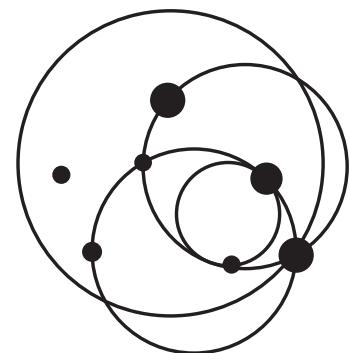




FUTURE-ORIENTED SCIENCE EDUCATION MANIFESTO



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FEDORA - Future-oriented Science EDUcation to enhance Responsibility and engagement in the society of Acceleration and uncertainty
This project received funding from the European Union's Horizon 2020 Research and Innovation program under Grant Agreement n° 872841
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‘Let’s explore the future, it is unknown and exciting’.

Quote by young people discussing the Future together (KinderTrendrede Breda, NL)



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WHAT’S GOING ON?

As citizens of the world, we are dealing with all kinds of complex issues and challenges, such as climate change, global health, multiculturalism, social justice, artificial intelligence and new technologies. These challenges require us to build visions of the future that empower our actions today. This will define the future for all of us.

EMPOWERMENT & HOPE

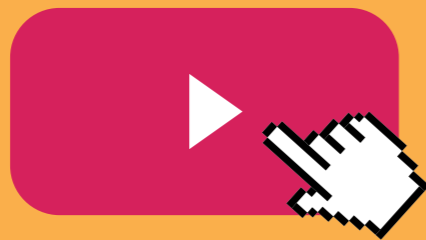
It is not always easy to feel connected with the future, especially for young people, as it can feel abstract and distant. By explicitly discussing the future and making it more tangible, for example, in the classroom, it becomes much easier to conceptualize. It creates empowerment, hope and agency to get involved. And when considering the complex issues confronting us all, we believe there is no better place to get started than in science education.

SCIENCE EDUCATION & FUTURES THINKING

Research shows that people expect the future to be greatly influenced by science and technology. We, however, need to ensure that the advancements in science are in line with the futures we envision. It is, therefore, essential to think critically of the possibilities and pitfalls of science-driven innovations and to connect them in an interdisciplinary way. This will increase scientific literacy, agency, and responsible research and innovation.

A significant overlap exists between futures thinking skills and scientific competencies, such as problem-solving and critical and creative thinking. However, extending the scientific competencies with additional skills related to futures thinking, like time perspective, agency beliefs, openness to alternatives, systems perception, and concern for others, will further enrich science education and prepare students for tomorrow.

SHORT ANIMATION:
FUTURES THINKING
IN A NUTSHELL



YOU'RE ALREADY DOING IT...

Because many science education curricula already contain elements of these futures competencies, there is ample opportunity to build upon and expand the current skill development to increase futures literacy in science education. This manifesto is here to inspire you and your fellow education innovators on your journey to get futures thinking into your national curriculum, local schools, and classrooms.

10 RECOMMENDATIONS TO STIMULATE FUTURES THINKING IN YOUR CLASSROOM

The following recommendations can be used as a starting point to update your current science curricula and lesson plans.

These recommendations are a selection of relevant insights that emerged from the FEDORA research studies.



1 // Increase awareness of constant change

Change is the only constant. The only thing we can be sure of is that the world will keep changing. Although assuming that things will continue the way they are is often comforting, the reality is that situations, especially in the long run, often get disrupted in unexpected ways.

To what extent do the activities and exercises in your science curriculum consider an ever-changing environment?

2 // Address uncertainty and ambiguity

The future is not here yet, and there are many possible futures. Including futures thinking-related activities in the curriculum will help your students become more comfortable with the feelings of uncertainty and ambiguity; embracing the fact that there is not always a 'right' answer.

To what extent do the activities and exercises in your science curriculum develop confidence in handling uncertainty and allowing for multiple solutions?

3 // Reflect on time

Thinking about the future is also thinking about the past and the present. How do historical events trigger actions in the present, and how do they influence the future? Futures thinking makes your students aware of time and the relevance of history.

