



**Surrounded
by Science**

Newsletter #4

December 2022

**UNIVERSITY
OF TWENTE.**



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think tank for the 21st century

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WEIZMANN INSTITUTE OF SCIENCE

NTNU



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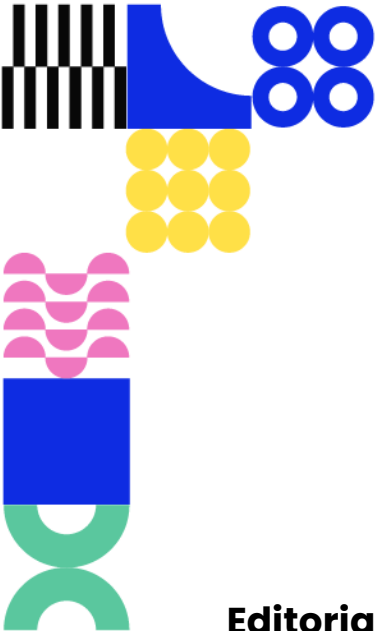
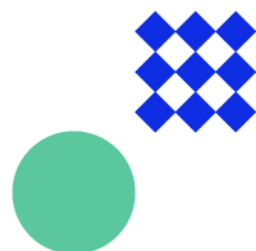
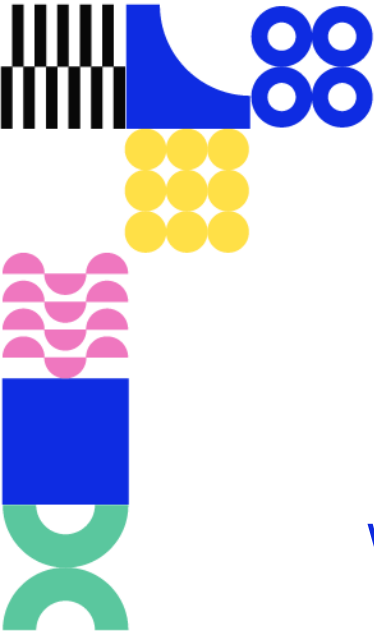


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Editorial

Welcome to the December 2022 newsletter

Christmas is nearly upon us, and as the year draws to a close, there certainly hasn't been an idle moment! In this winter issue, we are reflecting on a busy trimester full of progress, milestones, project meetings, and new-born collaborations.

Although not without its challenges, we're ending 2022 very positively, and are looking forward to 2023.

Please read on to find out what Surrounded by Science has been up to during the last few months.

In this issue:

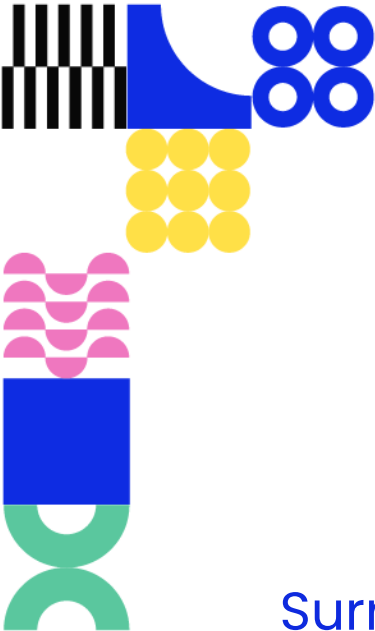
- Read about the Surrounded by Science meeting at Citta de la Scienza
- Find out about the collaboration between Surrounded by Science and OTTER Project: two sister projects
- Follow us in a conversation with Hannie Gijlers about Science Chaser in her interview featured in *SciPerspectives*
- Browse through our section "*What we're reading, listening to and watching*" to get inspired with insightful resources on out-of-school STEM
- Know more about a new round of events on informal STEM education

Once again, we hope you find our newsletter enjoyable and informative, and we look forward to having you as part of our exciting journey. Don't forget to visit our website, subscribe to the newsletter, and follow us on our Surrounded by Science social media channels!



Sara Anjos & Alice Iordache
Newsletter Co-editors





News

Surrounded by Science goes to Naples

02/11/2022



Image 1 Group photo of the Surrounded by Science consortium. Credits: Città della Scienza.

The 3rd Consortium Meeting of Surrounded by Science was held from 26 to 27 October 2022 at [Fondazione Idis-Città della Scienza](#) in Naples, Italy. The meeting started with a warm welcome by the General Director of Fondazione IDIS-Città della Scienza, Dr. Massimo Cavaliere, and the Project Coordinator, Dr. Tessa Eysnik ([University of Twente](#)) setting the stage for two days of productive collaborative work.

The 2-day meeting was devoted to presentations from the Work Packages in which the project is subdivided.

Starting with WP2 “Research Framework”, Dr. Natasha Dmoshinskaia ([University of Twente](#)) provided an overview of the inventory of 18 iSTEM case studies from the initial pool of more than 70 learning activities identified over the last six months, spanning across out-of-school science learning contexts, including outreach programmes, designed environments, and technology and media products.



