The Missing LINK

A PRACTICAL GUIDE FOR TEACHERS ON HOW TO TEACH BIOECONOMY

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EXECUTIVE SUMMARY

The overall aim of BioBeo is to develop and deploy an education programme that will enhance understanding and engagement across society regarding 'circularity' and the bioeconomy, using five bioeconomy themes – interconnectedness, outdoor learning, forestry, life below water, and the food loop. A sustainable network of interconnected European educators and stakeholders committed to promoting the bioeconomy concept through all channels will co-create and co-deliver the education programme. BioBeo will provide the means for better coordination between bio-science and education in schools by developing the Circular Economy Science-Society message. It will have a particular focus on circular lifestyle, circular behaviours, and a governance framework on society-wide engagement in bioeconomy policy. BioBeo shall take steps to address social issues such as gender bias, disadvantaged youth groups, migrants and members of society with additional needs. This guide serves as a missing link between the theory of bioeconomy education and the lesson plans created within the framework of the project. It focuses on the methodology of how interested teachers can set out and engage all school stakeholders (students, parents, colleagues, non-teaching staff, etc.) in teaching about the bioeconomy. It gives practical advice and provides hands-on tools that support the teachers in their everyday work (not just when teaching bioeconomy). It also includes several tools for self-reflection, self-evaluation and dissemination to enable sustainability.

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1. WHAT IS BIOECONOMY (EDUCATION)?

As defined in the European Commission's updated Bioeconomy Strategy of 2018, the bioeconomy covers "all sectors and systems that rely on biological resources (animals, plants, micro-organisms and derived biomass, including organic waste), their functions and principles. It includes and interlinks land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources; and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services."

A subset of the circular economy and closely linked to sustainable development, a bioeconomy aims to promote economic activities that can meet current needs without compromising the ability of future generations to meet their own needs.
The replacement of non-renewable fossil resources with renewable biological resources is the basic idea of the bioeconomy. The primary reasons to use more biological resources are:

- Fossil resources are finite, taking millions of years to form and are in limited supply. We need to have materials that can help sustain our economy sustainably. An economy based on biological resources can create economic value for the wellbeing of human society along with regenerating and expanding healthy ecosystems and biodiversity by balancing the use of natural resources to meet human needs without depleting them.

- Anthropogenic greenhouse gases emitted due to the combustion of fossil fuels are only partially "consumed" (sequestered) by plants during the next growing season, most of the emitted greenhouse gases remain in the atmosphere. These greenhouse gases remain in the atmosphere trapping heat, resulting in the anthropogenic climate change we're experiencing today.

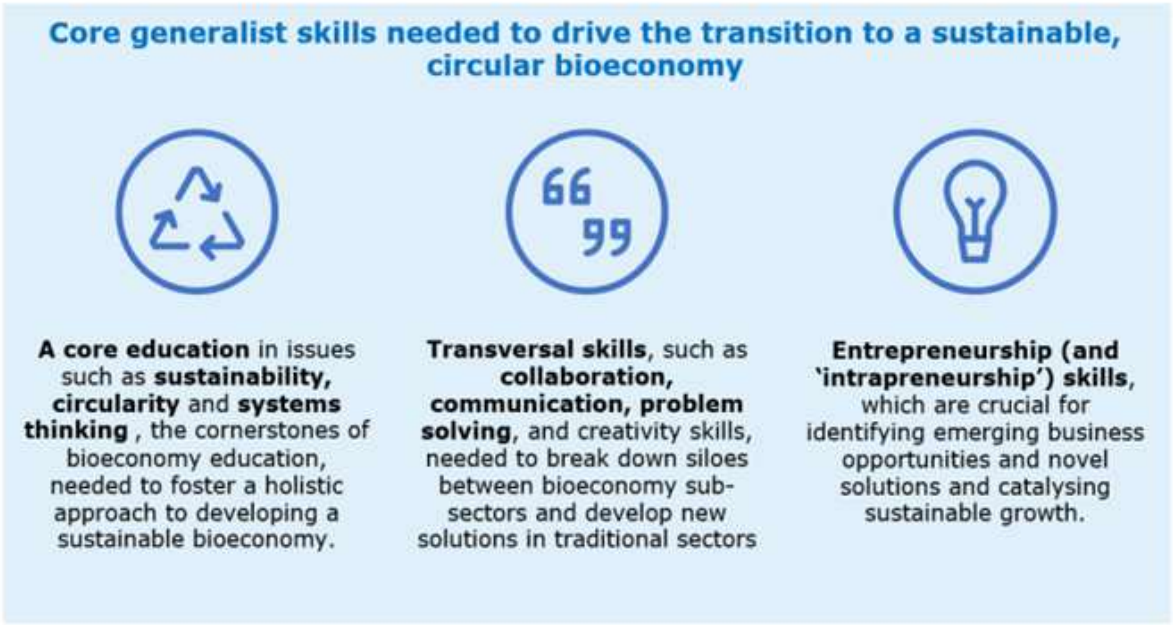
Within the context of the BioBeo project, bioeconomy is defined as a

"system-based approach in which fossil resources are to be replaced in a sustainable manner by renewable biological resources from terrestrial and marine ecosystems – such as forests, crops, animals, fish, microorganisms, organic waste, and agricultural side streams, to produce food, feed, fibres, energy, bio-based products, and services within a circular economy framework designed to optimise resource use based on a cascading hierarchy of utilisation options.
A sustainable and circular bioeconomy requires the application of education and training programs, scientific research, technology, and innovation with the aim of not only creating economic value but also regeneration and extension of ecosystems and biodiversity as well as improvement of health and well-being of the society. By addressing these systemic changes in the economy, the environment, and the society, the bioeconomy contributes to achieving a better and more sustainable future in which no one is left behind."

In this context, bioeconomy education can be understood as educational strategies and tools used by educators to engage learners with the knowledge and skills relevant to furthering the bioeconomy.

2. WHY INTRODUCING BIOECONOMY TOPICS INTO YOUR TEACHING PRACTICE AND CURRICULA?

In a policy brief from the European Commission on promoting education, training and skills across the bioeconomy, the following core generalist skills were identified as critical for supporing the bioconomy.



Many of the above skills have also been included in other educational frameworks such as 21st Century Skills and the European sustainability competence framework (GreenComp).

Supporting children and young people in developing these skills is critical for ensuring that they are able to actively participate in society.

3. HOW TO INTRODUCE BIOCEONOMY IN YOUR TEACHING PRACTICE ACROSS LEARNING AREAS

The aim of this guide is to help you integrate the concept and aspects of the bioeconomy in your teaching practice. You do not need to be an expert in the bioeconomy or have experience teaching biology or economics. Rather, the first step is to recognize that the bioeconomy already exists around us and so we simply need to learn how to recognize it.

When thinking about delivering a lesson or activity, consider the following guiding questions:

1. Are there any elements of the lesson (either required materials or concepts) that are related to renewable resources?
2. If yes, can any of those elements be connected with the events, policies, trends, industries, etc. in the local, regional, national, or global economy?

In the following chapters, we will provide an introduction to how the bioeconomy may appear across different learning areas, how to introduce a new concept such as bioeconomy to the school community, ensuring buy-in from the school administration and engagement from parents and guardians. This guide also offers checklists that help you plan and prepare the necessary resources and materials for successfully delivering a bioeconomy lesson with high levels of child participation. Lastly, we provide lesson plans related to the bioeconomy and recommendations on how to continuously embed the topic of bioeconomy in your teaching practice.

4. LEARNING AREAS

Below you will find a list of learning areas that are traditionally part of the school curricula. When introducing a new topic, it is essential to think through how you can integrate it in the already existing curricula as this will make advocating for the new topic much easier – essentially, you can prove that it is not new at all, just a new perspective!
We provide some tips for activities that are within the purview of the given learning area and can be connected to bioeconomy.

4.1 COMMUNICATION AND LANGUAGE

Any lesson plan that is aiming at improving communication and/or language skills can include elements of bioeconomy. In mother tongue education you can use bioeconomy terms in your usual grammar-related activities, introduce literary texts that can serve as a basis for example to explore bioeconomy-related lifestyles from earlier times or our current period, and naturally, in foreign language classes the opportunities are endless if you spark the interest of your students towards bioeconomy – while learning vocabulary they can also learn about bioeconomy.

For younger learners:

- Create memory cards of the most important terms of bioeconomy and their child-friendly definition or an image and the term. Play the memory game. This can also be done in the foreign language they are studying.

For teenage learners:

- Organise a debate: students have to list the pros and cons of introducing a chosen practice of bioeconomy and argue in pairs.
- Ask your students to translate the SDG goals into the foreign language they are studying and then compare their translations with the official one.

4.2 PERSONAL, SOCIAL, AND EMOTIONAL DEVELOPMENT

Social-emotional learning is becoming more and more important in all aspects of schooling. In the European context, two, somewhat overlapping frameworks have been developed that may inspire you: the LifeComp on personal, social and learning-to-learn competences, and the GreenComp on sustainability and environmental competences. Using the frameworks, you can plan your classroom activities to consciously focus on the competence areas included in them, focusing on bioeconomy.

