

## School Innovators

# HANDBOOK FOR TEACHERS AND OTHER EDUCATORS



Help today's youth  
become tomorrow's  
climate leaders!



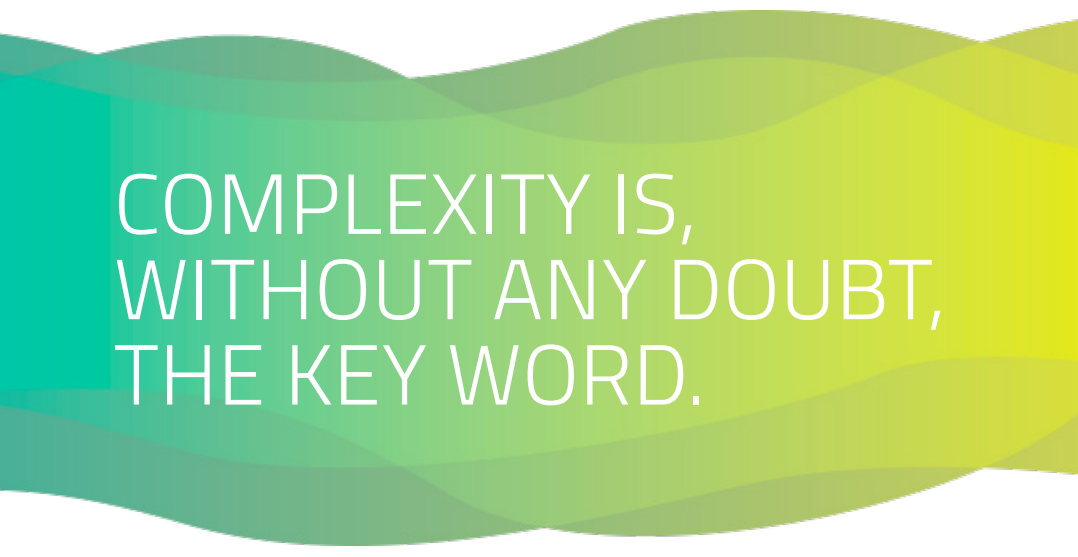
# INDEX

<b>INDEX</b>	01
<b>FOREWORD</b>	03
<b>INTRODUCTORY CHAPTER: THE YOUNG INNOVATORS PROGRAMME</b>	06
» Welcome to the Young Innovators	
<b>HOW DOES THIS HANDBOOK SUPPORT YOU?</b>	10
<b>BACKGROUND INFORMATION</b>	11
<b>YOUR PROGRAMME IN A NUTSHELL</b>	15
<b>YOUR JOURNEY</b>	16
<b>INTEGRATION CHAPTER: ALIGN YOUNG INNOVATORS WITH YOUR TEACHING PLAN</b>	21
<b>DECIDE ON THE CHALLENGE</b>	26
<b>STUDENTS GET READY FOR THE CHALLENGE</b>	29
» 1.1 Introduce the Young Innovators programme to your students	30
» 1.2 Deliver basic climate change and sustainability knowledge in the classroom	32
» 1.3 Get a grip on system innovation	34
» 1.4 Climate change in the light of system innovation	39
<b>EXPLORE THE CHALLENGE</b>	40
» 2.1 Create teams	41
» 2.2 Present the challenge and start exploring it	44
» 2.3 Teams make a system map of the challenge	45
» 2.4 Teams re-frame the challenge and choose their own challenge path	46
<b>IDENTIFY OPPORTUNITIES FOR CHANGE</b>	47
» 3.1 Reflect on stakeholders: who to get on board?	48
» 3.2 Find out what is influencing the challenge path	49
» 3.3 Explore opportunities for change	50
<b>COME UP WITH SOLUTIONS AND SHARE WITH THE WORLD</b>	51
» 4.1 Generate many ideas for solutions	52
» 4.2 Pick an idea and come up with a solution	53
» 4.3 Create an action plan	54
» 4.4 Share your plan: present solutions	55
» 4.5 Harvest insights and reflect	56
<b>GLOSSARY</b>	57
<b>REFERENCES</b>	58

# FOREWORD

The great technological advances of the last two centuries have made possible a smaller world with an enormous number of fast-communicating vessels. As a consequence, the perception of the problems that concern human beings and ecosystems has begun to change: the Climate Emergency is the 'elephant in the room' that can no longer be ignored. We are undoubtedly facing an imminent problem of high impact and consequences in many areas - such as public health, food, economy, urban planning or biodiversity. In other words, we are facing a systemic problem.

This fact can produce an understandable blockage in adult beings. We have been educated through a competence-centered educational system that has been (to some extent) efficient in generating competent labour in a society rooted in the Industrial Revolution, but which has simplified our vision of reality, cutting down on the perception of the complexity inherent in the real world we face.



COMPLEXITY IS,  
WITHOUT ANY DOUBT,  
THE KEY WORD.

Learning how to manage complexity can be the first step towards a different problem-solving approach based on a deeper analysis of the challenges we are facing. We need to devote more time to exploring different and divergent perspectives, gathering and analysing data, to work in interdisciplinary and intergenerational teams, to devote as much time and energy in imagining and co-creating our future as in designing the technological solutions we will need.

Those of us who dedicate ourselves to education in any of its stages must exercise honesty and integrity, not just as professionals, but as social subjects. Ignoring or undermining the management of complexity in educational and training processes condemns us to societies unable to solve their problems, to face their challenges and to provide themselves and their ecosystems with the necessary levels of dignity and justice.

And the Climate Emergency is a huge and complex systemic problem that threatens the dignity, justice and even the survival of societies and ecosystems on this planet. Its imminence forces us to make this exercise of honesty and integrity, and also to reform our way of educating and training the new generations, the next adults. They may inherit a paradise ruined, in part, by several generations of the same adults that have to take self-criticism with our socio-economic, but also educational and cultural systems and structures.



**Nierika Hamaekers**

I want to fire the sustainability flame in as many people as possible! My purpose is to motivate, inspire and guide others to take bold action on climate change and sustainable development. To work towards these impactful transformations I design didactic learning materials and dynamic group sessions. I have facilitated successful innovation pressure cookers, summer schools, workshops and training courses for (young) professionals, academics and students. My professional background is in strategy & sustainability consulting and my academic one in sustainable business & stakeholder management. My lifelong exploration of new surroundings has shaped my cultural awareness and my joy for working in inter-cultural environments.



**Ana Torralba Barallat**

Mother of 3, friend, teammate, caregiver, coffee lover and lifelong learner. When not working in my next project in "my ideation lab" (my spot at home), you can find me running or hiking. After more than 10 years as senior consultant, I decided to disrupt myself to follow my passion: education and sustainable development. In 2018 I joined the EIT Climate-KIC's network of coaches. Since then, I am involved in the Pioneer's into Practice and other education programs to help people shift mindsets and engage with sustainable living. My professional background includes a Master in Civil engineering by the Polytechnic University of Madrid and studies in Education and systemic coaching.

A big thank you to our fellow learning designers Diane Brueggemann and José Manuel Martín, as well as the Young Innovators core team, for supporting us along the process of creating these learning materials.

The genesis of this Young Innovators programme refers us to the application in the educational context of the challenge-led approach, a collective problem-solving perspective originally devised by the Climate KIC Transitions Hub to address transitions to sustainability in socioeconomic systems. From the germ of this programme idea in 2017, a heterogeneous team of people dedicated to innovation in the educational field have put all our efforts into the progression of this programme.

This has been done by adapting participatory methods of co-creation across European partnerships to encourage the transformation of our children and young people into adults capable - not only of facing complexity, but also of growing up with adversity and uncertainty. In short, we have tried and we are trying to contribute to the birth of a kinder and more resilient world.

The Young Innovators team have done our best to encourage this change in the present, which begins by looking to the future to correct the defects of the past. We hope that, as an educator, you will let us accompany you on this adventure through this programme. The dignity and justice of our future adults deserve our unity in facing this challenge together.

**Dr José Manuel Martín Corvillo,**

Participatory methods expert and data analyst (Ingenio UPV, EIT Climate-KIC). Methodologist and mentor of Young Innovators programme.

**MSc Gianluca Avella,**

Regional coach and facilitator (AEISS Modena, EIT Climate-KIC). Methodologist and trainer of Young Innovators programme.



# INTRODUCTORY CHAPTER: THE YOUNG INNOVATORS PROGRAMME

## Welcome to Young Innovators!

We are delighted to support you and your students in this learning journey towards creating solutions for climate change. Whether you choose to condense the Young Innovators programme into a week, or spread it out over several weeks or months, we help you with everything you need to integrate it into your teaching plan, implement it and make it a success.

## For who?

If you are concerned about the climate emergency that we are currently living through, and feel ready to make a difference through the power of education, then this programme is for you. Teachers and other education catalysts take part in the Young Innovators programme because they see opportunities for making positive change and are curious about how we can rethink our current ways of living. By introducing Young Innovators into your classroom, you empower the young people you teach with to make a real and long lasting impact.

## What is Young Innovators?

This profoundly transformative educational programme empowers your 12-18 year old students to better understand our global climate reality, while generating ideas for a more sustainable future. Students have the chance to face real-world climate change challenges<sup>1</sup> that come directly from their local community. Challenges can range across a large variety of topics: from waste reduction, clean energy and sustainable mobility, to reduced inequalities, improved health, zero hunger, and more. While making sense of these complex issues, students gain important skills that allow them to improve and move forward together.



<sup>1</sup>Challenge (also in Glossary): in the context of the programme, a challenge refers to any situation in the real world that is perceived as necessary to change or improve.

## Mission

Our mission is to empower future generations to lead us to a prosperous, inclusive and resilient society based on a net-zero carbon economy.

We want to equip young people worldwide with the competencies needed to become change-makers and lead systemic innovation, and we want to transform the education system by main-streaming climate education and embedding systems thinking and challenge-based learning.

## Numbers



Engage **30.000 young people** through the Young Innovators programme **by 2023**



Train **10.000 teachers** through the Young Innovators programme **by 2023**



Run Young Climathon events in more than **1.000 locations** globally **by 2030**



Reach 3 million young people or **10% of young Europeans** **by 2030**

## Activities

All content and guidance of this Handbook is related to the Schools Innovator aspect of the Young Innovators programme.

### School Innovators

This education programme aims to boost the necessary skills of students aged 12 to 18 to prepare them to be active and insightful citizens in the future.

### Young Climathon

The Young Climathon allows students to work on the city's and partners' challenges and develop solutions. The students start transforming their solution into a project or business idea using innovative and digital technologies, input from experts, fellow students and entrepreneurs and mentoring from coaches and EIT Climate-KIC Alumni.

### Young Changemakers

In this programme, selected and motivated student teams will aim to develop their winning initiative with the input of local experts and stakeholders. Students who participate in the Young Innovators programme get impacted further, while they receive the support to realise impact on their environment, on society and on the enterprises which have brought in climate challenges.

This programme is being rolled out into schools and organisations all across Europe and the US with the support of our Delivery Partners. They play a key role with their assistance in facilitating and implementing this programme both in formal and informal educational contexts.

## How does it work?

The challenge-led<sup>2</sup> learning approach used in the Young Innovators programme empowers students to apply their existing knowledge and experiences to real and pressing situations.

This, combined with the system innovation<sup>3</sup> approach, helps them to better perceive the world and its complexity.

Students learn how everything is connected and constantly changing. They are enabled to take a step back and look at the big picture first - and only then do they start thinking of solutions.

## The programme structure

The Young Innovators programme is divided into four learning Modules. These Modules guide you and your students through each step of the programme: from making sense of the challenge, analysing its system dynamics, finding opportunities for improvement, and ultimately developing unique solutions for change. Each Module is accompanied with a set of Lesson Plans that help you put this all into practice.



<sup>2</sup>C. Matti et al. 'Challenge-led system mapping. A knowledge management approach', 2020, p. 8

<sup>3</sup>Ibid., p.10.

## Each Module includes:

**1** An overall view of what you need to deliver, including the desired outcomes of each section and references to the corresponding tools and Lesson Plans that support the learnings.

**2** A detailed description of all the concepts and teaching methods that you need to understand prior to starting to practice in the classroom.

## Your role

As a teacher you take on the role of a coach: you guide your students throughout the programme, defining the context and asking the right questions to unleash their creative potential. You create excitement about the challenge and motivate your students to be engaged and involved. Make sure to let your students know that you are stepping out of the teaching role and playing this new role.



# HOW DOES THE HANDBOOK SUPPORT YOU?

This Handbook is a comprehensive manual for teachers and educators with clear steps and practical facilitation tips, which, in combination with our **Lesson Plans**, will help you transfer the programme into your classroom. It presents a set of guided activities that aim to support young people to engage with local climate challenges, give them a sense of empowerment, and build their skills and values.

