

# Methods for Circular Economy Teaching

- Method Guide and Tool Kit





Hi! You're holding a guidebook that you can use to provide your students with interesting ways of learning circular economy. This book presents three different methods and a comprehensive toolbox. I hope you'll find this book helpful!



Inka Mäkiö & Marketta Virta (eds.)

## Methods for Circular Economy Teaching

– Method Guide and Tool Kit

The method guide was produced with the support of Sitra.

**#circulareconomy – New Pedagogy and Corporate Cooperation to Promote Module Studies in Circular Economy**

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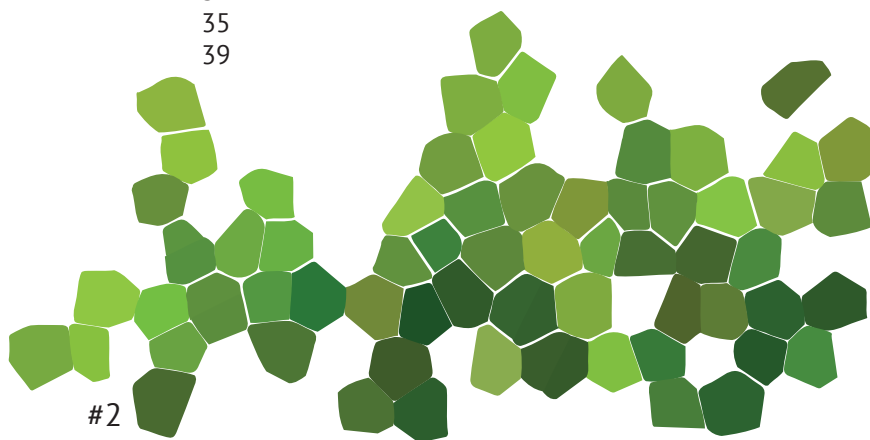


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# Tool Kit

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# 1. Introduction

It has become obvious that in order to survive as a planet and species, we need radical changes in the way we produce, consume and educate. The linear model of economy where we think in terms of “from cradle to grave” must be replaced by thinking in circular terms of “from cradle to cradle”. Both materials and nutrients must come back into use again when a single product is at the end of its life cycle.

To move into a circular model, both society and business as well as individuals need to change. The importance of education in this process is paramount: the future implementers of the circular model are in our schools and universities now. Wherever they are, it is our duty to help them gain the understanding of circularity and equip them with the skills they need to lead projects and work together in multidisciplinary teams. We need everyone – the engineers, the designers, the business people and social workers – to make circularity truly work.

This guidebook is designed for educators who want to take part in helping their students learn the facts and skills for practicing circularity. We present three methods that can be freely adapted. They can be implemented as a single course or integrated into an existing course or courses. What these three methods have in common is that they are in project mode, they involve students from different fields and they are carried out in close cooperation with those in working life. The students are challenged to solve problems that a real client has.

The circular model does not refer merely to circulating materials. Skills and knowledge circulate as well. Shared expertise becomes a way of life in multidisciplinary teams. Each student offers his or her understanding for the use of others.

This guide has been produced as part of a project run by the Finnish Innovation Fund Sitra. Projects taking place throughout the country aim to develop a variety of method packages for teaching circular economy. This project was a collaboration between three universities of applied sciences: Turku, Tampere and Lahti. The methods used by these universities were tested by their partners Oulu, Savonia and Vaasa respectively. We have also collected tools used by each of these institutions in the “toolkit” at the end of this guide.

The first part of the guide describes elements common to all of the methods, the type of brief given by clients, how the projects are best run in a learning institution as well as guidelines for assessing the students. In order for you to find the most suitable method for your purposes a table comparing the methods is provided. At the heart of each method is work done by the students on real cases, project work and learning. Please feel free to adapt the methods to suit your own purposes.

*Sitra is a Finnish future fund that collaborates with partners from different sectors to research, trial and implement bold new ideas that shape the future. The aim is a fair and sustainable future, in other words, the next era of well-being.*

## 2. Glossary and Guidelines for Use

This guidebook has three parts. Chapters 3 to 8 describe the general principles inherent in all three methods. These are followed by a description of each method. Finally, we have provided a toolbox to help you implement the method of your choice. The tools comprise of letters, forms, assessment sheets and guidelines for team building exercises.



### Glossary

**project** = the students work in teams completing a project which starts with a brief (challenge/problem) from a client and finishes with a presentation of the solution to the client

**progress presentation** = an opportunity for the team to present the state of the project to the coach (and the client)

**final presentation** = a presentation the team gives on the final results of the project to the coaches and the client

**generic skills** = general work life skills

**partial credits** = credits that students receive if they only complete a certain part of the project

**benchmarking** = learning from others, comparing activities with those of others

**coach** = a teacher or someone else guiding the students

**student tutor** = an experienced student who supports the team by asking questions and giving encouragement

**mentor** = a person encouraging and helping the students

### 3. On Goals and Methods

The methods we offer you in this guidebook have been developed in universities but they can be easily adapted to other institutions. The methods are based on projects, but to be successful the students should have some understanding of the circular economy model and its possibilities. This can be achieved by asking them to get acquainted with prescribed material and leading a discussion on it before launching the projects.

Using these methods does not require the coaches to have prior experience on teaching circularity. There is plenty of material available for you to become familiar with the basic concepts. Here are some suggestions:

#### **Open courses in the internet:**

You can find courses and MOOCs from all around the world in [edX](#).

Ellen MacArthur Foundation [Higher Education Resources](#) offers videos, tasks and publications concerning the circular economy.

Finnish higher education institutions offer courses in their portal, [campusonline.fi](#). Look for 'kiertotalous'.

#### **Literature:**

[Sitra](#) has published a great deal in English.

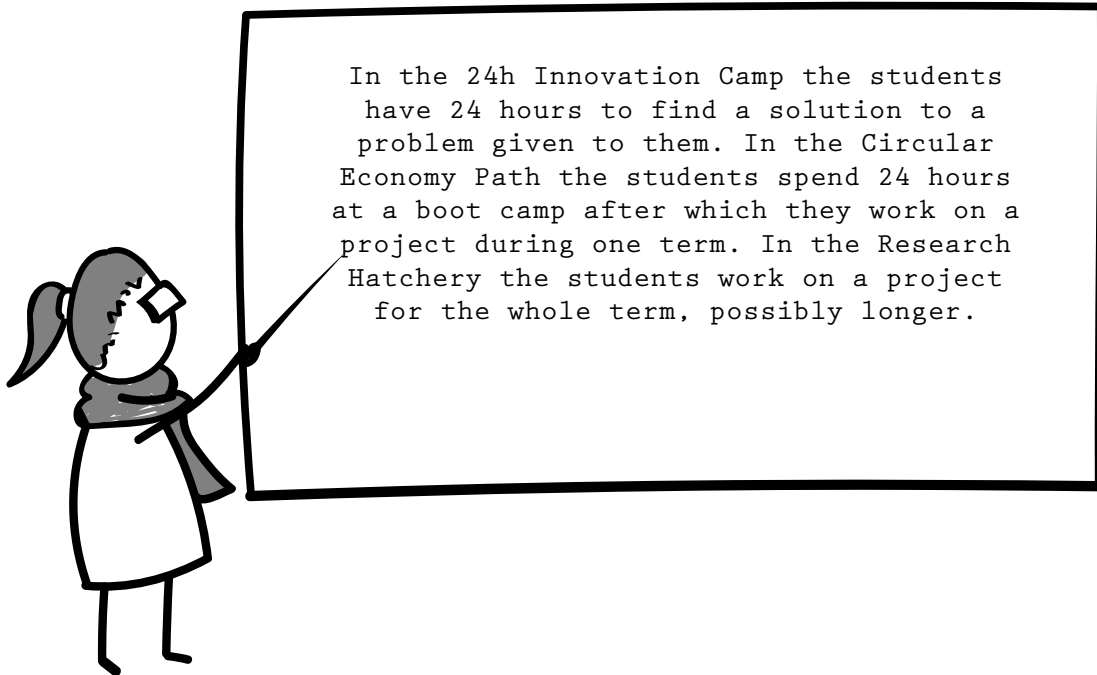
The main concepts to grasp when teaching the circular model are the need for a new way of using resources and consuming them. We are already overusing the planet and population growth will make the problem worse. We need a systemic change to make circularity work. It is not enough to increase the level of recycling, instead products need to be designed so that they last, can be mended, and are easily reused and recycled. The main issue is for a product to keep its value as long as possible. Understanding the basis of the circular model and grasping the idea of a new business model are important learning goals when teaching the circular economy.

## Circular Economy Competences

- Why circular economy is necessary: the scarcity of resources
- What circular economy is: the basic concepts of circular economy
- The systemic change required
- How circular economy works: circular economy in practice, business models in circular economy

The methods described here are all based on working in a project mode. Learning is often most efficient when theory is applied to solve practical problems. Three Finnish universities of applied science have used these methods and they vary in length from short, 24-hour innovation events to projects lasting a whole term. You can find a comparison of the three methods in a table in Chapter 4.

We believe the learning goals should be both conceptual, describing what the students need to know about the circular economy and generic, describing the skills need for working in a project. You need to adapt the learning goals to fit the length and breadth of your particular implementation.



### Conceptual learning goals:

Mastering the basic concepts of circular economy and understanding limited resources

Being able to apply the business models of circular economy

Being able to apply systemic thinking in problem solving.