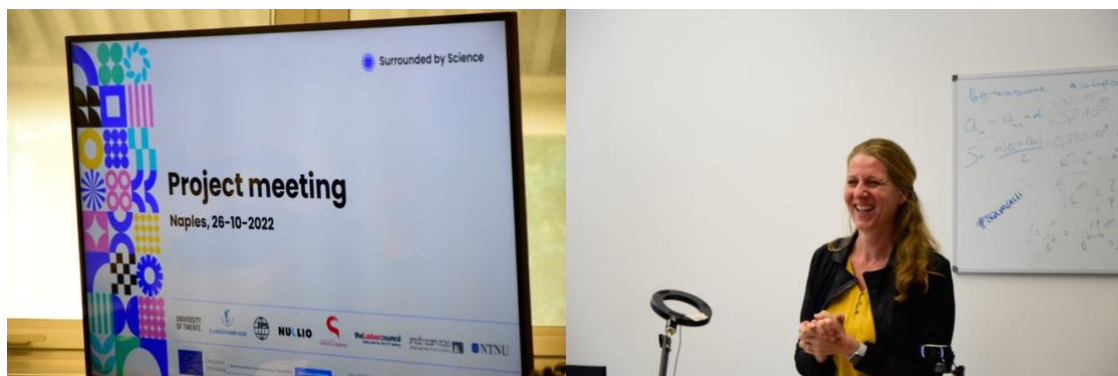
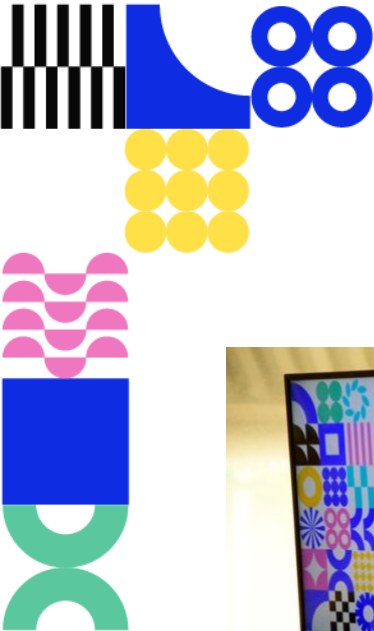


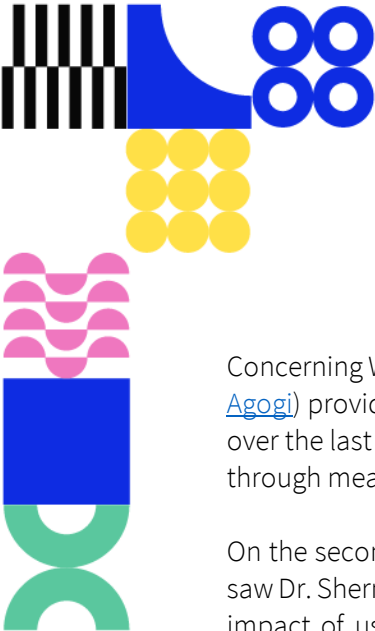
Image 2 Surrounded by Science Project Coordinator Dr. Tessa Eysink (University of Twente) opens the Naples meeting. Credits: Città della Scienza.

Continuing with WP3 “Digital Toolbox”, Dr. Hannie Gijlers and her team at [University of Twente](#) presented the first prototype of Science Chaser, the web-based app that the project develops to monitor users’ iSTEM learning activities. The members of the Surrounded by Science consortium had also the opportunity to try out and reflect on the Science Chaser by visiting [Corporea](#). Città della Scienza’s new permanent exhibition divided into 14 thematic islands that together offer visitors an integrated learning experience on how the complex network of signals, electric and chemical nature ensure the dynamic balance of the human body.



Image 3 Members of the Surrounded by Science consortium at the Corporea exhibition space at Città della Scienza. Credits: Città della Scienza.



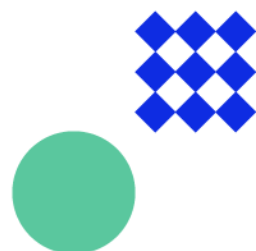


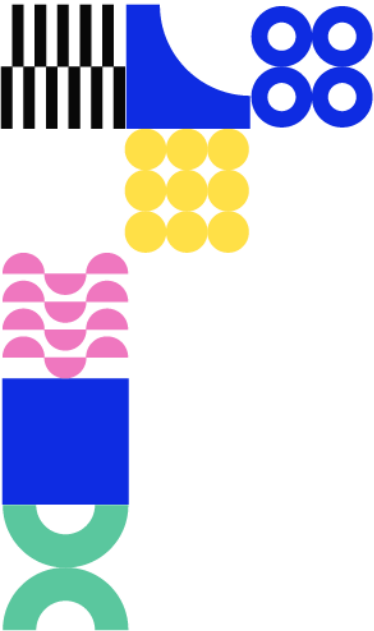
Concerning WP7 “Communication and Dissemination”, Dr. Angelos Alexopoulos ([Ellinogermaniki Agogi](#)) provided an overview of the communication and dissemination activities that took place over the last six months as well as the plan for future activities that will help promote the project through meaningful and active engagement of its target audiences.

On the second day, the spotlight was fully pointed at WP5 and WP4. WP5 “Impact Assessment” saw Dr. Sherman Rosenfeld ([Weizmann Institute of Science](#)) presenting the tools for assessing the impact of users’ experience with the selected case studies on their science proficiency. WP4 “Research Implementation” saw Dr. Luigi Cerri and Valentina Carusone (Città della Scienza) introducing the framework within which the actual implementation of the research will take place.

The afternoon of the second day was organised into 3 parallel working sessions: one for the “Digital Toolbox”, a second for “Research Implementation” and “Impact Assessment”, and a third one for “Communication and Dissemination”.

A visit to Città della Scienza’s Planetarium was a perfect prelude to the closing session, during which Project Coordinator Dr. Tessa Eysnik summarised the key points that emerged from the intense and fruitful 2-day meeting and gave appointment to the Surrounded by Science partners for the fourth biannual meeting that will be held online in Spring 2023.





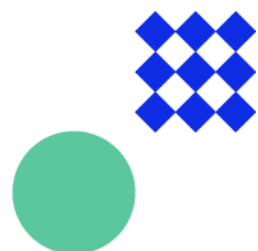
**Surrounded
by Science**



A collaboration is born!

06/12/2022

Driven by a shared vision of understanding the impact that out-of-school experiences on science learning, the Surrounded by Science and [OTTER](#) Horizon 2020 Research and Innovation Actions have joined forces. Under a concrete set of joint dissemination and communication activities, this collaboration aims to amplify the message that holistic learning extends beyond the classroom to diverse settings and environments. As OTTERs put it, informal science educators within research institutions, science museums, farms and zoos are valuable partners to teachers for inspiring and fostering new set of skills, competences, and attitudes amongst students.