## Young Innovators adapts to your needs

Because we are aware of your workload and the rapidly changing pedagogical environments you work in, the programme has been designed in such a way that it can easily adapt to your needs - both curricular and extracurricular. It integrates well with a large range of subjects, learning goals and education competencies<sup>4</sup>. So rather than perceiving Young Innovators as a radical change in your teaching, see it as an impactful addition to your own teaching plan.



Together you move from what seemed to be impossible at first, to creating sustainable and positive impact.



## Minimise your workload with the use of our support set of resources

To help you engage in this learning journey, while simultaneously saving you from spending too much time on preparing, we have developed a complete set of complementary resources including:

- » **Handbook:** the document you are currently reading!
- » **Toolbox:** A comprehensive resource book with a set of dynamic Lesson plans with their corresponding exercises and visual tools to unfold each activity described along four modules of the Handbook.
- » **Young Innovators Learning Platform:** an online platform that combines the best of technology and collaboration tools to support your teaching while engaging with a broader learning community of Young Innovator's schools and partners.
- » **Teacher training:** designed to equip you with the knowledge on our methodologies and tools needed to understand, engage and launch the programme in your classroom.

<sup>4</sup>For more details on education competencies and how these can be integrated in your teaching plan, see chapter 'Align this programme with your curriculum' of this Handbook.

<sup>5</sup>The current toolbox has been adapted from: J. De Vicente and C. Matti, 'Visual toolbox for system innovation. A resource book for practitioners to map, analyse and facilitate sustainability transitions', 2016.

# BACKGROUND INFORMATION

## Classroom goals

Along the empowerment journey of your students, we strive for the following three goals:

» **Shift mindsets**

Throughout this programme, we want students to experience new mental models that foster their vision, understanding, creativity and emotional agility to better understand complex problems related to climate change.

» **Foster leadership**

Young Innovators unlocks the ability of young people to accept uncertainty and hold complexity – two defining qualities of wise leaders that will enable them to tap into the wide range of opportunities for improvement.

» **Connect and thrive**

Students become aware of the need for a collective effort. We aim to have them experience 'the power of many' through teamwork, collaborating and engaging with a larger community.

Young people will be a critical part of our future and of rebuilding the deep change that our world requires.

Young Innovators is here to empower them to become tomorrow's climate leaders.

How this empowerment is translated into your classroom and what we aim to attain with this, is explained in the next sections.

## Approach

Young Innovators helps students to make sense of the world around them by learning from real challenges from their communities. This experiential approach relays on:



### » **Challenge-led learning**

Students are surrounded by many different challenges, ranging from community-based issues such as green spaces recycling practices and mobility problems; to global issues, such as biodiversity, plastic waste and air quality. If we manage to engage youth in turning these stumbling blocks into innovations towards a solution, we will be on our way to make our world healthier, more just and sustainable for all.

The challenge-led approach uses challenges as a starting point to help learners understand real-life contexts from different perspectives. It allows students to explore, discuss, and meaningfully construct concepts and relationships, ultimately leading to collective solutions to complex problems.

This approach is multidisciplinary, project-based and problem oriented. By engaging in complex problems, students acquire content knowledge that connects with many 'standard' curricular subjects such as natural science, social studies, technology, or arts; while simultaneously developing essential skills for their future.



### » **System innovation**

Solving today's pressing problems requires us to take a step backwards and reflect on the bigger picture. This can be done through observing the systems we live and work in, and start understanding the web of interrelations that create complex problems.

System innovation is an approach that allows your students to gain this broader perspective. It will help them in diagnosing the systems that surround their challenges, and to reflect on how solutions would make an impact. It ultimately helps them understand the profound change that is needed to face the climate emergency.

System innovation requires active learning and continual evolution; but innovation and learning are two sides of the same coin: when leveraged together they are the most effective means to catalyse transformation<sup>6</sup>.

<sup>6</sup>C. Matti et al., op. cit., p. 12.

## Methodologies

This programme is led by solid pedagogical methodologies that ensure deep learning, increased knowledge uptake, as well as the development of competencies and new skills for personal fulfilment and active citizenship.

### » **Experience-based pedagogy**

Since this programme is challenge-led, learning by doing<sup>7</sup> – this fosters: a hands-on approach where teaching and learning is based on the reality of the students' experience, developing learner autonomy and independence. Furthermore, it encourages students to interact with their environment, improve, collaborate, and move forward together.

### » **Active-blended learning format**

The Young Innovators programme introduces an active-blended learning format, consisting of the application of knowledge through tools and hands-on activities as part of a problem-solving process. In essence, this methodology focuses on delivering knowledge and resources prior to the challenge, then using precious face-to-face classroom time for the reinforcement of key concepts and application of critical thinking.

### » **Cognitive mapping and knowledge visualisation**

Visualisation in learning processes helps students to better understand and make sense of interrelated concepts – it enables them to 'connect the dots'. By using systems mapping and other visual tools included in this programme, you are helping your students build collective knowledge among peers and providing them with alternative ways of expressing themselves.



<sup>7</sup>Study.com [website], 'John Dewey On Education: Impact and Theory', accessed 24 June 2020.

## Learning Outcomes

While diving into the programme, your students will be challenged to meet different learning outcomes. This will lead them to **mastering new abilities such as analytic reasoning, complex problem solving, and teamwork.** These 'future' skills enable them to be flexible and adaptable in different roles and contexts, allowing them to thrive.

# Your students will develop skills in



### ENTERPRISING SKILLS

Moving from ideas into action in exploring solutions to climate change.



### MOBILISING OTHERS

Understanding and developing social capital to engage others in ideas related to climate mitigation.



### MANAGING UNCERTAINTY

Being aware of the ambiguity, precariousness and sudden changes that define the climate change crisis.



### BEING A CHANGEMAKER

Engaging and mobilising yourself and others for the greater good.



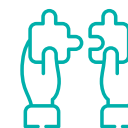
### CREATIVITY/ INNOVATION

Generating innovative ideas and new solutions within a given context



### SYSTEMS THINKING

Broadening thinking to identify aspects within a system, understand complexity and interrelations.



### PROBLEM SOLVING

Gathering, analysing and interpreting information to solve problems through a negotiated solution within the area of climate change.



### LOW CARBON LIFESTYLE

Analysing consumer behaviour, sustainability and product life-cycle and end-of-life treatment.

# YOUR PROGRAMME IN A NUTSHELL

Based on the methods and theory outlined, the Young Innovators programme is designed as a multi-stakeholder programme, thus, bringing together different people and organisations, that are willing and able to contribute to the programme's success. Key contributors are:

## Who is involved?



<sup>8</sup>Stakeholder (also in Glossary): in the context of this programme, stakeholders are described as those involved in the system of the challenge - be it a person, a group of people, an organisation, or anyone who shows an interest (or has a 'stake') in the challenge.

# YOUR JOURNEY

## Prepare

The first two chapters will help you understand the programme, integrate it with your teaching plan and launch it.



## Module 1

### STUDENTS GET READY FOR THE CHALLENGE

You start igniting the curiosity of your students to explore climate change in a new way.

To do so, you help them experience what a system is and how system innovation will frame the process they will go through during the challenge.

#### 1.1

Introduce the Young Innovators programme to your students

#### 1.2

Deliver basic climate change and sustainability knowledge to the classroom

#### 1.3

Get a grip on system innovation

#### 1.4

Climate change in the light of system innovation



## Module 2

### EXPLORE THE CHALLENGE

The challenge is presented to your students. By reflecting on the challenge from a system's perspective, students identify 'what is going wrong' in a broader way and thus needs to change.



2.1

Create teams

2.2

Ppresent the challenge and start exploring it

2.3

Teams make a system map of the challenge

2.4

Teams reframe the challenge and choose their own challenge path

## Module 3

### IDENTIFY OPPORTUNITIES FOR CHANGE

You coach your students to dig deeper into their challenge, connect dots, spot opportunities for improvement, and generate innovative ideas.

3.1  
Reflect on stakeholders:  
who to get on board?

3.2  
Find out what is  
influencing the  
challenge path

3.3  
Explore  
opportunities  
for change



## Module 4

# COME UP WITH SOLUTIONS AND SHARE WITH THE WORLD

Time to unlock your students' full creative potential, guiding them through the process of developing concrete solutions, and think of possible steps to get there.

4.1

Generate many  
ideas for solutions

4.2

Pick an idea and  
come up with a solution

4.3

Create an  
action plan

4.4

Share their plan:  
present solutions



# INTEGRATION CHAPTER: ALIGN YOUNG INNOVATORS WITH YOUR TEACHING PLAN

## Align this programme with your curriculum

- » **Previous step:** you have read the introductory chapter of this Handbook and gained a basic understanding of the Young Innovators programme.
- » **Desired outcome of this section:** you see the potential of integrating Young Innovators into your curricular and/or extracurricular teaching plan.
- » **Next steps:** you decide on a challenge for your students.
- » **Supporting resources:** [Lesson Plan 1.1](#)



Who do you want to get on board from your school and broader community to the Young Innovators programme? Start reaching out to these stakeholders and form your team!



## How does Young Innovators align with your curricular subjects and educational competences?

One of the reasons often given for not teaching climate change and sustainability at schools is that there is no space for it in an already packed curriculum and school agenda. However, if you have a closer look at the themes and issues that fall under the umbrella of these concepts, you will soon realise that **working with sustainability provides a great opportunity for making connections with other subjects** such as geography, literature, economics, art and other subjects you already teach in class.

The Young Innovators programme uses a **challenge-led** approach. This means that students learn about climate change and sustainability **through real topics**. As a result, next to adding meaningful contemporary knowledge to your lessons, you also enrich your teaching methods with a pedagogy that allows students to explore, discuss, and meaningfully construct concepts and relationships.

The local challenge aspect of the Young Innovators programme, combined with the fact that **climate change ranges across various social, economic and other general curricular topics**, provides both you and your students with a great opportunity to work more closely with your peers and broader school community.

In the Curricular Alignment table on the next page you can see how most common subjects taught to 12-18 year old (maths, geography, economics, ethics), relate to multiple sustainability topics that you can address through the programme's local challenges.

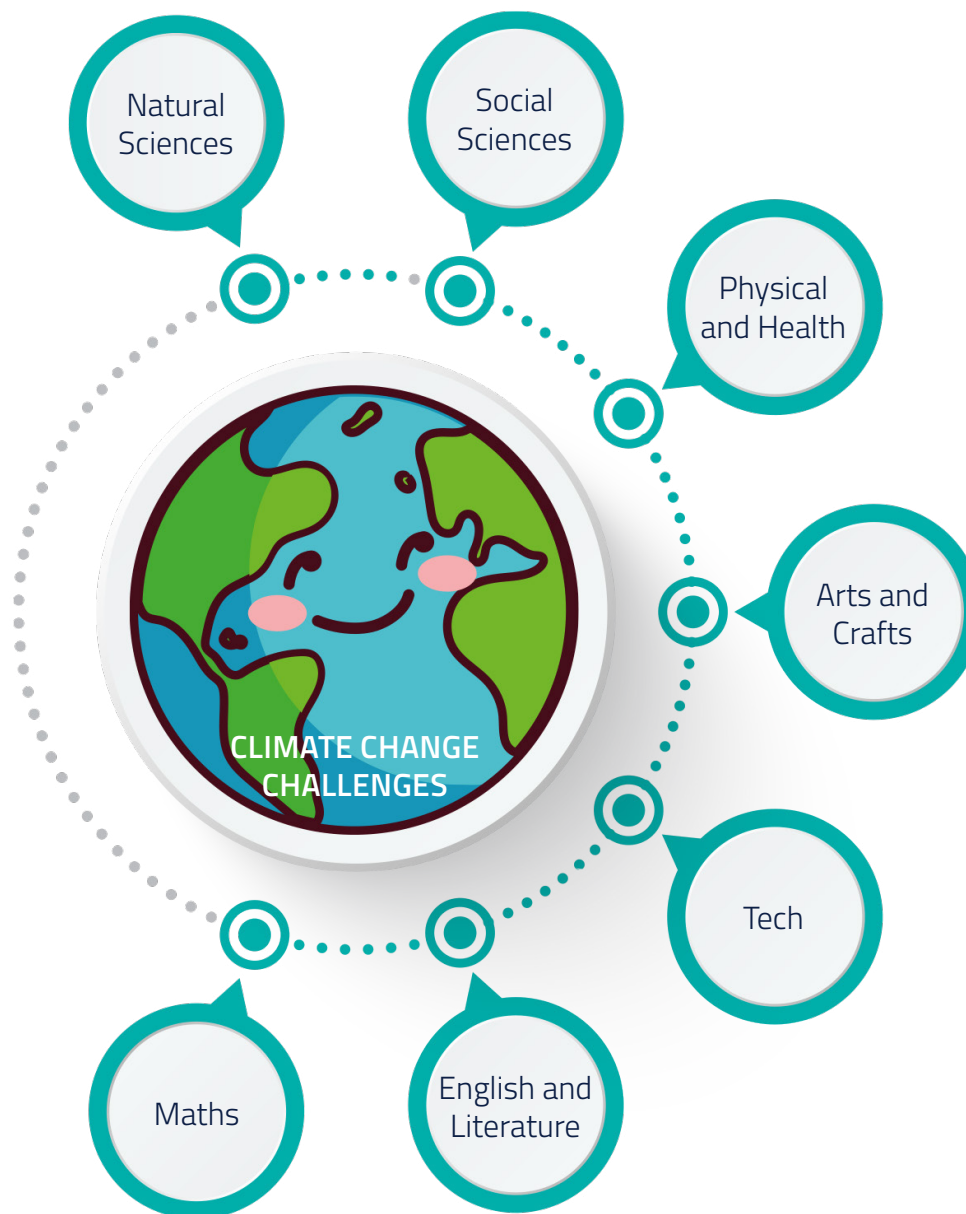


Table for curriculum alignment:  
relation between common curricular  
subjects and sustainability topics that  
can be covered by the challenge.