- Role play: write character cards for the citizens of a small town (e.g. mayor, notary, doctor, teacher, shopkeeper, butcher, builder, etc.) and distribute these randomly. Ask the students to consider how their daily life is affected by climate change and other environmental problems and how introducing the practice of bioeconomy would change that. Have them play out a town meeting in their roles.

4.3 PHYSICAL DEVELOPMENT

Health and well-being are areas that receive more and more attention in schools. Use opportunities in physical education, biology and other lessons for your students to experience and also learn about the link between their physical development, health and well-being, and bioeconomy.

- Play the game Letter statues. The students dance to lively music. When the music stops, the facilitator shouts out a letter of the alphabet. Students must immediately form a statue of a word that starts with that letter and that they can connect to bioeconomy. The facilitator walks around asking for the words and checking if the students can explain how they are connected to bioeconomy. If two Ps have the same word, they drop out of the game.

4.4 READING LITERACY

Reading and literature lessons provide a great opportunity to read about simpler lifestyles, to discuss the positive and negative elements of life in previous periods based on literary exploration, and also to produce literary texts on bioeconomy topics. From folk and fairy tales to classical literature, you can use various resources. Using tales or storytelling methods also provide an opportunity for students to imagine bioeconomy-related scenarios, and to identify how seemingly necessary supernatural intervention (e.g of the Fairy Godmother) can be replaced by human activity.

- Have students work in groups. Hand out the basic terms of bioeconomy with their explanations (one term for each group) and ask students to rewrite it so that a kindergartener can understand it. They can also create illustrations or infographics.

4.5 DIGITAL LITERACY

Digital literacy has been identified as a basic transversal competence package addressed in all schools in Europe. Digital and physical realities are a continuum for the students of today. When introducing bioeconomy education, two aspects of digital literacy are important to address. On the one hand, digital technology has multiple uses that support bioeconomy projects to be successful from using digital tools to monitor activities to utilising social media for promoting a project and influencing behaviour. This requires a high level of competence in all fields of digital literacy as identified in the DigComp of the EU. At the same time, bioeconomy education also offers the possibility for acquiring knowledge about the substantial carbon footprint digital technology use causes and teach students to also consider this when planning their actions.

- Ask students to investigate the carbon footprint of their digital practices as well as how it grows with using technology more or using AI
- Ask students to phrase questions about the bioeconomy and check what answers ChatGPT gives.
- Ask students to create a social media page on a chosen platform about the bioeconomy.

4.6 FINANCIAL LITERACY

Understanding personal finances as well as the basics of how trade and state budgets work have been identified as basic skills, equal in importance to reading and writing literacy, that all students should have by the end of their formal education. In many school systems, it is still a neglected area. Sustainable financial literacy goes beyond these traditional elements and requires people to also identify the sustainable or non-sustainable nature of financial transactions, sustainable budgeting, sustainable investment, and sustainable borrowing. Since projects require budgeting in all cases, bioeconomy education is perfect for developing these basic skills and competences.

- Engage families in evaluating their financial practices, and measure their sustainability
- Engage with local businesses and NGOs and make it a project for your students to explore how they are implementing sustainable financial practices
- Encourage sustainable budget planning for local bioeconomy projects
- Plan sustainable action for raising funds and investing their income
- Ask students to calculate the extra expense (if any) of buying sustainably grown vegetables, fruits etc. in an average food shopping.
- Ask students to list the financial costs of climate change (if any) an individual might have to face in their own area.
- Ask students to role play being the Minister of Finance in their country. What would they spend more/less money on and why? Let them debate.

4.7 MATHEMATICS

Mathematics lessons provide the perfect opportunity to focus on the economy element of bioeconomy. Collecting facts and figures and using them for making their own calculations of costs and benefits, estimating probabilities, exploring potentially necessary financing provisions also support students to focus on the practical elements of introducing such activities, and to link sometimes rosy plans to realities.

- Have students calculate their ecological footstep/average food kms/ how many kms the objects in their bag travelled to them.

4.8 UNDERSTANDING THE WORLD

Children are generally curious to explore and understand the world around them. Before entering formal education, their curiosity supports them to learn very fast. In the school environment, this curiosity is often curbed. Give your students opportunities to explore any topic they are interested in, celebrate their out-of-school learning, and create opportunities to share these in front of their peers.

- Play the game Web of Life with the students to make them understand that everything is connected to everything else.

4.9 EXPRESSIVE ARTS AND DESIGNS

Arts are a perfect vehicle for supporting students in understanding their own attitudes and feelings about a topic, and bioeconomy is no exception. Make sure to provide students with opportunities to choose the art form they feel most comfortable about so that they can focus on their message rather than struggle with the technical aspects. Some collaborative art forms (e.g. performing arts, creating audio or video content) offer students to find the roles that fit them best and allow them to explore the diversity of their talents. Analysing works of art from previous centuries can also support this.

For younger learners:

- Explain to students what upcycling is. Have them gather materials from their home garbage for a week and then organise an arts and crafts workshop where they can swap materials and create beautiful artworks.

For teenage learners:

- Have students work in groups and create a poster/video clip advocating for the bioeconomy.

Ask students to take photos of sights in their neighbourhood they think could be improved through introducing the practice of bioeconomy. Organise a photo exhibition of their works

5. DEFINING YOUR STUDENT'S LEARNING OBJECTIVES

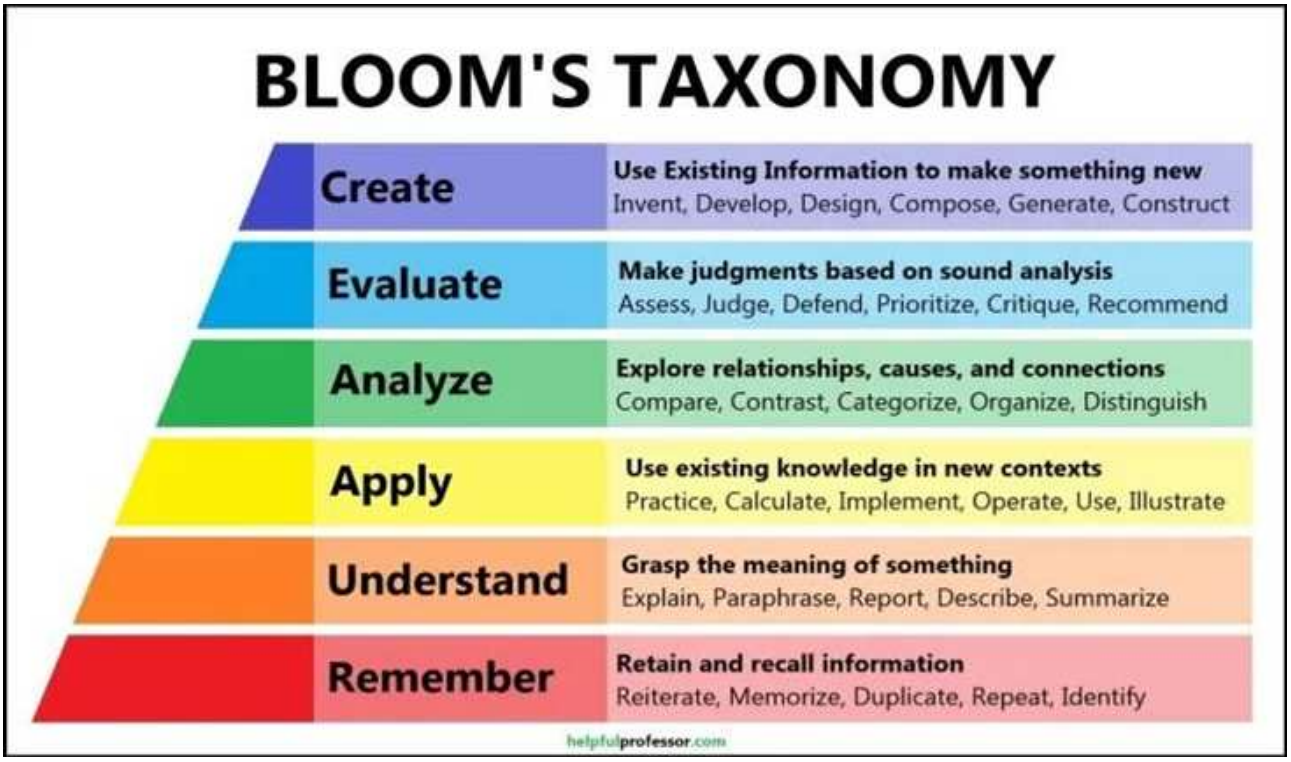
A new topic that is not included in traditional or compulsory curriculum offers the opportunity to define learning objectives together. By engaging your students, their parents and your co-workers (not only fellow teachers, but also other school staff) in designing what you want to learn and what results you want to see, they will feel they own the learning process and will be more engaged in related activities.
When you design the learning objectives, explore what the different participants already know. Some things will be known by all, others by only some. It helps you to define what the majority will need to learn (about), but also who the educators will be. Using this approach, you will realise that learning about bioeconomy topics is a really collaborative effort. In some cases, your students, their parents or a technician will be the educator, and you, the teacher will also be a learner.

