

# Office of Astronomy Outreach Activity Toolkit

ASTRONOMY OUTREACH ACTIVITIES



# Intro



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This toolkit is a compilation of crowdsourced astronomy outreach activities that can be implemented during one of the IAU Global Outreach Events. We invite you to experiment with the activities featured here and to contribute.

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At the onset of the COVID-19 pandemic, the International Astronomical Union Offices issued a call to action to the astronomical and broader scientific communities to help alleviate the stresses of prolonged confinement. And the astronomy outreach community answered the call in droves! Practitioners from around the world shared great digital astronomy resources and fun activities that helped parents and educators keep their children occupied and entertained.

Building on this legacy, the Office for Astronomy Outreach Activity Toolkit aims to collect and share activities from and for the astronomy outreach community. Activities are presented in a simple and direct way, can be adapted to local needs, and should be used freely. A living document, the Toolkit will be updated and shared on an ongoing basis. We will publish this Toolkit under a [CC-BY 4.0](#) license.

We invite you to use and [contribute to the Toolkit!](#)

The only rule we ask you to follow: we welcome contributions of activities that you did not create yourself, but we kindly ask you to make sure the activity is published under a Creative Commons License that allows users to share and adapt the material (if the activity was previously published), and that correct attribution is provided.

If you have any questions, comments, or suggestions, please contact us

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# Meet the IAU Astronomers!

#IAUOutreach

The [Meet the IAU Astronomers! programme](#) connects amateur astronomers and informal and formal educators with IAU member astronomers for virtual or in-person events. Through these meetings, the IAU members speak with children, adults, undergraduate students and other members of the public on astronomical research topics, the importance of astronomy for society, and choosing astronomy as a career. The programme also facilitates undergraduate-level lectures. The intent is to present opportunities for colleges and universities to introduce astronomy to their students, particularly at institutions without astronomy programmes.

The Meet the IAU Astronomers! programme aims to enable any community to meet professional astronomers and share the wonders of the universe regardless of where they are in the world.

If you are interested in hosting an IAU-member astronomer for a talk, please fill out [this Google form](#).



IAU

NAOJ

Your chance to meet **professional astronomers**,  
no matter where you are!



# WOMEN AND GIRLS IN ASTRONOMY



## Activities

Bias in STEM

Draw an Astronomer

Find Gender Stereotypes in Astronomy Representations!

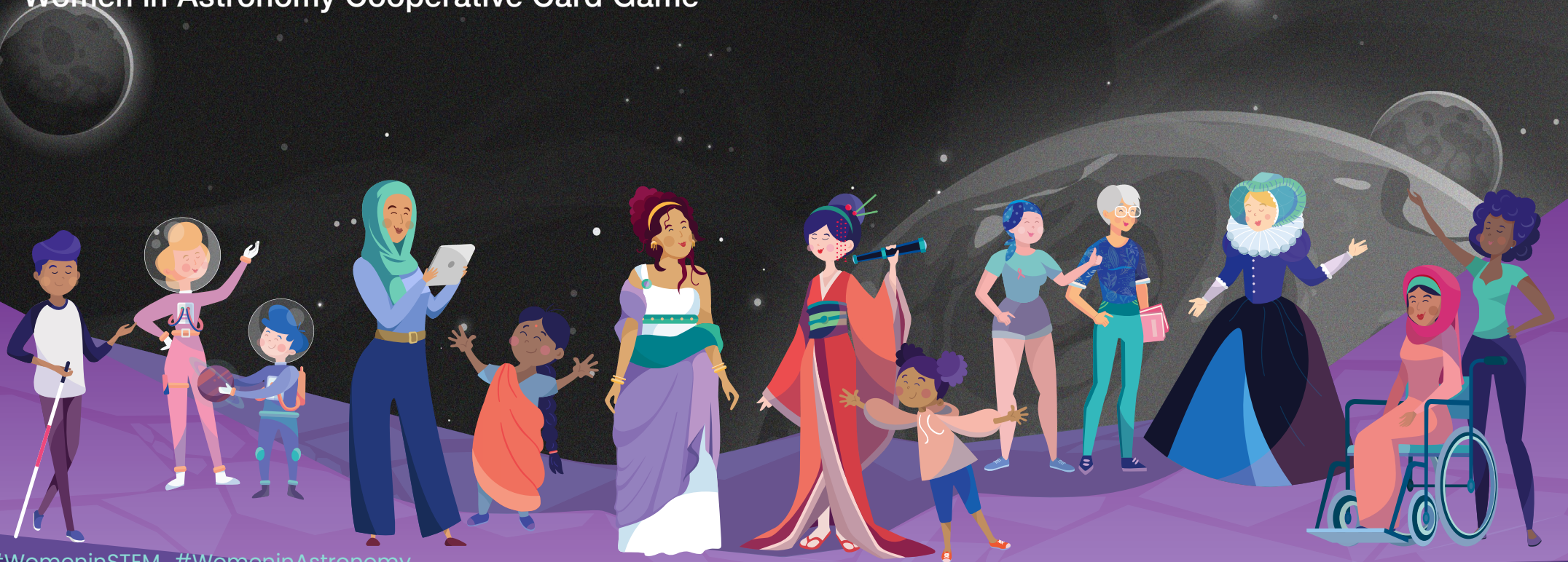
Who does what?