To what extent do the activities and exercises in your science curriculum examine the past, and present and link this to potential futures?

4 // Stimulate long-term thinking

Futures thinking requires taking a long-term perspective. It goes beyond thinking of only today and tomorrow, it pushes your students to think of possible consequences for the next decades and beyond. It helps your students to become more conscious of the well-being of future generations and to think of sustainable, long-term solutions.

To what extent do the activities and exercises in your science curriculum stimulate students to think of long-term, sustainable solutions?

5 // Apply systems thinking

Futures thinking requires consideration of the effects and consequences of various changes in a holistic way. By observing not just the one-to-one impact of a change, but the impact of the change on the entire system, students will likely get a deeper understanding of the consequences of any action. Systems thinking requires students to understand the wider implications of implementing solutions.

To what extent do the activities and exercises in your science curriculum stimulate a 'system thinking' approach to examining potential solutions.

6 // Think in plural

We often talk about the future as if there is only one fixed future, but there are many possible futures. That is why we use the plural form; Futures Thinking. The fact that we don't know the future means that we have to think about it fluidly. Being open-minded helps to think of many alternative futures.

To what extent do the activities and exercises in your science curriculum help students think about more than one alternative and solution?

7 // Be curious

Futures thinking asks students to scan their surroundings meaning to observe, examine, hear, smell and feel what is happening around them. It guides students to pay attention to signs of change that show potential pathways into the future, for example upcoming technologies, new products and services. These signals are everywhere and students should be stimulated to discover new sources of change and to expand their horizons.

To what extent do the activities and exercises in your science curriculum activate students to explore signs of change?


 [\[click here to watch challenge 1\]](#)

8 // Unlock imagination

Science is often associated with facts and logic, but futures thinking requires imagination. But so does science! After all, many innovations and discoveries seemed entirely impossible just years prior.

Through futures thinking related activities you bring the sense of discovery, speculation and imagination into the classroom. Out-of-the-box thinking is needed to imagine the seemingly impossible.

To what extent do the activities and exercises in your science curriculum stimulate out-of-the-box thinking, creative thinking and imagination?

 [\[click here to watch challenge 2\]](#)

9 // Make conscious choices

Futures thinking is not only a source of inspiration, but also a way to reflect on your preferred future and your own values and beliefs. From the multiple futures out there, which one would you like to see happening and why? And what are the actions needed that will increase the probability that this future becomes reality? Futures thinking is not just about reflection but also about conscious actions!

What extent do the activities and exercises in your science curriculum help users make value-aligned choices?

 [\[click here to watch challenge 3\]](#)

10 // Create engaging narratives

Thinking about futures triggers interesting ideas. Students should be encouraged to share their ideas in a variety of ways, such as through visuals, plays, songs, games, or whatever helps to make these futures scenarios come to life. Moreover, by being creative in the way we share our ideas we can engage others and stimulate them to envision more sustainable futures.

To what extent do the activities and exercises in your science curriculum encourage being creative and share ideas?

WAYS TO FACILITATE THE INTRODUCTION OF FUTURES THINKING:

- Take a systemic approach to designing the curricula
- Include various stakeholders in designing curricula
- Stimulate interdisciplinarity and project-based learning in the curricula
- Train faculty to become more familiar with futures thinking competencies
- Integrate futures thinking into teacher training programs

TO CONCLUDE

By including futures-thinking into science education students will not only engage in 'sense making' by applying a systemic, rational approach to the present, but also engage in 'strange making' by unlocking out-of-the box and imaginative thinking to the futures.

WE NEED YOU!

To help young people prepare for their future, we need your help.

> TEACHERS

Engage with the future in your classroom and actively focus on the development of futures thinking skills.

> CURRICULUM DESIGNERS

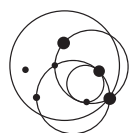
Integrate futures thinking skills into national and local curricula.

> POLICY MAKERS

Support us by advocating futures thinking in your national science education.

Want to start futurizing your science education?

Go to <https://www.fedora-project.eu/partners/> and join us!



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