Learning objective and learning outcome: the learning objective establishes the expectation of what the learning outcome will be.

Two tips to write your students' learning objectives:

- be **specific**, identifying exactly what your students should be able to do to meet the objective
- it should be **measurable** or **performance-based**, so that someone other than your students can identify whether the objective has been achieved.

Try to avoid verbs like *understand* or *know* when writing cognitive learning objectives because they describe outcomes that are neither specific nor measurable.



More verbs for writing learning objectives using Bloom's (revised) taxonomy:

Cognitive process dimension	**Verbs for writing learning objectives**	
1	Remember	arrange, define, duplicate, label, list, memorise, name, order, recall, recognise, relate, repeat, reproduce, state
2	Understand	classify, describe, discuss, explain, express, identify, indicate, locate, recognise, report, restate, review, select, translate
3	Apply	apply, choose, demonstrate, dramatise, employ, illustrate, interpret, operate, practise, schedule, sketch, solve, use
4	Analyse	analyse, appraise, calculate, categorise, compare, contrast, criticise, differentiate, discriminate, distinguish, examine, test

Cognitive process dimension	Verbs for writing learning objectives	
5	Evaluate	appraise, argue, assess, choose, compare, defend, estimate, evaluate, justify, judge, predict, prioritise, rate, select, support
6	Create	arrange, assemble, collect, compose, construct, create, design, develop, formulate, manage, organise, plan, prepare, propose, set up

6. DEFINING YOUR OWN LOCAL LEARNING OBJECTIVES

It is important to identify what kind of professional development you expect from introducing bioeconomy topics into your curricula/ teaching practice. Think about the subject(s) you teach, your own interests, your students, and the local environment. Set a time limit for yourself: it might be the school year, six or three months.

The domains of learning can be categorised as affective (attitude), psychomotor (skills), and cognitive (knowledge). An easy way to remember this is with the acronym ASK:

Attitude	Changes how a learner chooses to act.
Skills	This domain focuses on changing or improving the tasks a learner can perform.
Knowledge	This domain focuses on increasing what participants know.

Identify at least one **specific**, **measurable** objective for yourself in all three domains

Attitude: how exactly will your attitude change?	
Skills: What new skills will you learn?	
Knowledge: What new knowledge will you have?	

7. EXPLORING RESOURCES

To include bioeconomy in your education activities, you need to identify what resources will be necessary for successful implementation. You need to have time and space in an already packed school year to implement your activities. You will need to identify what human resources are available – in yourself, your colleagues, your students, their parents, in experts and at institutions that you have access to. In the checklist below, you will find some very basic questions to help you start this process.

This Participatory Asset Mapping Toolkit may offer you some ideas and guidance

7.1 MAPPING PHYSICAL RESOURCES

Bioeconomy education should not be theoretical. However, if you want to make things happen, if you want to create pilot projects, test ideas and allow your students to observe bioeconomy in action, you will need physical resources beyond the traditional ones you have in the classroom or school.

You have two options when you map the physical resources necessary:

- You can map what is already available and plan your activities accordingly. It may sound very restrictive, and it indeed is if you only consider resources available at school. But once you broaden your scope, you will see that local communities, local businesses and local landscapes already offer a lot.
- You can also aim for more and identify the resources that are

necessary for your activities in general. Once you have a full "shopping list", you can check what is already available and figure out what is still to be obtained and how. Be careful with the mapping and avoid the "bad recipe description" trap. When you cook, and you only have the edible ingredients listed, you may realise during the cooking process that you lack certain utensils, like a big-enough pot. Make sure to think about all physical assets you need.

7.2 MAPPING THE WHOLE SCHOOL APPROACH

Bioeconomy activities are always community-based, so you will need to map the necessary human resources having this in mind. It is a well-known saying that it takes a village to raise a child. Similarly, it takes a village to provide successful bioeconomy education, and it nearly always takes the form of mutual learning.
It is also a fact that children's learning is far from being confined to school. Actually, research has confirmed multiple times that children learn much more outside of the classroom than in class, and that they learn from a lot of people around them. The whole school approach that we recommend you to implement considers the leading role of the teacher, the education professional in coordinating the support students get for their learning, but also acknowledges that the teacher is a co-educator, one of many, who is also a learner.

However, there are some aspects to consider as they may lead to challenges in implementing sustainable bioeconomy education activities:

1. As a teacher, do you belong to the community that is around your students? If you are an "outsider", how can you become part of the community? Who are the key players who can help you enter?
2. Do local community members share your values, your view of

the world? Do they think things that are important for you are really important? Do you understand their values, priorities, challenges?

3. Imagine that you start the necessary collaboration successfully. How do you want to prevent actors dropping out, becoming disengaged, and thus endangering the sustainability of your actions?

4. How do you plan to include digital realities in your activities? Are you familiar with the competence levels of the different actors (including yourself), their access to technology and data, and their attitudes towards technology (including your own)? Do you know who the actors that can and need to be engaged to support this are?

8. IDENTIFYING BARRIERS (LEGISLATIVE, NATIONAL, LOCAL)

- School is a very slow-changing organisation, and very often change is also made difficult by existing legislation as well as internal or external expectations.
- Sometimes these barriers are real, sometimes they are imagined or established through regular practice assumed to be an obligation.
- For introducing something new like bioeconomy topics in school, you need to become familiar with real barriers to be able to overcome them, but also need to understand which are the barriers that are internal to you as a person or your school as a teaching team.
- Once you identify these barriers, you can create strategies on removing or bypassing them.
- In a growing number of countries, it is becoming more and more difficult to invite anybody not employed by the school to join school activities. In such cases, you can plan your activities outside of school, outside of school hours, and if necessary you can also invite a parent or non-formal educator to host the activity instead of school.
- In some countries, curricula are very full and relatively rigid. You can still explore how you can exercise your pedagogical freedom that is a basic teacher's right to include the topics you want.
- In some countries, students are restricted in their movements during school hours. In most cases there is no legal basis for this, but it is a tradition.
- For these and other barriers to be identified, you will need to make yourself familiar with relevant legislation. And as a teacher, you may find this task intimidating, but with the whole school approach in mind, you can find the right supporter or educator (probably a parent with a legal background) in the community.

9. PLANNING

Planning your activities thoroughly is important, especially when you are exploring new turf like bioeconomy. You need to know what you want to do, why and how, but also identify what you consider success to be able to evaluate and adjust your plans. As with all other elements of a bioeconomy education activity, this is best done together. Below, we offer you a framework for your planning, but before you start, there are some elements to consider.

When planning the project, you have to consider:

- `physical disabilities`, e.g. can your wheelchair user student enter the premises where you will have the project?
- `mental disabilities`, e.g. does your autistic student have a talent that could be useful in the project?
- `gender-related issues`, e.g. does the school community accept if girls play male roles?
- `age-related issues,` e.g. do the older students accept the opinion of the younger students?
- `national minorities`, e.g. does the project include any historical or cultural references that might be derogatory for your national minority student?
- `religious issues`, e.g. does the project timetable take into consideration the religious holidays of all the students?

In each of these examples, if the answer is not a definitive "YES" you have to think about possible solutions. It is unacceptable to shrug one's shoulder and make compromises. Naturally, if any of the above examples do not apply, e.g. because you do not have physically disabled students, you can skip considering those issues. However, you still have to be aware of these questions, because e.g. an under/ overweight student or one wearing glasses might feel just as incapable of participation as a wheelchair user.

It might take more effort, time and dedication to find a real role for all the students who wish to participate, but eventually it will be much more useful for everybody. At the same time, do not force any student to participate, but make sure that those who are reluctant know that they have a wide range of possible roles. Play cooperative games with them, note their strengths and make suggestions regarding their possible tasks. If you feel that the student would be willing to participate, but their family does not support it (e.g. they feel that it takes too much time and would hinder their academic progress), consider inviting the family to take part in the planning.