Being aware of management tools related to circular economy

Identifying a project and the technological-economical possibilities and limits concerning a particular field

### Generic learning goals:

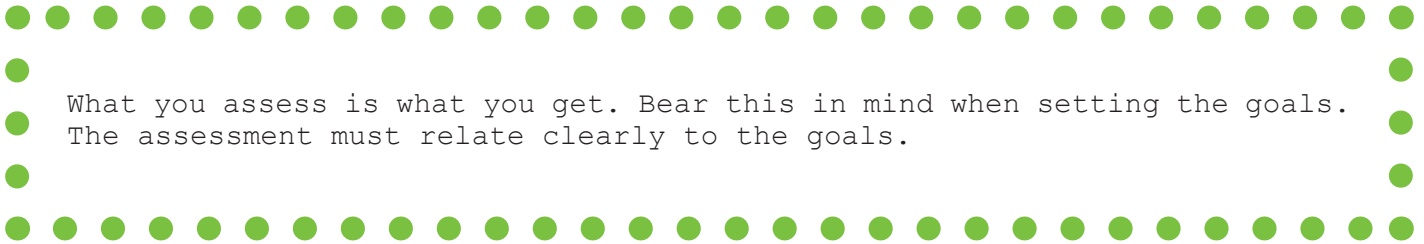
Identifying the needs companies have concerning circular economy and finding information and solutions

Developing team working skills

Networking and seeing its importance

Resourcing the tasks at hand with the given aims in mind

Pitching and presentation skills.



What you assess is what you get. Bear this in mind when setting the goals.  
The assessment must relate clearly to the goals.

## 4. Comparing and Contrasting the Methods

The similarities and differences of the three methods can be found in the table below. The main differences have to do with the length of the process and the number of students involved. Each method requires a client and a clear brief. The coaches need to be agile and able to guide the students without interfering too much. Each method needs careful planning and preparation both in terms of schedules and resources. Chapters 3 to 8 describe issues common to all three methods and chapter 9 shows their differences.

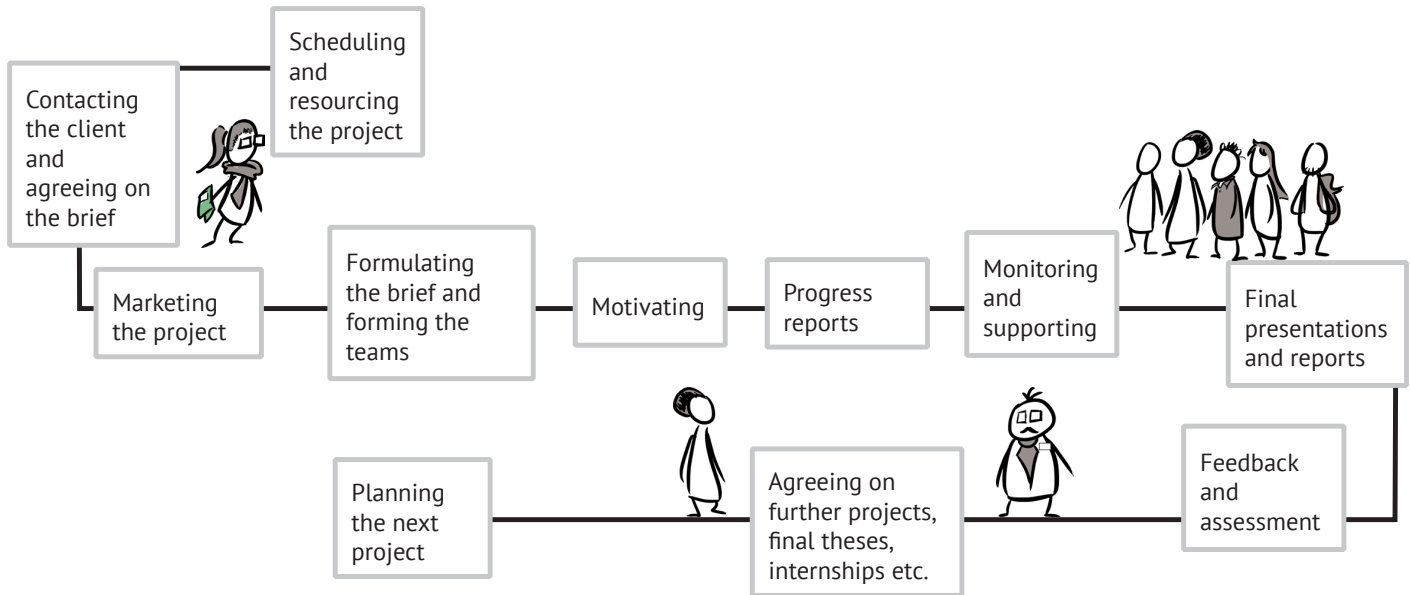
Ideally, the methods are used as part of a course where the principles of circularity are dealt with. If this is not possible, you need to make sure the students obtain this information for example through the means described in Chapter 3. You can also organise separate introductions to the theme.





| Method                            | 24h Innovation Camp  | Circular Economy Path  | Research Hatchery  |
|-----------------------------------|--|--|--|
| <b>Number of students</b>         | 30–60 students, max 7 per team   | 30–60 students from different fields, 3–7/team   | 3–7 from different fields  |
| <b>Credit Units (ECTS)</b>        | 1–2 ECTS/student   | 3–15 ECTS/student depending on the number of hours used.   | 1–5 ECTS or more depending on the number of hours used.  |
| <b>Time</b>                       | 24 h in one, two or three blocks.  | 24 h BootCamp, then 8 h/week/term  | 1–6 months, starting when convenient   |
| <b>Where and how</b>              | The camp needs a venue where there is enough spaces for all teams to work undisturbed. If the camp is divided into separate blocks, ideally, the same venue is used each time. | 24 h Boot Camp needs a venue big enough for group work. The following weekly meetings can take place in ordinary classrooms.   | The initial venue is organised by the coach. After that the team arranges its own meetings. Regular meetings with the coach take place every week or every other week. |
| <b>Number of coaches</b>          | The number of coaches depends on the number of participants. Each coach has maximum of two teams to coach.   | Teachers of design, business and technology act as coaches.  | The workshop is led by one coach who may have a more experienced student as an assistant.  |
| <b>Expectations on the client</b> | The client gives a brief and at the end of the project comes to hear the results.  | The client meets the students 3–5 times during the term. The client should be available for consultation during the whole project. The teams agree the meetings with the client. | The client meets the students 1–5 times during the workshop. The client should be available for consultation during the whole project.                                 |
| <b>The number of briefs</b>       | Each team can have its own brief, but alternatively the teams may work on the same brief, possibly even compete against each other.  | 4–6 briefs. The students have a say which brief they prefer but the final decision is made by the teachers.  | One Research Hatchery usually has one brief. However, if the brief has more than one part, a new Research Hatchery is put together after the first part is completed.  |
| <b>Tools to use</b>               | Innovation and evaluation 10 and 17. Assessment tools 12–14. Other tools as needed.  | Project management tool 4–9 and assessment tools 12–14. Other tools as needed.   | Project management tool 4–9 and assessment tools 12–14. Other tools as needed.   |





Project roadmap from the point of view of the leading coach

## 5. Preparation

### Ensure the necessary resources

The preparation of any project begins when planning the year ahead. **Ideally, the circular economy project is part of a course in which case finding the resources is easy.** You engage the necessary number of people and schedule the project. When the group is likely to be large, many coaches and possibly student tutors are needed. Contacting clients is also vital. Tell them about the benefits of involving students in their development work.

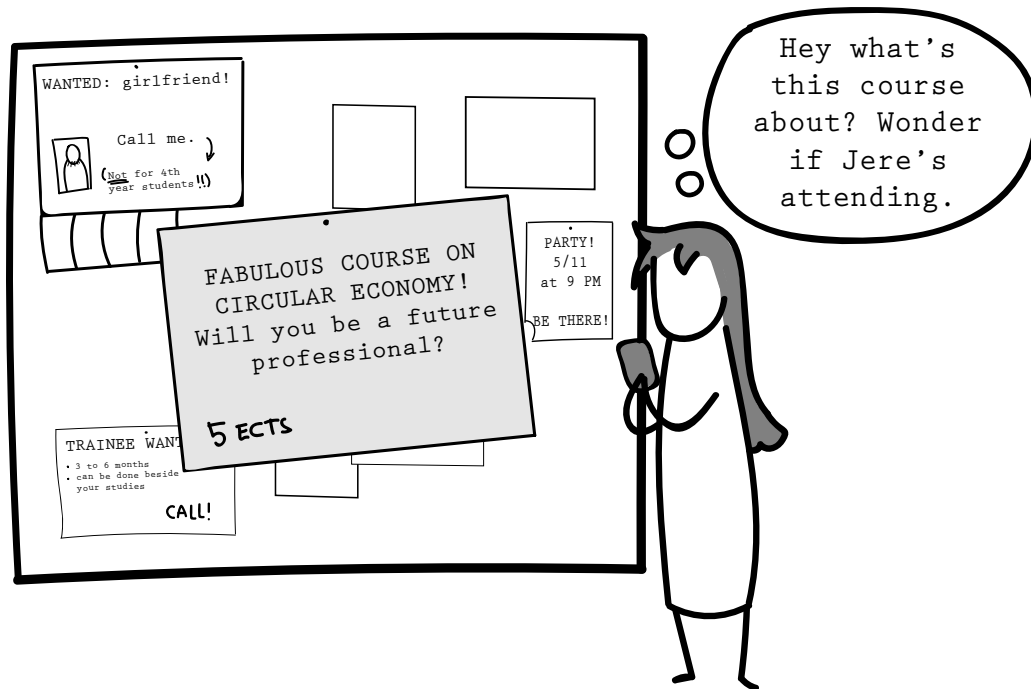
### Formulate the brief

As you are preparing the project, do keep in touch with the client so that you can formulate the brief together. The client knows the needs of their company and you know how to word the brief so that it makes sense to the students. You should also look at the assessment and evaluation criteria together and **agree on how the students can keep in touch with the client during the project and how feedback will be given.** Whilst you are preparing the project, pay attention to the possible need for experts and find out if they are available for consultation during the project.

## Market!

Start informing students about the projects well in advance. Use as many channels as possible, the intranet of your institution, TV screens, notice boards and social media. **More is more, so marketing needs to take place frequently to meet as many students as possible.** Students sharing their positive experiences with other students is by far the most effective way to engage others.

