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EvoKE

Key recommendations on science communication in Europe relating to health and food safety

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Our Organisation

- EvoKE (Evolutionary Knowledge for Everyone) is a multidisciplinary network promoting scientific literacy, with over 480 members from 53 countries.
- Current members of EvoKE include evolutionary biologists, education researchers, teachers, journalists, museum professionals, science communicators, artists, designers and citizen science organisations.
- By bringing together people with distinct skills, experience, and cultural backgrounds, we aim to foster effective, collaborative projects that will increase scientific literacy across Europe, both in evolution and beyond.
- Improving the public understanding of evolution can help people develop the skills and scientific knowledge needed to address issues relating to, for example: human health, food security, protecting biodiversity and adapting to climate change.

Our Vision

We seek to promote scientific literacy and public understanding of evolution, so that citizens can make informed decisions, thereby contributing to an inclusive, sustainable and resilient future.

Our work

- **Evidence-based policy advice** on science education, public engagement, and topics where evolutionary science may inform policy decisions.
- **Researching** effective strategies to promote scientific literacy (work currently implemented through our EU- funded COST Action 'EuroScitizen').
- **Support** and **disseminate** collaborative projects on evolution education and outreach.
- **Train** EvoKE members and evolutionary biologists in effective science communication and outreach.

Our target audience

- General public
- Educators
- Media
- Researchers
- Policymakers

Get in touch with us

- EvoKE website: **https://evokeproject.org/**
- EuroScitizen website: **http://euroscitizen.eu**
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Introduction

In the autumn of 2018, the European Commissioner for Health and Food Safety, Vytenis Andriukaitis, consulted EvoKE on several science communication issues important to social wellbeing and sustainable development in Europe. These included how to change people's attitudes toward science, scientific knowledge, and how to communicate about risk, with a special emphasis on food-related issues.

Our response [1], based on research in education and science communication [2] was that simply providing access to information and facts (the so-called deficit model of science communication) is not sufficient. People build their positions and attitudes based on emotional factors and then engage in motivated reasoning, looking for and/or attaching greater value to evidence and experts that support their initial attitudes [3]–[6]. Although more studies are needed, research already provides avenues to address this problem. In this document we use the most important lessons of the research to recommend solutions that can be applied, illustrated by case studies [3]–[9].

Key recommendations

1 - Align your message with your target public. Tailoring your message in a way that respects, addresses and builds on their ideologies, values, worldviews, interests, personal and social identity needs and reduces the impact of their fears and phobias. Simply stating facts is not enough;

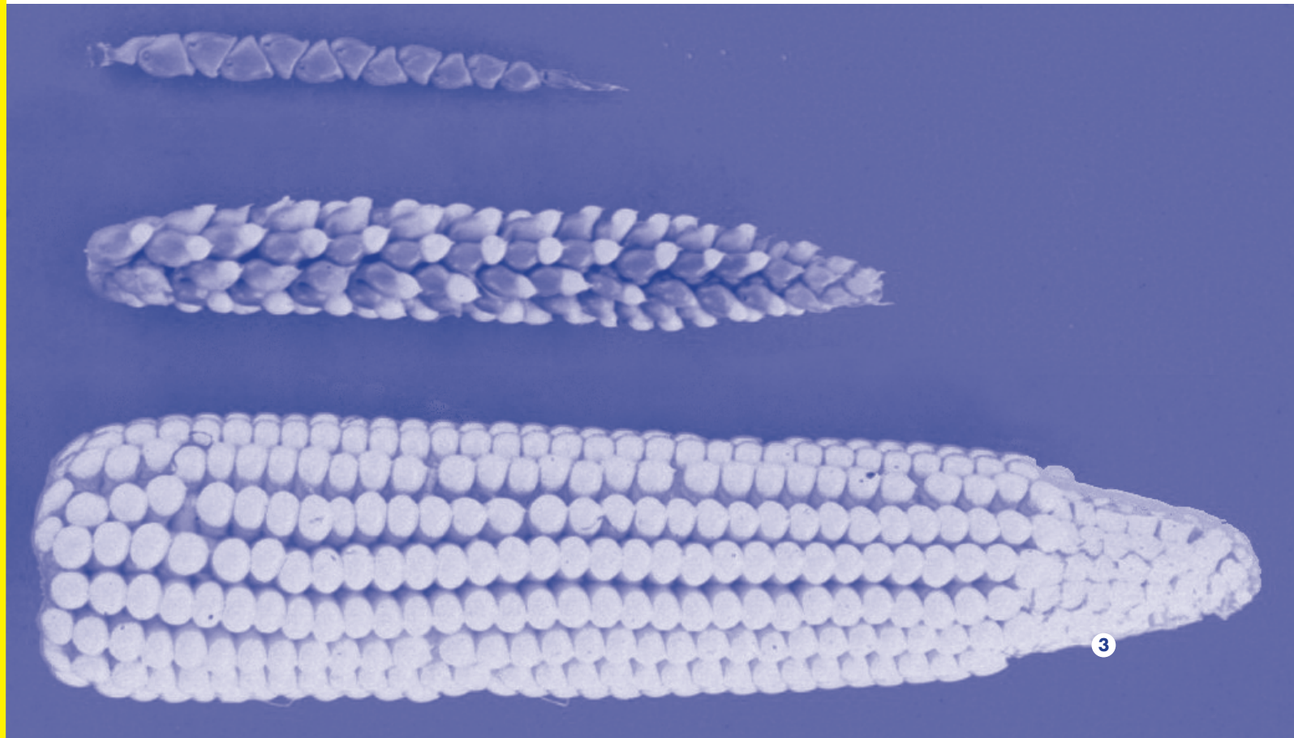
2 - Convey your message through people who are perceived as belonging to your public's social group;