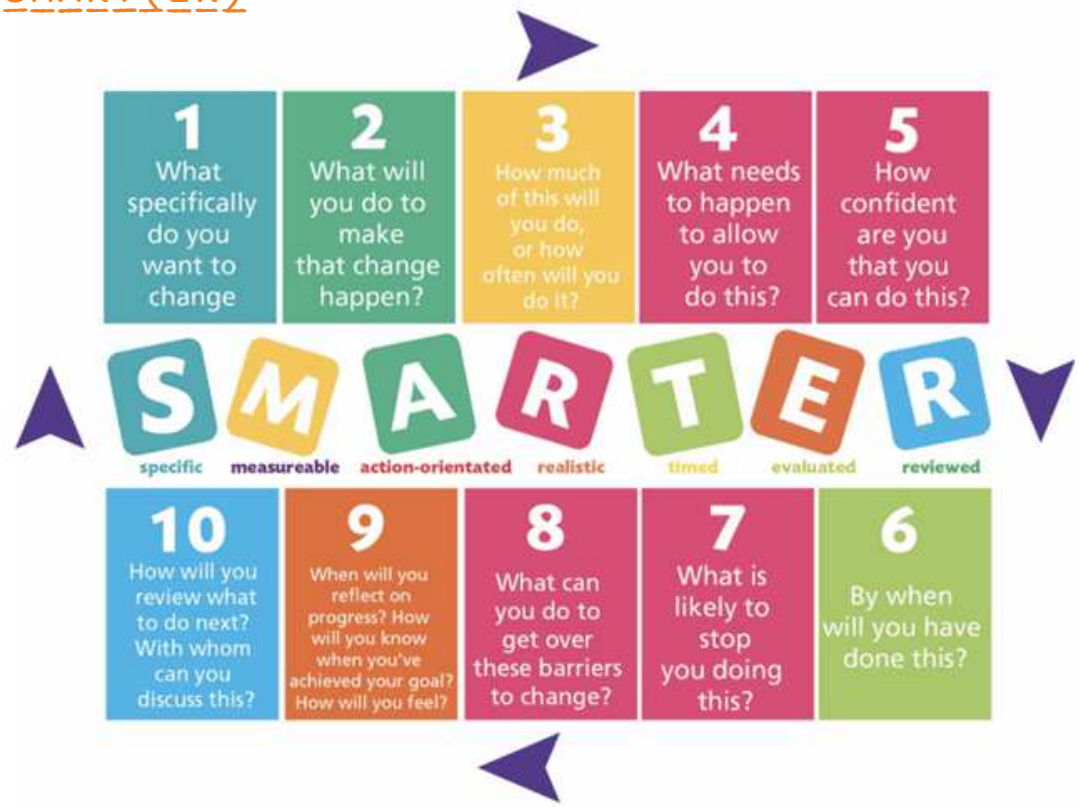
When looking for a solution, it is best to involve the student(s) and their families and ask for their opinion and advice. By acknowledging awareness of the issue you have taken the first important step towards inclusion and show that you, your school and the project consider inclusion an essential starting point.

9.1 MAPPING THE WHOLE SCHOOL APPROACH

ASK YOURSELF THESE QUESTIONS WHEN PLANNING AN ACTIVITY/PROJECT	YES	NO	NOT SURE, MUST CHECK
Create a to-do list based on your notes.			
Do I have enough space?			
Do I have enough time?			
Do I have the necessary materials/equipment?			
Can I integrate it in the curriculum?			
Can I include all my students? (Think about physical, mental, financial issues, gender, age, nationality and religion)			
Can I create alternative ways of participation if necessary?			
Do I have to ask permission from administration/parents to do this activity?			
Do I have to ask for support (from colleagues, parents, administration)?			
Do I know how I will include the students in the planning?			
Do I know how I will engage the parents into this activity/project so that they will support it and learning?			
Do I know how I will include the local community?			
Do all the people I wish to cooperate with share my values regarding this project?			
Do I know how I will prevent actors dropping out or becoming disengaged?			
Do I know how to include to include digital realities in the activities?			
Do I know how to make our work sustainable?			

There are plenty of good ways to develop a strategy, when defining goals. A helpful method can be the SMART method, and its further developed version "SMARTER":

9.2 SMART(ER)



How to use the SMARTER goal setting template?

Step 1. Specific

Try to define the goal as specifically as possible: what is it that you are trying to achieve? The diagnosis step can help you identify the issues and now it is time to declare what exactly the goal you are aiming for is.

Step 2. Meaningful

Your goals need to be meaningful to you and your school community. Use the input from your school community to define why you want to achieve these goals. Having a meaning attached to goals will help you keep your motivation.

Step 3. Achievable

While dreaming big is necessary, you will only be able to reach realistic goals. It does not mean that you cannot aim high but consider the obstacles and opportunities carefully. It is better to set smaller, short-term goals as milestones to help you achieve a long-term goal. This way you can keep track of progress.

Step 4. Relevant

The goals that you set need to be relevant for your school community. You might need to prioritise as there are often many challenges. What is it that really concerns the school stakeholders?

Step 5. Time-Bound

Strongly relating to the third step, when setting goals, you want to include a deadline to accomplish these goals. Set realistic expectations, but then stick to the deadline.

Step 6. Evaluate

It is essential to evaluate whether the goals are being achieved. At a later stage of this guide you will find some support on how that evaluation can be done in an effective and inclusive way.

Step 7. Readjust

Innovation and change is always a circle, After the evaluation step, you will see what were the changes achieved, what were the challenges that maybe prevented your school community to fully reach the targets set, or how new targets can be made. Just like in every other step, it is crucial that all school stakeholders are involved in making the plans, and often you might also need to bring in some external professionals who can provide their expertise on specific topics. The community of parents

can be especially valuable to think about not only as guardians of their children, but as professionals in their own field.

10. MAKING DECISIONS TOGETHER- CHILD PARTICIPATION AND PARENT/FAMILY ENGAGEMENT

10.1 WHY IS CHILD PARTICIPATION IMPORTANT?

In all modern education movements, the voice of the learners is crucial. It is even more crucial to listen to their concerns, ideas and needs in the case of programmes that are embedded in real life and local communities.

According to the UN Convention on the Rights of the Child (UNCRC) children have a basic right to the education that is best for them, and they also have a basic right to express their opinion and for this opinion to be heard on all topics that have an impact on their rights (United Nations, 2010). A closely related right is to have access to all information they need to form their opinion. The Convention acknowledges age differences, and subsequently there is an obligation to scaffold these rights with methods that consider the evolving capacities of children. This creates the basis, the legal obligation for facilitating the participation of children in decision-making in education using age-appropriate methods.

In BioBeo we are pursuing the approach urged by both child rights activists and innovative educators: "Nothing about them without them." We consider it obvious that in early years, as well as from a certain age onwards, children can choose what they are interested in and want to learn more about. However, there are the in-between years that coincide with compulsory education when there is no or very little room for these

individual interests. This education programme offers to open the door to them and targets students who are interested – or whose interest can be developed and nurtured – in any of the five BioBeo core themes.

10.2 CHALLENGES OF CHILD PARTICIPATION

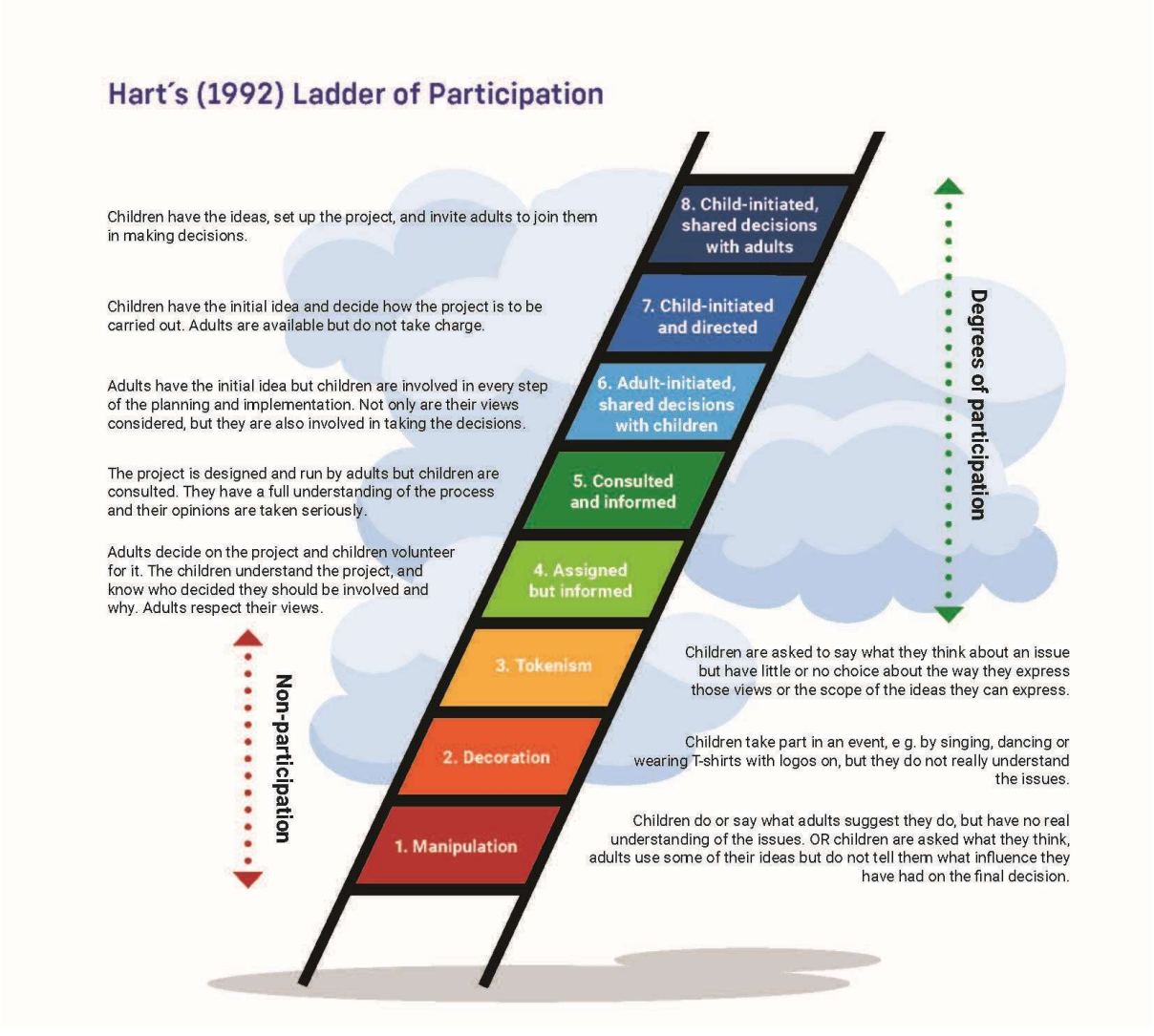
According to research carried out in 2015 and refreshed in 2019[1] in over 20 European countries, students clearly wish to be part of decision-making in all aspects of education, but in most countries, there are no mechanisms for that for primary school students at all, usually only school level mechanisms for secondary school students, and nothing at municipal, regional or national level. Student representation is sporadic in decision-making bodies such as school boards, and even if there are student representatives, their participation is often formal as no age-appropriate methods are used to elicit their real voice.
There are three main arguments that are regularly used to counter child participation and especially the participation of younger children.