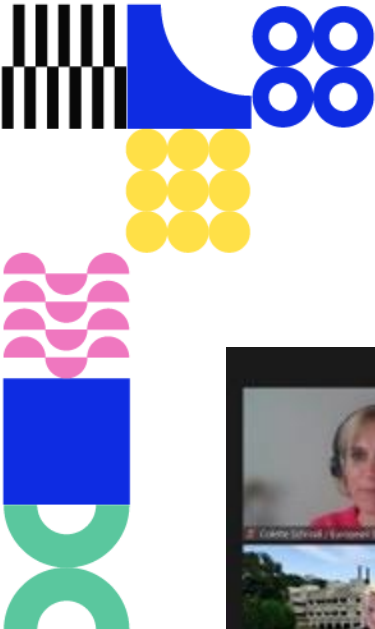


Image 4 OTTER and Surrounded by Science teams meet online in November 2022

The first online meeting between the Communication and Dissemination teams took place in November 2022 with the aim to get to know each other and share ideas on joint communication and outreach activities in the future. This was followed by a second online meeting on 5 December 2022 during which both teams identified common areas of collaboration in the communication, dissemination and exploitation of both projects' activities.



Communication

Social media collabs, Guest Blogposts



Dissemination

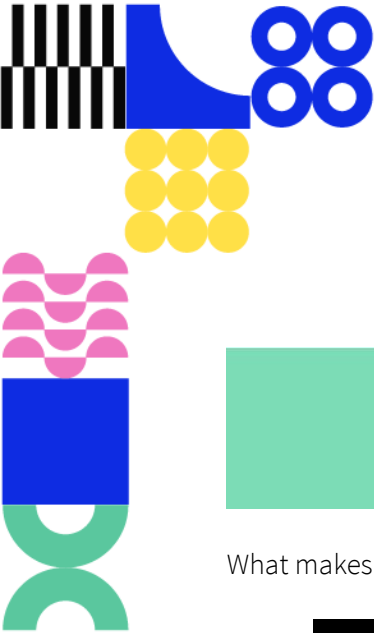
Webinars, Workshops, Colloquiums



Exploitation

Non-academic & Academic Publications





OTTER in a nutshell

What makes OTTER unique? Find it out in the video below!

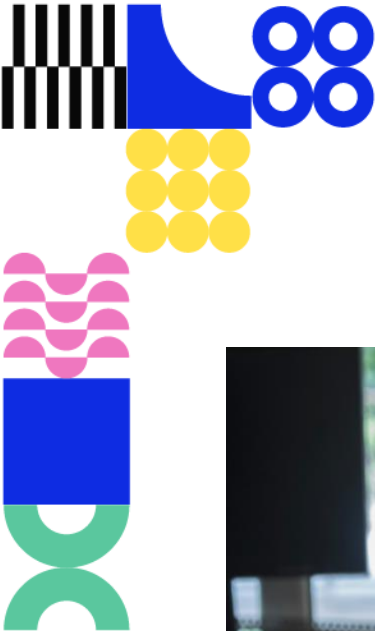


Stay tuned!



Watch out this space and follow us on our social media for updates on this win-win collaboration!



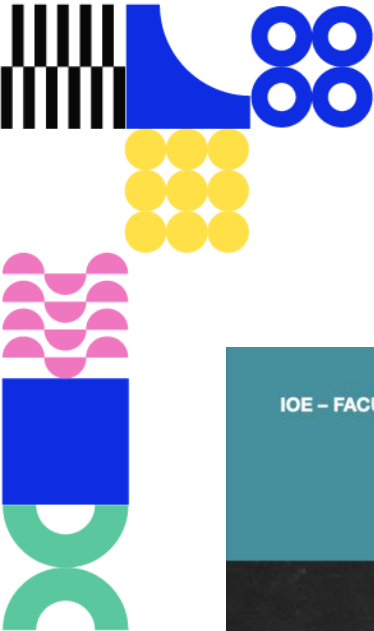


Make science curricula more relevant to everyday life

07/12/2022

A new report by [IOE](#), UCL's Faculty of Education and Society, provides rich insights into the voices of young English people for how school science could be improved. The report is part of [ASPIRES](#), a 13-year, England-based longitudinal research project that explores young people's science aspirations and trajectories, and the factors that shape them (including family, school, careers education, social identities, and inequalities). The This report draws on data from phase 3 (ASPIRES 3), following the young people's lives into adulthood and employment, and their reflections back on their school science experiences. Findings are reported from 7,635 survey responses from 21 and 22-year-olds, and 50 interviews conducted with 20 and 21-year-olds who have been interviewed since the age of 10.





The analysis of this data identifies four areas of improvement for school science that young people felt would support their learning and engagement with the subject.

Improvement #1

Make the science curriculum more relevant

72% of young people wanted the school science curriculum to be more relevant to “everyday life”.

Improvement #2

Increase problem-based science learning

60% of young people indicated that there was a need for a greater focus on and problem-based learning.

Improvement #3

Reduce exam pressure

More than 52% of young people indicated that they would have liked less exam pressure at school.

Improvement #4

“Better teachers”

41% of young people identified that they would have liked “better teachers and/or more specialist teachers”.

The study’s Principal Investigator Professor Louise Archer explained “young people are key stakeholders in education yet too often their voices are missing within policy and curriculum





reform. Our new report draws on data from over 7,600 young people, sharing their views on how to improve school science”.

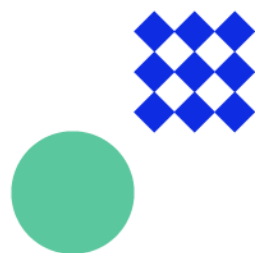
The report makes policy recommendations, informed by the insights of young people, which include continuing to incentivising STEM graduates to enter the teaching profession, improving teacher retention, and providing initial teacher education and/or professional development which draws on principles of inclusive pedagogy and critical professional reflection.