		MOST COMMON SECONDARY EDUCATION CURRICULAR SUBJECTS							
		ARTS EDUCATION	EARTH SCIENCES Geography	DESIGN AND TECHNOLOGY	MATHS AND ENGINEERING	NATURAL SCIENCES Biology	ENGLISH LANGUAGE Literature	SOCIAL STUDIES Economics, Ethics, Religion	Physical education Health education
TOPICS COVERED BY YOUNG INNOVATOR'S CHALLENGES	Climate action	✓	✓					✓	
	Sustainable communities		✓			✓		✓	
	Smart cities			✓	✓			✓	
	Sustainable mobility			✓				✓	
	Renewable energy		✓	✓	✓	✓		✓	
	Healthy lifestyles - active mobility, diet	✓			✓	✓	✓		✓
	Oceans - clean water	✓	✓	✓	✓	✓	✓	✓	✓
	Food waste			✓	✓	✓	✓	✓	✓
	Life on Earth - animals ecosystem	✓	✓	✓	✓	✓			
	Responsible consumption (fashion, food...)	✓			✓		✓	✓	✓
	Clean air and pollution		✓	✓	✓	✓			✓
	Green infrastructure and Nature based solutions	✓		✓	✓	✓			
	Circular economy	✓		✓	✓			✓	

## Our Learning Outcomes cover essential education competencies and future skills

Education has a vital role to equip young people with new skills that enable them to adapt and thrive in a future that is increasingly defined by complexity. Whether one calls these 'leadership skills' or 'future skills', there is a consensus on the necessity for collaboration, creativity, and the ability to identify opportunities to act in a changing environment.

This graphic shows the relationship between **Young Innovators Learning Outcomes**, **the main educational competencies in schools**<sup>9</sup>, and common curricular subjects that cover these competencies. The programme's Learning Outcomes are at the core of this dynamic, meaning that it can easily be aligned with your curricular needs and/or objectives.

For example, you can develop your students' numeracy competencies by adding mathematical data as a resource of information when exploring the local challenge with your students. If your focus perhaps is more on literacy competencies, you could add complementary written or oral exercises that help students communicate their knowledge about the sustainability issues at hand.

As explained before, whether you choose to integrate Young Innovators into your curriculum or carry it out as an extracurricular activity, our pedagogical approach and methodologies will help your students develop essential skills that prepare them for the future.

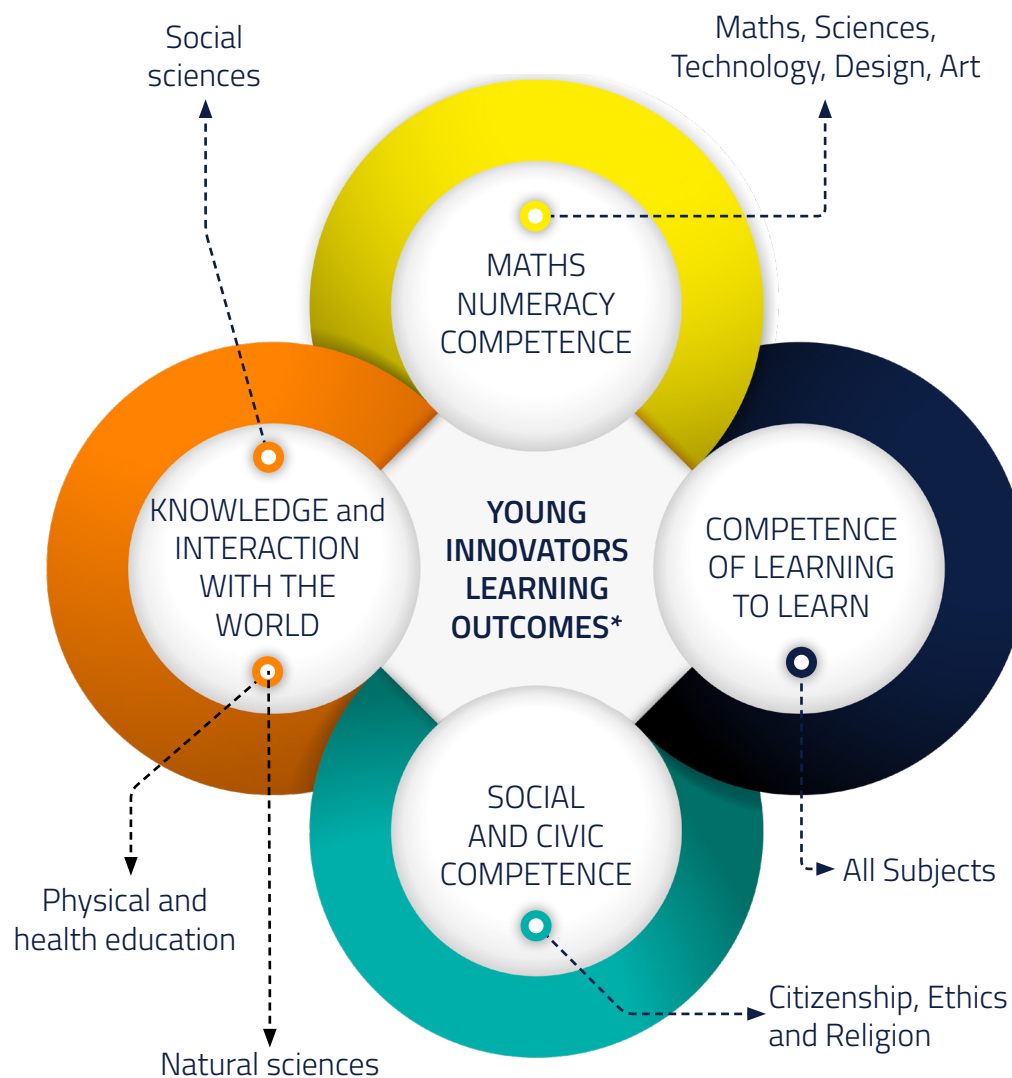


Diagram on competencies integration: relation between the Learning Outcomes of Young Innovators with general education competencies

\* Learning Outcomes can be found on page 13 of this Handbook.

<sup>9</sup>COUNCIL RECOMMENDATION of 22 May 2018 on key competences for lifelong learning (Text with EEA relevance) (2018/C 189/01)

## Your turn: try aligning the programme with your own teaching plan

To gain a better understanding of how you can fit Young Innovators sessions into your own teaching plan, we have developed **Lesson Plan 1.1** (the first one of the Toolbox), which helps you find linkages between both. We also give you an overview of the amount and length of the Lesson Plans that are included in the programme, so that you can start thinking about your own timeline.

Although it is recommended that you try to integrate all Lesson Plans into your schedule, if you have any type of constraints, you can consider leaving those that least match your teaching goals.



## When to introduce Young Innovators in class?

Once it is realised that climate change is cross-curricular and conceptually connected to many topics you may teach in class, you can start figuring out when to introduce the Young Innovators sessions with your students. That means, finding the time and space to work with your students. Some tips to plan the Young Innovators sessions are:

- » **Try to schedule the sessions on a regular basis** (one or more times per week/bi-weekly/monthly) to make it easier to follow-up the process and maximise the Learning Outcomes;
- » **Our Lesson Plans vary in length** - from 45 minutes up to 2 hours. We recommend planning a slightly longer amount of time so that you can include breaks and energisers.
- » Make sure that, before starting your Young Innovators session, **you have read the corresponding Lesson Plan** and have organised all materials needed.
- » You can either work in your classroom or decide to find a different **space** to inspire your students. How about going outside?<sup>10</sup>

<sup>10</sup> Outdoorclassroomday.com, 'A Summary Of The Survey Findings Conducted For Outdoor Classroom Day 2018', accessed 20 June 2020.

## DECIDE ON THE CHALLENGE

- » **Previous step:** You have aligned the programme with your teaching planning
- » **Desired outcome of this section:** Find and engage with the challenge owner and gather all relevant information you need to frame the challenge and introduce it in class.
- » **Next steps:** Move to **Module 1** and introduce the programme to your students.

Once you have understood the framework of the programme, aligned its principles and goals with your teaching plan and decided how Young Innovators sessions fit in class, you are ready to move forward and find a challenge that inspires your students and yourself!

What do we understand when we use the word 'challenge'?

The news about our natural world and our current climate emergency often seems like something that comes directly out of a horror movie: devastating wildfires, an unprecedented climate crisis, mountains of pollution, etc.

But if we choose to take an active, realistic optimistic approach to exploring the many ways we can contribute to rebalance our planet, we will find opportunities for change where others only see obstacles. We will find a challenge: a demanding or stimulating situation in our lives or communities; a call to engage with a social or environmental cause we care about. This mindset shift from 'problem' to 'solutions' will unlock your student's inner change-maker and put them on the path to build a better future.

<sup>11</sup> M. Magnell and A.K. Högfeldt, 'Guide to challenge driven education', 2015.

<sup>12</sup> M. Nichols, K. Cator, K. and M. Torres, 'Challenge Based Learner User Guide', 2016.

<sup>13</sup> Learning by doing (also in glossary): a hands-on approach where teaching and learning is based on the reality of the students' experience, developing learner autonomy and independence.

## Why a challenge?

To be able to go through a challenge-led process, students need a good basis of specialised knowledge in core educational subjects, which remain at the heart of their school curriculum. Young Innovators aims to strengthen and complement this specialised knowledge through open-ended, challenge-led, interdisciplinary teamwork - creating a positive environment that stimulates learning amongst peers and teachers. Students are empowered to understand complexity, experiment, fail, observe the consequences of their decisions and finally thrive. This approach enables students to bridge the gap between knowledge and societal demands, enabling them to make a positive impact on society.<sup>11</sup>

Furthermore, adding challenges to learning environments often results in a sense of urgency, passion, and ownership – ingredients often missing in schools.<sup>12</sup> And you, as a teacher, will see the value and impact of learning by doing<sup>13</sup> and learning through reflection along the way.



Please bear in mind that all challenges, no matter if the main focus is either social or environmental, should always have a strong link with a climate-related issue.



## Who is your challenge owner?

The challenge owner is the individual, group or organisation who proposes a real and local problem to be tackled by your students. Examples of challenge owners are:

- » **Political and sectoral institutions:** the city hall, ministries, universities...
- » **Local businesses:** factories, grocery store, farmers, fauna and flora carers...
- » **Local community:** An innovation hub, the flea market, a whole neighbourhood, the school community...

### Play4Volt

Dutch Project developer Habitoo wanted “more leeway to realize a nature-inclusive housing project”. Their question ended up with a team of young changemakers in Zeist, The Netherlands. Their solution? Play4Volt: a playground with dynamos to use the energy of children playing to generate electricity. Sander Dobbenga, strategist at Habitoo, is enthusiastic about the integral concept of Young Changemakers: “What I find amazing is that the students didn’t focus on just one aspect, but saw and approached the question as a whole. This innovative thinking is exactly what the world needs.”

## Find your challenge

To find a challenge, your first step is getting in touch with your Young Innovators local **Delivery Partner**<sup>14</sup>, who is going to help you along the way. When aligning the programme with your curriculum, you probably started thinking about certain subjects and competencies that should be covered by the challenge. **If this led to a preference when it comes to the topic of the challenge** or the type of organisation you would like to involve, let your local Delivery Partner know, who will find and get in touch with an appropriate challenge owner and will facilitate the communication between you.

If you have no preference for the challenge topic, or **if you want to be surprised** with a challenge, your Delivery Partner can also provide you with a ready-made challenge of the current local landscape. This challenge could come from any challenge owner in your local community, or from another EIT Climate-KIC<sup>15</sup> programme nearby.