Tiktok Science Stories

Women in Astronomy Cooperative Card Game

11.02 — 8.03.2023

*Organize or join an event  
worldwide to celebrate  
Women and Girls in Astronomy!*



#WomeninSTEM #WomeninAstronomy



# Bias in Astronomy

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## Concept

The activity explores biases that operate in society and the ways in which these biases can limit the contributions of diverse communities to STEM.

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## Overview

- Participants: Kids and teens
- Difficulty: Medium

## Materials & personnel

- Facilitator
  - Pen, paper and highlighters in different colours
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## Breakdown

1. Ask participants to work in pairs and write down as many astronomers (scientists) as they can in 60 seconds.
2. Ask them to go through their list and highlight all the women. With another colour, ask them to highlight the scientists who are indigenous (for example). Here you can ask participants to highlight astronomers from any under-represented communities relevant to your country.
3. Collect the data from the lists anonymously.
4. Ask the group to discuss the data. What trends do participants see? What questions does this provoke for them? Why that is? Have participants ever felt the impact of bias in their personal life? Have they felt excluded from STEM fields?
5. Working in small groups, ask participants to create a concept map showing all the factors that can impact who gets to do STEM (astronomy).
6. Discuss the various factors and explore whether they would impact different people differently.
7. Ask participants to consider how this map might have looked if it were developed 100 years ago.
8. Ask participants to create a poster that celebrates the contributions of a little-known scientist.

You can invite participants to join the OAO's [Discover an Astronomer Poster Contest](#).

For a full activity breakdown and resources visit [The Gist Project website](#).

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## Outcomes

Participants explore the ways women and other communities have been written out of science history, and to take action to highlight the importance of diversity in STEM.

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# Draw an Astronomer

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## Concept

The activity explores stereotypes, role models and careers in Astronomy.

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## Overview

- Participants: younger children
- Difficulty: Easy

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## Materials & personnel

- Pen, pencil and paper for participants
- 1 facilitator

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## Breakdown

1. Ask participants to draw an astronomer, (you could open the discussion to other space-related careers), and ask them to try to include as much detail as you can: age, ethnicity, gender, family life, hobbies, where they live, etc.
2. Hold an age-appropriate group discussion in which participants compare drawings and note common themes.
3. Tease out the discussion, the judgement and choices they make, and ask people whether they are going with assumptions or “fighting” them. Look at the source of those assumptions, and think about how they make you feel. Introduce the idea of “unconscious bias” to the audience.

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## Outcomes

Participants explore norms and stereotypes by reflecting on their own scientist drawings.

# Find Stereotypes in Astronomy Representations!

## Concept

The workshop focuses on gender-stereotyped representations of Astronomy (or other STEM careers) in advertisements for technological objects (such as telescopes, computers, smart-phones, video games, cars, etc.) and recruitment campaigns for schools, training, or jobs in Astronomy and other STEM fields.