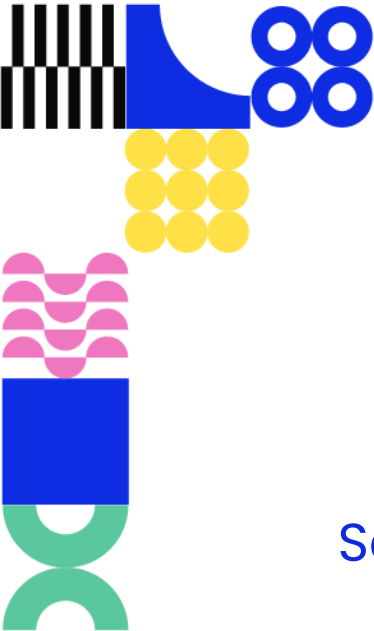
Links

[Download](#) the executive summary

[Read](#) the full report

Article source: [IOE – Faculty of Education and Society](#)





SciPerspectives

Science Chaser: A Tool for Science Learning Evaluation on the Go

by Alice Iordache and Angelos Alexopoulos | 16/12/2022 | Blog

Learning Science As you Go

Back in September 2020, the OECD released the landmark report [Back to the Future of Education: Four Scenarios for Schooling](#) to support long-term strategic thinking in education. Building on the ground-breaking [2001 OECD Schooling for Tomorrow](#) scenarios, these four scenarios recognise that there is no single pathway into the future, but many. As stated in the report, “*in a complex and quickly changing world, this might require the re-organisation of formal and informal learning environments, and reimagining education content and delivery.*”

Teasing out the intersections between formal and informal science learning environments is at the heart of the Surrounded by Science project. Indeed, in a world where distinctions between education, work and leisure become blurred, learning – including science learning – is increasingly taking place everywhere, anytime. According to Scenario 4 of OECD’s *Back to the Future of Education* report, examples of learning and skilling outside formal schooling are already visible today in the sense that children have a strong say in “*what they’d like to learn and when.*”

Over the last year, the Surrounded by Science project has mapped out good science learning practices outside the classroom that offer a better understanding of the nature and effects of informal STEM (iSTEM) education. Several case studies have in turn been identified to help the project team better understand how users experience these iSTEM activities and how they affect their science proficiency, a multi-faceted concept that encapsulates attitudes and behaviours such as being excited by science, engaging in scientific reasoning, reflecting on science, and identifying with the scientific enterprise.



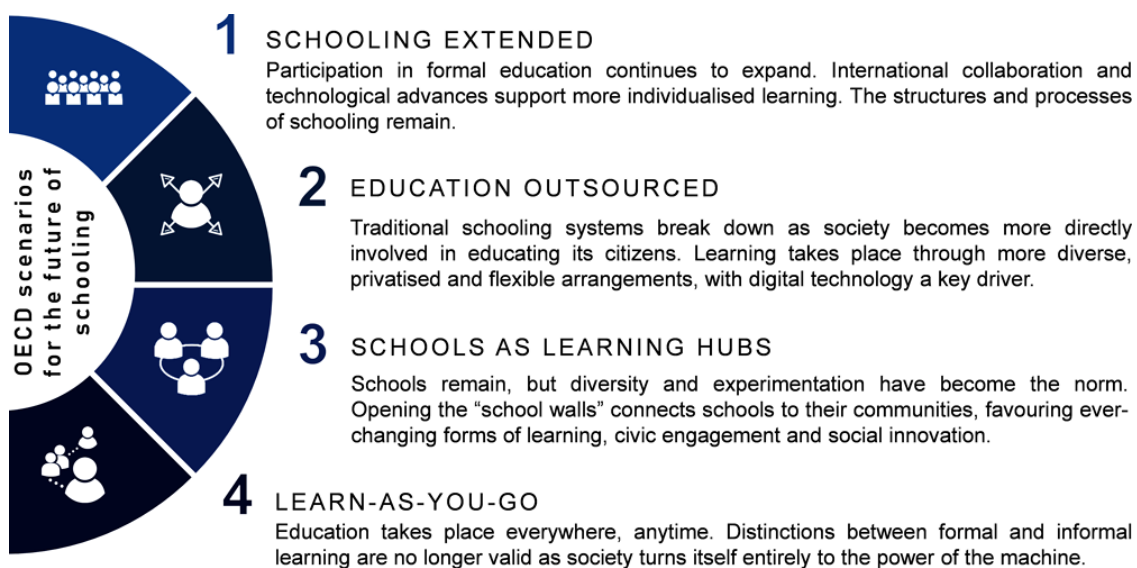
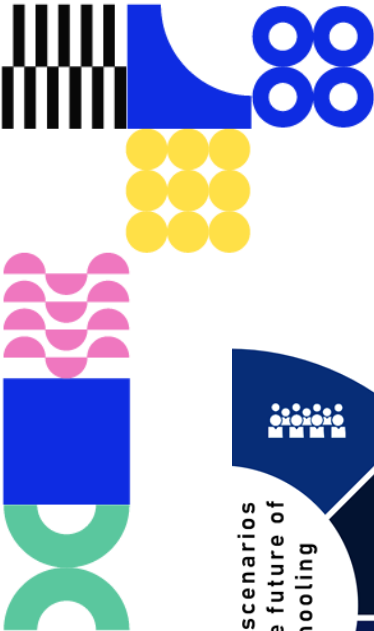


Image 5 Source: OECD (2020) Back to the Future of Education: Four OECD Scenarios for Schooling, OECD Publishing, Paris.

But how can one effectively follow users' science-related learning paths on the go? Our answer is by using the *Science Chaser*, an innovative app developed by the project team.

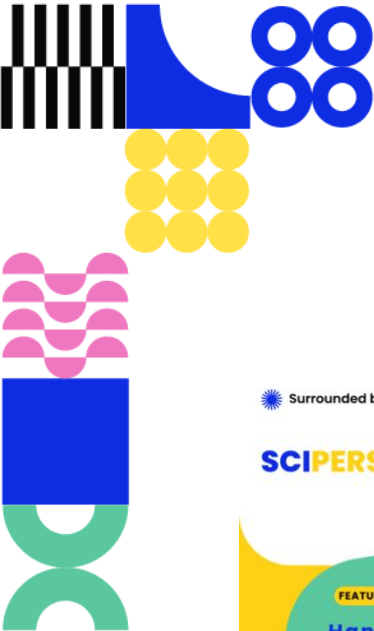
So, let's learn all about it from Asst. Prof. **Hannie Gijlers** (University of Twente), Surrounded by Science Research Manager and Digital Toolbox Lead, as interviewed by Alice Iordache (Lisbon Council).