**Another option is framing the challenge around an issue that is going on in school.** If you or your students have identified an issue related to climate-change that needs to be solved, you can share this idea with your Delivery Partner. If the topic is found suitable, you need to determine who the challenge owner will be (for example the school director, the canteen staff, the gardener...). Together with the Delivery Partner and the challenge owner you then frame the challenge.

<sup>14</sup> Delivery Partner: are the partners we have throughout Europe to help educators embed their programme locally (also see Glossary).

<sup>15</sup> EIT Climate-KIC is a European knowledge and innovation community, working towards a prosperous, inclusive, climate-resilient society founded on a circular, zero-carbon economy. It is the organising organ of Young Innovators and many other programmes. This large network opens up new opportunities to connect with their partner organisations and work together to unlock systemic change. <https://www.climate-kic.org/>

## Make the challenge understandable and inspiring

Once you have selected a challenge, either your Delivery Partner or the challenge owner should provide you with an introductory one-pager. This (easy to engage with) document is meant for your students to be read at home to prepare for the challenge. You might also receive other supporting resources for students such as videos, images, maps, infographics, etc.

You can also gather additional relevant information yourself, which you consider helpful for your students to make sense of the challenge. Find inspiration and resources in the Young Innovators Learning Platform to enhance the presentation and understanding of the challenge.



## Set a date for the challenge presentation

With all the materials ready, you can now set a date with the challenge owner to present the challenge. If possible, we would highly recommend you to plan a face to face meeting. If this is not possible, you can also arrange for a conference call or use a ready-made video of the challenge owner.

This is a great opportunity to make your students feel that they are part of something real and important. Therefore, the more committed the challenge owner is, the more opportunities for your students to ask, share and co-create knowledge. In turn, this will increase the engagements and enthusiasm of your students themselves.



## Module 1

# STUDENTS GET READY FOR THE CHALLENGE

Did you grasp the 'big picture' of Young innovators and have you taken the time to align it with your teaching plan? Then you are ready to introduce the programme into your classroom and start creating excitement about the discovery journey your students are about to embark on!

Module 1 has everything you need to gradually unfold the programme's concepts, dynamics and ways of doing. You and your students start to put system innovation into practice in order to understand climate change challenges. Let the adventure begin!



## INTRODUCE THE YOUNG INNOVATORS PROGRAMME TO YOUR STUDENTS

- » **Previous steps:** you have understood the programme; aligned it with your teaching plan (1.1 Planning Align your programme) and decided on a challenge (Lesson Plan 1.2).
- » **Desired outcome of this section:** students are excited to engage with the programme.
- » **Next steps:** Get ready to deliver basic climate change and sustainability knowledge to the classroom.
- » **Supporting resources:** Young innovators Learning Platform

Introducing a new programme in the classroom requires you, as a teacher, to strategically combine several important factors such as **creating an atmosphere** that supports learning, and setting reasonable expectations for learning outcomes. Studies<sup>16</sup> have shown that most important predictors of school satisfaction were positive school climate, support from teachers and frequency of modern teaching methods.

**Young Innovators can help you** provide a positive classroom environment that encourages student achievement and teacher satisfaction alike.

### Set the scene

Impressions, especially first ones, will be key to the results and outcomes. The first sessions of the programme will be vital for establishing your classrooms culture and expectations. So we have designed a set of creative materials to help you set the scene and inspire your students to join you on board: you will find helpful resources in the Young Innovators Learning Platform.

### Tap into your student's interest

"Why do we have to learn this?" It's the question that haunts every teacher. When school-work doesn't seem relevant, students quickly lose interest and stop learning. To prevent this from happening when introducing the Young Innovators in the classroom, remember to tap into your students' interest. You can focus on:

- » The unique chance to **face real-world climate challenges**;
- » The authentic, **meaningful collaborations** that will arise from this challenge
- » The opportunity to **connect with stakeholders**<sup>17</sup> that are involved in the challenge, such as municipalities, non-profits organisations, entrepreneurs and local businesses;
- » The **chance to share their projects** with other 'young innovators' around the world, by joining light house events such as a Young Climathon;
- » They are going to **have fun!**

<sup>16</sup> M. Sakic Z. and Raboteg-Saric (2011): School and classroom climate and student (dis)satisfaction with school, 2011.

<sup>17</sup> See Glossary.

## Find a 'youth changing the world' story to inspire your students

From small kids to elderly people, we all love stories. Our brain thinks in stories: they activate a part in our brain that helps us remember **and better engage** with the given information. Indeed, telling a story in class is ingrained in many teachers' pedagogical repertoires as an alternative way to introduce course material beyond a straight lecture, with the added benefit that students will find this way of learning more interesting and entertaining.<sup>18</sup>

To take advantage of this neuroscience fact, we recommend that you use this technique to inspire your students when introducing the programme into your classroom: engage with your students by **showing what other young people are doing to take action**. You can look for videos and books on the internet or browse through the Young Innovators Learning Platform to find some recommendations.

## Introduce Learning Diary

As you may have experienced, reflection is a powerful tool to help students look back and think about what they thought, felt or saw during an event or experience. This also helps you, the teacher, as you receive valuable feedback on your students' learning processes. Not only on their learnings of conceptual knowledge, but also the emotional experiences that impact your students' ability to learn. Research shows that a good support of these types of emotional needs leads to higher academic achievements and a more positive sense of wellbeing.<sup>19</sup>

Therefore, **after each of our Lesson Plans we include a reflection exercise**. We suggest you provide your students with a special notebook to be used as a 'Learning Diary' for these reflection exercises. Alternatively, you can invite them to buy one themselves or recycle an old notebook that still has empty pages.

Having a Learning Diary to reflect on their thinking in a systematic and fun way will be a powerful tool to enhance your student's experience with the Young Innovators programme.

<sup>18</sup> S.M. Kromka and A.K. Goodboy: 'Classroom storytelling: Using instructor narratives to increase student recall, affect, and attention', 2019.

<sup>19</sup> J.A. Durlak et al., 'The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions', 2011

## DELIVER BASIC CLIMATE CHANGE AND SUSTAINABILITY KNOWLEDGE IN THE CLASSROOM

- » **Previous steps:** you have introduced the Young Innovators programme to your students.
- » **Desired outcome of this section:** students are able to relate their individual and collective actions and behaviours with the effects of these on the environment.
- » **Next steps:** Get ready to create a basic understanding of systems and system innovation with your students
- » **Supporting resources:** [Lesson Plan 1.2](#)

We have already shared how climate change introduces challenges many topics and issues that can be covered across your curriculum. Previously, you have prepared your own approach of how to interweave these concepts into your teaching plan. Now it is time to introduce the topics to your students. The current Module gives you tips and tricks that can help you towards this purpose.

### How to introduce climate change into the classroom in an engaging positive way?

Climate change is a topic of interest for young people, but introducing it in a classroom for the first time may feel challenging for you. The main barrier is that it is such a broad topic that can be hard for teachers to translate into youth-speak without overwhelming them—or even scaring them.

Luckily, there are many activities, tips and resources available (see [Lesson Plan 1.2](#)) that enable you to first engage your students with the topic at a more emotional level to then gradually introduce climate change problems and solutions. This helps them to feel safe to express their worries and anxieties about the changes that are happening in the world. Gradually, students gain the ability to relate their individual and collective actions and behaviours to the effects of these on climate change. In turn, these reflections can help students gain the confidence and trust in their influence and impact by generating solutions.

If you are interested in diving a bit deeper into how to talk with your students about the climate emergency, we recommend you to enrol in the EIT Climate-KIC course 'Engaging people on Climate Change'.<sup>20</sup>

<sup>20</sup> EIT Climate-KIC course: 'Engaging people on Climate Change'. Can be accessed through: <https://learning.climate-kic.org/fr/programmes-and-courses/engaging-people-on-climate-change>

This course explores engagement from a different angle, introducing a transdisciplinary approach that integrates traditional messaging, behavioural and systems innovation approaches but also taps into an often-ignored psychosocial perspective. If you are interested in diving a bit deeper into how to talk with your students about the climate emergency, we recommend you to have a look to EIT Climate-KIC's course 'Engaging people on Climate Change'. You can check 'Engaging people on Climate Change' directly in [this link](#).

Once you feel confident talking about this topic, you can follow the next sequence to introduce it to your students



### START NOW... AND LEARN AS YOU GO!

We have developed [Lesson Plan 1.2](#) to help you introduce climate change and sustainability topics for the first time in class.



### MAKE IT LOCAL

The challenge topic you will lead this 'climate conversation' about how climate change is interconnected with community action.



### END WITH INSPIRATION

Find out what climate change looks like for young people like your students around your country or beyond and illuminate the path forward for them to be conscious, nature-minded citizens by bringing to the classroom stories about collective action and collaboration towards climate action.

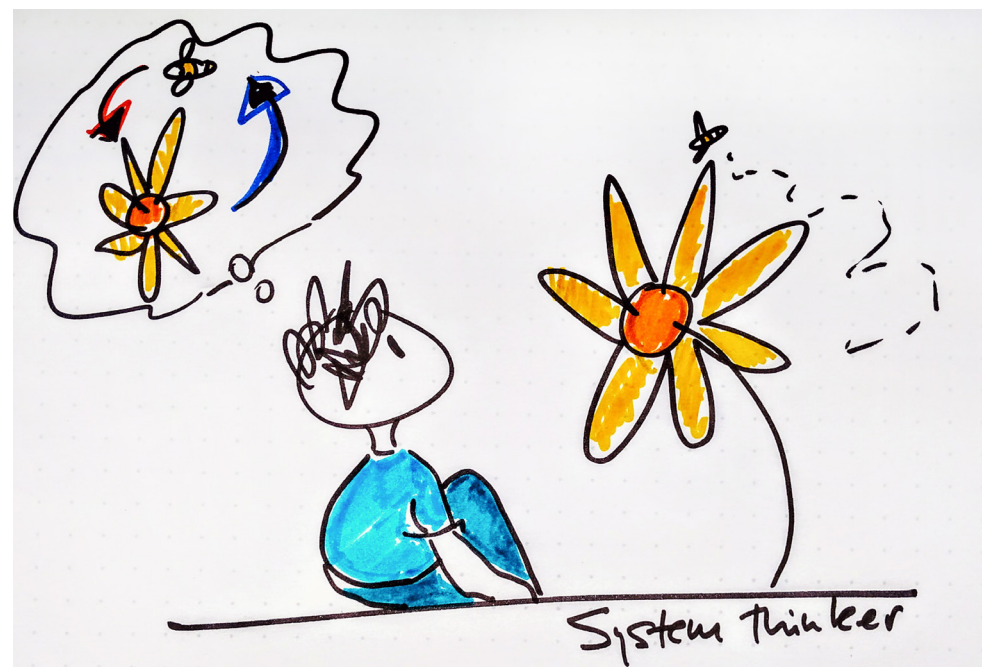


## GET A GRIP ON SYSTEM INNOVATION

- » **Previous steps:** you have transferred some basic knowledge on sustainability and climate change to your students; you have created enthusiasm around the topic by introducing the Young Innovators programme and its challenge-led approach.
- » **Desired outcome of this section:** your students experience what a complex system is, and how it is affected by elements that are removed from or added to the system.
- » **Next steps:** you help your students understand what system innovation is and why it is important when talking about climate change.
- » **Supporting resources:** [Lesson Plan 1.3](#)

As explained in the introduction of this Handbook, Young Innovators uses system innovation as an approach for students to better understand our climate emergency, while simultaneously empowering them to come up with innovations that help solve it.

While as a teacher you don't have to become a systems innovation expert, it is important to be familiar with the basics of the concept as it will help you understand why the approach is so important in the context of climate change.



### Core concepts of the programme: systems, system innovation and challenge-led learning

To get a good feeling of the 'why' behind the activities and exercises of the Young Innovators programme, **it is important to first understand what a system** is. After shortly elaborating on this concept below, we explain and exemplify the concept of system innovation. Finally, we elaborate on how the programme puts this approach into practice through challenge-led activities.



## SYSTEMS

A system is a structure formed by several elements and the relationships established between them. These structures can change according to the influence and evolution of individual elements.

Examples of systems are our human systems such as political systems made of associated institutions; economic systems that drive production; social systems governed by rules; and natural systems or ecosystems dealing with biodiversity, climate, water, and more.



## SYSTEM INNOVATION

System innovation is an approach to innovation based on the awareness that any change we plan to introduce in a particular sector in society will affect and be affected by other parties. We speak of system innovation when profound innovation happens within a system, making this system transition into something new.<sup>21</sup>

Some profound examples of system innovation are the agricultural and the industrial revolutions, both of which fundamentally changed how societies operate.