## Overview

- Participants: 13 – 18 years old (20 -30 participants per workshop)
- Duration: 90 min.
- Difficulty: Medium

## Materials & personnel

- 1 Facilitator
- 1 Computer & video projector
- 1 Flip chart
- 3 Different ads + 3 different campaigns
- Pen & paper - 1 per participant

## Breakdown

1. Before the start of the workshop, choose the ads that will be shown during the workshop and prepare the analysis grids that will be distributed to participants.
2. Start with a question: What are the skills, ideas, adjectives, and qualifiers that you spontaneously associate with masculine and feminine? Give 2 post-its to each participant. They will write what they associate with masculine on one and what they associate with feminine on the other.
3. The post-its are then stuck on the flip chart and arranged into 2 columns: one column for words associated with feminine and one for words associated with masculine. They will be commented on at the end of the workshop. The person leading the workshop (the facilitator) then explains the general notion of stereotypes, clichés, preconceived ideas.
4. Working in groups, participants analyse one ad for technological objects and fill in the grid. Ask them to do the same for an recruitment campaign ad.
5. Each group chooses a presenter, who explains the group's findings to the rest of the participants.
6. After all the groups present their findings, look back at the post-its. Participants will compare what was written on the post-its, i.e. feminine and masculine word associations with the stereotypes identified in the ads.

- A full activity breakdown of the activity can be found [here](#).

## Outcomes

Through the discovery, comprehension and analysis of stereotypes in the ads, participants will be led to question how these stereotypes influence the way they view the skills/abilities associated with astronomy, science and technology, and how these stereotypes influence their choice of studies and careers.

# Who does what?

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## Concept

A fast and easy activity on gender stereotyping in our thinking.

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## Overview

- Participants: Children age 8 to 11
- Difficulty: Easy and low cost

## Materials & personnel

- 1 facilitator
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## Breakdown

1. Read out the following list and ask for hands up if you think it's a thing for people socialized as girls and no hand up if you think it's a thing for people socialised as boys or vice versa.

Words: Burping and Farting, Rescuing, Dancing, Teaching, Cooking, Pink, Doctor, Nurse, Cars, Diet drinks, Astronomer, Blue, Cleaning, Lawyer, Engineer, Set of spanners, Computer programmer, Red, Glitter, Mathematician.

2. Once you have read through the whole list follow with the discussion. Some topics for discussion could be: Why do you think there was so much agreement? Where do these ideas come from? Where are these answers coming from?

3. Share an explanation of gender roles: From an early age, gender roles are communicated to us and often influence what we like, our behaviours, and the choices we make. Frequently, we conform to these roles and build an identity around them. These ideas arise from all sorts of sources: our families, the media, what we're exposed to, and much more. Studies have even shown that parents speak differently to babies depending on what gender they were assigned at birth. It's also been shown that our cultural beliefs re-enforce what is seen to be acceptable behaviour, including what we do and what (or who) we like.

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## Outcomes

Participants will become more aware of gender stereotyping in their thinking.

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# TikTok Science Stories

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## Concept

TikTok Science Stories allows participants to know and experiment with what it means to be a science communicator.

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## Overview

- Participants: Kids and teens
- Difficulty: Medium

## Materials & personnel

- Beamer or TV
  - Facilitator
  - A video device for each group (smart-phone, camera, etc.)
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## Breakdown

1. Share a video where a science communicator, explains their role. [This video](#) from Wiradjuri woman and astrophysicist Kirsten Banks is a great example, you can search for science communicators from your own country. Feature a woman or other gender minority.
2. Invite participants to do some research on the science communicator you highlighted. Ask them to choose one of their videos to explore.
3. Participants discuss who the audience could be, and what features of the video support that idea. What connects the audience to the science communicator?
4. Ask participants to identify a range of purposes and examples of science (astronomy) communication. A shared concept map might be one way to collate ideas.
5. Working in groups, invite participants to create their own science (astronomy) communication video (3 minutes long). Before they begin creating their video, participants should plan their content and how they are going to ensure effective and engaging communication.

For a full activity breakdown and resources visit [The Gist Project](#).

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## Outcomes

Participants learn about the diverse roles of science communicators and are challenged to create their own science communication work in a contemporary medium.

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# Women in Astronomy Cooperative Card Game

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## Concept

By playing a cooperative card game, the public will discover the role of women in astronomy and recognise their contributions and their role in advancing the science of astronomy.