1. They are too young to have an opinion.
2. They are not experienced enough to form a relevant opinion.
3. They are not able to participate in the discussions of adults.

We tend to assume far lower ability levels in children than they actually have . Our knowledge of child development shows this very clearly, but we also know it from experience. While parents are accompanying children to school for a longer and longer time, and schools are afraid to or forbidden to just let children go home at the end of the day, children who are members of these organisations build their own campfires and prepare their food over it in summer camps.

10.3 CHALLENGES OF CHILD PARTICIPATION

The Ladder of Child Participation is a useful tool to check if activities that are considered child participation activities are really participatory or not.



In the above infographic the participatory and non-participatory methods are illustrated by an example each. The following examples of participation by age group will help professionals understand how the level of children's participation can be increased in a school and will give teaching professionals and school leaders pointers for designing their bioeconomy programmes. The non-participatory levels are not included.

Level of children's agency	Preschool	6–10 years old	11–14 years old	14–18 years old
Assigned but informed Adults decide on the project and children volunteer for it. The children understand the project and know who decided they should be involved and why. Adults respect their views.	- The rules of the playground. The teacher wants the children to learn the rules of the new playground that was built during the summer. Children are asked to test the equipment they like (monkey bars, slide, swing, sandbox, etc.) one by one and the teacher explains the rules. Children have the opportunity to ask questions.	- The school grounds. The teachers create an environmental education project in which children can volunteer for various tasks to make the school grounds greener.	- The school canteen. The school head decides to reform the school canteen. Children are organised to conduct a survey created by the school head asking students about their preferences and the result of the survey is taken into consideration when the school head takes the necessary steps of reform.	- The field trip. The teacher decides to take the class on a field trip to a museum that has a collection that is relevant for their subject. The teacher offers topics and children can volunteer to create short presentations during the field trip on various artifacts to explain their relevance. The teacher organises the trip giving small tasks to volunteers.

Consulted and informed The project is designed and run by adults, but children are consulted. They have a full understanding of the process, and their opinions are taken seriously.	- The rules of the playground. The teacher wants the children to learn the rules of the new playground that was built during the summer. Children are asked to test the equipment they like (monkey bars, slide, swing, sandbox, etc.) one by one and give feedback on what they think could be dangerous. Together they discuss how best to avoid these dangers and what rules they need to agree on to use the playground safely.	The school grounds. The teachers create an environmental education project to make the school grounds greener. Volunteer children form groups, and they have the opportunity to suggest ideas for various parts of the project which are taken into consideration.	- The school canteen. The school head decides to reform the school canteen. Children are invited to contribute to the creation of a survey about their preferences which is then conducted in the school and the result of the survey is taken into consideration when the school head takes the necessary steps of reform.	- The field trip. The teacher decides to take the class on a field trip to a museum that has a collection that is relevant for their subject. Children can propose topics and create short presentations during the field trip on various artifacts to explain their relevance. These presentations form a significant part of the school test they write later. Having consulted with the children, the teacher organises the trip and small tasks are managed by volunteers.

Adult-initiated, shared decisions with children Adults have the initial idea, but children are involved in every step of the planning and implementation. Not only are their views considered, but they are also involved in taking the decisions.	- The rules of the playground. Before the new playground is built, the children are asked about their favourite equipment, and their answers are taken into consideration. When the playground is ready, children are asked to test the equipment, and they give feedback on what they think could be dangerous. Based on their feedback, minor adjustments can be done to make it safer/more fun. Together they discuss what rules they need to agree on to use the playground safely.	- The school grounds. The teachers create an environmental education project to make the school grounds greener. Volunteer children are put in groups and are consulted on all the important aspects of the project: the needs assessment, the planning, distributing the resources and the tasks.	- The school canteen. The school head decides to reform the school canteen. Children are invited to contribute to the creation of a survey about their preferences which is then conducted in the school. The result of the survey is taken into consideration, and the school head organizes a "tasting event" where children have the opportunity to try meals and give feedback. Their feedback is an important element when the school head takes the necessary steps of reform.	- The field trip. The teacher offers the opportunity of a field trip that is relevant for their subject. Children research the possibilities and make suggestions on the destination. Together they decide which is the best solution. Children can propose topics and create short presentations during the field trip. They give feedback on the presentations and together they decide which of the presentations should be included in the school test they write later. Following a discussion, the teacher and the children agree to distribute organizational tasks.

Child-initiated and directed Children have the initial idea and decide how the project is to be carried out. Adults are available but do not take charge.	- The rules of the playground. Before the new playground is built, the children are consulted about their preferences. They can have a test run, give feedback and then there are adjustments to make it safer/ more fun. Children suggest putting up warning signs. They discuss what signs are necessary and draw them together.	- The school grounds. Children propose an environmental education project to make the school grounds greener. They form task forces, distribute the tasks and decide on all the important aspects of the project.	- The school canteen. The children decide to reform the school canteen. They create a survey about their preferences which they then conduct in the school. Based on the results of the survey they organise a "tasting event" where they have the opportunity to try meals and give feedback. Based on the feedback, the children make suggestions on how to reform the school canteen. The school head accepts their research-based decisions and takes the necessary steps.	- The field trip. Children suggest the opportunity of a field trip that is relevant for their subject. They research the possibilities and make suggestions on the destination. They decide which is the best solution, propose topics and create short presentations during the field trip. They give feedback on the presentations, and they decide which of the presentations should be included in the school test they write later. Children organise the trip and inform the teacher.

Child-initiated, shared decisions with adults Children have the ideas, set up the project, and invite adults to join them in making decisions.	- The rules of the playground. Before the new playground is built, the children are consulted about their preferences. They can have a test run, give feedback and then there are adjustments to make it safer/ more fun. Children suggest putting up warning signs. They invite the teacher to comment on what the possible dangers are. Together they discuss what signs are necessary, where to place them and how best to draw them.	- The school grounds. Children propose an environmental education project to make the school grounds greener. They form task forces and invite teachers or external experts to contribute ideas. Based on the ideas and information they gathered; they distribute the tasks and decide on all the important aspects of the project.	- The school canteen. The children decide to reform the school canteen. They invite teachers and parents to contribute to a survey about their preferences which they then conduct in the school. Based on the results of the survey they organize a "tasting event" where children and adults have the opportunity to try meals and give feedback. the children make suggestions on how to reform the school canteen. The school head accepts their research-based decisions and takes the necessary steps.	- The field trip. Children suggest the opportunity of a field trip that is relevant for their subject. They research the possibilities and make suggestions on the destination. They invite their teachers, present their ideas and listen to their feedback. Based on their feedback they decide which is the best solution, propose topics and create short presentations during the field trip. They give feedback on the presentations and also ask the teacher to comment. Together they decide which of the presentations should be included in the school test they write later. Children make plans on organizing the trip, ask for the teacher's comments, make decisions and inform the teacher.

[1] (Salamon-Haider 2015., 2019.)
[2] Kunt, G. (2022) The Children's Republic of Gaudiopolis The History and Memory of a Children's Home for Holocaust and War Orphans (1945–1950). CEU Press, Budapest, New York
[3] Smit, F., (2015). Variatie in schooltijd en onderwijskwaliteit. Radboud University, Nijmegen
[4] Moffet, C. (2021). The Play of Art: Propensity and Pedagogy in Contemporary Chinese Early Childhood Education. Studies in Art Education, 62:3, 222-235

10.4 CHILD PARTICIPATION LIST

ASK YOURSELF THESE QUESTIONS WHEN PLANNING/ IMPLEMENTING AN ACTIVITY/PROJECT	YES	NO	NOT SURE, MUST CHECK
Create a to-do list based on your notes.			
Do I know the participating children enough to map their abilities?			
Have I consulted the participating children regarding their ideas and the roles they wish to take when planning the activity/project?			
Have I encouraged the participating children to initiate similar/ further activities/projects?			
Have I supported the participating children to initiate similar/ further activities/projects?			
Have I scaffolded the decision-making process of the participating children by allowing them enough time and safe space, teaching them the knowhow and taking their decisions seriously?			
Have I celebrated the individual and common success of all my students?			