3 - Foster opportunities for researchers to engage with the public in a meaningful dialogue to build empathy towards science and scientists;

4 - Foster opportunities for researchers to co-create science with the public, aligning the public's and researchers' needs, interests, values and motivations;

5 - Empower science teachers to develop educational approaches built on students' motivations and societally relevant problems to foster students' scientific literacy and engagement with science.

Note that risk perception will not be addressed per se, as the same research cited above and the key recommendations listed here apply to risk perception [10]. A few points of interest specifically related to risk perception are worth mentioning though. Additional research shows that public reactions to



political measures are not necessarily correlated with public risk perception but with "victims' statute" and people's worldviews [11]. It has also been repeatedly shown that a positive frame makes risk less threatening. For example, patients told that "90% of patients do not get a bad blistering rash" perceived treatment as less risky than those told that "10% of patients get a bad blistering rash" [12]. Also, in the scope of vaccination campaigns, messages that strongly state that there is no risk have been shown to result in a higher perceived vaccination risk than weaker negations of risk [13].

Key recommendations in detail

1 - Align your message with your target public.

Successful approaches used in nutrition education programs show the importance of people's emotional engagement for behavioural changes [14]. Programs in which students are only provided with information about healthy habits during a regular class session were either less or either less or notot effective in promoting preference and an increased vegetable intake than those in which these lessons were coupled with opportunities for children to engage emotionally with food. This emotional engagement could be cooking, gardening or simply being given choices.

The importance of valuing people's choices and self-identity has also been demonstrated [14]. Programs that impose or restrict the consumption of a set of food items were shown to be non-effective (or even counterproductive) while those that offer children the possibility of choice between food items (thus respecting their self-identity) have been shown to have more positive results. EvoKE members have been involved in a program designed to broaden elementary students' food preferences - especially willingness to try fruits and vegetables - and to foster students' engagement in scientific practices. To overcome students' rejection of culinary vegetables (and respect their self identity and food phobias), they were allowed to try several tomato varieties, distinct parts of the tomato, distinct sized pieces, and, when needed, to experience the tomato with other senses [15]. This approach led to a significant increase in preference and willingness to try tomatoes in the target group, with several students initially refusing to try it, subsequently adopting one of the tomato varieties as their prefered lunch item [15].

In 2014, experiments looking at the determinants for choice of beef purchases among four different EU countries demonstrated that consumers valued different nutritional and health claims [9]. While UK consumers valued higher claims on protein and/or iron, in other countries claims on saturated fat yielded higher preference. Even within countries, food choices depend on different factors, and multiple consumer segments can be identified [16]. For low income populations, price will often be the major determinant over safety [17]. Thus, identifying your public matters when it comes to changing attitudes.