Sharing information about the results of previous projects is also important. The rewards of a project, be it a prize from a company, a patent application or employment, might be more attractive to students than mere credits. Successful projects also make it easier to get new briefs from new companies. If the project is part of a course, recruitment as such will not be an issue but do pay attention to motivating the students.



## Book spaces and equipment

Go carefully through the equipment and spaces needed. Often a computer and network suffice, but some projects require laboratory equipment or professional tools. The access to these needs to be secured. Try to predict the need for materials, tests and trial runs and plan where that might take place. Make sure you know who will take responsibility for the possible costs.

If the project takes place outside your institution, book the facilities in good time. Even if you stay in your school **make sure the students have sufficient suitable spaces to work in.**

## Establish the assessment and the tools

Take time to clarify to yourself how the students will be assessed and what are the project management tools that the students will need. You can find documents for project management and assessment in the toolkit. The tools needed for each method are mentioned in the descriptions. Communicate the assessment criteria to other coaches and the students. **Ensure that everyone knows what is expected of them.** The various roles in a project are described in Chapter 7.

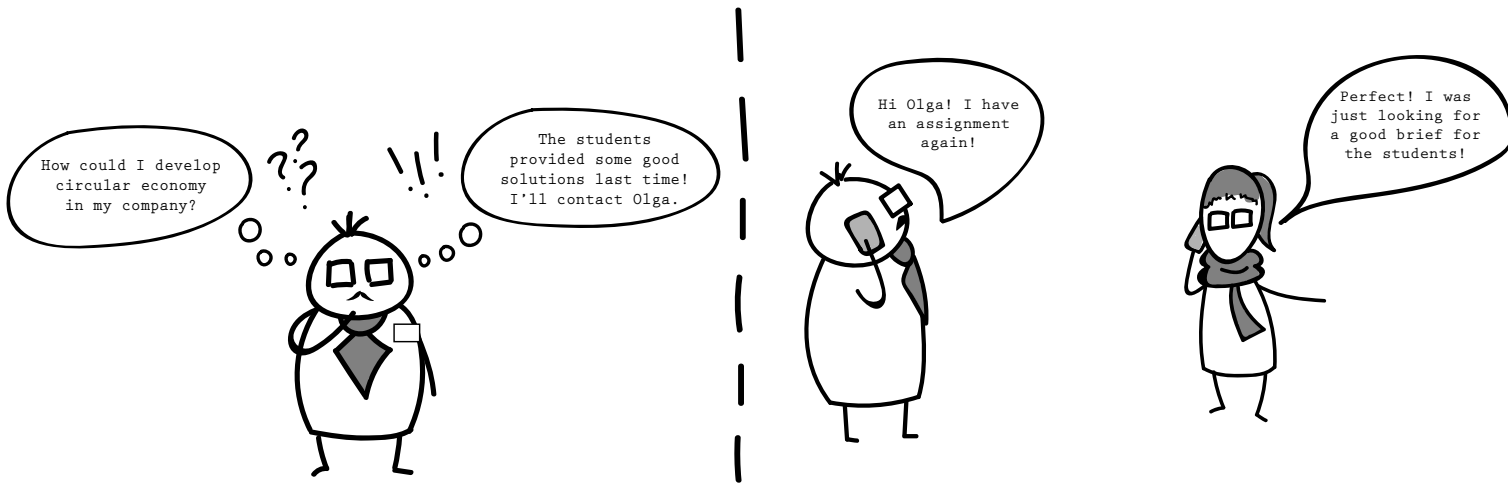
Make a list of the activities that should take place during a project (presentations, progress reports etc). You can find useful documents for this in the toolkit (tool 4). Each method includes a checklist to help you keep everything in mind. You can also find examples of the schedules (tool 1).



## Using a coaching approach

You and the other coaches lead by example. **Do not give ready answers but use questions instead.** The table below gives examples of unconstructive – but very human – reactions and suggestions on how to proceed.

| The Situation   | Avoid these  | Use these  |
|---|--|--|
| You know the solution the students are thinking about is technically impossible to put into practice. | "That cannot be done."                                     | "How are you going to meet the technical challenges?"  |
| You know the group is not sufficiently aware of the properties of a substance.                        | "Let me tell you about the properties of this substance."  | "How are you planning to find out about the properties of the substance?"                        |
| The participants have chosen an idea that is not very innovative.                                     | "There is nothing new in that, you know."                  | "Now, do think how you could develop this idea even further."                                    |
| The group has not given thought to the economical aspect of the idea.                                 | "Well how will you make sure this is economically viable?" | "How would you describe your idea to a business angel?"  |
| You realise the students have misunderstood a concept.  | "Hey, X does not mean...it means..."                       | "I suggest you double check how this concept is understood."                                     |
| You realise the students do not understand the properties of the raw material.                        | "You don't understand..."                                  | "What facts do you think you need to find out for this?"   |
| One of the group members dominates the situation.   | "Would you mind shutting up for five minutes, Peter?"      | "How do you ensure everyone gets heard in this group? Who takes the responsibility of for that?" |
| You notice the team has not understood what they have been asked to do.                               | "But the guy from the company said that..."                | "What do you think is the most essential issue in what you have been asked to do?"               |



## 6. Brief

### Client

There is no circular economy project without a client who needs something worked out. A client can be a large or a small company, association, project, municipality, community or even a private person. A business can be from any sphere of life and at any stage in its own life cycle.

The most important aspect of the brief a client gives is that it meets a real need. Genuine cases from work life motivate the students taking part. The brief should concern circular economy, it should have an impact on society but, above all, it should have significance for the client. The link with real life is the important factor even if the solution would not be revolutionary.

### The need may be for

- a survey, study or analysis
- testing and development
- quick trials and innovation
- thesis work or PhD
- services or content (e.g. to increase visibility)

● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●  
●  
● A student can be a client, too! One of the projects worked on a student's dream to move into a van.  
● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●

Depending on the length of the project the client would ideally be involved in many of the progress meetings and be available for consultation throughout the project. Make sure you ask the client to evaluate the success of the project (tool 15).

We advise you to draw a written agreement with the client to clarify the parties and the schedule. It is also vital to agree who has the rights to the ideas and materials created during the process. There is a draft of such an agreement in the toolkit (tool 2).

### Checklist for the client



#### The Client is asked to:

- share experience, expertise and information
- help and guide
- give clues
- listen, complement, encourage and ask questions
- understand the value of the students' fresh ideas for the company
- evaluate the students' work at the end of the project

#### The Client should refrain from:

- giving ready answers
- criticising too harshly
- making decisions on behalf of a team
- modifying the brief during the process



## **Criteria for the Brief**

When planning the brief, bear in mind that a concrete approach usually works better than one with very wide scope. The client is likely to benefit more if the students develop existing activities further rather than try to solve large, complicated problems.

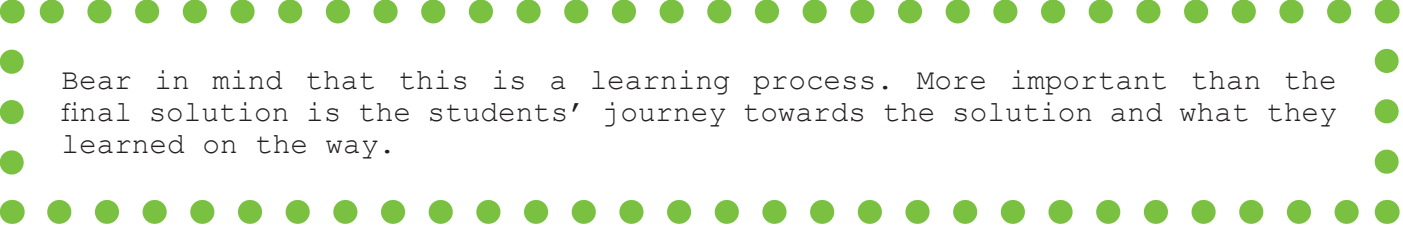
Ask the client to explain the problem and the challenge clearly without giving possible alternative solutions. The next step is to trust the competence, attitude and team working skills of the participants.

The client might need your help in formulating the brief. The need behind the brief might concern resource efficiency, recycling, extending the life cycle of a product or turning a product into a service.

### **Examples of suitable briefs:**

- extending the life cycle of a product
- a product as a service
- sharing platforms
- renewability
- resource efficiency and recycling
- risk analysis and management
- analysis of the circular economy strategy in a company.





Bear in mind that this is a learning process. More important than the final solution is the students' journey towards the solution and what they learned on the way.



### A good brief:

- is clear and simple
- allows room for innovation by setting a clear goal but not the means to reach it
- meets a demand, but the clients core activities are not dependent on its success
- is sufficiently challenging but still realistic
- makes it possible to use a variety of skills from different fields
- explains why the task has been set and who will benefit from it
- gives the necessary initial information.

You can find examples of briefs and projects at the beginning of Chapter 9.

When the brief has been formulated it should not be modified. The form of the desired result should also be agreed in advance. Does the client want a solution, a product, an analysis or something else? The goals can also be divided into smaller units. The solutions should be economically, ecologically and socially sustainable.

# GREETINGS FROM XXX UAS!

Does your company have an annoying problem and your employees don't have time to focus on solving it beside their daily tasks? Have you not had time to figure out what circular economy could mean for your company? Did you know you could find the solutions to these kind of problems via student-company cooperation.