10.5 THE NECESSITY OF PARENTAL ENGAGEMENT

One of the core elements of the BioBeo education programme is that it builds on collaboration with local communities. This is in line with the nature of a circular bioeconomy. Thus, it is natural that when introducing the programme at school level, you start with the immediate community of your students: their parents[1] and family.

It is important to note that parents want the best for their children, even if their idea of what is best is not in line with your position. Some parents need more help from trusted professionals to deliver on this wish. To be able to support them, the first step is to **build trust**. It is important to be aware that for some parents a teacher might be a figure of authority or someone they are afraid of, possibly based on their own schooling experiences[i].
Parents are the first and most important **equal partners** for school professionals in educating a child. When building a partnership, the following basic principles are to be applied[ii].
Firstly, we must focus on the legal responsibility. All countries of Europe (and also of the world apart from the USA) have ratified the UN Convention on the Rights of the Child. As a result, regardless of what other legislation, e.g. education acts state, parents have the responsibility for the education of their children, and **schools are primarily accountable to them**. Therefore, introducing something new in the curriculum or education programme of the school needs

1 Parents play a special role in the lives of their children. When we refer to parents in this document, we mean any person who has the legal responsibility for a child, be it a biological or adoptive parent or a guardian. However, parenting a child usually does not solely lie with the legally responsible "parent". Spouses of parents with no legal role, older siblings, grandparents and other family members, even au pairs or neighbours nearly always play a co-parenting role and co-educate children. For this reason, we consider parents and the broader family with a co-parenting, co-educator role when parental engagement is discussed

their acknowledgement, in an ideal case approval. Parents have the right to take part in decisions that affect their children, and introducing new content is definitely such a case. It is essential that parents are invited to the conversation.

Furthermore, there are important, **pedagogical and psychological reasons** why it is important to highlight the importance of parental engagement. Parents are the primary educators of their children. This not only means that they are the first during the course of life, but also that they have a major impact on the learning of their children. We know from research that parents have the **largest impact on a child's attitude to learning** (and school) up to age 11–12[iii]. This role is taken over by the peer group in teenage years, but parents are still in second place. Thus, schools and teachers, with much less impact, would ideally work in closer partnership to help their children at this sometimes precarious age. They need to team up with parents to have the support of the home for the cause. For a new programme to be successful, parents need to know about what is being taught, to be interested in what their children do, and to be supportive and not obstructive. For potential success and benefit for all parties, parents must be invited into the conversation to support, rather than obstruct, the educational efforts of professionals.

The BioBeo project is providing an opportunity for a partnership of numerous generations, including educators, parents, school community members and of course the children themselves.

The key principle is that **school must not educate children against their families**[iv]. Thus, introducing a new concept such as bioeconomy needs to be aligned with the practices and values of the families of your students. For example, if a local community depends on a certain agricultural practice that is not

particularly planet friendly, it would not be beneficial to approach the programme highlighting what the local community is doing wrong. Alternatively, it would be more advantageous to open the conversation on a positive note, by inviting families to discuss how they feel local practices could be improved after introducing the concept of a bioeconomy generally. Parents may not be able to explicitly support children in their learning and understanding of a bioeconomy concept due to time constraints or lack of skills. However, they can, with an open and co-working relationship, offer scaffolding for this work by showing interest and being supportive. Parents of course, cannot and will not do this unless they are invited to the discussion in the first place. Leaving the parents out or trying to educate them by sending messages home via their children can easily become highly counterproductive to the work done at school. What teachers need to consider for this is that most parents only have one schooling example: their own personal lived experiences. They may demand (some loudly) that the Pythagorean theorem or the Napoleonic wars are taught, because that is what is important to them according to their personal experience. However, **school professionals must convince parents** that bioeconomy is just as important and given the situation we find ourselves in, in the current climate crisis, some may state that sustainable development education, such as the introduction of the bioeconomy concept is timely and more important than ever. Similarly, methods need to be introduced or explained to parents in advance. They may not understand without explanation what kind of learning is happening when children are doing bioeconomy activities. Therefore, every effort must be made to ensure parents are made aware of the methodology and the content before implementation of bioeconomy content in the schools. The **format of the discussion**

should be carefully **chosen to be inclusive**. Sending a letter home or inviting parents to a frontal presentation are not suitable[v]. In an ideal situation, there are multiple opportunities and channels open for communication, and parents have the opportunity to ask questions and also contribute to the shaping of the local programme. They should be welcome to **participate as learners or educators**, building on their desire to learn and/or expertise – that may well exceed that of a teacher – as the programmes to reach their full potential are ideally community-based.

This open and communicative approach leads to parents being more **engaged in the learning of their children**, but also to them becoming (more) **engaged with school**[vi]. If parents are engaged both ways, it is easier to **keep them engaged with school** as their children are growing and engagement in their learning is becoming less intense. Parents are a superb resource for a school (not just financially). Some, for example grandparents, may have time to offer a helping hand during school hours, others may bring rich personal experiences with a circular bioeconomy and the concept of circularity, some might be experts in a field that is important for the programme and some might even be the policy makers in local and national government.

It is important how and in what parents can participate. The most important thing is that there is a **possibility for participation**.

In BioBeo, we are differentiating between parental involvement and parental engagement. In the case of **parental involvement**, the initiative comes from the school, and parents (usually the ones with the legal responsibility only) are invited to get involved in something that is already in place. In the case of **parental engagement**, the school focuses on the co-educative nature of home-school relationships. As a result, the target group is widened

to those with a co-parenting role, communication is always reciprocal, and it results in parents having a significant impact on how the programme is shaped and carried out.
The following infographic, the **Ladder of Parental Participation**[vii], may help educators decide if practices with parents are truly participatory. While levels 1 to 3 are non-participatory methods, 4 and 5 are examples of parental involvement, and 6 to 8 are considered to be parental engagement.

10.6 PARENTAL ENGAGEMENT STEP-BY-STEP

I. Preparation (before)

Parents need to be informed about and engaged in shaping the programme before you introduce it. Teachers may start by understanding what the parents know about bioeconomy and making it possible for them to collaborate, to express their concerns and to offer what they want in terms of support.

- Explain why the programme is being introduced, what is planned for children to do and learn. Seek ideas from parents for activities with the same learning goal. Ensure them that it is not an extra burden for them or for their children but fits regular school time.
- Make sure to introduce any external player, creating opportunities for parents to learn from them or to visit external sites before the programme starts.
- Make sure to answer

II. Ongoing communication (during)

- Make sure that parents can get all the information they want during the implementation.
- Ask parents to join either as co-learners or as co-educators if they have experience. In some areas, local knowledge, especially the knowledge of grandparents and other elderly family members might be very useful and enlightening.
- Make sure to actively communicate all important milestones and achievements.
- Be available for questions, concerns and ideas – in timeframes that you mutually agree on.

III. Celebration (before the end)

- Make learning visible for parents and find some achievements in the case of each individual student.
- Value parents' contribution to the activities, their time, effort and knowledge, and make it visible.
- Be consistent with the topic and avoid ways of celebrating that are not sustainable.

IV. Evaluation (after)

- Invite all parents (and also all students) to give meaningful feedback and take their opinion into account. Evaluate what went well, what you can learn from errors, mistakes and hiccups.
- Start planning the next round together with them.

10.7 PARENTAL ENGAGEMENT BY AGE GROUP OF CHILDREN

	3-6	7-9	10-12	13-15	16+
Invite parents to accompany the group	X	X	X		
Invite parents to be part of the activity together with their children at school	X	X	X	X	X
Invite parents to be part of the activity together with their children at home	X	X	X	X	X
Invite parents to do activities with children other than their own at school	X	X	X	X	X
Invite parents to do activities with children other than their own at home		X	X	X	X
Ask parents to plan activities or do research on organisations matters	X	X	X	X	X
Invite parents as experts	X	X	X	X	X
Ask about the opinion of parents	X	X	X	X	X
Ask children to interview their parents		X	X	X	X

10.8 PARENTAL ENGAGEMENT CHECKLIST

ASK YOURSELF THESE QUESTIONS WHEN PLANNING/IMPLEMENTING AN ACTIVITY/PROJECT	YES	NO	NOT SURE, MUST CHECK
Have I mapped what the parents know about the bioeconomy?			
Have I consulted the parents regarding the new bioeconomy education content, their possible concerns and opportunities of further engagement?			
Have I used communication methods that are accessible for all the parents?			
Have I made sure that parents can engage in various ways that suit them (regardless of their education level, free time, financial status, religion or mother tongue)?			
Have I created opportunities for the families to mingle during the activity?			