Science Chaser: in the words of Hannie Gijlers

Alice Iordache (AI): What is the Science Chaser and why is it helpful?

Hannie Gijlers (HG): The Science Chaser is a tool that users of informal STEM activities can use in two ways: first, by the visitors, and second by the researchers and activity providers. It can be used by the visitor of an out-of- school science learning activity, such as a visit to a science centre or science museum, to interact during their visit or during their interaction with a specific activity. The interaction would, for instance, be answering a short question, scanning QR codes that will allow them to interact with the activity and get additional information. At the same time, visitors can use the Science Chaser after their visit to the science engagement organisation to report their post-visit activities.





Typically, the first interaction of a user with the Science Chaser would be when they visit a specific activity, for instance, in a museum, and start using the APP in the given museum according to the activities presented. But once they have registered, they will also be able to use the Science Chaser to report every subsequent out-of-school science activity. So for instance, if they are playing an educational game, or if they are visiting a website or watching a documentary, they can add that to the Science Chaser. This feature is not functional yet, but we are laying out the development plans and have a clear idea of what it should look like.

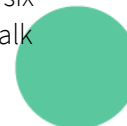
The Chaser offers various assessment tools, for instance through multiple choice items, but also through concept mapping activities or questionnaires. And that also implies that visitors of science activities, outreach programs, etc., will interact with the Chaser during their visits and fill in some short questionnaires. So, during the visit, we have short questions that ask people about their interaction with iSTEM activities related to the six strands of science proficiency. So, we are assessing the six strands of science proficiency through the Science Chaser in a quite unobtrusive manner. In the end, this information can also be of value to the activity provider. The science engagement organisations that provide the activities can also evaluate those activities through the Science Chaser.

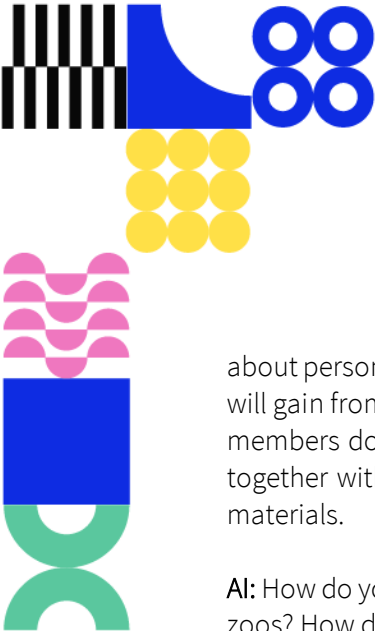
The Science Chaser is not limited to an entire exhibit or museum. Informal science organisations can also use it for specific parts of an exhibit, or even to collect information about one single activity. It is co-created by the researchers with the activity providers and tailored on their needs and evaluations, always keeping in mind the users' perspective.

AI: How are you planning to process the information that you collect with the Science Chaser? One path would be researchers evaluating all these responses and benchmarking them, let's say against the six strands. Could you elaborate more on how this process works?

HG: Next to the Science Chaser, we have the Toolbox Manager. At this point, people within the project (researchers and activity providers) can create content for the science organization that they are linked to and find data that is collected in their organisation. For instance, when we talk about an assessment in the person-in-context oriented perspective, we collect the information on the spot. Visitors will fill out a few short questions related to the activity that they just engaged with. This information will be then made available to the researchers and the activity providers through the Digital Toolbox Manager.

Additionally, we also hope that we will be able to implement some simple visualisation tools to automatically enable some basic images of the data collected. Assessment will start from the six strands of science proficiency. However, not all activities will aim at all six strands. When we talk





about person-oriented assessment, we focus more at the individual and what it is that this person will gain from the activity in line with the strands that the activity is focused on. Since the project members do not have sufficient domain knowledge to cover all iSTEM activities, they will work together with domain experts from the science engagement organizations to develop the test materials.

AI: How do you plan on getting in touch with science organisations? Like for example, museum or zoos? How do you plan to implement the Science Chaser in this type of organizations?

HG: We have some initial contacts with the organisations interviewed during the first part of the project. They talk to us about the science activities that they have been developing and from the interviews we had with them some were selected or volunteered to participate in the research. We have selected case studies that we think are potentially interesting and that we are also interested in collaborating with us. We would like to continue to collect data and are still interested in talking to activity providers and teaming up with them. We are still reaching out and building the community as well as the visitors in terms of schools that would like to collaborate with us.

AI: What type of data are you asking for when using the Science Chaser? Could you give us some examples?

HG: When a user registers to the Science Chaser, we just ask for their age range. And with every activity that they do, we will know that a given user has done a given activity. This will help us elaborate that a person within a specific age range engaged with that activity, and we will have some basic information on, for example, how long they interacted with the activity, if that is available, and if they filled in some questionnaires or completed something online related to it. Then if they go on and use the Science Chaser in their everyday life, then they will report the activity.

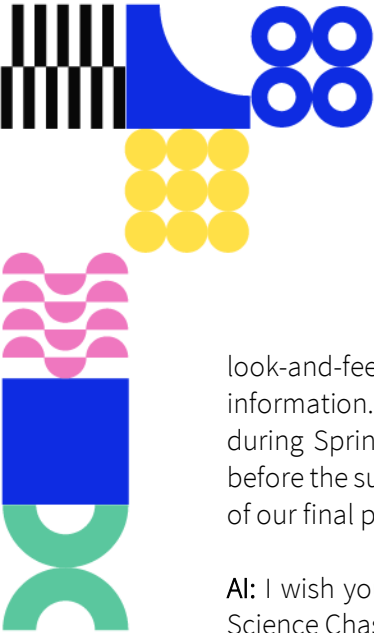
AI: Interesting. So, what's in for the users? We have been talking about the researcher and activity providers, but what else could children and teenagers get from it?