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2 - Convey your message through people who are respected.

This approach has, for example, been exemplified in the field of climate change. A 2014 report showed that more than half of Americans would sign a petition in favour of tackling global warming if asked by a person they "like and respect" [18]. Examples for this also exist in nutrition education: it has been shown that everyday peers influence children's preferences, attitudes and food intake habits [19]. This fact has been successfully applied to improve children's preference for some food items, either by encouraging them to have lunch with peers who like these food items or using people or characters admired by the children to model the intended behaviour ([19] and ref therein).

Research evidence supports the contention that researchers can be more effective communicators if they emphasise their shared cultural identity with the public or are perceived as being part of the public's social group [3],[4],[19]. Some science communication projects have already built on the shared identity of the researchers and the public to foster public engagement with science. Good examples of such approaches are projects that bring together immigrant researchers and communities, both from the same country of origin, to foster scientific literacy, such as the the Native Science Project or the project "Hands-on science to promote language learning in bilingual contexts" [21]. Preliminary results of this latter project's evaluation, revealed positive impacts in children's scientific literacy and attitudes toward science.

When the public characteristics (e.g. ideologies, values, worldviews, interests, personal and social identity) are not well defined or known in advance, the best practice would be to include researchers/science communicators with diverse profiles, including minority cultures. Using this approach, science communication projects will enhance the probability of different people to recognise a shared identity with the science communicators [2]. Scientific speed-dating events may represent good opportunities to do this [22], [23] (see point below).

3 - Foster opportunities for researchers to engage with the public

Engaging in meaningful dialogue with the public is important as it allows researchers to better understand their target audience so that they can communicate their science effectively [6]. Training researchers in science communication may contribute to the effectiveness of these dialogues by providing them with skills and tools to better identify key aspects of the conversation to build on. Such conversations also provide opportunities for researchers to better understand the public's needs and identify research questions that are more aligned with these priorities [6].

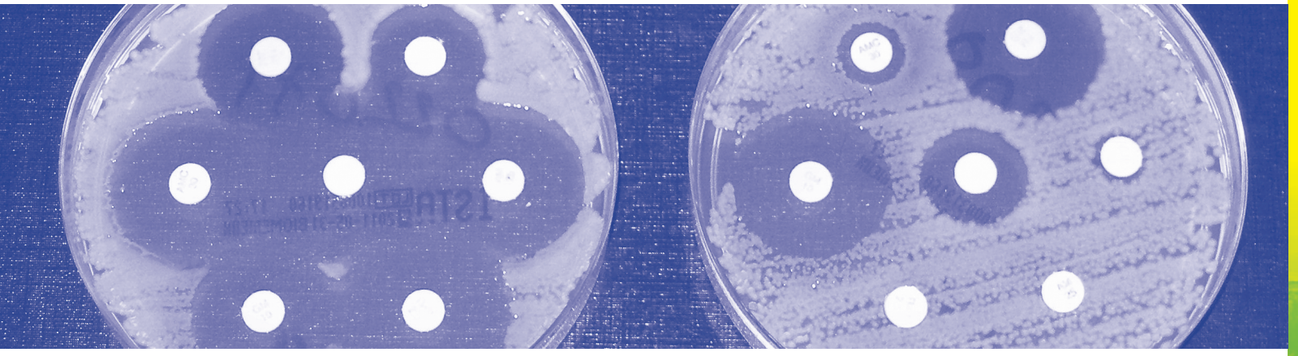
Scientific speed dating events are interesting formats, which are designed to promote closer conversations between researchers and the public with diverse profiles. EvoKE members organised a scientific speed-dating event between researchers attending the ESEB 2015 conference in Lausanne and the local public in a bar [22]. The event was advertised around the evolution and diversification of beer and cheese, two products strongly valued by local people. This resulted in high media coverage of the congress [24] as well as the science of evolution [25]. In addition to demonstrating a high engagement level, the public attending reported after the event an increase in their understanding of evolution and in their willingness to finance research in evolution [22]. A further good example is the SciSparks project, led by EvoKE/EuroScitizen members [26]. In this case, highschool students meet with seven different researchers in a speed-dating setting up, that ensures a wide diversity of gender, personalities and paths that students can identify with, in a personalised setting. As a result, the number of students declaring that they knew how experimental results are validated was increased six-fold after the intervention. Overall, the results suggest strong and significant impact on students' understanding of the nature of science [23].