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## Overview

- Age Group: 13-18 years old students, groups and families
- Duration: 20 minutes to 1 hour

## Materials & personnel

- 1 or 2 facilitators depending on the number of participants
  - A set of cards & table/cord to set the cards in order
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## Breakdown

1. Create and print a set of playing cards. The front of the cards displays a photo or painting of a female astronomer + name + a short text presenting them and their biggest/most famous accomplishment or discovery (don't indicate any dates on this side). The back of the cards displays a photo or painting of a female astronomer + name + years of birth and death.
2. After introducing themselves and the game, one of the facilitators reads the front of the first card out loud and hangs it with the date showing.
3. They pick another card, read its information aloud, and ask the group where it should go: before or after the first one.
4. The second facilitator (if there is one) can walk among the public to catch some thoughts and encourage the players to share them with the group. Facilitators can give some clues without providing the correct answer. The card is hung where the group says it should be.
5. The facilitators pick a new card (or ask one of the players to take their role).
6. Players go through the deck, taking their time to discuss where which card goes. They are free to adjust their timeline as they go, revisiting and discussing why they made the choices they made.
7. In the end, the facilitator or one of the players goes through the timeline, turning the cards over to reveal the dates and if necessary, repositioning them. Players are encouraged to discuss their decision-making process.

A full activity breakdown and a set of cards in English can be found [here](#).

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## Outcomes

New role models for teenagers, better representation of women in schools, science centres and museums and other informal learning settings, and share women's contribution to astronomy throughout history.

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# Dialogue activities



Dialogue activities aim to bring together different stakeholders. They are formats that allow educators, professional and amateur astronomers, policymakers, and the wider communities to present, showcase, share, discuss the science of Astronomy.

- Discussion Continuum
- Priority Game
- Reversed Science Cafe
- Science Espresso
- Science Speed Dating
- Video Synthesis
- World Cafe

If you have any questions, comments, or suggestions, please contact us

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# Discussion Continuum

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## Concept

Discussion Continuum is a way for participants to discuss the reasons why the group is rather for or against certain positions, giving them the possibility to widen their own viewpoint on certain topics.

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## Overview

- Audience: 8-30
- Duration: 120 min.
- Difficulty: Medium

## Materials & personnel

- A set of cards
  - Fact sheets
  - 1 moderator/discussion
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## Breakdown

- 1: A set of cards are prepared illustrating a controversial statement or issue about a common topic. Two cards “agree” and “disagree” are placed at the two ends of a table.
- 2: One person reads out loud a card and then places it in a certain position between “agree” and “disagree” according to his/her opinion.
- 3: A second person reads another card, and places it in between, justifying the reason of his/her choice, and also whether she disagrees/agrees more or less with the previous card’s position. A discussion can be encouraged to gain a consensus on whether the previous card should be slid up or down the scale.

A “fact sheet” can be provided or referred to when discussing the statements and views provided. It is important that facts come in when they are requested by the discussion.

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## Outcomes

Sharing different opinions around the same issue and understanding how a single issue can be viewed from many different angles.

## Tips and Comments

Cards should be very synthetic and provide clear questions that admit different opinions. The activity can be very helpful when addressing astronomy and space-related topics that have a clear and direct impact on a community day-to-day, for example, light pollution, satellites, etc.

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# Priority Game

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## Concept

An activity that allows you to explore the views held by the participants. Priority Game will also provide a chance for participants to have their awareness heightened by seeing and discussing various and new points of view.

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## Overview

- Audience: 4-6
- Duration: 120 min.
- Difficulty: Medium

## Materials & personnel

- A set of cards about a topic
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## Breakdown

- 1: Give a set of cards with several sentences about one topic, all of which are true.
  - 2: The group are asked to place them in order of priority (just the degree of importance) agreeing on a scale, through discussion.
  - 3: Participants are invited to explain their choice.
  - 4: The results of several groups are then compared with similarities and differences being discussed.
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## Outcomes

Participants will gain a better understanding of their own opinions and underlying reasons and views become explicit.

## Tips and Comments

Cards need to be relevant so that setting a priority is difficult and needs discussion. The activity can be very helpful when addressing astronomy and space-related topics that have a clear and direct impact on a community day-to-day, for example, light pollution, satellites, etc.