HG: Next to gamification we might have some kind of recommendations. So, based on what they did, or what they have in their everyday life context reported, we might have also recommendations for them. For instance, if you have been to a planetarium and that is reported, the system might also propose some follow-up activities.

AI: What stage is the Science Chaser currently undergoing? Is it fully operational?

HG: The data collection part is fully functional and will be used during the first round of data collection starting in January 2023. Interactive elements that allow science engagement organisations to interact with the users of the chaser will need further development but can be used during the second round of data collection starting autumn 2023. We are still polishing the



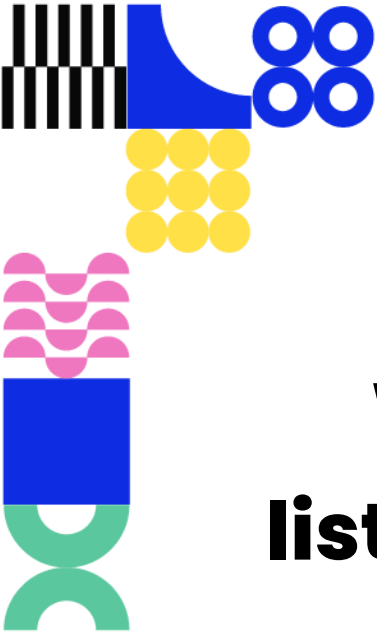


look-and-feel based on feedback received, but it is fully working and suitable to collect information. The Surrounded by Science consortium plan to launch the fully fledged version during Spring 2023. The preparatory phase for the recommendation system will start already before the summer break, but it will be implemented near the end of the project, so it will be part of our final product.

AI: I wish you good luck in this exciting journey! And thank you for introducing our readers to Science Chaser, one of the milestones of Surrounded by Science!

HG: Thank you for this interview opportunity!





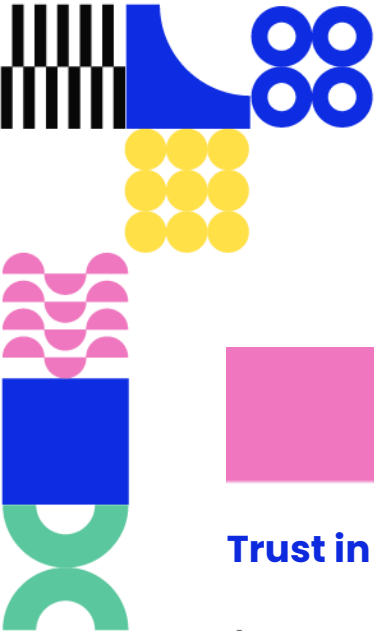
What we're reading, listening to and watching

by Angelos Alexopoulos | Blog



A curated selection of reads, movies and
videos, podcasts, and more on out-of-
school STEM learning





READS

Trust in Science

"A scientific endeavour that is not trusted by the public cannot adequately contribute to society."

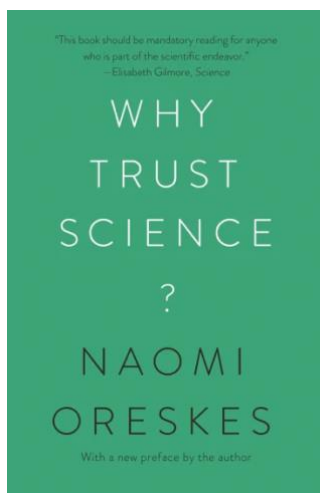
Sudip Parikh, CEO of the American Association for the Advancement of Science and executive publisher of the Science family of journals

Amid the coronavirus pandemic in winter 2021, Sudip Parikh (CEO of the American Association for the Advancement of Science and executive publisher of the Science family of journals) wrote an insightful opinion piece entitled [Why We Must Rebuild Trust in Science](#). A big takeaway from this article?

"The time to build trust is before you need it. We need to build relationships in and across communities to become better informed and much more inclusive in how we define problems and find solutions. We must proactively and vigorously make connections and build trust between scientists and communities."

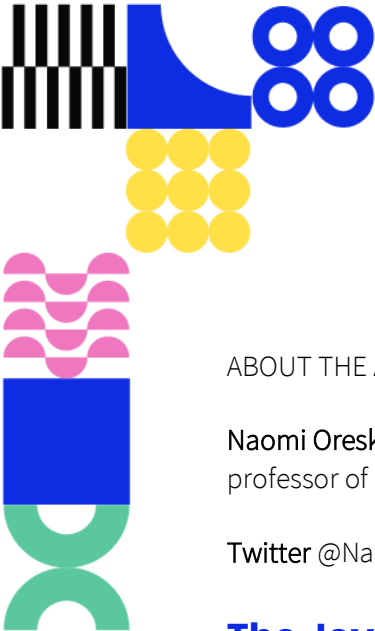
But what is trust in science? And why trust in science is important? These two questions are at the heart of this pick.

DESCRIPTION



Are doctors right when they tell us vaccines are safe? Should we take climate experts at their word when they warn us about the perils of global warming? Why should we trust science when so many of our political leaders don't? Naomi Oreskes offers a bold and compelling defense of science, revealing why the social character of scientific knowledge is its greatest strength—and the greatest reason we can trust it. Tracing the history and philosophy of science from the late nineteenth century to today, this timely and provocative book features a new preface by Oreskes and critical responses by climate experts Ottmar Edenhofer and Martin Kowarsch, political scientist Jon Krosnick, philosopher of science Marc Lange, and science historian Susan Lindee, as well as a foreword by political theorist Stephen Macedo.





ABOUT THE AUTHOR

Naomi Oreskes is the Henry Charles Lea Professor of the History of Science and affiliated professor of Earth and planetary sciences at Harvard University.