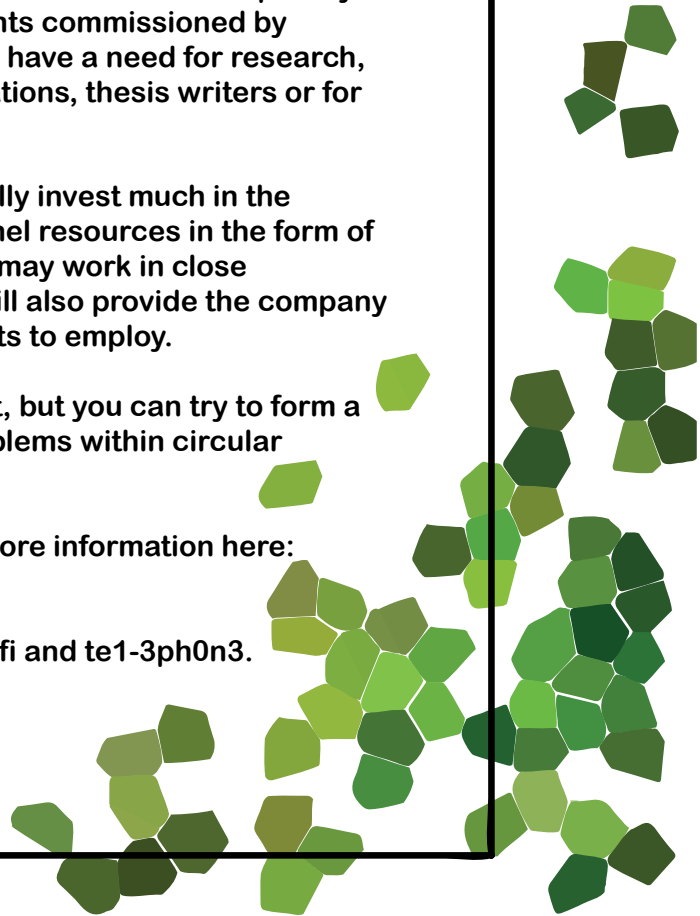
Our university of applied sciences arranges innovation projects on circular economy, the idea of which is to have a multidisciplinary team of students working on assignments commissioned by different companies. The company may have a need for research, development, piloting or testing, innovations, thesis writers or for example content or service production.

The company does not need to financially invest much in the project, but it will require some personnel resources in the form of working hours. If needed, the students may work in close cooperation with your company. This will also provide the company with an opportunity to find future experts to employ.

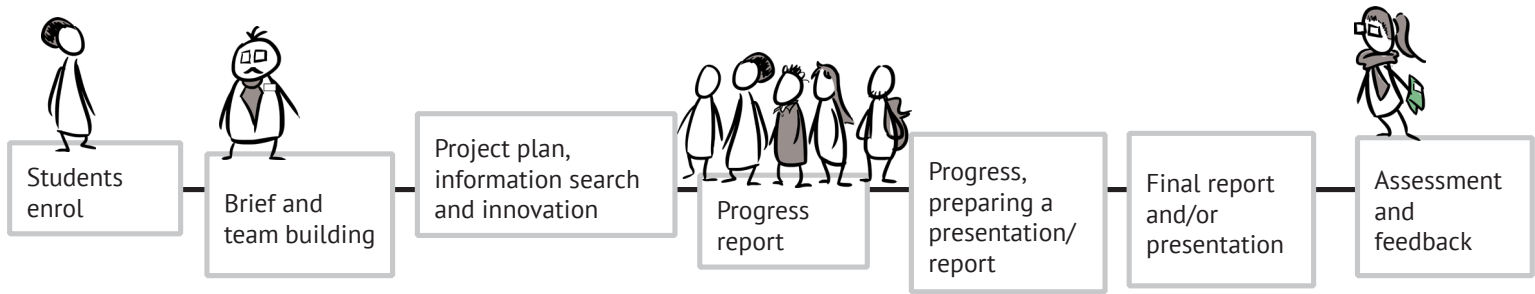
We will help you to form the assignment, but you can try to form a clearly outlined project working on problems within circular economy.

If we got you interested, you can find more information here:  
[www.schoolswebsite.fi/projectwebsite](http://www.schoolswebsite.fi/projectwebsite)

You may contact [this.person@viaemail.fi](mailto:this.person@viaemail.fi) and te1-3ph0n3.



## 7. Working Phase



### Team Building

Before you launch the project make a decision on how the student teams are to be formed: will the students choose their team mates or will you form the teams? Bear in mind the importance of students from different fields working together. The roles people tend to take in teams can also be used as criteria when thinking of different combinations.

Becoming a team is an essential and important element in the success of a project. With the help of teambuilding activities, you can help the students to work together effectively and deepen their understanding of the significance of engaging with different fields in solving problems related to the circular economy. The team members as well as the coaches need to invest in teamwork skills as well as leadership. To be a good team player is a skill you can learn! The persons coaching a team need to monitor the process to see if team building is taking place tacitly, as people are working together or whether explicit team building activities are needed.

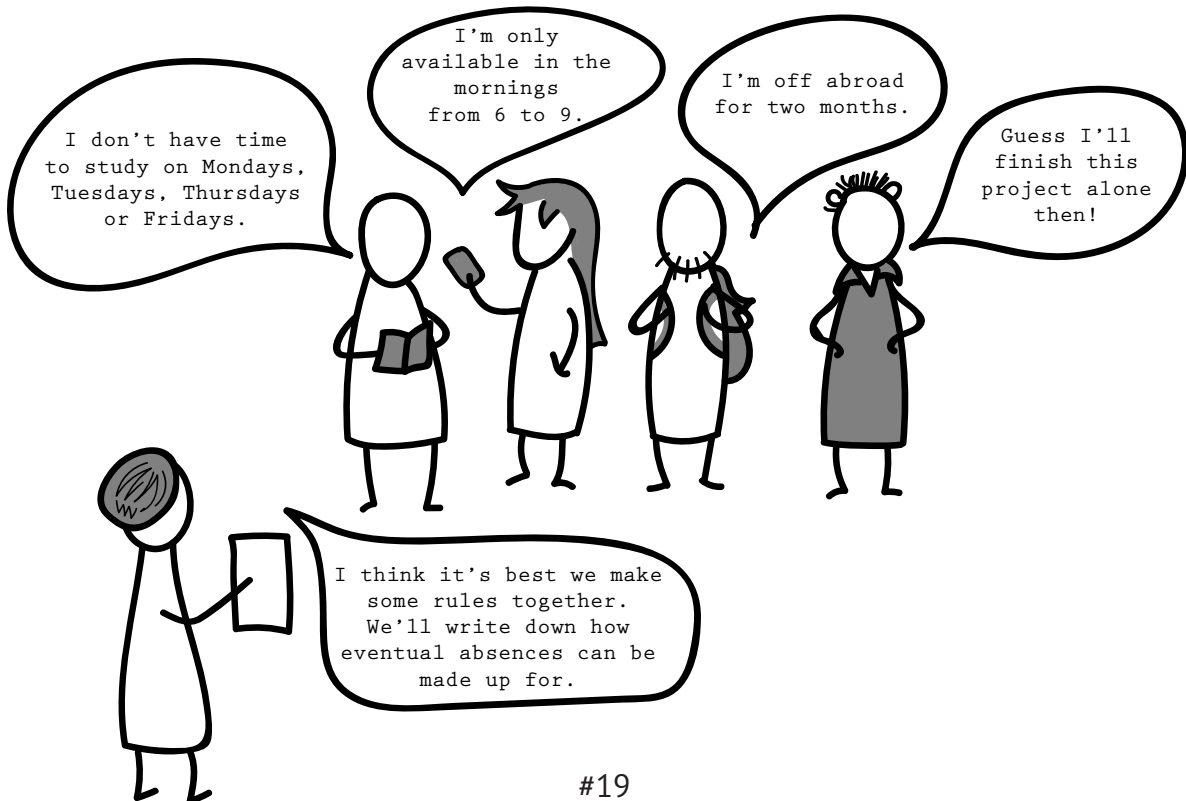
There are suggestions for team building activities in the toolkit (tool 11).



## Rules

Make sure the goal of the project is put into writing. The goal is the same for everyone, even for the client. After this each team should agree on rules for their time together. Tool 3 in the toolkit gives helpful tips for the agenda of the first meeting of a team. At least the following questions need to be asked and answered:

- What kinds of challenges and opportunities are the team likely to face during the project?
- What are the procedures for resolving conflict?
- How do you enhance and maintain a good team spirit?
- What are the channels of communication and how will the team members be updated?
- How are decisions reached?
- How are absences dealt with?



In a multidisciplinary team the students come from different working cultures and are at different stages in their studies. This can make working together challenging. Problems can be prevented by having in place clear agreements about the amount of required presence and ways to make up for absence.

## Roles



**The Coach** is in charge of clarifying the goals and the idea of the project to the students. He or she initiates the team building and monitors the working of the team. During the project the coach stays in the background but is aware of the progress of the process and intervenes if necessary. (More details in Chapter 5.)

**The Client** gives the project its topic and goal, but also the necessary background information. The client should be available for further inquiries. At the end, the client should give feedback to the team. (More of the clients' role in Chapter 6.)



**The Project Manager** oversees the working of the team to ensure the project progresses according to plan. He or she also contact the client and the coach when necessary. The students choose the project manager themselves.

If the project team is divided into sub-teams (for example marketing and communication) each team should have **a responsible person** who sees that what has been agreed gets done. This person also reports to the project manager.



**The Student tutor** is an experienced student who supports the team by asking questions and giving encouragement.



The teams may also choose to elect a secretary, a coordinator, a presenter and a completer finisher. Usually, the clearer the assigned roles, the more efficient the progress of the project. The students should take into account their varied backgrounds and their learning needs when deciding on the roles and responsibilities.

## Starting the Project

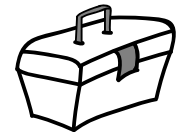
With the longer projects, the students need to draw a project plan showing the schedule of the project as well as the resources (people, machines, spaces and devices). Good aids for scheduling are Gantt-diagrams, Excel and various electronic project management tools (e.g. MSPProject). The project plan should also include the possible risks and means for handling them. There is a model for a project plan in the toolkit (tool 5).

Before the start of a longer project, each student should have a detailed plan of their part in the project and the time available for it. The students should keep a log of the plans and realisation of time use (tool 6). With the help of the log it is easy to track the total of the hours a student is giving to a project. When you compare the realised hours with the plans you can intervene if the situation does not look good.