Similarly, Stofer and colleagues [27] recruited diverse pairs of researchers, with science outreach training, to establish casual conversations with the public in places such as bars, cafés, libraries and laundromats in rural and urban areas. Their results show that 76% of the conversations taking place at these unusual places resulted in high or medium engagement of the approached people.

4 - Foster opportunities for researchers to co-create science with the public.

A promising approach to co-create science with interested members of the general public is citizen science. One particular model of co-created research is **Participatory Action Research** (PAR) - a collaborative process of co-designing research between academic researchers with concerned public groups. Sikkens et al. [28] applied a PAR intervention to promote the appropriate use of prescriptions for antimicrobial drugs. Despite a range of antimicrobial stewardship programmes, research has indicated that changing physicians' prescribing behaviours can be challenging, often because of behavioural and cultural reasons [29]. In their PAR intervention, Sikkens et al. [28] worked with health care workers: they first spent a year collecting baseline data, conducting interviews with practitioners from diverse clinical settings to better understand their needs and motivations. They used this information to understand the root causes of the problem and to design possible intervention strategies to address them. In a follow-up phase, practitioners were further invited to co-construct solutions and choose an intervention strategy for their department. Over a year, monitoring of implementation was conducted by "ambassadors" and the level of appropriateness of antimicrobial prescription. At the end of the study, researchers found that the level of antimicrobial appropriateness had risen significantly, by 13%, suggesting that this intervention was effective.

PAR as a methodology, and co-created citizen science more broadly, has further been highlighted as a tool for environmental stewardship [30], climate adaptation [31] and conservation [32]. Guidelines on co-creation from organisations such as Sense About Science (UK) [33] and EU funded projects such as RRI tools [34] and Orion Open Science [35] exist and are available to researchers who want to use this approach.



5 - Empower science teachers to develop educational approaches built on students' motivations.

Aligned with previous recommendations, research in science education also supports educational approaches that build on student's features and motivations. When students can learn and apply scientific knowledge to understand different contexts that are valued by them, and to find solutions and make informed choices regarding social scientific problems [7]–[9], [36], their educational outcomes are improved. This strongly supports educational strategies such as Science Technology and Society (STS) and Social-Scientific Issues (SSI) that encourage students to learn science and engage in scientific practices and discussions to address social scientific problems and to learn about the Nature of Science (NOS). These approaches have been shown to effectively promote the learning of scientific content and the NOS, the development of social and negotiation skills and positive attitudes towards science [36]–[39]. For example, Klop and colleagues [40] developed and evaluated an STS educational model framed around biotechnology in which students were asked to role-play a researcher performing genetic analysis, and providing medical recommendations to a doctor. During this process they engaged in scientific practices, and scientific, moral and ethical discussions about this SSI. This approach resulted in a significant increase of student's scientific literacy, and positive attitudes towards genomics and biotechnology [40].

What can EvoKE/EuroScitizen offer?

- EvoKE/EuroScitizen can help to create a more knowledge-based society by promoting public understanding of science (including both facts and processes) through effective science communication and education, so that citizens can make informed decisions.
- We can leverage our highly motivated and diverse multidisciplinary networks with expertise in science communication, education, and evolutionary biology, to:
  - Provide timely expert advice to policymakers in relation to health and food safety issues;
  - Engage with citizens through public outreach events and the media to promote scientific literacy;
  - Develop best practices for science communication;
  - Build strategies to prevent the reinforcement of common misconceptions about science – especially evolution – relating to food, health, and the environment;
  - Conduct research on science communication and scientific literacy, e.g., in the media and in formal or non-formal educational settings.
- As the EvoKE network expands it will increasingly be able to provide timely policy advice on science communication, education, and relevant matters related to health and food safety, and conservation where evolutionary biology is important.

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