira started the conference with a presentation on the importance of circular economy for a country like Portugal. He made clear that circular economy will be the future, providing more access to resources and new jobs. At the same time, it will be a challenge for a country like Portugal, with



Sabine Wiemann



Sarah Heinrich

“**He made clear that circular economy will be the future, providing more access to resources and new jobs**”

mainly small and medium businesses, to compete with other European countries in the transition to a circular economy. Countries like France and Germany have more larger companies with extended possibilities to invest in the new technologies that are needed for a circular economy. It could be a task for the European Union to oversee this transition and to support smaller countries in this.

Education for circular economy is about shifting mindsets

“Nothing grand has been achieved that did not come from an exaggerated ambition”, was the sentence Sara Heinrich started with, a quote of Jules Verne. During her keynote, Sara pointed out that accelerating the transition to a circular economy is about

shifting mindsets. And teachers are in the business of shifting mindset. That is why teachers and educators play a catalytic role in accelerating the transition to a circular economy. “Education for a circular economy does not simply boil down to just more time spent on ‘economic literacy’ and systems literacy - it’s the mindset around why this is important and the vision that underpins this mindset.

“**Nothing grand has been achieved that did not come from an exaggerated ambition**”

The vision for a future whose economy is regenerative and restorative by design will only become reality if we manage to shift our mindset to seeing the economy, society, the environment – in short the world – as complex interconnected systems with rich flows of resources, materials and information.

Summary of the conference: plenary session

This shift in mindset in how to approach future challenges is key. Teachers are in a catalytic position in facilitating this shift in mindset that will lead to a different approach to resource and economic questions in the future.”

Happy with ThreeC learning outcomes

Martin de Wolf started his presentation with a personal point of view on the importance of circular economy, to introduce why he's so happy with learning outcomes of the ThreeC project. Martin started his career with 'development education', based on the idea that global inequality needs to be minimized.

Education for a circular economy aims the same goal, but with a much more positive approach. That positivity became clear from the examples Martin presented: an aquaponics project by a Dutch company **Conceptenbouwers** and a circular production process of chocolate from the **Chocolatemakers**. Students of secondary and

vocational schools were introduced to these kind of inspiring companies during the ThreeC school projects. Students appreciated the strong emphasis on the design-process for products as a positive way to come up with alternatives for existing linear production processes. At the same time, the projects made students aware of the existing, unsustainable world and also their individual behaviour.

Martin ended his presentation with an invitation to all teachers to continue the work on education for a circular economy. ThreeC brought a nice overview of learning activities and teaching strategies to work on systems thinking and design assignments, but this is a field of education that needs further development.

“
Education for a circular economy - a much more positive approach”



Summary of the conference: school projects presentations

The second part of the conference consisted of two parallel sessions where teachers presented their ThreeC projects. One session focused on three secondary school projects, the other section on vocational school projects. All teachers developed school projects, based on the didactical approach that was developed by ThreeC consortium members. More about this didactical approach can be found [here](#).

Secondary school projects

The first project was presented by Marta Villares of [Escola Secundária Fontes Pereira de Melo](#), Porto. Marta developed a project about cork. She introduced a problem by telling a specific trait of the tree: not removing the bark kills the tree. What if we stopped cutting the cork tree, because of declining cork production, what kind of effect would this have on social, economic and political problems? A cork manufacturer was included to gain more interest from the students. One of the school's students presented which idea she designed as part of this ThreeC

project. She initiated the idea to reuse plastic hammers as water bottles. At the same time, she went to a manufacturer to talk about the options of reusing cork for making soft hammers, instead of plastic hammers. It's one example of the innovative ideas that students came up with during this project.

The second school project was presented by Ton Sprangers of the [Cambreur College](#) in Dongen, the Netherlands and Marielle Antonie, teacher student at Fontys University of Applied Sciences. They conducted a project that started with visiting waste management companies. Students were introduced to waste management, but were also triggered to wonder why we have so much waste and how we can reduce the amount of waste? It ended up in a design assignment where students had to choose one of the materials that are collected by the waste management companies, in order to come up with a (packaging) product that can be reused endlessly.

Students especially liked this design assignment, where they had to use creative thinking skills to come up with a circular idea.

The third secondary school project was presented by Sven Spruijt, teacher at [De Nieuwste School](#) in Tilburg, the Netherlands. Sven started his project by giving all his students a piece of chewing gum. Students were confronted with the problems that chewing gum on the streets created. They were challenged to analyse the production and waste management of chewing gum, using different perspectives.