## PUTTING SYSTEM INNOVATION IN PRACTICE<sup>22</sup>

This system innovation framework is aimed at providing with the tools, the practice and the mindset necessary to apply a systemic perspective to the challenge.

When applying system innovation, you go beyond the linear approach sometimes used, in which there is the tendency to focus on the obvious problems and jump right into solutions. Instead, you are able to see the big picture and how the different parts of it are interconnected. It doesn't make these challenges any less complex, but it gives us a way to embrace that complexity and work toward solutions.



## SYSTEM MAPPING<sup>23</sup>

System mapping is a fun, interactive and participatory dynamic whereby you guide your students through visual tools as well as open, dynamic discussions. Next to creating a better understanding of the context, relationships and influences within a challenge, system mapping uncovers new perspectives and hidden opportunities that will help students to later identify solutions for positive change.

Since the Young Innovators programme is led by challenges, the starting point of using system mapping is their real and local context.

<sup>21</sup> C. Matti et al., op. cit., p. 12.

<sup>22</sup> J. De Vicente, 'Systems Innovation framework :A framework for systems innovation to come true', 2018.

<sup>23</sup> C. Matti et al., op. cit., p. 19.







## Transfer the essence of system innovation to your students

Once you understand the basics of system innovation yourself, it is time to transfer this understanding to your students.

However, rather than directly sharing concept definitions with them, [Lesson Plan 1.3](#) provides you with a set of playful and dynamic activities so that your students can actually experience the concepts. The main goal here is to set the scene and make your students enthusiastic about applying system innovation techniques to the upcoming local challenge.

We highly recommend you to take enough time to reflect on the main takeaways of [Lesson Plan 1.3](#). These are crucial for getting your students into the right mindset for the rest of the programme, while providing them with the necessary knowledge about system dynamics.

These can be summarised as followed:

- 01  In systems, everything is connected;
- 02  Systems are constantly changing;
- 03  Change definitely happens if you add or take away a part of the system;
- 04  Change can have either positive and negative consequences for the system;
- 05  If the negative consequences are too large, the system can collapse;
- 06  System collapse can be avoided by intervening on time.

## CLIMATE CHANGE IN THE LIGHT OF SYSTEM INNOVATION

- » **Previous steps:** students gained knowledge of the concept of complex systems and started understanding basic system dynamics.
- » **Desired outcome of this section:** your students are able to see climate emergency from a system's perspective and reflect on why this new approach is needed to address climate and sustainability challenges; give students the confidence that they are part of the solution.
- » **Next steps:** engage in the local challenge (next Module).
- » **Supporting resources:** Lesson Plan 1.3 and 1.4

Solving today's pressing problems requires understanding the big picture – to gain a quick understanding of the whole and to be able to convey it to others in a simple way. To change systems, the web of interrelations and complexity has to be understood.

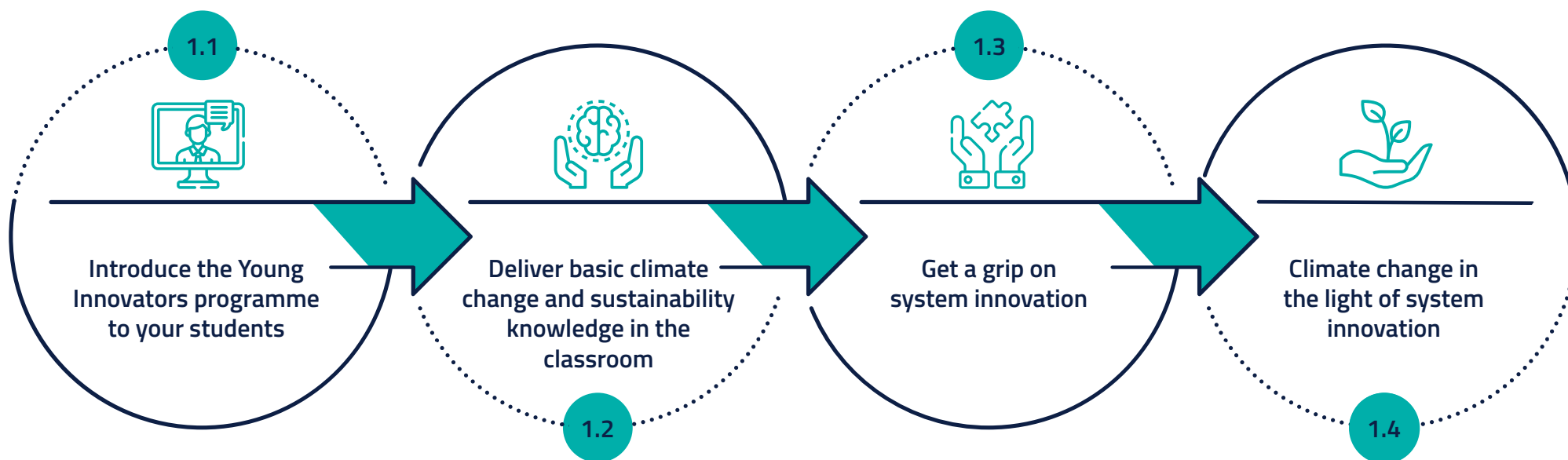
The Young Innovators programme uses the system innovation approach because we believe that the only way in which our current climate emergency can be solved, is by triggering a profound transition in our current systems. In the previous section we briefly introduced this narrative; in this section we dig a bit deeper, as it will help you with facilitating your students' learnings during this Module's activities.

The main exercise of Lesson Plan 1.3 and 1.4 is for your students to create a systems map around the global 'challenge' of climate change. Next to helping you with transferring the system innovation narrative to your students, this exercise is also a great way of consolidating your students' knowledge on climate change. Furthermore, this exercise helps to prepare your students for Module 2, as they will already be familiar with the tool when facing the local challenge.

### Why is understanding system innovation important for solving our climate emergency?

Elaborating on the main takeaways listed in Module 1.3, helps to understand why system innovation is a helpful approach for addressing our current climate emergency. Simply explained: the recent changes in our climate system are having negative consequences in other environmental, social and economic systems. Although the great majority of the world's climate scientists (united in the Intergovernmental Panel on Climate Change)<sup>24</sup> say that we are still on time to act and avoid these systems from collapsing, society will have to undergo a profound transition in its systems to do so. The bottom line is that, with the right interventions, we can still get out of the state of the climate emergency:

<sup>24</sup> V. Masson-Delmotte et al., 'Global warming of 1.5 C. An IPCC Special Report on the Impacts of Global Warming of 1.5°C', 2018.



After the system mapping exercise that is explained on the next page, students will reflect on the link between climate change and system innovation. We highly recommend you to try to get across (your own version of) the above narrative during the reflection process.

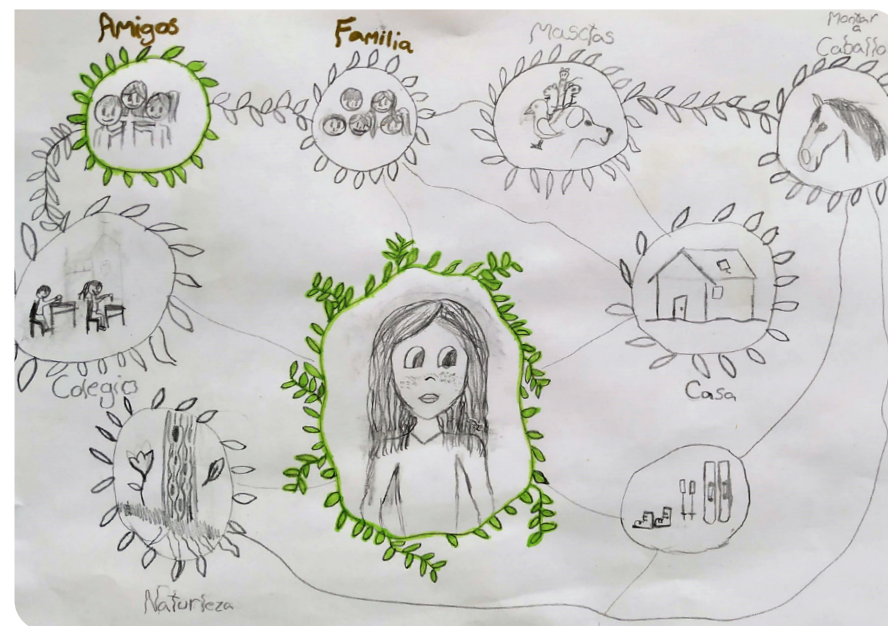
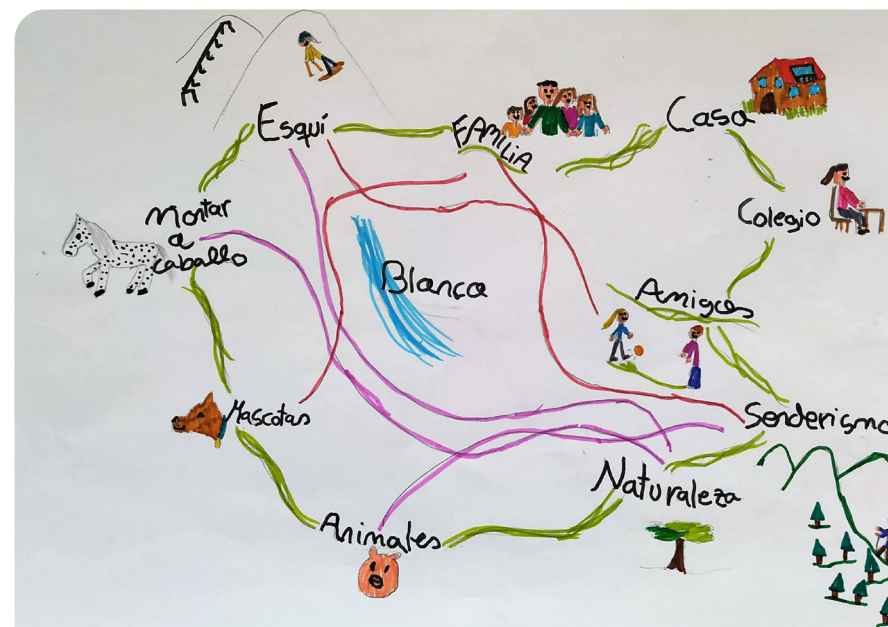
## System maps for understanding the big picture of climate change

Time to get started with system mapping! Our [Lesson Plan 1.3](#) takes you and your students through the full process of exploring the most important elements of climate change, and reflecting on how these elements are interconnected and influencing each other.

Important to mention is that the system mapping exercise of [Lesson Plan 1.4](#) (part 1) is quite content heavy, involving hard knowledge on the causes and consequences of climate change. Remember that your goal here isn't to explain this content to your students, but rather to coach them through the knowledge that they already have.

The outcome of this exercise is a clear overview of the system dynamics that surround climate emergency. Hence, when reflecting on the system map, it is recommended to transform the 'alarming' mood about climate change that might have arisen from the exercise, into a positive 'action-hungry' mood. To do so, [Lesson Plan 1.4](#) (part 2) provides playful exercise, where students uncover their own super powers and think of the best way they can personally contribute to solving climate change.

Wrap up this Module by reminding students of the good news: they are already contributing to solutions by being engaged in the Young Innovators programme! Make sure to enthuse for the upcoming challenge and start thinking of inspiring resources you can provide them with about the challenge owner and the broader topic of the challenge.



"Map your life" exercise done by Blanca & Elena Sanchez de Ribera, 12 years old, Spain.

## Module 2

# EXPLORE THE CHALLENGE

By now, your students should feel really excited to finally start working on the local challenge. Module 2 finally reveals the real-life issue that they will be engaging with for the rest of the programme. Let the challenge exploration begin!



## CREATE TEAMS

- » **Previous steps:** students have learned about systems and climate change, and understand how system innovation is needed to solve our climate emergency.
- » **Desired outcome of this section:** form diverse teams; have students understand their role within the team and communicate expectations.
- » **Next steps:** present the local challenge.
- » **Supporting resources:** [Lesson Plan 2.1](#)

The very first step before getting to work with the challenge, is to divide your student's group into smaller working teams. How you do the team formation is completely up to you, but in this section we give you a few tips for running this process smoothly.

### Team formation and team building

Forming teams might seem like a simple step that doesn't take any consideration. After all, can't you just tell students to break into groups? Well, they can, but this process can take a long time and might not be beneficial to everyone. Some students tend to group up based on social ties, which often leads to chattering instead of having them focused on the challenge. For other students team formation brings social anxieties to the surface, leaving them feeling overwhelmed before the activity has even begun. Therefore, taking a few minutes to think about how to divide students into teams can go a long way toward making sure that they accomplish all you hope they can.