The credit units a student gets from a project should reflect the hours he or she has used. One credit unit equals 27 hours of work, so in order to get 5 credits, a student should work some 135 hours on the project.

As to getting started with the innovation, you can find innovation methods and tools for evaluating an idea in the toolkit (tools 10 and 17).

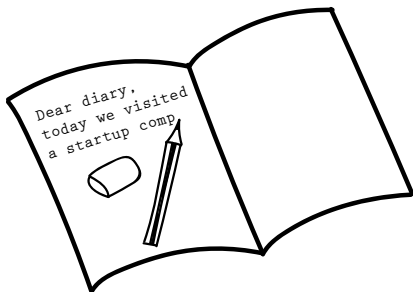
## Ways to Follow Up a Student



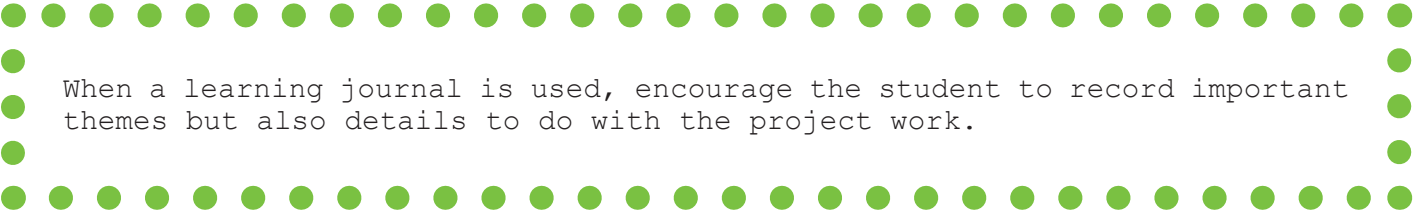
### Learning journal

A learning journal supports the learning process of a student (tool 7). In it the student can document experiences and observations. The documentation is not necessarily for others to see, but the material might come handy in the project itself or as proof of work done.

The learning journal can be a basis for a report that the students may be asked to write (tool 8). It is good to start the learning journal with an evaluation of one's starting point (competences, personal goals) as well as expectations based on the project and roles in it. These can be clarified during the project. Also, suggestions for further development are something to make a note of in the journal.



The form of the journal is free, but it is important to make regular entries, daily or a least weekly. Encourage the students to leave the straitjacket of a formal report and write poems, draw cartoons etc.



When a learning journal is used, encourage the student to record important themes but also details to do with the project work.

### **Learning report**

You can decide to ask the students to submit a learning report at the end of a project (tool 8). The report should include reflection on the content and activities, and organisation of the project from the student's point of view. The learning journal comes to good use when putting together the report.

The students describe their contribution to the project and reflect on their learning in relation to the goals of the project. They should also discuss the strengths and weaknesses of individual team members as well as the whole team. They should also evaluate the success of the tasks completed and how well the goals of the project were achieved. Encourage them to analyse the reasons for successes and failures and to give suggestions for improvement.

The form of a learning report is free and it should have various attachments; products of the project, publications, net pages and products. The client's evaluation of the project should also be included. Consider keeping the reports confidential and use them as an aid when you assess the students.

### **Log**

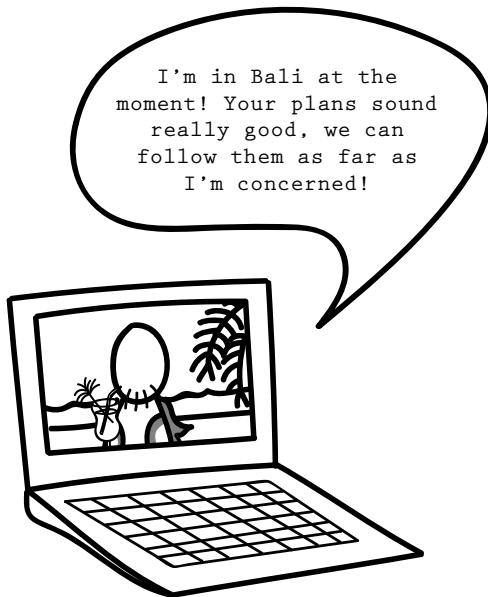
With longer projects, it is advisable to ask the students to log the hours they use during the project (tool 6). The hours used for the project should be documented on a daily or at least on a weekly basis. If this is done on an Excel sheet the available hours are easily seen. This is also a tool for the coach who can easily see when things are not going as planned. This "bookkeeping" can also be part of the assessment.

## Challenges

Problematic situations are a part of a project. You handle them best by preparing for them. Take time for team building activities so that the students get to know each other and trust begins to develop. Making sure the team members agree on the rules and then follow them prevents most of the problems from ever occurring. You can manage risks by inviting the team members to brainstorm on possible problems and ask them to agree on the procedures to deal with these. Encourage the students to discuss issues openly, preferably before things start to turn sour.

Your great challenge is to trust the process and not interfere with the activities of a group unless it is absolutely necessary. When the team has got stuck your services are needed. Assure the students that opening up to you about problems will not affect their grade. Ask direct questions on how things are going, both from the whole team and from the members individually. To get the dynamics of the group working is vital for the success of the programme.

In an ideal situation, the teams can work intensively and all together in the spaces that you have provided. In practice, working together is often challenging. The students need to show commitment right from the beginning. Using the Internet for conferencing is an option if the team has agreed on it. Do encourage face-to-face communication if it is possible.



### Examples of possible problems:

- someone does not take part as agreed
- the client is not available
- the brief is changed
- the project manager does not work as agreed
- messages are not passed on
- the group is too large
- difficult to find time together
- personal tragedies.



## Completing the Project

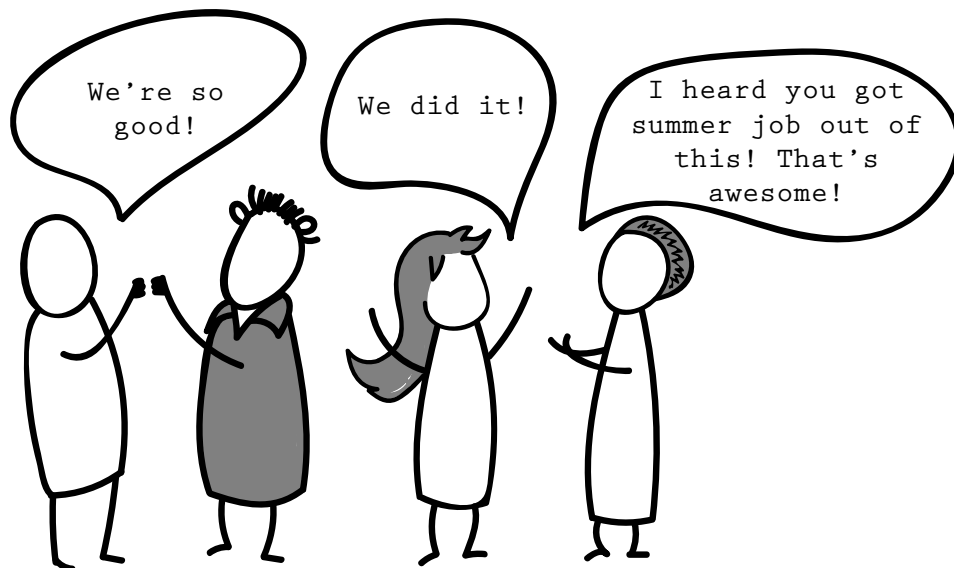
### Things to bear in mind at the end of a project:

- assessment
- final presentations/seminar
- possible articles
- thanking the client.

Do make the results of the projects known at least in your institutions but also to a wider audience. The project teams can write articles about their achievements and the learning processes. If the client is agreeable, invite people to listen to the final presentations. More of the final presentations in Chapter 8.

A project might be the start of another project or further research. Be very aware of such suggestions and make a note of them. This will benefit you when it is time plan new projects. Sometimes there is a new need for an immediate follow-up. In such cases, the students of the original project might want to continue, but recruiting new students is also possible.

It is possible that as a result of a project some of the students will be recruited by the client. You might inquire about this from the client.



## 8. Assessment

### Basics of Evaluation

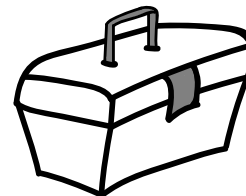
Project work makes it possible for the students to develop the basis of theoretical knowledge by doing. Assessing this type of learning is not straightforward. You can overcome this by using continuous assessment. Try to evaluate the starting level of the students accurately and use the same methods with each individual. Evaluate the learning that takes place not only at the end of the project but also throughout the process.

When you decide on the assessment criteria of the learning process, focus on both understanding of the circular economy and innovation competences (see more in the section "innovation competences"). Make the assessment comprehensive by using self-evaluation and peer-evaluation, as well as the coach's observations. You can find helpful tools for this in the toolkit.

Ask the teams to complete their self-evaluation and peer evaluation before you chair a final feedback and assessment session. You can ask the students to use applicable assessment tools (tools 12). You can use the same tools yourself to evaluate students. There is also a framework for assessment you may find useful to evaluate whether a student has reached the learning goals (tool 13).

#### Elements of assessment:

- the students' self-evaluation of their starting level and learning acquired during the process together with personal experiences and feelings (tools 6, 7 and 8)
- the observations and experiences of the coach (tool 12)
- self-evaluation and peer evaluation (tools 12)
- circular economy competences (tool 13)
- the client's evaluation (tool 15)
- evaluation of the final presentation (tool 16).



When you lead the final session, make sure that all the evaluations are taken into account: in addition to the evaluations that the students have made of themselves and of the others, the client's and the coaches' evaluations should be heard. Also ask the students to give feedback on the learning process as a whole (tool 14).