What motivates people to throw chewing gum on the street? Local policy makers noticed their interest in this matter and offered to be a contractor for the students. At the end, students came up with different alternatives for the production of chewing gum and smart tools for waste collection and recycling of chewing gum.



Summary of the conference: school projects presentations

Vocational school projects

Vicky Leemans presented with her colleagues the ThreeC project that was conducted at the fashion school of the **Vrije Sint-Lambertusscholen** in Westerlo, Belgium. Their students are educated to design and make clothes. The result of the ThreeC project, is a four-years-programme, which starts at the 3rd grade of their school. Students are asked to design a dress of biological fabrics. They need to design the dress in such a way, that the fabric can be reused for other purposes after one year. So in the 4th grade, students are asked to redesign the dress: it results in a skirt and a shirt. In the 5th grade they also learn to colour the fabrics, using natural techniques with curcuma, red cabbage and beetroot.

In the fourth year (6th grade), students redesign the clothes into accessories and art. All these years, the students use the same piece of material, so from dress to skirt to bag. Then they learn the principles of reusing and remanufacturing, where products are made to be made again. The school showed interest in

the products of the students, to be sold in the shop, where other students are trained to be salesmen.

Mariano Gomez Calcerrada from **CIFP Las Indias** introduced the ThreeC project in Tenerife. Mariano started with answers on the question 'why?'. As they are a school for clothing, hair and lifestyle, they are aware of their water footprint and impact on the environment by the usage of resources. The project that they developed consists of preparatory in-class activities and internship activities. Students have presented as preparatory activities a sustainable business project that includes CE aspects. During the internships, students have to answer a questionnaire, included in the guidelines. They have to answer questions related to the business model, product process and product design. After doing that, they write an advice for this company how some linear aspects can be changed into a circular system. The information that the students have collected at the companies are very useful

to know because the local entrepreneurs are aware of the possibilities of this new philosophy, this new business model.

Joska Pouw and Jolanda Helverstein presented the results of their ThreeC projects at **ROC Fashion Design school** in Tilburg, the Netherlands. Their first project started in September 2015, during a project week at the beginning of the college year. They did the same project a second time with another group of students during a regular module, which gave the possibility to improve some elements. As they teach in fashion, the project was about fashion too. Students analysed the fashion industry, to understand which aspects of the production could be improved. At the end, they received an assignment of Havep, a garment manufacturer in the region. One student, who was absolutely not interested in sustainability or circular economy, got triggered by this assignment and is currently doing a circular economy internship at Havep. Joska and Jolanda are currently conducting a third project, following the ThreeC didactical

approach. They struggled with teaching strategies for systems thinking, but found nice ways to improve the effectiveness, using images instead of words. They also involved other colleagues in these projects, to increase interest in the ThreeC approach.



Summary of the conference: workshops

In education for a circular economy, systems thinking and networking are important aspects of the didactics and learning environment. The workshops that were organised in the final part of the conference, were linked to these aspects: one workshop about systems thinking, one about internal networking and one about cooperating with contractors. A fourth and a fifth workshop were organised for students of Portuguese schools, who also visited the conference.

1. How to train learners in systems thinking?

The workshop started with a short presentation by Lennie de Ridder, teacher at the **Norbertuscollege** in Roosendaal, the Netherlands. Students from her school made study of a regional economic transition, where sugar used to be produced a lot. But due to a cut down of production subsidies, there was no longer a market for sugar beets. At the same time, there was a growing demand for biobased materials. This project could be seen as an interesting

example of systems thinking. After students understood what happened in that regional transition, they were asked to think about relevant and circular applications for biobased materials, guided by an **expert** on that subject.

“**This project could be seen as an interesting example of systems thinking**”

In the second part of the workshop, participants discussed about systems thinking. There was a strong consensus on the meaning of systems thinking: it's a skill that young people should develop at school, in order to understand our complex and changing society, but also to be able to come up with alternatives for existing situations. Participants also agreed on the idea that it is possible to train learners to apply complex systems thinking techniques, like feedback mechanisms and system circles. Different teaching strategies can be conducted, like

card games and mystery plays. Important is to start early and to scaffold the learning process.

2. How to organise network-learning within schools?

In this workshop, Marcel Kops (teacher at **Were Di** in Valkenswaard, the Netherlands) and Eefje Smit (teacher trainer, Fontys University of Applied Sciences), focused on setting up multidisciplinary projects within schools. When asked, most teachers will agree on the importance of multidisciplinary projects. They are known to improve learner's motivation for school and it is an interesting way to get to know your fellow colleagues. But in reality, it proves to be difficult to organise these projects within schools. In this workshop they asked participants: what challenges do you encounter in setting up a multidisciplinary project? How can these challenges be overcome? And can we define success factors? The participants of this workshop noticed they faced similar challenges.

