

MINDS OF THE FUTURE – QUESTIONS FOR FURTHER DISCUSSION

Minds of the future is a round table discussion where 11 brilliant young minds and Nobel Prize laureate David MacMillan explores the future solutions to issues important to youth today. They are discussing 6 questions, and each part can be watched separate from each other (about 20 min each) or together in the full film (about 2 hour).

TIPS FOR DISCUSSION: You may want to divide your group into smaller groups and then have a summarizing discussion in whole group. Perhaps you want to prioritize between the questions or let different group discuss different questions. All facts and statements are directly taken from the Minds of the Future.

TIME ESTIMATE: 60 min for one part and discussion or 2 hours watching followed by an hour-long discussion. 10 min per part.

Here are questions to be used in your classroom, science club or with your friends:

PART 1

Xiaoqing, Rebecca, and Ben all talk about the importance of incorporating climate change and the issues of climate change into the early education, and across subjects.

- How has climate change, the issues of climate change and its solutions been incorporated into your education?
- How can the education regarding climate change improve within your school system? The more and concrete examples you can come up with, the better!

Ben talks about the importance of looking into the possibilities to solve climate change and points out day zero in Cape Town. Day zero was almost a climate disaster where cape town (a capital in South Africa) was incredibly close to running out of fresh water, resulting in political and social movements toward reducing freshwater consumption. As a result, the water usage followed the 2018 crises became about half of the 2014 usage.

- Can you come up with other examples of positive climate news, or examples where negative trends have been shifted towards more sustainable solutions?

Some potential useful sources to discuss climate solutions:

[Day Zero still looms over Cape Town | MIT Climate Portal](#)

[Project Drawdown](#)

[Exponential Roadmap Initiative |](#)

Nobel Prize Laureate David MacMillan talks about the importance of communicating how fun it is to be involved in science and take part in designing experiments and evolving a scientific field. He also talks about how scientists today are rather bad at communicating this to the broader society and youths. We at the Swedish Federation of Young Scientist tries to bridge this gap with the exhibition Young Scientist (Utställningen Unga forskare) and by organizing SIYSS, however there is more that can be done.

- Do you have some fun memories from a lab, from reading or from an experiment that taught you something new and interesting about a STEM (science, technology, engineering, and

mathematics) subject? Perhaps you have a STEM teacher whose lectures you like a bit extra. What is it, that this teacher does that makes science fun and approachable?

- How can Science and academia bridge the gap to youth and non-scientists to get more people engaged in science?

“I did not choose organic chemistry, organic chemistry chose me” is something David McMillan says to describe his passion about organic chemistry, and Bertram passionately talks about his interest in computer science and programming.

- Is there any field of science that you are passionate about? What sparked your interest? How do you nurture your interest?

Hector talks about how the teaching of science should be shifted from stating facts (“mitochondria are the powerhouse of the cell”) to more applied approaches (how can we take advantage of the energy production from mitochondria to solve a certain issue)?

- Do you agree with this? How can this be better incorporated into the teaching of STEM subjects? Could this be incorporated into the design of your high school projects (gymnasiearbete)?

PART 2

Both Hector and Asmi talked about how internet has been central to both their projects which involved using technical tools to improve contact between patients and health care practitioners (for more info on their research visit <https://ungaforskare.se/siyss/siyss2022/> to access their abstracts, posters and reports). They also mention how the internet has been used as a tool for learning, especially during the pandemic where a lot of teaching needed to be moved online.

- How central is access to the internet in a) your education and b) day to day life?

Bertram talks about threats to open internet access and David McMillan talks about the function of early day libraries in providing knowledge. Jordan talks about how open access to information is limited today, partly due pay walls to access scientific publications.

- Have you encountered problems in your search for knowledge due to limited accessibility? How did you solve this? What do you see as threat to open internet access?

Bertram also talks about the importance of protecting your rights to decide over who has access to your data and how your data is handled.

- Are you concerned about the handling of your data? Do you use specific applications to save your passwords? What consequences could come from your computer, bank or social media account being hacked?

If you are interested in learning more about cybersecurity, visit [cybersecurityacademy.se](https://www.cybersecurityacademy.se) access school material or if you are interested in cyber security on your spare time.

PART 3

88 percent of the youth feel responsible for the climate and 71 percent want to have an active role in the green transition. The discussion that follows brings up that the responsibility needs to be shifted on to policymakers and away from individuals.

- What can you do as an individual and what impact does that have compared to the impact from policy makers?
- Why haven't policy makers already taken more responsibility in this matter?
- How would a shift towards policymakers have bigger impact on the climate crisis? Do you agree?

Bertram mentions that he does not believe that we have a climate crisis, but a democracy crisis. Not because he does not think we have a climate crisis but because he wants to shift the focus from the environment to the politics, decision- and policy makers. He believes that democracy has failed in this matter, but also states that democracy is the best system we have.

- Can you understand his way of thought? What's your thoughts about his way of tackle the climate issue?

The U report by UNICEF states that 47 percent lack capital and resources for environmentally friendly ideas to support the green transition and to go towards a green economy. Noelia mentions that funding is a fundamental part for innovation and science, and that there are a lot of sustainable ideas that needs funding.

- Do you have sustainable ideas for the future? Do you know how to pursue an idea and how to get funding and get the support you need? What is the first step?

Héctor discuss that we as collective need to put pressure on policy makers, no more green washing, but actually start to wash this planet. Green washing is mentioned several times during the discussion.

- What is green washing? Have you ever encountered green washing? How can you know if something is green washing or not?
- How can you put pressure on policy makers to start “washing” the planet? How can we as individuals get together to improve the policies towards a sustainable future?