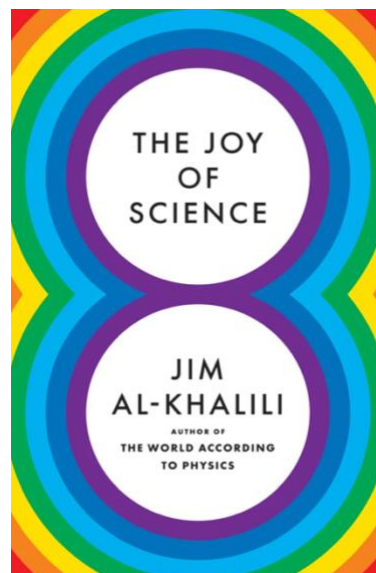
Twitter @NaomiOreskes

The Joy of Science

DESCRIPTION

Today's world is unpredictable and full of contradictions and navigating its complexities while trying to make the best decisions is far from easy. *The Joy of Science* presents 8 short lessons on how to unlock the clarity, empowerment, and joy of thinking and living a little more scientifically.

In this brief guide to leading a more rational life, acclaimed physicist Jim Al-Khalili invites readers to engage with the world as scientists have been trained to do. The scientific method has served humankind well in its quest to see things as they really are, and underpinning the scientific method are core principles that can help us all navigate modern life more confidently. Discussing the nature of truth and uncertainty, the role of doubt, the pros and cons of simplification, the value of guarding against bias, the importance of evidence-based thinking, and more, Al-Khalili shows how the powerful ideas at the heart of the scientific method are deeply relevant to the complicated times we live in and the difficult choices we make.

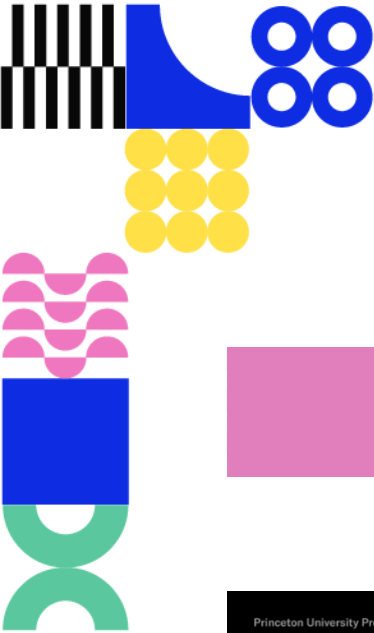


ABOUT THE AUTHOR

Jim Al-Khalili is an Iraqi-born theoretical physicist at the University of Surrey, where he holds a Distinguished Chair in physics as well as a university chair in the public engagement in science. He is also a prominent author and broadcaster. He has written 14 books on popular science and the history of science, between them translated into twenty-six languages. His latest books include [The Joy of Science](#) and [The World According to Physics](#), which was shortlisted for the Royal Society Book Prize. He is a regular presenter of TV science documentaries, such as the Bafta nominated *Chemistry: a volatile history*, and he hosts the long-running weekly BBC Radio 4 program, *The Life Scientific*.

Twitter @jimalkhalili





PODCASTS

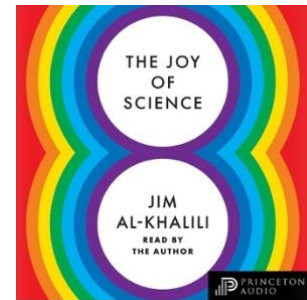


The editor of the New Books Network presents an episode in the Princeton University Press Ideas podcast with Naomi Oreskes which talked about her terrific book: [Why Trust Science?](#)

Listen to the [podcast](#) and [read](#) the full transcript!

The Joy of Science, narrated by acclaimed quantum physicist Jim Al-Khalili, presents 8 short lessons on how to unlock the clarity, empowerment, and joy of thinking and living a little more scientifically.

[Listen in!](#)



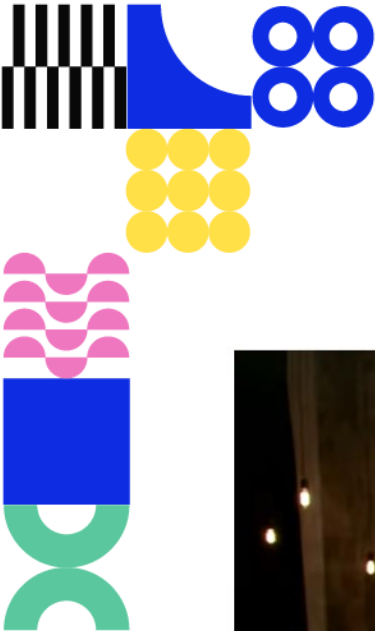
VIDEOS

TEDTalks: Naomi Oreskes on why we should trust Science

Many of the world's biggest problems require asking questions of scientists — but why should we believe what they say? Historian of science Naomi Oreskes in her TEDTalks video podcast thinks deeply about our relationship to belief and draws out three problems with common attitudes toward scientific inquiry, giving her own reasoning for why we ought to trust science.

Listen to the video:





Video 1- Naomi Oreskes TEDTalks: Why we should trust scientists on <https://youtu.be/RxyQNEVOEIU>

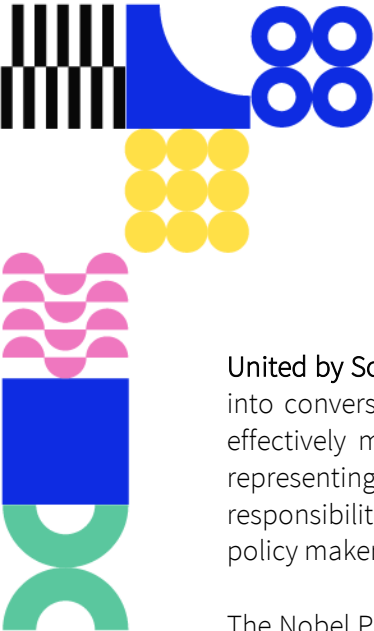
Want to know more about trust in science? [Here](#) you may find a list of selected resources.