They came up with tips and some success factors:

- Start with a rather small project and formulate specific goals along the way.
- Create a good team around you with someone who has knowledge of and influence on the curriculum.
- Create a positive inner circle so you don't have to do the projects on your own.
- Use an external partner, this can have a huge motivating impact.
- Make sure nobody has a hidden agenda and clear communication.
- Find the passion of others.



Summary of the conference: workshops

3. Private companies and schools: possible cooperation in innovative learning projects

René Boon and Suzanne Broeders are teachers at the Koning Willem I College in 's Hertogenbosch, the Netherlands. Together with seven students and teacher trainer Michiel Lippus, they organised a workshop on cooperation with external contractors. They made a clear statement at the start of the workshop: "A lot of companies are interested in involving students and embrace the concept of circular economy. So our advice is: don't sit and wait. It motivates students". One student: "I felt more important and taken seriously. It keeps the assignment real".

At the start of this ThreeC project, students received an assignment of the Conceptenbouwers (see 'plenary session'). This company is currently rebuilding an old manufactory to a hotel, based on the principles of a circular economy. Students were asked to design relevant circular products for the hotel, using 'waste' materials



from the hotel. Students came up with several creative ideas: a dressing table, made of floor wood and some doors, with re-used lamps. A floating terrace platform (the hotel is next to a canal), made from floor wood and seal pipes from the sealing. A couch, made from wood and steal. A green gym with equipment like dumbbells, plates and so on, that was

“**I felt more important and taken seriously**”

re-used from the building. Another idea was to design a sign board for the hotel, made from images of re-used products. The students experienced the project as a positive learning process, stimulating them to be open-minded and creative. They now wish to work together with other companies, outside their 'comfort zone'. René wrapped up the workshop, saying it's important to be flexible and to keep space in your curriculum, when you want to cooperate with an external contractor. Be, like a teacher, entrepreneurial too.

4. Students working on the GREEN award

Sabine Wiemann, Tim Scholze (project managers at BUPNET GmbH, Germany) and Hanna Villa (teacher at Kuoppanummi school centre in Helsinki, Finland) invited groups of students to participate in a workshop for the **GREEN network**. Apart from setting-up a sustainable European network, GREEN aims to integrate climate change related topics sustainably into (science) education

“**There is climate action happening everywhere**”

in schools and to promote teacher training on climate change education: basic concepts, trends and issues, educational implications of teaching about climate change. GREEN announced the second GREEN award: "There is climate action happening everywhere. Each of us can engage in climate actions and make a difference. The GREEN team is inviting European school students to show us their projects and ideas that contribute to this momentum for change.

We are looking forward to seeing young people's innovation, and the climate change solutions they are developing in their schools or communities". During the workshops, students worked on first ideas to join in this contest. Back at school, they will continue to work on their ideas. More information on the GREEN award can be found [here](#).

About the ThreeC Consortium

ThreeC is a European funded Erasmus+ project. The ThreeC Consortium consists of eight educational organisations from seven European countries:

- Landkreis Kassel (Germany)
- BUPNET GmbH (Germany)
- Euneos Corporation (Finland)
- Fontys University of Applied Science (the Netherlands)
- IES Las Indias (Spain)
- Tallinn University (Estonia)
- Universidade Portucalense Infante D. Henrique (Portugal)
- Vrije Sint-Lambertusscholen (Belgium)

The ThreeC conference in Porto was hosted and organised by Universidade Portucalense Infante D. Henrique, especially in cooperation with BUPNET GmbH and Fontys University of Applied Sciences, with support of the other ThreeC partners.

- Universidade Portucalense Infante D. Henrique (UPT) is a private higher education institution, created in June of 1986. UPT is organized in four Departments:

Law, Economics, Management and Informatics, Heritage and Tourism and Psychology and Education. More than acquiring theoretical knowledge, the students have the chance to develop practical work and research projects, developing different kinds of skills that prepare them for jobs in future career and for living in a competitive global society.

- BUPNET GmbH is an adult education provider. BUPNET plans, organises and runs staff-development and education programmes in all educational sectors, always with a focus on sustainable and “circular” economy and CSR.
- Fontys School of Teacher Training in Tilburg is one of the most experienced institutes in teacher training in the Netherlands. Many of its members of staff are involved in the curriculum development for secondary schools in the Netherlands. Education of sustainable development is one of the fields of expertise of a group of Fontys’ teacher trainers.



Colophon

Fontys University of Applied Sciences in cooperation with the ThreeC consortium, June 2016

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Photography: Universidade Portucalense

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