Once teams are formed, during the first session of this Module go through the 'team agreement' exercise explained in [Lesson Plan 2.1](#). In this exercise teams identify their group values, as well as a set of ground rules, that will define the relationship and expectations of the team. Also, this is a great moment for you to further generate enthusiasm and excitement within the teams for the upcoming challenge.

## Understanding the stages of team formation

It might take some time for your students to adjust from being a group to being a team. While some students may feel more comfortable in their team than others, it is almost certain that all teams will have to find their own way to collaborate.

For teams to collaborate effectively, the students in the team must be able to work together to contribute collectively to team outcomes. But this won't happen automatically: it will develop as the team works together on our activities and exercises. Team work usually follows easily recognisable stages, known as forming, storming, norming, and performing<sup>25</sup>. In the 'Extra resources' section of [Lesson Plan 2.1](#) we further elaborate on these four stages; understanding these team dynamics will help you in supporting and accelerating effective teamwork.



<sup>25</sup> B.W. Tuckman, M.A.C. Jensen. 'Stages of small-group development revisited', 1977.

## PRESENT THE CHALLENGE AND START EXPLORING IT

- » **Previous steps:** students have been grouped in diverse teams and feel excited about the launch of the challenge.
- » **Desired outcome of this section:** students have a good overview of the challenge.
- » **Next steps:** help students understand the system in which the local challenge is embedded and identify 'what is going wrong' in this system.

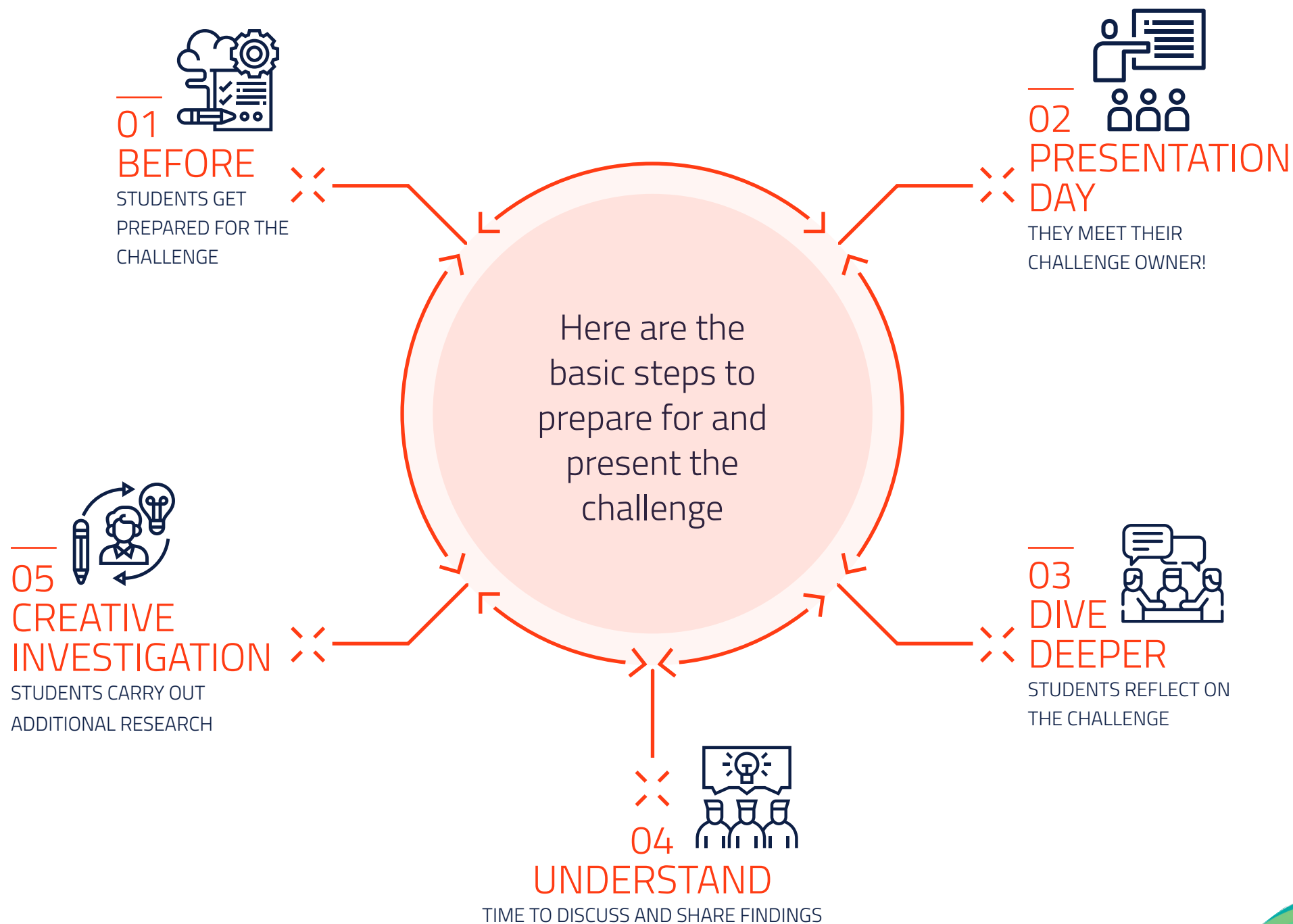
### Have the challenge owner present the challenge

The moment of the challenge presentation is a key point of the programme. A challenge that is not well explained or poorly backed-up can be detrimental to the rest of the process. Therefore, it is important to have a challenge that is clearly formulated and a challenge owner representative that has the right communication skills to engage with your students.

In whichever way the challenge is presented, the most important goal is that students feel enthusiastic afterwards and can't wait to get to work.

Your role here is to encourage engagement with the programme and inspire a hands-on mindset.





## TEAMS MAKE A SYSTEM MAP OF THE CHALLENGE

- » **Previous steps:** the challenge was presented and students carried out an initial exploration.
- » **Desired outcome of this section:** students get the big picture and identify problems.
- » **Next steps:** each team creates its own challenge path.
- » **Supporting resources:** [Lesson Plan 2.3](#);

The system mapping exercise in [Lesson Plan 2.3](#) helps to create a better understanding of the local system in which the given challenge is embedded. Having practiced with this process in the previous Module will help your students get through the current exercises with fluency.

The input of the system map is guided by five simple questions, which help students take a step backwards and analyse the context of the given challenge. Teams first identify the bigger issue or problem behind the challenge, followed by a search for the causes and consequences of this issue. The main goal is to have students reflect on the environmental, social and economic factors that are surrounding the local challenge.

Once all the details of the issue have been explored, teams cluster or group similar ideas and start finding connections and relationships between these clusters. The purpose here is for students to create a complete overview of the different elements of the system and understand how these elements are interconnected and constantly changing.

Reflecting on the different elements and relationships within the system helps students to identify a set of dynamics that are 'going wrong', or said differently, to diagnose 'problems' within the system. Hence, the concrete output of this Lesson Plan is a shortlist of problems that can directly be related to the local challenge.



## TEAMS RE-FRAME THE CHALLENGE AND CHOOSE THEIR OWN CHALLENGE PATH

- » **Previous steps:** students started to understand the context of the challenge.
- » **Desired outcome of this section:** teams find a set of pathways that could all solve a different part of the broader challenge, and choose the one that they would like to solve most.
- » **Next steps:** (Module 3) further reflecting on the influencing factors of the challenge, to ultimately come up with opportunities for change
- » **Supporting resources:** [Lesson Plan 2.4](#)

Given challenges are often broad, not specific enough, and impersonal. That is why the next step is for each team to choose a specific perspective of the challenge to continue with. Those that we call the 'challenge paths', are formulated based on the most pressing problems previously diagnosed in the local system. Students reframe these problems into immediate and actionable challenge statements.

Teams then have to choose for which challenge path they want to find a solution. Since the rest of their Young Innovators programme is dependent on this decision, the right guidance in this decision-making process is crucial. Our [Lesson Plan 2.4](#) suggest that you help your students through this decisive phase through a voting exercise based on two criteria:

- » The level of enthusiasm they feel and about each challenge path; and
- » The impact made if the challenge path would be solved.

Even if the lesson plan suggests a very specific process for choosing challenge paths, we would invite you to add your own flavour to this dynamic, as you know your students best and have experience with motivating them. Most importantly, make sure that each student is included in the process, and that everyone feels engaged with and passionate about the team's final choice.



Challenge reframing encourages engagement, leading to more focused and better problem solving.



## Module 3

# IDENTIFY OPPORTUNITIES FOR CHANGE

When dealing with climate change challenges we are confronted with complex systems, which tend to be chaotic and not easy to understand. It takes patience and practice to analyse and start grasping what is going on in these systems. However, instead of taking our time to observe the dynamics within systems, **our brains have the tendency to jump right into tackling the most superficial problems and finding quick opportunities and solutions.**<sup>26</sup> It is then crucial to create an awareness amongst your students for these natural behavioural patterns of our brains, thereby explaining how important it is at this point of the process to further deepen their understanding of the challenge before coming up with real project ideas.

Hence, instead of diving into opportunities directly, in this Module we will first make sure your students **understand the full scope and context of their challenge path.** To do so, you can help them analyse stakeholders<sup>27</sup> and their needs (as well as other external factors) – that could either hold the team back from developing a good solution, or contribute to their insights..

Only when students have deepened their learnings on the dynamics that go on within their challenge paths, will they **start ideating**<sup>28</sup> **about creative and innovative opportunities for change.**



<sup>26</sup> R. Mata, Cognitive bias, 2012.

<sup>27</sup> See glossary.

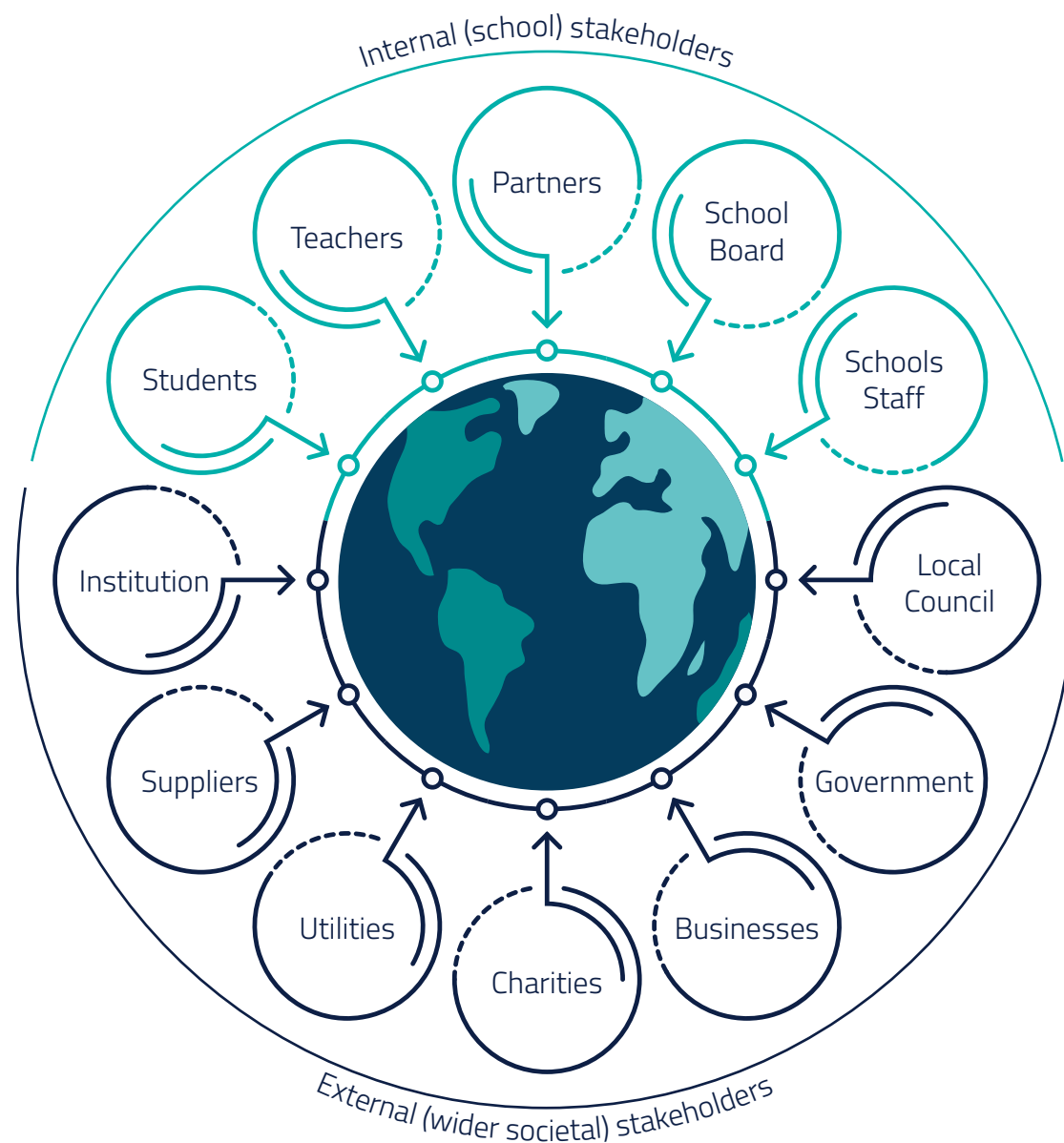
<sup>28</sup> Ideation (also in Glossary): a tool for generating as many ideas or solutions as possible to a problem or issue by creating the conditions for letting go of assumptions and prejudices. This diversity of viewpoints and perspectives generates a creative tension becoming the source for innovation.