11. COMMUNICATION TIPS (FACE-TO-FACE AND DIGITAL)

In teachers' communication with families and local communities they need to consider their diversity: they have different work schedules, they have various obligations that influence their availability, their level of interest is diverse, some might be more knowledgeable than you while others have no knowledge or interest in the topic, some might not speak the language of instruction or have a different dialect or linguistic register from yours.
Communication is based on the following principles also called the 7Cs[viii]:

Some general ideas for ensuring the principles:

- Use multiple means of communication for conveying information,
- Check that the communication channel of your choice is accessible for parents, especially in the case of digital communication,
- Make sure not to use jargon,
- Use AI translators (e.g. DeepL) and people speaking the language to translate to the languages parents understand best,
- Be aware of each other's availability and plan communication accordingly (e.g. do not expect a reply in the morning to a message sent in the evening, but parents should also be aware that you have time off, too),
- Try to start communicating face-to-face, digital communication is better if the relationship is established,
- Try to implement the "nothing about them without them" principle, and engage the children as well as the parents in communication.

12. TIPS FOR ACTIVITIES WITH PARENTS AND FAMILY

Teachers will find ideas for engaging parents in the various activities suggested in this toolbox. The following are just general ideas for teachers to consider when planning their own activities beyond the toolkit.

- Make learning and success visible for the families – the most often used tool for this is a portfolio. Take time to celebrate development in the presence of the child and their parents.
- Make parents aware of what is being done at school and give them ideas on how they can support learning during everyday activities. One way of doing it is giving them ideas on how to use the children's new knowledge in their everyday family life.
- Invite parents to join the school activities at any time. A long-term project called IncludED[ix] has proven that it supports learning regardless of the parent working with their own child or others.
- As children grow older, try to engage their parents more with other children. It is often awkward for a teenager to work with their own parent in front of their classmates.
- Build on what parents know and can do. Especially in the case of parents in more difficult personal situations in life, it is an important moment of personal pride and also a possibility for their children to be proud of them.
- Do not suggest activities that can be felt as a burden.
- Suggest activities with the family in a broad timeframe – to be done in a month or so. This ensures that you are not messing up any important family moments.

- Healthy competition, for example a gamified method of collecting badges can be very attractive.
- Encourage families to do things together outdoors. It also makes it easier for them to mingle. Some families might be more protective of their personal space, but happy to collaborate outside.
- Consider that for a lot of parents the school is not a good venue to be invited to if you want them to be relaxed and open.

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[i] Goodall, J. (2017) Narrowing the achievement gap: Parental engagement with children's learning, Routledge, London and New York

[ii] Adapted from Henderson, A.T. (2007). Beyond the Bake Sale: The Essential Guide to Family-school Partnerships. The New Press, New York. Infographic by Parents International

[iii] Desforges, C. and A. Abouchaar (2003). The Impact of Parental Involvement, Parental Support and Family Education on Pupil Achievement and Adjustment: A Literature Review, Department of Education and Skills.

[iv] A detailed case study on the spectacular failure of the famous Jamie Oliver school meals reform at first offers a perfect example to support this. It is available at www. thensmc.com

[v] See Goodall (2017)

[vi] Goodall, J., Montgomery, C. (2014) Parental involvement to parental engagement: a continuum, Educational Review, 66:4, 399-410.

[vii] Arnstein, S. R. (1969) "A Ladder of Citizen Participation," JAIP, Vol. 35, No. 4, July

1969, pp. 216-224; Salamon, E., & Haider, B. (2015). Parental Involvement in School and Education Governance, ERNAPE – examples specifically updated for BioBeo. Infographic by Parents International

[viii] Adapted from mindtools.com. Infographic by Parents International

[ix] Flecha, R. (2015). Successful Educational Actions for Inclusion and Social Cohesion in Europe. Springer, Cham, Heidelberg, New York, Dordrecht and London

13. COLLABORATION WITHIN THE SCHOOL

As these bioeconomy education activities are designed to be school projects, it is important to consider which of your colleagues are to be engaged.

First and foremost, you need to have school leadership on board. This is necessary for a number of reasons: school leadership should understand the pedagogical value of your project, students or you may need to skip classes, you will probably use school premises and equipment, you may need support from other teachers or non-teaching staff, but they may even get involved in case of a complaint. Make sure that school leadership is kept informed, and make sure students are part of this information process so that this element of the project is also participatory.

You may want to engage other teachers in the process, to hold lessons collaboratively or simply to offer them an informed choice to also include bioeconomy topics. In such a case, make sure that pedagogical leadership is not taken over, students agree with engaging a certain teacher, the teacher's role is clear for all, and the teacher plays according to the agreed rules. In case of potential problems or doubts you can consider engaging an external player such as a local expert instead. The same is true for any non-teaching staff you may engage in the process, such as the janitor who may play a crucial role.

At the same time, your colleagues need to be informed and have ownership of your project as much as possible. Especially when you need a substitute or take students out of class, a positive mindset about the project is important. It is crucial to make the pedagogical value of your project clear to colleagues.

Depending on the composition of the student or student-adult team you are working with, as the pedagogical leader you may need to spend time and energy on building the group of people into a team as it is crucial for the success of your efforts. Team building activities create a climate of cooperation and contribute to collaborative problem-solving, develop empathy and trust in the group and in yourself, enhance creativity, and boost self-esteem. This means that you may need to include specific team building activities in case of a conflict or challenge during the planning, implementation and evaluation process, too.

Team building helps everyone get to know and trust their fellow team members, but you do not build trust overnight. Your team goes through gradual stages as they grow from a collection of strangers to efficient collaborators. Psychologist Bruce Tuckman's team building model[1] describes five stages – forming, norming, performing, storming and adjourning – to show how teams can become more united over time. During the performing stage – that is desirable to reach with your team –, everyone is working together at their highest potential, they have built the highest level of commitment, trust, and support for one another. It means that they are at their most productive and are highly motivated to achieve team goals.

Forming happens when your team first comes together. Team members learn about each other, the project requirements, and the leadership structure. This is also the information gathering stage. They are beginning to form impressions of how well they are going to work together. You may want to organise a picnic for all team members and include some activities that help them learn (more) about each other.

In the norming phase, teams become more cooperative. Team members start to understand and appreciate each other's working style, ethics, and roles. This helps them respect the team leader as well

as each other. They acknowledge the talents, skills, and experience that each team member brings to the table. They are more willing to trust and depend on one other to get work done. You may want to organise a problem-solving event to support them at this stage, such as a scavenger hunt or escape room event.

In the performing stage, your team really starts shining and working together harmoniously. They are motivated to work towards the team's goals with efficiency and enthusiasm. You as the pedagogical leader can be sure that the work is being properly done and focus on boosting team morale rather than supervising your team. But even once you have achieved this goal of performing as a team, you want to keep the momentum going and keep an eye on them to notice any sign of the fourth stage of a team, storming.

There are various methods to keep up the team spirit in the performing stage. Most of them require being together outside of the project. You can take your team out to have ice cream together or have a friendly match in the sports court. Storming is also a natural part of team building. In the storming stage, people start to push against the established boundaries. Conflict or friction can also arise between team members as their true characters – and their preferred ways of working – surface and clash with other people's. At this stage team members may challenge your authority or management style, or even the team's agreed goals. Left unchecked, this can lead to face-to-face confrontations or simmering online tensions.

At this stage you may want to organise activities that are aiming at building trust, resolving conflict or clarifying personal and team goals. `Town Hall meetings` are also beneficial at this stage.

If your project is leading to a one-of event (that is not recommended in bioeconomy education), your team may also reach an adjourning (or mourning) stage when the team gets disbanded. It happens even

if the students will continue to meet in the same school or classroom as the team itself is dissolved. Take the time to celebrate the team's achievements – having positive shared experiences will make it easier for them to engage in other activities or future projects with some of the team members. There might be team members who are uncertain about their future social position (it is typically those who are not the centre of attention or liked by teachers but were brilliant in the project). Boost their confidence and future position by praising them in front of students or teachers. Small tokens of praise such as certificates are also often well received.

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[1] Tuckman, B.W. (1965). 'Developmental Sequence in Small Groups,' Psychological Bulletin, 63(6). Available here.

14. ADVOCATING FOR YOUR GOALS

It is not a usual role of a teacher to strongly advocate for a certain learning area or activity. When introducing bioeconomy, you are likely to become an advocate, too, and you need to prepare for that, too. What you will need to do in your bioeconomy advocacy are

1. Formulate a strong message on the importance and relevance of your planned activities
2. Try to anticipate pushback arguments of different actors such as your school leader, your colleagues, parents, the students or other local actors.
3. Adjust the message and their presentation to the audiences. Use simple and attractive presentations (any by presentation we do not mean ppt's, but nice visuals or just simple slogan-like messages)
4. Be convinced of your messages and make your performance convincing.
5. Involve your main allies, especially children and parents in advocacy, but make sure their activities are participatory and you are not "using" them, avoid manipulation, tokenism or decoration level activities – see the Ladder of Participation.