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# Reversed Science Cafe

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## Concept

Reversing a classic Science Café, the Reversed Science Café has experts ask questions to the public and listen to answers. Experts and citizens work together in small groups to formulate solutions to the challenge of making research and innovation more diverse, inclusive and open.

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## Overview

- Participants: 30+
- Duration: 180 min.
- Difficulty: Medium

## Materials & personnel

- 1 expert + 1 moderator per group of 8 people
  - Tables for 10 pp
  - Chairs/flip chart/markers
  - Tape/blue tack
  - General moderator
  - Hot and cold drinks
- 

## Breakdown

- 1: Define your topic of interest or challenge, related to your community.
  - 2: Find highly qualified, well-prepared experts. Experts can be scientists, researchers, engineers, innovators. They should bring real questions on issues relevant to their work and requires feedback from the audience.
  - 3: Introduce the event, and goals, present the experts and divide people into small groups with at least 1 expert, 1 group moderator and around 8 people. You can use a projector to present the topic. We suggest having at least 5 groups and no more than 10 pp (10').
  - 4: Main presentation by one of the experts to the audience (15').
  - 5: Each of the experts is introduced to each of the groups and asked their questions. The moderator also selects one person from the group to write down the results of the discussion on a flip chart (10').
  - 6: Groups discuss internally without the experts who leave the tables (20').
  - 7: Experts re-joins the groups and the discussion continues (15').
  - 8: Audience members visit other groups and learn about their questions and discussions. One of the participants will remain at their table to present the results to the expert and moderator. The rest start visiting the rest of the groups in at least 2 “delegations” (5-10').
  - 9: Group outcome exchange. If time allows, groups should exchange their results (30').
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## Outcomes

The informal style of a reversed science cafe will help establish new relationships between all audience members including experts. You will be able to produce 5-10 short written recommendations with respect to the local challenge.

## Tips and Comments

Your experts are key for the success of the event: make sure they are ready to listen to the participants' opinions.



# Science Espresso

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## Concept

Reversing a classic Science Cafe, the Reversed Science Cafe has experts ask questions to the public and listen to answers. Experts and citizens work together in small groups to formulate solutions to the challenge of making research and innovation more diverse, inclusive and open.

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## Overview

- Participants: 30+
- Duration: 180 min.
- Difficulty: Medium

## Materials & personnel

- 1 expert
  - 1 moderator
  - Chairs in a circle
  - Computer, beamer and screen
  - Loudspeaker system
  - Felt pens/ flip charts
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## Breakdown

- 1: Select a topic that resonates with your local environment.
  - 2: Select an expert in the field. Your expert is key to the success of the event: make sure your expert is highly qualified, well-prepared and ready to listen to the participant's opinions.
  - 3: With your expert, select the tangible topics that could be discussed.
  - 4: Once on-site, the day of the event, one expert presents their research in 10 minutes and invites the audience to discuss. Your moderator should facilitate the discussion if need be, by pointing out possible questions, directing the discussion towards the point of view of an ordinary person, or towards how their research is affecting society etc.
  - 5: Discussion for 20-30 minutes.
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## Outcomes

The objective of a SE is to enable dialogue between the general public and experts representing different areas of research and other science-bound aspects of social interactions. It should help establish new connections contributing to building trust and openness to dialogue.

## Tips and Comments

Keep a very informal atmosphere. Participants should be familiar with the topic to be discussed.

# Science Speed Dating

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## Concept

An activity that gets local stakeholders and scientists in contact with a bigger number of citizens through short conversations, discovering the local challenges for “real people”.

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## Overview

- Audience: 20+ people
- Duration: 30-60 min.
- Difficulty: Easy

## Materials & personnel

- Timer, loud bell or buzzer
  - One small square table for every two participants
  - Two chairs per table
  - Microphone for presentations
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## Breakdown

- 1: Begin the session with an interactive presentation, stating the intention of the speed dating, the challenge and the main rules behind the activity.
  - 2: Invite the scientists to give a short 30 seconds introduction of their background/expertise.
  - 3: Begin the session by seating local stakeholders and scientists at the tables.
  - 4: Each round will be about 3-5 minutes. Either the scientists or local stakeholders can do the moving (60 seconds are needed for them to move)
  - 5: The session is complete when everyone has spoken with one another.
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## Outcomes

Science Speed Dating is a great way to brainstorm and generate ideas between scientists and a wider range of local stakeholders. It is a method that is informal, but one that is a high-energy social activity that both local stakeholders and scientists can enjoy.