## REFLECT ON STAKEHOLDERS: WHO TO GET ON BOARD?

- » **Previous steps:** teams have chosen a challenge path.
- » **Desired outcome of this section:** teams get an overview of all stakeholder groups, and a deeper analysis of the most important ones.
- » **Next steps:** explore the context of the challenge path, including the factors and trends that are influencing it.
- » **Supporting resources:** [Lesson Plan 3.1](#)

In the context of this programme, **stakeholders can be described as those involved in the system of the challenge** – be it a person, a group of people, or an organisation. A stakeholder can be anyone who shows an interest in the challenge path or who is (or thinks she/he is) influenced by the solution. The amount of stakeholders involved in each challenge path and their level of influence can vary greatly.

The aim is to find a real-life challenge that is integral to a system in our society that, with improvement, would reduce negative affects in our environment. Depending on the challenge, examples of stakeholders can be those embedded in the school context: the students themselves, teachers, parents, the school board, other employees of the school- such as the canteen staff of the cleaning personnel. We would encourage you to try to aim for contact with a broader context if possible though, eg: local governments, businesses (including their employees, directives, suppliers, cultural and non profit institutions, local community members, among many others). See Delivery Partners in the Glossary for help with making these connections.



## FIND OUT WHAT IS INFLUENCING THE CHALLENGE PATH

- » **Previous steps:** identifying which stakeholders to get on board.
- » **Desired outcome of this section:** students determine factors and trends that are influencing the challenge path, and reflect on how these can help or hinder them.
- » **Next steps:** generate many ideas to solve their challenge.
- » **Supporting resources:** [Lesson Plan 3.2](#)

When exploring the context of the given challenge in Module 2 your students reflected on the main issues behind it including the environmental, economic and social factors. This helped them better understand the issue and choose a more specific path to address it. Now it is time for your students to start **exploring how external issues can influence their challenge path**.

[Lesson plan 3.2](#) guides you and your students through the process of finding causal relationships between the external world and their challenge path, to then rationalise how each of these can either help or hinder the team in bringing forward a solution. The fun and dynamic format of [Lesson Plan 3.2](#) will help you foster the critical thinking skills of your students, empowering them to go beyond 'just' looking at the obvious.



I was pleased to see how enthusiastic the participants became to develop their own product based on my case. They were able to connect the theme beautifully with their own ambitions and wishes. I was impressed by the level and understanding of the groups and the quality of their pitches. A really valuable way to introduce young people to important topics. They are clearly capable...



Hans Fast (Owner and coach): Off grid techniques for tiny houses - Tiny House 4 Amersfoort

## EXPLORE OPPORTUNITIES FOR CHANGE

- » **Previous steps:** students identified 'enablers' and 'barriers' to start solving the challenge path.
- » **Desired outcome of this section:** teams generate as many creative and different ideas as possible that meet their challenge path.
- » **Next steps:** further develop solutions.
- » **Supporting resources:** Lesson Plan 3.3

By now, your students have made a long journey to understand the system of the given challenge and their specific challenge paths. They also have carried out a deep analysis of who and what to take into account when trying to solve their challenge paths. They are now fully equipped to start thinking of solutions!

**Lesson Plan 3.3** provides you and your students with an ideation exercise to find new ways to meet the challenge. By plotting first all the current innovations within their challenge path, students can identify opportunities that haven't been explored before.

Since this is an ideation<sup>29</sup> exercise, the purpose is not to find a unique solution yet, but rather to come up with the largest amount of ideas. It is about possibilities. Therefore, it is essential that you set the right mindset and create the collaborative atmosphere that is needed for your students to get creative. To help you with this, **Lesson Plan 3.3** has a short introductory game that introduces the four principles for effective ideation<sup>30</sup>.

<sup>29</sup> See Glossary.

<sup>30</sup> Toolbox.hyperisland.com [website], accessed 24 June 2020.

These are simple guidelines to support students' creativity and to think big, so to produce a large quantity of ideas in the initial stage of coming up with ideas.

### 01. Yes, and...

Build on the ideas of others by saying *yes* and adding onto their ideas. Listen actively for opportunities to build and elaborate.

### 02. More is more

In the first stage, it's all about quantity. Focus on getting down as many ideas as possible rather than striving to come up with really *good* ideas. Get it all out.

### 03. Postpone judgment

Suspend your inner critic and resist the urge to evaluate the ideas as they flow out. Anything goes and the time for focused judgement is later.

### 04. Team is everything

Make full use of everyone's brains by ensuring that every team member is included. Create space for everyone to contribute their ideas.

Once you have set the scene and moved on to the actual ideation exercise, your **students should end up with an overview of opportunities and possible solutions** to their challenge path. You then help your students pick one or several ideas to move forward. It is key here to have your students reflect the effects that their ideas could have on the system of the challenge.

Wrap-up this Module by creating buzz and curiosity for the steps to come: out of their shortlisted solutions they will pick a few and create a perfect sustainable future solution!

## Module 4

# COME UP WITH SOLUTIONS AND SHARE WITH THE WORLD

Before deep diving into this last Module, we will quickly recap what you and your students have been through so far:

- » First, you practiced with system dynamics, after which you reflected on real world sustainability issues by uncovering the big picture of climate change ([Module 1](#));
- » Having created a basic understanding of climate change and the complex systems surrounding it, you stepped into [Module 2](#), where the challenge was introduced, the classroom was split into teams, and students engaged with the challenge in different ways;
- » In [Module 3](#) teams started to unfold the challenge, thereby identifying enablers and barriers, and spotting opportunities for change.

Welcome to [Module 4](#)! You are ready to unlock your students' creative potential and witness how they thrive when making positive change. In this final Module you guide your students through the process of finding the solutions needed to build their envisioned sustainable future - and help them think possible steps to get there.



## GENERATE MANY IDEAS FOR SOLUTIONS

- » **Previous steps:** students have identified opportunities for change within their challenge pathway.
- » **Desired outcome of this section:** a vision board of each team's ideal future, where their challenge pathway is completely solved.
- » **Next steps:** students are ready to evaluate the different solutions that they have identified, and end up choosing their favourite one.
- » **Supporting resources:** [Lesson Plan 4.1](#)

Based on the opportunities for change that each team has identified in Module 3, their next step is to generate a large quantity of ideas that could bring those to life. In this context, ideation is about how to unleash and harvest individual creativity and how to turn this into collective intelligence.

To do so, in [Lesson Plan 4.1](#) we guide you through an **ideation process** that uses visioning techniques to spark the creativity of your students. This is something we often do without even noticing it: like when using our imagination to explore alternative possibilities for a problem; or when we question assumptions and use our imagination to explore new possibilities; or when we 'play' to place ourselves into alternative futures.

At the end of this session, teams will have built their **vision boards** of the perfect future with many ideas that could help solve the challenge path. These are not concrete solutions yet, but articulate further wishes to open up space for innovation.

If after going through this exercise, you or your students are not yet happy with the result, don't hesitate to search for other playful idea generation dynamics and test these out in your classroom.



## PICK AN IDEA AND COME UP WITH A SOLUTION

- » **Previous steps:** teams generated vision boards with a wide sample of creative ideas.
- » **Desired outcome of this section:** after picking their favourite ideas, each team has developed a visual story for a concrete solution.
- » **Next steps:** teams set an action plan
- » **Supporting resources:** [Lesson Plan 4.2](#)

After going through an intense ideation process in [Lesson Plan 4.2](#), which has hopefully led to multiple creative and sometimes radical ideas, the time has finally arrived for students to choose and develop their unique solution.

A **solution** can be composed of either a single idea that came out of the ideation exercise(s), or a combination of various ideas. Your role in this process is to help teams to collect their ideas, find patterns, combine and make choices, to ultimately end up with the winning idea(s) that will shape their solution. [Lesson Plan 4.2](#) takes you through a playful activity that helps you complete this task.

At this stage it is extremely important to **create an atmosphere that allows for innovation and action**, where students are able to release their creative potential. To hold this atmosphere make sure you continuously step into the coaching role, keeping teams excited, motivated and engaged with the process. Another recommendation is to carry out this session out of the classroom or event outdoor space – to ignite creativity.



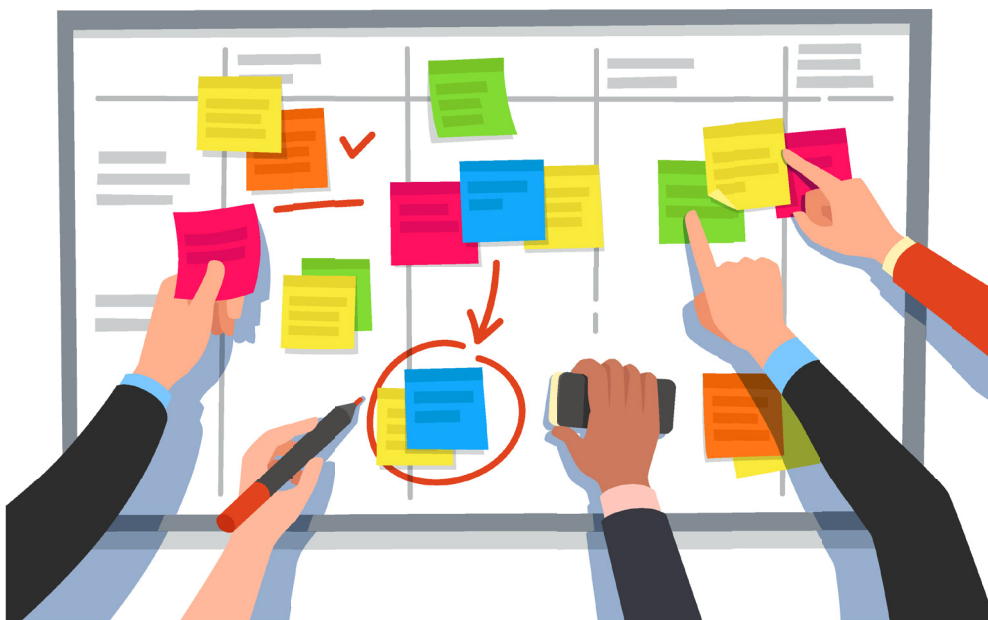
Teams collect ideas, find patterns and make choices to end up with a solution for their challenge path



At the end of this session, your students pause and reflect on the process they just went through and on the outcome to which this has led. The debriefing time will help teams to **start figuring out what steps** are needed to take action, which will be further explored in the next [Lesson Plan \(4.3\)](#).

## CREATE AN ACTION PLAN

- » **Previous steps:** teams have transformed their visionary ideas into more concrete solutions.
- » **Desired outcome of this section:** the solution concepts, the action plans that bring the solutions to life, and (when applicable) the corresponding prototypes.
- » **Next steps:** teams share findings with the challenge owner and try to engage a larger audience with their projects<sup>31</sup>.
- » **Supporting resources:** [Lesson Plan 4.3](#)



<sup>31</sup> Project (also in Glossary): in the context of the programme, a 'project' refers to the whole process of the team working with the challenge, from the system mapping to the presentation of the team's solution.

Now that each team has defined their unique solution, it is time for them to **move from imagination to reality** by making prototypes<sup>31</sup>. In the context of this programme, a prototype is a first model that teams build in order to test the concept that is behind their unique solutions.<sup>32</sup>

The **prototypes** show the implementation of the solution, which could either be a product, service, campaign, change in policy, or anything else that your students thought came up with. [Lesson Plan 4.3](#) provides you with tips and ideas for guiding your students through a fun prototyping exercise.

Once students have developed their unique solutions, they will need to gather everything they have collectively learned to start **drafting a concrete action plan**. At the end of [Lesson Plan 4.3](#) you can help your students with thinking of exciting, yet realistic steps towards making their solutions come true.

The action plans briefly touch upon the steps they will take to make their solution successful.

<sup>31</sup> Prototype (also in Glossary): a prototype is a simple experimental model of a proposed solution used to test or validate ideas, design assumptions and other aspects of its conceptualisation quickly and cheaply, so that the designer(s) involved can make appropriate refinements or possible changes in direction. Source: V. Singh, 'Manage Your SAP Projects with SAP Activate', 2017.