Advocating for your project has three main stages:

1. Raising awareness of the project
2. Actively engaging people in the project
3. Promoting the final results

In the first stage your main goals are to recruit participants and to set a positive attitude towards your project in school leadership, the venues you are planning to use, the potential sponsors or supporters offering material help, parents, etc. In this phase your communication is short, to the point, but relatively general. You do not yet have a full team; you may have not decided on the bioeconomy topic and you do not have a developed project or educational plan.

The second stage happens during the project planning and implementation stage, and communication is very targeted. The aim of advocacy is supporting successful implementation. If you could raise awareness of the above listed target groups, this is the stage to "cash" them in. This can take many forms from colleagues allowing children to skip class to the local librarian being enthusiastic to find resources for research to local entrepreneurs offering physical resources or space.

In the final stage you first want to show your achievement to a larger audience such as the education authority, local municipality or the communities around the school. The aim may be to support sustainability, but you may also want to aim for upscaling or mainstreaming your activities with the necessary localisation in each learning group. It may mean that you invite external audiences to observe your activities or results, but you have to be very careful about that. If you want to give your students a major role in it – as you should –, you have to remember that it is very different for students to present something in front of people they know like family and friends, or strangers. Similar considerations are in place if the local media is interested or can be made interested.

One element of consideration is data protection in relation to pictures and videos. Even if all participants give consent to photos

or videos to be made public, they have a basic right to be forgotten, so you need to make sure there is a way for these photos or videos to be taken down. As it is a near-impossible task, it is better to not allow any public pictures of faces – in practice this means asking the audience not to share photos where anybody is recognisable on social media.

15. ASSESSMENT AND EVALUATION

Your activity/project may be extra-curricular. If this is the case, you are free to develop an assessment system that supports learning most. If you manage to include your activity/project as a curricular activity, its uniqueness provides an opportunity to build an assessment system that suits your students best and the practices you develop during the project can later be used in your everyday teaching.

Below you will find definitions, explanations and examples for various types of assessment.

An **assessment** is a systematic process for measuring an individual's abilities based on various data. When you assess your students, you match their skills, behaviours against certain (usually centrally set) parameters, to provide a measure of their strengths and weaknesses.

Depending on the context, assessments can be standardised or fluid. A **diagnostic assessment** is a form of pre-assessment or a pre-test where teachers can evaluate students' strengths, weaknesses, knowledge and skills. These assessments are typically low-stakes and are intended to help teachers identify what students know and can do in different domains to support their students' learning. When planning your activity/project, it is essential to conduct such assessments so that you are aware of your students' present skillset. Since you will also have a timeline to work with, make sure that you have realistic expectations regarding the development of students' skills. Underestimating their capabilities is

just as harmful as overestimating it, and it might be necessary to be flexible and change some parts of the project on the way to make it more or less challenging for them.

Formative assessments take place throughout the learning process (in this case, the activity/ project) and provide real-time feedback. These assessments measure the efforts and dedication of your students. Even if they are not very skilful (yet), their enthusiasm or diligence might deserve praise. By acknowledging their commitment, you encourage them to develop further.

When applying **summative assessments**, you compare what your students know to the expected level of knowledge required for a specific context. Your activity/project can be very complex, and this might be difficult to measure, so it is a good idea to apply summative assessments to various aspects, e.g. assessing the background research and the quality of the implementation separately.

An **evaluation** is the systematic assessment of design, implementation or results of an initiative. For example, when having finished your project you evaluate it, you critically analyse the various outcomes and data to help you measure its success. You aim to make an objective judgement on the value, quality, or significance of your project using a set of well-defined criteria. It helps students to see clearly how they performed, but this practice can also support the implementation of another similar project in the future.

It's important to assess how students' skills have developed during the project, and to do so in ways that don't inadvertently disadvantage some children compared to others.

Inclusive assessment is based on continuous activities that allow both students and teachers to understand how the students' progress meets the learning objectives. It should include:

- early, low-stakes, frequent assessment and feedback for learning.
- multiple and varied methods of student performance.
- the use of exercises or assignments that promote self-assessment and self-awareness.
- assessments before, during, and after learning.
- transparent assessments that clearly articulate step-by-step instructions as well as the criteria for success.

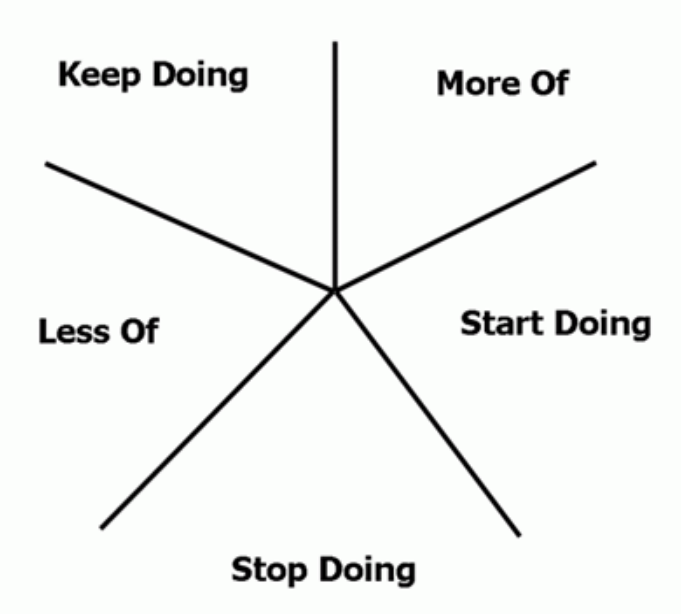
There has been increased attention over grading practices and equity, because research evidence shows that grading negatively impacts learning. Prominent grading approaches often privilege individuals with the greatest resources, preparation, and desired behaviours. While you might feel that working on a school project does not necessitate giving grades at all (or you only give high marks as a reward for participating students), you might want to consider the practice of ungrading. It is not as simple as just removing grades. This practice suggests that we need to do intentional, critical work to dismantle traditional and standardised approaches to assessment. In ungrading, feedback is subjective and individualised and invites the student to use these to continue learning. For example, you might feel that the research a student has done in the project is not comprehensive enough, because they used just one book. Instead of rebuking the student, you should encourage them to find other resources and see if that data confirms or contradicts the earlier research. This way the student's critical thinking also develops.

15.1 STARFISH DIAGRAM

To wrap-up the reflections and improve project implementation, have your team synthesise their reflections in a StarFish diagram. The five prompts of the Starfish technique are as follows:

`Stop` – What should we stop doing?
`Less` – What should we do less?
`Keep` – What should we keep on doing?
`More` – What should we do more?
`Start` – What should we start doing?

The Starfish technique helps you identify the impediments in your work and remove them to speed up the work in progress, and more importantly, values the feedback from your team



Reflection techniques and tools are great for self-regulation and team regulation. A reflection diary allows teachers to record their thoughts and monitor an ongoing experience. They can provide a platform for professional growth and learning. Teachers can expand

their expertise by delving thoroughly into their teaching techniques, situations, or even long-held beliefs.

15.2. SCAFFOLDING QUESTIONS FOR A REFLECTIVE DIARY FOR TEACHERS

Learning goals & outcomes	To what extent have we reached the learning goals?
	What about the complexity of the learning task?
	Were there any bottlenecks in performing the learning task?
	What were the learning outcomes we achieved?
Learning design	What learning activities and resources are making an impact?
	Are learning activities stimulating the enjoyment of learning?
	Is it something I can do differently?
Students	All students were involved in the lesson's development?
	If not, what prevented them from doing so?
	Where would this activity be on the Ladder of Child Participation?
	Which sequences were most appreciated by the students? And the least appreciated?
Parents	Were all parents engaged in planning?
	If not, what prevented them from doing so?
	Where would this activity be on the Ladder of Parental Engagement?
Self-focus	How did I feel doing this lesson/project/activity?
	What did I like most?
	What would I change about myself?
Classroom management	Was the pace of teaching/learning optimal?
	Did conflicts arise? Were there students who refused to engage in group activities?
Goal setting	Make brief notes about what you will do next… nothing will ever give you 'all you need to know' on a subject. Therefore, you should always be thinking: What next?

15.3 PERSONAL MIRROR

Content	What have I learned from this activity/project?
Evaluation	What else do I need to learn in relation to the observed practice?
Regulation	What can I do better?
Academic development	How does this learning experience contribute to my academic development? Based on it, what further objectives do I want to achieve?
Professional development	What was my professional learning gain?
Personal development	What did this experience mean to me?

16. SUGGESTED FURTHER READING

Goodall, J., Weston, K. (2018) 1*00 Ideas for primary teachers: Engaging parents*. London, Bloomsbury Education

Price-Mitchell, M. (2015). *Tomorrow's Change Makers: Reclaiming the Power of Citizenship for a New Generation.* Eagle Harbour Publishing.

Robinson, K., & Aronica, L. (2018). *You, Your child and School*. Vintage, New York.

Winthorp R. et al. (2021): *Collaborating To Transform And Improve Education Systems - A Playbook For Family-School Engagement*. The Brookings Institution. Washington D.C., USA

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