Nobel Prize laureate Ben Feringa talks to students



Video 2 Nobel Laureate Ben Feringa talking to students - <https://youtu.be/NsyYrz5xQ8>





United by Science brought science students from throughout Latin America and the Caribbean into conversation with Nobel Prize laureates to explore how science and scientists can most effectively make a positive impact on society. Eighty undergraduate and graduate students representing almost every country in the region were invited to focus on issues that include the responsibilities of the scientist, the power of collaboration, strategies for building bridges with policy makers and society in general, and the wider societal implications of all these themes.

The Nobel Prize Dialogue “United by Science” is supported by Nobel International Partners 3M, ABB, Capgemini, Ericsson and Scania.

BLOG POST

3 Ways to Engage Students in Real-Life Science

by Emily Ancona

Learning science and scientific language can be a challenging and painful experience for some students, especially those in already marginalized groups (Patterson Williams, 2020). Minoritized students, students in special education, ESOL students, struggling readers, etc. may approach science education with negative emotions with harmful past experiences shadowing their engagement with learning. A way that educators can help combat this trend is by providing real-life experiences and examples of science through disciplinary and digital literacy practices in science education, namely through science communication.

Science communication shares “scientific ideas, methods, knowledge and research to non-expert audiences in an accessible, understandable or useful way” (Newcastle University, 2022). In other words, it’s a way to engage with science in a nontraditional way that doesn’t focus so much on academic language and practices that don’t really support students from minoritized groups. Science communication comes in many forms, but some of the best, in my opinion, also feature digital literacy. Here are a few of my favorite platforms for science communication that are accessible and interesting for any and all learners:

1. Podcast – Ologies (Smologies)

The free podcast “[Ologies](#)” by Alie Ward, or perhaps her classroom-safe, expletive-free version “[Smologies](#),” features interviews by prominent scientists in every field imaginable, from ecology to anthropology to sociology and featuring topics like otters, postcards, pumpkins, trains, and eating plants. Alie Ward’s motto “Ask smart people dumb questions” and humorous





interview style is engaging and informative and the podcast format is accessible for many learning styles. (It even has transcripts for every episode!) Ward often selects scientists from minoritized groups to interview in an effort to expand listeners' perspectives on who can be a scientist. Smologies episodes run about 25 minutes long and are well-suited for a classroom setting, homework assignment, or research source.

2. Social Media – Hank Green on TikTok

[Hank Green](#) is a prominent science communicator stationed on social media to answer everyone's seemingly impossible questions about life and science. Green has been in the content creation biz since 2007 and has started accounts like VlogBrothers, SciShow, and Crash Course that spread information (and combat misinformation) to online audiences. One of his newest ventures is his TikTok account. In short videos (30 seconds to about 3 minutes long), Green does his best to explain baffling phenomena like how infrared photos work, what electrolytes really are, and how popcorn pops in an effort to help listeners "learn more, understand more, and be more curious about their world." Green's videos are succinct, feature captions, and address a wide range of topics, making them accessible and engaging to all kinds of learners.

3. Live Interviews – Skype a Scientist

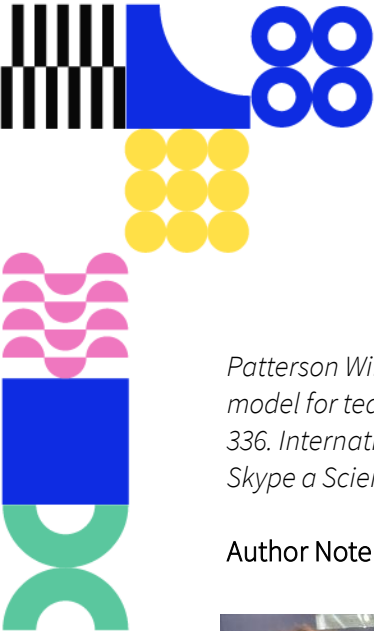
Created by teuthologist (squids!) Sarah MacAnulty, [Skype a Scientist](#) is a nonprofit organization connecting real scientists to the public for live interviews with families, schools, libraries, and individuals. With a database of over 1400 scientists, interested parties can fill out a Google Form specifying the age of their group, type of scientist they are interested in, and when they are available and Skype a Scientist will connect them with a working scientist to "get their answers straight from the source." Skype a Scientist also features scientists from historically marginalized groups; users can request a scientist who is a person of color, LGBTQ, low income, female, 1st generation college student, or disabled. It even offers sessions led in languages other than English. In a live format in which students can ask their own questions to someone who actively works in the field, Skype a Scientist is a great way to combine digital and disciplinary literacy for learners.

This list is by no means comprehensive of all the avenues available for science communication. A quick Google search can reveal countless ways to engage students in digital and disciplinary science learning. But, as education begins (hopefully!) to shift away from traditional science practices, especially in the realm of academic language and accessibility, science communication is the way to go.

References

Green, H. (2021, December 12). [\[TikTok\]](#)
Newcastle University (2022, January 7). *Science communication*. Newcastle University. <https://libguides.ncl.ac.uk/sciencecommunication>





Patterson Williams, A. D. (2020). Sustaining disciplinary literacy in science: A transformative, just model for teaching the language of science. *Journal of adolescent and adult literacy*, 64(3), p. 333-336. International Literacy Association. doi: 10.1002/jaal.1100
Skype a Scientist. <https://www.skypeascientist.com/>

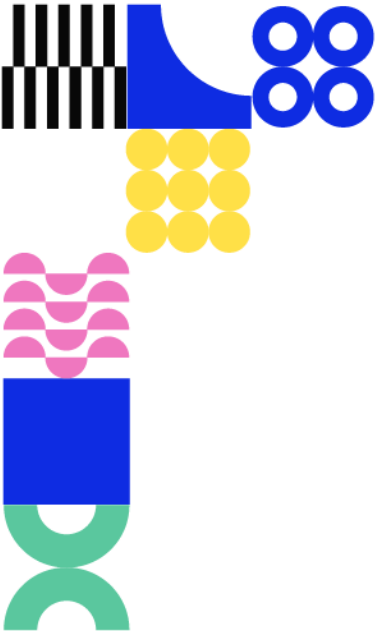
Author Note



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