<sup>32</sup> A.H. Blackwell, E. Manar, (2015): 'Prototype', accessed 13 June 2020.

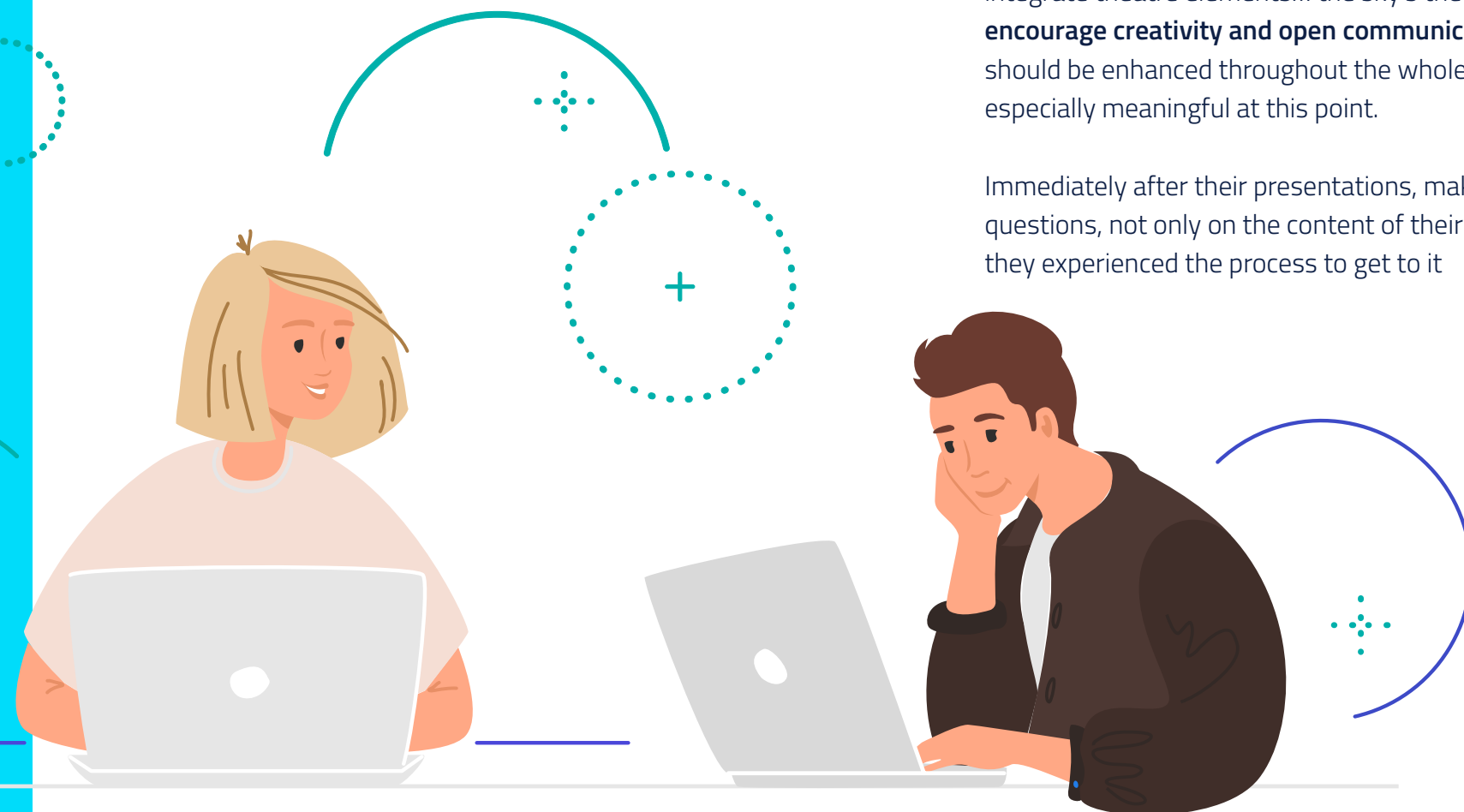
## SHARE YOUR PLAN: PRESENT SOLUTIONS

- » **Previous steps:** teams have an action plan and are ready to share their solutions.
- » **Desired outcome of this section:** students engage with the audience and feel that they can make real change.
- » **Next steps:** time to reflect and celebrate
- » **Supporting resources:** [Lesson Plan 4.4](#)

Each group will share their solution with the rest of the class. If possible, you can **consider inviting the challenge owner and other stakeholders** so that they can appreciate the results of the challenge. Have your students present their prototypes and action plans in an engaging way, avoiding standard slide presentations and encouraging more innovative ways of expression.

They could use videos, develop real prototypes, present an animated storyboard; hold a photo exhibition; use storytelling techniques, and integrate theatre elements... the sky's the limit! Most importantly, **encourage creativity and open communication** - two skills students should be enhanced throughout the whole programme, but which are especially meaningful at this point.

Immediately after their presentations, make sure to ask teams a few questions, not only on the content of their solution, but especially on how they experienced the process to get to it



## HARVEST INSIGHTS AND REFLECT

- » **Previous steps:** teams have successfully shared solutions and their action plans.
- » **Desired outcome of this section:** students reflect on how they connect with what they have learnt and done throughout their project<sup>34</sup>.
- » **Next steps:** praise their effort and hard work that went into their success, is time to celebrate with your students!
- » **Supporting resources:** [Lesson Plan 4.5](#)

Until now, your students are used to reflecting on their learnings using the ‘Learning Diary’ as referred at the end of each Lesson Plan (explained in section 1.1). This has placed your **students on the path of building a growth mindset**<sup>35</sup> – the belief that their talents can be developed through hard work, good strategies and productive feedback from others.

To help them think about the whole process of their team project and not only on the outcomes of the challenge, we have designed [Lesson 4.5](#) so you can guide your students to grasp key insights, and reflect on them. We have included some guiding questions and activities related to both **personal and group reflection**. The three main sections of the Lesson Plan are:


- » Your project and you
- » Your solution and its impact in your community
- » Your project and your future

You can use this Lesson Plan or opt to think of other fun, creative ways to have your students reflect on this process along the challenge pathway with their teams.

### One more time...

Thank you for facilitating, guiding, inspiring, and believing that your students can make a difference!

### Now it is time to celebrate with them!!



<sup>34</sup> See Glossary.  
<sup>35</sup> C.S. Dweck, ‘The new psychology of success’, 2008

# GLOSSARY

**Challenge:** in the context of the programme, challenge refers to any situation in the real world that is perceived as necessary to change or improve. A challenge is concrete, immediate, actionable and should build excitement.

**Challenge path:** a line of work that could solve a different part of the broader challenge being addressed.

**Challenge-led approach:** is multidisciplinary, project-based and problem oriented learning methodological approach that uses challenges as a starting point to learn from real life. It allows students to explore, discuss and meaningfully construct concepts and relationships, ultimately leading to collective solutions to complex problems.

**Challenge owner:** the individual, group or organisation who proposes a real and local problem they are dealing with to be tackled by your students.

**Delivery Partner:** the Young Innovator programme is being rolled out into schools in many different countries via Climate-KIC partners. These partners deliver the programme through their local network of schools and youth agencies. They can offer training and support and introduction to local stakeholders and challenge owners. If you have not been introduced to the programme via a local delivery partner and would like to connect, please leave a request here on the form provided <https://younginnovators.climate-kic.org/get-involved/>

**Ideation:** is a way for generating as many ideas or solutions as possible to a problem or issue by creating the conditions for letting go of assumptions and prejudices. This diversity of viewpoints and perspectives generates a creative tension becoming the source for innovation. Many tools exist to carry out this ideation process.

**Innovation:** the implementation of an element that was not originally part of the system or the reassignment of an existing one. This will solve or prevent the problem identified and lead to an improved and healthier system.

**Learning by doing:** a hands-on approach where teaching and learning is based on the reality of the students' experience, developing learner autonomy and independence.

**Learning outcome:** a clear statement of what the learner is expected to achieve and how he/she is expected to demonstrate that achievement.

**Mindset:** it describes the position from where to operate and relate to others and the reality to make sense of it. In practice, it is a set of values, behaviours and perspectives that guide the way we approach reality.

**Project:** in the context of the programme, a 'project' refers to the whole process of the team working with the challenge, from the system mapping to the presentation of the team's solution.

**Prototype:** a simple experimental model of a proposed solution used to test or validate ideas, design assumptions and other aspects of its conceptualisation quickly and cheaply, so that the designer(s) involved can make appropriate refinements or possible changes in direction.

**Solution:** the design of a process, a prototype or other new approach for how people can do things.

**Stakeholder:** a person, a group of people, an organisation, or anyone who shows an interest or is affected (or has a 'stake') in the challenge.

**System:** a structure formed by several elements interconnected and in which any change we may introduce will affect (and be affected) by other elements that are part of it.

**System innovation:** an approach to solving complex problems by introducing an innovation that will lead to lasting results.

**System mapping:** a fun, interactive and participatory dynamic whereby participants are guided through visual tools as well as open, dynamic discussions that aim at better understanding systems.

**System thinking:** a holistic way of looking at and understanding the dynamics of complex problems and as embedded in a system.

# REFERENCES

- Blackwell, A. H., Manar, E., eds. (2015): *Prototype, UXL Encyclopedia of Science* (3rd ed.). Retrieved 13 June 2020.
- De Vicente, J. and Matti, C., (2016): *Visual toolbox for system innovation*. A resource book for practitioners to map, analyse and facilitate sustainability transitions. Transitions Hub Series. Climate-KIC, Brussels. ISBN 978-2-9601874-1-0.
- De Vicente, J., (2018): *Systems Innovation framework: A framework for systems innovation to come true*. Transitions Hub and Professional Education. EIT Climate-KIC, Brussels.
- Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D., and Schellinger, K., (2011): *The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions*. *Child Development*, 82, pp. 405-432.
- Dweck, C.S. (2008): *Mindset: The new psychology of success*. Random House Digital, Inc.
- Hyper Island, *Toolbox*.hyperisland.com [website], *Idea and Concept Development* <<https://toolbox.hyperisland.com/idea-concept-development>> accessed 24 June 2020.
- Magnell, M. and Högfeldt, A.K., (2015): *Guide to challenge driven education*. KTH Royal Institute of Technology. ISBN 978-91-7595-089-1.
- Masson-Delmotte, V., Zhai, P., Pörtner, H.O., Roberts, D., Skea, J., Shukla, P.R., Pirani, A., Moufouma-Okia, W., Péan, C., Pidcock, R. and Connors, S., (2018): *An IPCC Special Report on the Impacts of Global Warming of 1.5 °C Above Pre-industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty*. Edited by Valérie Masson-Delmotte, Geneva, Switzerland, World Meteorological Organization.
- Mata, R., Cognitive bias, (2012): *'Encyclopedia of human behaviour'*, pp. 531-535.
- Matti, C., Martín Corvillo, JM., Vivas Lalinde, I., Juan Agulló, B., Stamate, E., Avella, G., and Bauer A. (2020): *Challenged system mapping*. A knowledge management approach. Transitions Hub series. EIT Climate-KIC, Brussels. ISBN 978-2-9601874-3-4.
- Nichols M., Cator K., and Torres, M., (2016): *Challenge based learner user guide*. Redwood City, CA: Digital Promise, pp. 24-36.
- Kromka, S.M, Goodboy, A.K., (2019): *Classroom storytelling: Using instructor narratives to increase student recall, affect, and attention*. *Communication Education* 68, no. 1, pp. 20-43.
- Outdoorclassroomday.com* [website], (2018): *A Summary of the Survey Findings Conducted for Outdoor Classroom Day 2018*. <<https://outdoorclassroomday.com/wp-content/uploads/2018/05/FINAL-Project-Dirt-Survey-Outdoor-Play-and-Learning-at-School-2018-15.05.18.pdf>> accessed 20 June 2020.
- Sakic, M. and Raboteg-Saric, Z. (2011): *School and classroom climate and student (dis)satisfaction with school*. In D. Miljkovic and M. Rijavec (Eds.), *Positive Psychology in Education, Book of Selected Papers*, Zagreb, Faculty of Teacher Education, University of Zagreb and ECNSI, pp. 117-132.
- Singh, V., (201and): *Manage Your SAP Projects with SAP Activate: Implementing SAP S/4HANA*. Packt Publishing Ltd.
- Study.com [website], John Dewey On Education: *Impact and Theory*, <<https://study.com/academy/lesson/john-dewey-on-education-impact-theory.html>>, accessed 24 June 2020.
- Tuckman B.W. and Jensen, M.A.C., (1977): *Stages of small-group development revisited*. *Group and Organization Studies* 2, no. 4, pp. 419-427.