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## Tips and Comments

Providing cards at the table with extra questions on the topic is a good way to encourage lagging discussions.

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# Video Synthesis

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## Concept

A format for participants to make a short video impressions representing a synthesis of what they learned. They can do this in smaller groups, interviewing each other, or doing a short role play.

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## Overview

- Audience: 6-12 people
- Duration: 30-60 min.
- Difficulty: Medium

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## Materials & personnel

- A video device for each group (smartphone, camera, etc.)
- Paper props and other materials that the groups can use to create an animation

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## Breakdown

- 1: Participants are divided into smaller groups of 2-3 people.
- 2: First, in groups, participants need to think about what they learned and which message they want to convey in the three-minute video.
- 3: Then the groups will have to develop the images and video shots that will tell their story, by drawing a storyboard.
- 4: They need to collect and organise what they need to have at hand.
- 5: Shoot! The video is filmed in one shot. There should be no editing afterwards.
- 6: (optional) Depending on the group size and available time, some or all, videos are shared with the rest of the group (e.g. ask for volunteers).

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## Outcomes

Video synthesis will help groups of people reflect and discuss about the learnings and outcomes of the activities carried out during the day (s) in a fun way.

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## Tips and Comments

If not done before, this activity may take longer than 30 minutes, so preparation beforehand is needed.



# World Cafe

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## Concept

A widespread and simple format to create spaces of dialogue to take place. It can be modified and adapted in a variety of ways to suit the time, amount of people and topic.

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## Overview

- Participants: 20+
- Duration: 1-4 hrs.
- Difficulty: Easy

## Materials & personnel

- Round tables for 4-5 ppl. & chairs
  - Flip chart on each the tables
  - Markers + blue tack
  - Bell or chime
  - Moderator ( & mic.)
  - Accessories to give a café feeling
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## Breakdown

- 1: Small groups (around 4-5 people) converse together around tables about a common topic/problem they experienced - pre-determined beforehand for each group. The type of question/s you used to spur conversations is important to think about. Try to think of open-ended questions that encourage inquiry and discovery.
  - 2: After the first conversation, someone stays at the table as a 'host', while the others move to a new table. The host summarises what has taken place at that table and those who are new share their previous conversations.
  - 3: On the table, there will be pens and paper to record conversations as they happen, ideas or concepts.
  - 4: At the end all the sheets will be pinned up, allowing themes to be drawn from them seeing what concerns people the most.
  - 5: Prioritization method can be used, for instance, as you go through points raised the group shouts "very important" or "not important" 'No discussion', just stating the groups feelings.
  - 6: Multiple rounds can be done, returning to the tables with "very important" concepts and conversations on how to change them. Discoveries will be made from the intermingling of conversations between many stakeholders.
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## Outcomes

World Cafe is an easy and classic dialogue activity that broadens the mindset of each person through interaction and collective learning with various stakeholders. Rounds creates a space for people to connect with a number of people, cross pollinating ideas throughout the whole day.

## Tips and Comments

Much like with Science Espresso, keeping the environment informal is key.

# Other activity repositories



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There is a universe of astronomy outreach resources waiting to be discovered. Any resource repository you would like us to feature? Please email a link to Suzana Filipecki Martins ([suzana.filipecki@oao.iau.org](mailto:suzana.filipecki@oao.iau.org))

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- [Big Ideas in Astronomy](#): “Big Ideas” and supporting concepts that all citizens of our planet should know about astronomy.
  - [AstroEdu](#): Peer-reviewed astronomy education activities
  - [Call to Action During COVID-19](#): a repository of digital astronomy resources and fun activities you can do at home
  - [ESA Kids](#): Space news, information, animations and downloads for kids aged between 6 and 12 from the European Space Agency
  - [Space Scoop](#): Astronomical news for children
  - [NASA Youth and Community Activities](#)
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