There are several tools that you can use to help the students and yourself create data to back up evaluation, for example the learning journal, work log and learning report. With the help of these, the students can give structure to their experience and analyse what they have achieved and what they have learnt. It is also a way to revise what has taken place so far and what new goals should be set. When writing peer evaluations the students can benchmark their performance against those of others. When the results of self-evaluation and peer evaluation are combined with the coaches' observations and experiences the workload of the assessor is lighter and the assessment is more equal and comparable.

It is important to inform the students of the evaluation methods and basis for grades in advance. They should be part of the mutually agreed rules.



## The Client's Evaluation of the Project

Clients are an important source of feedback and ideas for developing project work. They can also make a valuable contribution to the evaluation of an individual student. Ask the client if they think the project has reached the set goals and how they would rate the cooperation with the various parties. Let them tell the students how they might be able to utilise the results. It is also good to ask for their assessment of individual students' contribution to the project.

The client's evaluation is an important part of the student's learning experience. This is worth mentioning at the early stages of the cooperation. In the toolkit, you can find a feedback form which you can talk through with the client (tool 15).



## Final Presentation, Guidelines and Assessment

At the end of the project, you can organise a final event where the teams present their ideas to the clients and to other students. Make sure there is time for each presentation, and feedback from the client. The goal is to pitch each idea so that the listeners become aware of the need and how it is met (tool 9). Give each team at least 20 minutes for their presentations and questions.

The presentation is usually part of the evaluation of a team (tool 16). Consider whether the audience was taken into account, how easy to understand, effective and original the presentation was and whether the team stuck to the given time limit.



**When evaluating the results the coach and/or the client can focus, among other things, on these:**

- How future oriented is the idea: does it anticipate the future and take into account circular economy and megatrends?
- Strategies and programmes: how does the solution fit in with national strategies and the criteria of various sources of funding?
- The business model of the company: are the resources available used as the basis for innovative solutions?
- Results and effects: Is the idea profitable and competitive, can it be responsibly produced? Is it in accordance with the principles of sustainable development?

## **Innovation Competences**

In addition to understanding the particular substance of their field, employers also need to be able to take part in various innovation processes. The present problems are multidimensional and require a creative attitude.

Read more about innovation competences: **Innovation Pedagogy – Preparing Higher Education Institutions for Future Challenges, Konst & Kairisto-Mertanen, 2018** and **innopeda.turkuamk.fi**.

Five dimensions of innovation competence:

### **1. Creativity**

- the ability to think beyond the existing ideas, regulations, conventions or contexts
- the ability to create or remodel functional alternatives, ideas, products, methods or services independent of their possible usefulness or added value

### **2. Critical thinking**

- the ability to analyse and evaluate the advantages and disadvantages of ideas taking into account the risk factors involved when they are used for this purpose

### **3. Initiative**

- the ability to make decisions or take action to initiate positive change
- the ability to influence the actions of people creating or implementing ideas

### **4. Group work**

- the ability to work effectively with other members of a group

### **5. Networking**

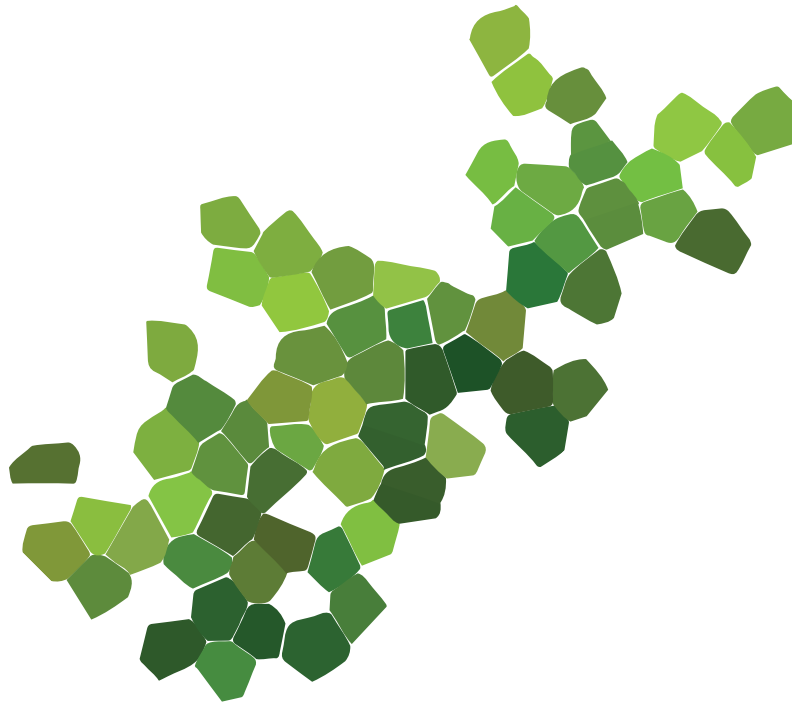
- the ability to make use of cooperation with people outside the group

You can find a tool for assessing innovation competences in the toolkit (tool 12).

## 9. Teaching Methods

The three methods for teaching circular economy chosen for this guide are presented in this chapter. You can make a quick comparison of them by studying table 3.

All the methods entail preparation, finding a client, the general principles of project work as well as assessment. These elements have been described in the previous chapters. The particular features of each project are highlighted in the following descriptions.



## 24h Innovation Camp

The 24h Innovation Camp (in use in Tampere University of Applied Sciences). In this teams have 24 hours to accomplish a brief from a client. The teams can be interdisciplinary or the members can be from the same field. As support they have coaches who are usually teachers. The camp can be realised independently or as a part of a course. The preparation for it needs to start early enough so that the necessary number of coaches can be recruited and the focus and criteria decided. Read more about the preparation in Chapter 4.

Twenty-four refers to the number of hours the students have for the process: receiving the brief, analysing it, listening to a possible inspirational talk, innovation, working out the solution and presenting it. The time can be divided in the most suitable way for each situation. It can be two 12-hour sessions, or three 8-hour sessions, or even a solid 24 hours.

| Method                     | 24h Innovation Camp  |
|----------------------------|--|
| Number of students         | 30–60 students, max 7 per team   |
| Credit units (ECTS)        | 1–2 ECTS/student   |
| Time                       | 24 h in one, two or three blocks.  |
| Where and how              | The camp needs a venue where there is enough spaces for all teams to work undisturbed. If the camp is divided into separate blocks, ideally, the same venue is used each time. |
| Number of coaches          | The number of coaches depends on the number of participants. Each coach has maximum of two teams to coach.   |
| Expectations on the client | The client gives a brief and at the end of the project comes to hear the results.  |
| The number of briefs       | Each team can have its own brief, but alternatively the teams may work on the same brief, possibly even compete against each other.  |
| Tools                      | Innovation and evaluation 10 and 17. Assessment tools 12–16. Other tools as needed.  |

### Realisation

The innovation camp should be organised in a space big enough for addressing all teams simultaneously. This space is used for the presentations at the end. It will be an enormous help if the teams have working spaces at their disposal to give them an opportunity to work undisturbed.

One person needs to take the overall responsibility of the camp. The other coaches work under this person. One coach can have two teams to coach at the most.

At the beginning of the innovation camp the students should receive a detailed schedule that describes the camp in a nutshell. The students are expected to become familiar with the background material in advance.



The camp starts with the group being divided into teams and team building activities. The teams are given their briefs and the students start brainstorming ideas. They need to go through a process of producing as many ideas as possible and then selecting a suitable idea for further development. This is then worked on and then presented to the client and the other teams.

## Checklist for the 24h Innovation Camp

### Before

- Plan the concept and consider with whom you will cooperate. Contact them as soon as possible.
- Work on the brief with the client.
- Define the starting level required for the project and put it in writing e.g. "For this project you have the required level if you have sometimes bought clothes."
- Draw up the agreements with the clients.
- Define the evaluation methods and criteria.
- Decide how absence will affect the grades.
- Market the project and give the students the background information and the schedule.
- Book the necessary spaces and acquire the necessary equipment.
- Invite the number of coaches required and see to their resources.
- Put together a step map that shows what needs to be done when, which spaces are available as well as the contact information of the staff and the client.
- Check the Internet connections, AV devices and the compatibility of devices and sound reproduction. Double-check these and re-check on the following day.
- Choose a team leader for the coaches. Give this person the power to make decisions e.g. changes to the schedules. Information should also pass through this person.
- Agree on the schedules. Decide when the coaches and the client will be available for consultation.
- Decide who takes the materials and provisions to the camp and who sorts the practical arrangements during the camp.

## **During**

- Look after the client and other possible visitors.
- Keep the time.
- Provide team building activities.
- Make sure each team has rules.
- Make sure the students know their roles.
- Arrange sessions with the teams, listen to and motivate the students.
- Carry out assessment in the agreed manner (observation, peer assessment).
- Organise the final presentation session.

## **After**

- Enter the grades into the system.
- Give the client the possibility to give feedback on the process.
- Find out about possible further projects.

## **Results and presentations**

As a result of the 24h Innovation Camp ideas are turned into solutions which the client can apply in their business. The solutions are presented in a final session where coaches and clients give feedback to each team.

## **Assessment**

Assessment can be weighted as required depending on the courses the camp is connected to. The most important thing is to agree on the focus of the assessment and methods of assessment. These need to be communicated clearly to the students.

## **Risks and challenges**

The greatest risk for the 24h Innovation Camp is that the brief is not suitable for the students. As sometimes happens when people work in teams, there is a risk that the members might not understand each other or someone appears not to be committing to the process. The commitment of the clients and the coach is also necessary for the success of the process.

The coaches cannot blindly trust the process but need to be aware of what is going on in their respective teams. It takes a considerable time to prepare a camp that has a clear structure and provides the students with the necessary information and the tools required for proper innovation.

## Examples of 24 hour projects

### Innovation in the BioHub Talent Valley

Students who had worked in the teams for some weeks were given an introduction to innovation. They then received a brief from the hosting company. The teams were guided through an innovation process where they started by producing a wealth of ideas, first individually and then in pairs. They were given tools for selecting the best idea and for developing it further. The ideas were presented to the coaches and to another team. The ideas were then developed further and eventually presented to the client. Self-assessment and peer assessment were used. In awarding the final grade, the coaches' observation and the client's feedback were also taken into account.