PART 4

In 2019 it was concluded that 1 million species face distinction, the distinction rate is 10-100 times higher than in ten million years. The discussion follows mentions the following: Stem is the key to prevent the decrease of biodiversity. With tech-solutions, such as AI and models etc., we can monitor species with tech in a non-evasive way. In the coral reef system, there is a huge threat of mass loss of marine life, here we see genetics as one part of the solution. It is possible to cross breed cold water species with warm water species to enhance life in as the water get warmer. But if something gets extinct, we cannot recreate it anymore, we need to see the value that we have and we need work to keep that value.

- What is biodiversity and why is it so important for us as humans?
- Do you know what loss of biodiversity challenges your homeland is facing?
- Can you think of more effective ways to lower the biodiversity loss?
- Do you get any ideas how to use AI and models to further prevent extinction or to slow down the climate change?

Benjamin brings up the fact that we are so used to hear that we have lost a species and get numb to facts of lost species, but there are some fantastic success stories, and we also need to share these stories.

- Do you know any success stories, where we have turned around and increased the number of a specific species? How was that done? Are there any risks with different methods?
- Professor Sir David MacMillan is convinced that we, as humans, will solve the upcoming problems. This reduction of species and other facts are telling us about, warning us, what is happening to the planet. We have stories every time we, as humans, face problems, we start to think about solutions and how we can impact and change.

"I think the part that, as humans, we can all understand, that this reduction, these dramatic numbers that you talk about, this is a sort of canary in the coal mine situation where it's telling us what's happening to our planet in real time even if it's ahead of what potentially could happen to humans it's telling us about what's again, happening to the planet. So, it's a warning. But what you have there was also two different stories about how you can start to think about innovation for the future. And one of the things that it always comes back to is every time we face problems as a race it also provides opportunities. It provides opportunities for us to step up and think about how we can start to innovate and think differently or change what we're doing. And I think one of the real moments that we have to think about right now, especially for young people or people in high school, is what can they do, what can they think about, what research paths, what science can they think about, what can start to have some kind of impact or think about this in a different way whether it's climate change directly, biodiversity correctly, but these are moments where it provides opportunities to think about how we can change it and fix it and move towards in a positive direction."

- What issues do you feel strongly about? Do you see any possibilities to apply your interests to help solve climate change issues or be a part of reducing extinction in the future?

Chemistry and “catalysis” will be the future solution for the climate crisis and biodiversity according to Professor Sir David MacMillan. But he also talks about the bad reputation of chemistry, [DDT](#) and pesticides has come up as examples of hostile chemicals.

- What are chemicals? And chemistry?
- How can chemistry help to solve climate crisis and help increase biodiversity?

PART 5 from Luleå university of technology

They are discussing the climate change, how that affects the weather and that one way to solve the agriculture problems that comes with changed weather is to find technical solutions.

- How do think technical solutions can help? What kind of solutions can you think of?
- Do you see any problems, any downsides, using tech to make the crops grow? What do you think is important to be considered for new technical solutions?

Insects as food is mentioned as one sustainable solution for food production and that “we don’t think about how sausages are made although it is kind of disgusting” according to Xiaoqing Sun.

- Why don’t we use insects more?
- Would you choose a protein source made from insects for your dinner? Why? Why not?
- Do you think it would be safe to use insects in food production?

We need to make the most of the fresh water we have and start recycling water and there are ways to do this. But we are also having problems with multi-resisting bacteria too.

- How could recycling water techniques affect multi-resisting bacteria? Why is this important to consider?
- Is it possible to find solutions that do not affect the problem with multi-resisting bacteria? What could that be?

In the end David MacMillan states that he has seen: “among younger people a desire to leave the world in a better place than they found it in.”

- Can you recognize that in your neighborhood? How do think this has evolved from when your parents were in your age?
- This statement covers a lot of subjects among a lot of global and local challenges, but what is important to you and your friends? Do you feel like you can contribute to a better world? Is that important to you?

PART 6 from Umeå university

It’s mentioned that wood can reduce carbon dioxide emissions and act as a carbon dioxide storage unit which reduce carbon dioxide in the atmosphere. The construction industry is mentioned to cause 33 percent of the carbon dioxide emissions. By using wood as a construction material, it may be possible to lower the carbon dioxide emissions in the atmosphere.

- What will happen to the carbon dioxide when the building is torn down or something happens to the building, a fire etc.? Is this a real plausible solution to reduce carbon dioxide from the atmosphere?
- What’s the pros and cons of using wood compared to more concrete and steel?

However, there are some downsides with using wood, growing more wood can cause reductions in biodiversity, lead to further deforestation of primary woods and as Jordan mentions we need to prevent further deforestation because it enhances global warming and affect eco systems negative etc. We need to manage the land we already cleared more efficiently, large areas are used for agriculture and perhaps if that can be used more efficient, more land can be used for secondary forests which also can help with help of degeneration with primary forest.

- How can we use the land more efficient for agriculture without negative effects? Is that even possible? What did they talk about in Minds of the Future? And what’s your thoughts about it?
- Who is most effected by deforestation?

In the future we need sustainable cities when more and more people are living in urban cities

- How can we make the urban cities more sustainable? What ideas do you have?

David MacMillan mentions that “It is remarkable how diversity will drive innovation, and it really does work.” It was noted that the level of innovation went down during the pandemic due to people could not move around.

- Why do you think that is? Why is a diverse group more innovative?

Hector is passionate about nature as inspiration. Nature is the one starting point we have in science, this fundamental starting point, the research is the human project. Nature is ground zero, picture a stone you can carve a tool to use further. Nature is inspiration. STEM is how we can explain nature.

- Do you get inspiration from nature in your life? What inspires you to investigate something further? When do feel inspired? By what? How do you use that inspiration? To what?