### Circular economy as part of a course

As part of their Environmental Management course a group of environmental engineering students took part in a 24h Innovation Camp on the traceability of textiles. Their brief was to develop a way to trace the origin of the raw materials used in textiles. In the briefing, the experts working in the textile laboratory gave background information and gave suggestions about out where to find out more. They were also available for consultation. The students had 24 hours in which to submit their initial ideas. A week later they were asked to give a short pitching talk on their ideas and written accounts of these were then forwarded to the company Finlayson. An expert from Finlayson later came to give a lecture elaborating on the topic.

## Circular Economy Path

The Circular Economy Path (used at Lahti University of Applied Sciences) consists of two parts: first a day long innovation event called BootCamp followed by a project that lasts one term. Ideally, a brief is such that an individual student works round 135 hours on it and gains 5 credits. It is possible, however, for students to gain as little as 3 and as many as 15 credits, depending on the number of hours they use for the project.

Circular Economy Path is interdisciplinary in nature, intended for any student interested in the circular economy model. It is launched at the beginning of each term with an info session. This is followed by the BootCamp which kicks the work off.

The BootCamp works well as the starting point for initiating and planning projects that are focused on work life and research and development. During the BootCamp the students do not just innovate and "solve" a problem but also draw up a realistic plan for further development. The ideas and plans are presented to the clients, coaches and other students at the end of the camp. The teams then continue to work on their idea for the rest of the term.

Circular Economy Path can be combined with various theoretical studies on the circular economy. In Lahti UAS such studies would be associated with design, product development, economy, town planning as well as material and resource efficiency.

| Method                     | Circular Economy Path  |
|----------------------------|--|
| Number of students         | 30–60 students from different fields, 3–7/team   |
| Credit units (ECTS)        | 3–15 ECTS/student depending on the number of hours used.   |
| Time                       | 24 h BootCamp, then 8h/week/term   |
| Where and how              | 24 h Boot Camp needs a venue big enough for group work. The following weekly meetings can take place in ordinary classrooms.   |
| Number of coaches          | Teachers of design, business and technology act as coaches.  |
| Expectations on the client | The client meets the students 3–5 times during the term. The client should be available for consultation during the whole project. The teams agree the meetings with the client. |
| The number of briefs       | 4–6 briefs. The students have a say which brief they prefer but the final decision is made by the teachers.  |
| Tools                      | Project management tool 4–9 and assessment tools 12–16. Other tools as needed.   |

## Realisation

The circular economy path starts with students becoming familiar with the projects and expressing their interest in ones that enhance their learning most. The coaches allocate the students into teams. The coaches lead projects in their own field of expertise.

The Path is launched at the BootCamp that usually lasts 24 hours, but it can be divided into two 12-hour sessions or even into three 8-hour sessions.

The BootCamp is an event where the students build teams, agree on the rules for their team, innovate and create a schedule for the project taking into account the resources available. They present their plans at the end of the camp. The presentation is an opportunity for the students to sell their idea to the client and explain how they are planning to develop it further. The teams meet their client 1–2 times during the camp.

After the BootCamp, the students commence with independent work according to their project plan. They meet their coach and client regularly. The Circular Economy Path finishes with final presentations as the students share with other teams and clients the results of the development process.

It is important to organise the BootCamp early in the term so that the students will have time to develop the idea during subsequent weeks. Circular Economy Path should be scheduled in the system, for example on one day a week.

In the development project the students study the relevant literature, document essential information and draw up a research plan. The teams create their own website where most of the documenting takes place. The progress of the project is monitored in meetings with the client and the coaches.

### **Checklist for implementing the Circular Economy Path**

#### **Before**

- Market the circular economy path well in advance.
- Recruit and resource the coaches and the student mentors.
- Meet the clients and agree what the briefs will be.
- Prepare the materials, create schedules and book the necessary spaces.

### **During**

- Present the projects, divide the students into teams and lead team building activities.
- See to practical arrangements of the BootCamp (space, scheduling, informing all stakeholders).
- Follow and coach the teams after the BootCamp.
- Make sure that the team makes team rules, risk and stakeholder analysis,
- If you have decided that the results will be presented at a website, make sure that the students design and implement the website.

### **After**

- Lead a feedback session with each team.
- Complete the assessment(home pages, reports, reflections, process)
- Results and presentations.

## **Results and presentations**

At the end of the term, organise a seminar to present all projects. Invite the clients but also staff from your institution and other prospective parties. Collect all the material together on the home pages of the projects and compile an article.

## **Assessment and feedback**

The development project has been assessed on a scale of 0–5 as follows:

- Understanding the theory: 15% of the grade
- Project/research plan: 15% of the grade (incl. presentation)
- Process management: 20% of the grade
- Reporting (especially the final report): 30% of the grade
- Project website: 10% of the grade
- Self and peer assessment: 10% of the grade (tool 12)

Each one of the above-mentioned sections requires a pass grade.

## **Risks and challenges**

The work of the team can be a risk, but so can the brief. You will not regret the time you invest in formulating a clear brief (see the criteria for a brief in Chapter 6). The client should also be ready to collaborate with the team throughout the project.

Make sure each team conducts a risk analysis and agrees on procedures to prevent such possible risks. The team members should also agree on actions they will take should the predicted risks occur.

## **Examples of Circular Economy Path Projects**

### **Construction waste**

In the autumn 2017, a student team worked with Ramboll Ltd as their client. Their brief was to develop methods to decrease the amount of waste created on building sites and increase its reuse. The team consisted of students of material technology, ICT, and environmental engineering. They developed a service to enhance the use of construction waste. They also discovered possibilities for strengthening the role of circular economy in renovation. A part of the project was creating links between consultants, recycling companies and building sites.

### **Circular Economy Competence in regional marketing**

The client of the project was Häme Chamber of Commerce whose travel division had set the possibilities of circular economy in marketing as one of its development themes for 2017. The team consisted of five students of energy and environmental engineering from Lahti. They collaborated with students from Häme University of Applied Sciences.

### **From rags to riches**

In the spring 2017, the focus was on finding alternatives for reusing textiles. The challenge is huge, as in Finland alone 70 million kilos of textiles are discarded every year, The majority of this, 55 million kilos, originates from ordinary consumers. Even though there are organisations who recycle used clothes, some 80–90% of discarded textile items end up being burnt. Students from material technology, environmental engineering, vehicle design and business formed a team whose brief was to investigate the amounts of discarded textiles and how textile waste could be utilised.

## Research Hatchery

The Research Hatchery (used in Turku University of Applied Sciences) is a model in which a multidisciplinary team of students works to solve a circular economy related brief. The need for the brief can rise from a research, development and innovation project, from a client in work life, or from a student. Research Hatchery is led by coaches, people working in the projects and student tutors. Research Hatcheries can be applied in long lasting development projects and as well as short and smaller research projects.

In a Research Hatchery the learning takes place in a variety of ways: by self-study but also by learning from peers. This is a flexible model for learning that does not offer straightforward answers but motivates the students to work towards goals and take responsibility of their work and learning.

| Method                     | Research Hatchery  |
|----------------------------|--|
| Number of students         | 3–7 students from different fields   |
| Credit units (ECTS)        | 1–5 ECTS or more depending on the number of hours used.  |
| Time                       | 1–6 months, starting when convenient   |
| Where and how              | The initial venue is organised by the coach. After that the team arranges its own meetings. Regular meetings with the coach take place every week or every other week. |
| Number of coaches          | The workshop is led by one coach who may have a more experienced student as an assistant.  |
| Expectations on the client | The client meets the students 1–5 times during the workshop. The client should be available for consultation during the whole project.                                 |
| The number of briefs       | One Research Hatchery usually has one brief. However, if the brief has more than one part, a new Research Hatchery is put together after the first part is completed.  |
| Tools                      | Project management tool 4–9 and assessment tools 12–16. Other tools as needed.   |

### Realisation

Before a Research Hatchery starts, a coach and a client formulate the brief and scale it to match the size of the group. This is a critical stage, as on the one hand, a too wide a brief does not bring the required result for the client and, on the other hand, a too tightly scoped brief limits the students and does not leave room for innovation.

In the beginning of a Research Hatchery, either the coach or the student tutor leads team building activities. It is advisable to reserve time for these at least during the two first sessions.



It is advisable to invite the client to present the brief so that the students can ask questions. The rules, goals and schedule are planned together with the students. A project plan must be drawn right at the beginning of the workshop. Clarifications and changes to the plan can be made throughout the project. Deciding who will be the project manager and allocating any other roles is also important to do before starting the actual work.

The tasks completed during the project depend on the brief. They might consist of peer development, information search and analysis, the students might interview experts, make visits and conduct research. In addition, the students meet each other regularly without the coach. This can be done face-to-face or using applications. The meetings can take place once a week or less rarely, depending on the brief.

During the Research Hatchery, both the coach and the client should be available for consultation. The coach acts as a mentor and lets the students create the best ways of working. Guidance and support is also available from more experienced students. The coach should encourage the students to contact experts from outside, too.

## **Checklist for implementing the Research Hatchery**

### **Before**

- Formulate the brief and determine the scope of the project.
- Draw and sign the possible contracts with the client.
- Market the project.
- Book the spaces and acquire the necessary equipment.

### **During**

- Invite the client to present the brief.
- Lead team building activities.
- Agree on the rules of the workshop with the students.
- Allocate roles to the students or help them to agree on the roles among themselves.
- See that team creates a project plan and comment on it.
- Meet the students regularly. Egg them on, help when requested and coach.
- Organise a progress seminar if necessary.

### **After**

- Organise a final seminar.
- Organise self-evaluation and peer evaluation and assess the students.
- Give the client a chance to give feedback.
- Find out about possible further projects.

## **Results and presentations**

The Research Hatchery finishes with a final presentation given to the client. It is also possible have a progress seminar where all the teams at work share their projects.

Depending on the brief, the Research Hatcheries can yield a variety of outcomes and results. There can be analyses and reports but also concrete ideas that can be developed further in another Research Hatchery.

## **Instructions for presenting results**

### **Progress seminar**

Halfway throughout the Research Hatchery it might be a good idea to organise a seminar to report on the progress made so far in each ongoing project. In the seminar, each team is allocated some 10 minutes to present their, brief and their goal as well as the progress so far. It is good to reserve time for questions and comments. This is a good opportunity for the teams to receive feedback and ideas. The teams find out about the work of other teams and may even utilise their work in their own task. If there is only one Research Hatchery running it a seminar is not viable.

### **Final presentation**

The Research Hatchery finishes with a final session where the results are presented to the client. It is important to reserve time for discussion. The coach and the client should give feedback to the students.

## **Assessment**

Research Hatchery can be assessed as either pass/fail or with the grades used in an institution. In addition to the assessment by the coach, self-evaluation, peer-evaluation and the client's evaluation are used.

## Risks and challenges

In the following you can find a list of possible risks concerning the client, the coach and the student.

### Client:

- the brief is not suitable for the students
- the brief is unclear and the students do not understand what is expected of them
- the client is not committed to the project
- there are disambiguates in the agreement
- the client cannot be reached
- the client forgets that work is done by students and the main focus is on learning, sometimes by making mistakes



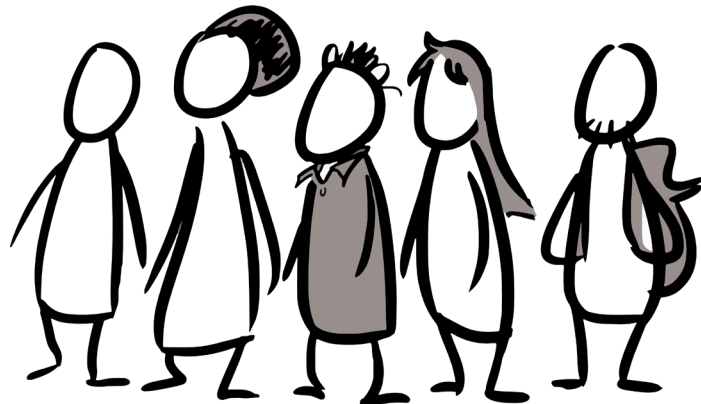
### Coach:

- no networks or contacts to get clients
- there are not enough students
- there are disambiguates in the agreement
- the team is not functioning, lack motivation or time



### Student:

- team building is unsuccessful
- the brief is unclear
- the experts do not answer emails or the phone, finding things out is difficult
- another team member does not act as agreed
- no proper feedback and so the team starts moving in a wrong direction
- the ownership of ideas is not clear



## Examples

### Turning a van into a home

The student team researched the possibility of converting a van into a dwelling. The students found out whether it is legal to use a vehicle as a home and what type of taxes are involved. Some of them drew plans on the necessary changes for the van. These were implemented at the end of the project. They wrote a report on what one needs to take into account when converting a van. The report is available for downloading.

### KIETOJ – the possibilities of the circular economy for Oili Jalonen Ltd

The company Oili Jalonen dismantles cars. The student team researched how the principles of circular economy could be applied in the activities of the company. The students found out how recycling of cars is organised in Finland and what changes were required in order for the materials of scrapped cars to be more efficiently re-used. During the project, the students visited various companies and interviewed experts. The results were a report and a video aimed at consumers on recycling cars.

# Tool Kit

Tool 1: Checklist and examples of timings for a coach

Tool 2: Agreement on a commission

Tool 3: Guidelines for students

Tool 4: Monitoring the project

Tool 5: Draft for a project plan

Tool 6: Project log and total worktime

Tool 7: Guidelines for the learning journal

Tool 8: Guidelines for the learning report

Tool 9: Guidelines for presentations

Tool 10: Innovation methods

Tool 11: Games for team building

Tool 12: Innovation competences

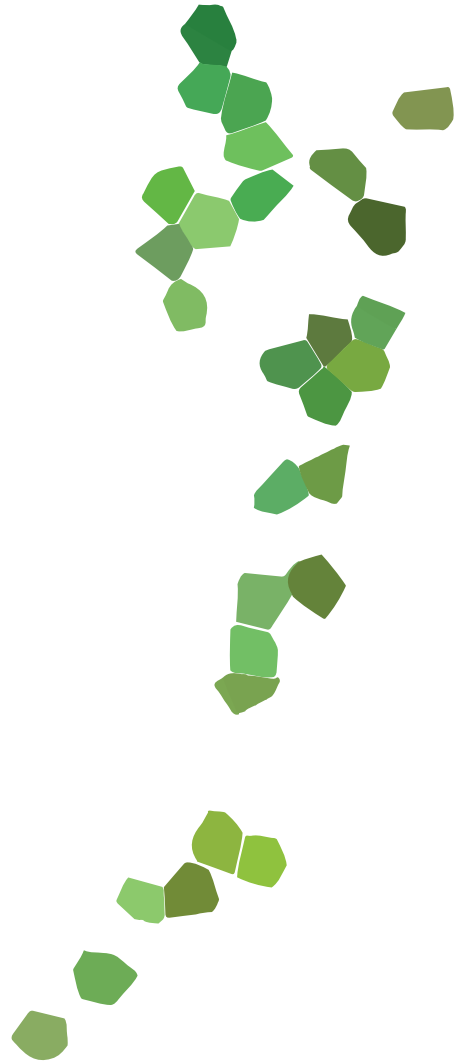
Tool 13: Joint assessment framework

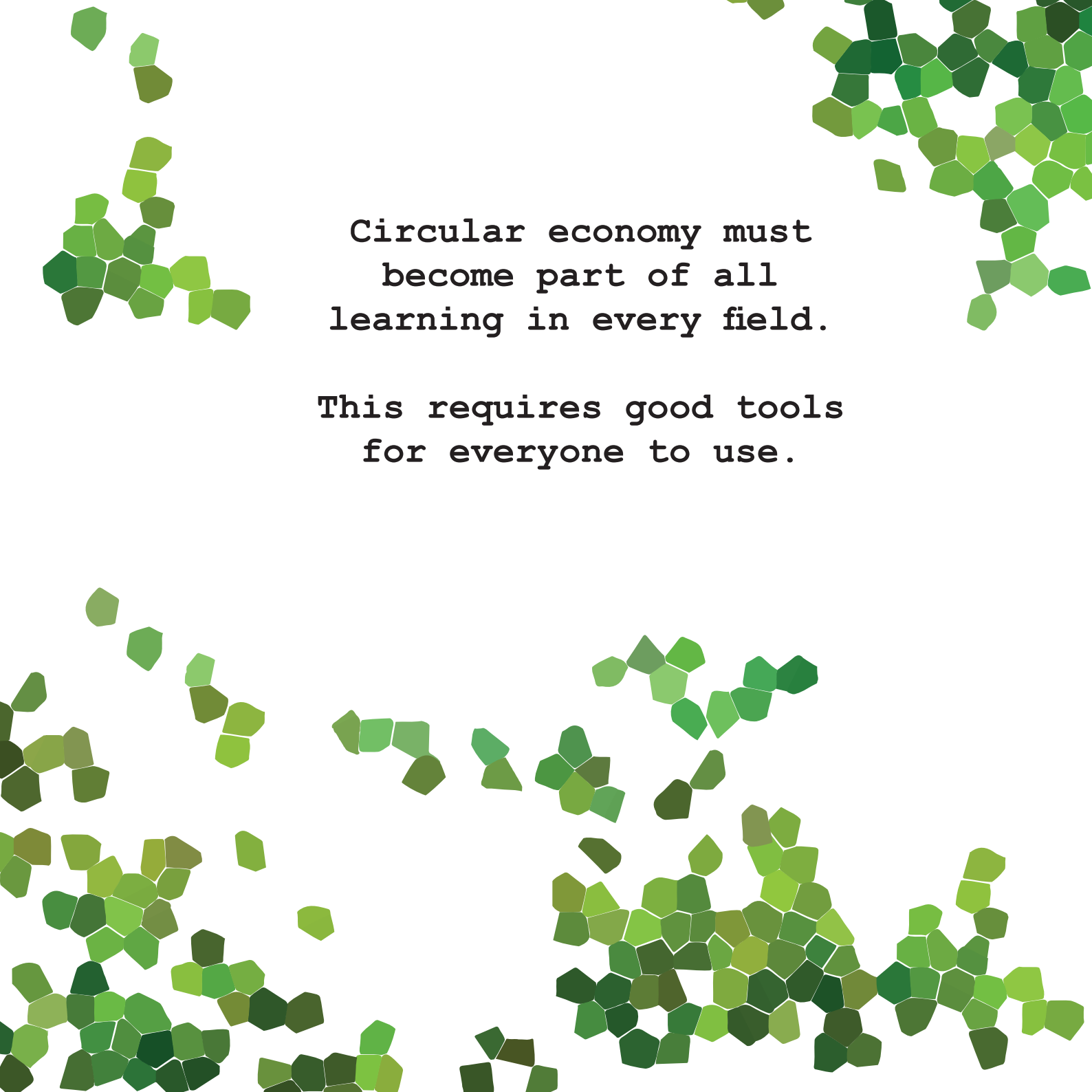
Tool 14: Feedback on a study module

Tool 15: The client's evaluation

Tool 16: Evaluation of the presentation

Tool 17: Evaluating an idea



The image features a white background with decorative green mosaic patterns in the corners. The top-left and bottom-left corners have smaller, more sparse clusters of green polygons. The top-right and bottom-right corners have larger, denser clusters of green polygons. The central text is arranged in two paragraphs.

Circular economy must  
become part of all  
learning in every field.

This requires good tools  
for everyone to use.