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In Scientific Dialogic Gatherings (SDGs), the participants read and reflect on scientific works and articles. SDGs are aimed at promoting collective learning through dialogue.

Everyone can participate in these dialogues, regardless of their age, gender or culture. The participation of people with low education levels, though, is favoured, with the goal of generating a more enriching and inclusive environment.

Through this participation, the participants acquire scientific knowledge, as well as the ability to argue while respecting each other.

This guide is designed for any institution interested in organizing SDGs to supply them with in-depth information about its principles and its implementation.

Section 1:

Why carry out Scientific Dialogic Gatherings?

“This project is very important to challenge the idea that [...] people of low education levels cannot read these articles because they will not understand anything.”
SDG participant

Scientific Dialogic Gatherings (SDGs) are a way to respond to current European challenges in science concerning institutions and programmes and civil society and education of adults, as explained in the following.

Such challenges are reflected in *Horizon 2020*, the European Union Framework Programme for 2014–2020. This programme is one of the biggest EU Research and Innovation programmes, working on coupling research and innovation, and on major social challenges. The programme goals include making science more attractive

to young people and involving citizens in research on formal and informal education in science.

Moreover, *Science for the XXI century, a new challenge*, published by the UNESCO World Conference of Science, establishes that ‘it is more than ever necessary to develop and expand scientific literacy in every culture and sectors of society’ (Declaration about science and the use of scientific knowledge, 1999, Preamble 3.34).

Regarding the education of adults, high demand for adequate techniques for

democratising knowledge and training in the scientific domain has been observed in recent years. This need comes especially from segments of the population with low academic training as these people traditionally have been excluded from the science domain but nevertheless can benefit from this knowledge in daily life.

"I am interested as the subject of science is not a topic that is talked about a lot."
SDG participant

Notably, the Universal Declaration of Human declares that 'everyone has the right to freely take part in the cultural life of the community, to enjoy arts and participate in scientific progress and the beneficial outcomes' (Universal Declaration of Human Rights, 1948, Article 27).

For these reasons, we detected a need to develop a project that accomplishes the goal of getting science closer to citizens. This is why we have transferred Dialogic Gatherings (DGs) to the scientific domain.

The DGs, taking place in different countries and in different fields, are among the **Successful Educational Actions (SEA)**, a set of practices for educational achievement independent of the geographic and socio-economic contexts of the participants and the centres where they take place.

Section 2:

How do we start a Scientific Dialogic Gathering?

First, we have to take into account that it is not necessary to have scientific or academic knowledge to start or participate in a SDG. The goal is precisely to learn and share from the best literary creations of humanity in the scientific domain, and SDGs show us how this is possible for everybody.

SDGs can start with the interest (of people/learners) to get involved in science or can be introduced (from an adult education organisation) as a different approach to subjects such as biology, chemistry and mathematics. It is important to mention that

SDGs are not limited to the natural sciences but include all areas of scientific knowledge accumulated by humanity over time (e.g. the natural sciences, formal sciences, engineering and technology, life and health sciences, social sciences and humanities).

The participants can use different resources to access the works and articles worked on in a gathering, such as acquiring and borrowing them from libraries, among others. In any case, it must be ensured that economic conditions are not impediments to participating in SDGs.

For additional help on how to carry out an SDG please refer to the online guide at:
<https://www.die-bonn.de/sciencelit/>



Setting up a gathering

A first meeting with people interested in a SDG takes place in which together the following decisions are made.

- We select, among all of us and through dialogue, an original scientific work or article of impact in the domain we wish to discuss. Everyone can make suggestions and discuss why it would be interesting to read it and share their thoughts about it in the gathering.
- We decide on the chapters and pages we will read for the first/next gathering.
- We arrange the meeting time and place for the gathering.

Before the arranged gathering takes place

- We read at home what we have agreed on, and if necessary, we look for complementary information for a more complete understanding.
- We highlight the paragraphs that attract our attention or that we find interesting and especially like. It is important that all the participants point out at least one paragraph

that they find interesting because this shapes the way the gathering is conducted. Once at each gathering, we discuss what we have read.

During the gathering

- First, we choose a moderator.
- Then the moderator opens the floor by asking who would like to explain their chosen paragraph. The moderator writes down a list of people who wish to talk or intervene and gives the floor to the first one who raises their hand.
- The person who has the floor reads his or her chosen paragraph out loud while the rest of the participants listen. The participant explains why he or she chose this paragraph and shares his or her thoughts on the paragraph with the other participants.
- Afterwards, the participant asks if someone would like to add a comment and gives the floor to the people who wish to speak, so they can give different interpretations and share experiences about the paragraph. Once the interventions are completed, the moderator asks if the participants agree to move to another paragraph.
- Then the moderator asks if someone has selected another paragraph on the same page and follows the same procedure with all the pages in order, ensuring the participation of all the people willing to contribute.
- No one is forced to intervene, but the people who participate less often should always be taken into account. To do so, a round of words can be conducted so that every person in the gathering gives a brief opinion on what was read. If some people who participated a lot in the gathering, the ones who participated the least are prioritised to receive the floor.

- When the gathering finishes, the participants agree on the next chapters, articles or work to read for the next session. Thus, the process starts again.



Practical aspects:

In the following, we point out some brief practical orientations to organise the gatherings:

- SDGs take place in sessions lasting one to two hours, with the frequency agreed on by the participants, for instance, weekly or biweekly, for the duration of time the participants agree upon.
- SDGs can take place in a normal classroom. The seats can be arranged in different ways as long as participants can see each other.
- The number of participants can vary in each gathering. It is not relevant, and it does not have an effect on the dynamics of the activity.

Section 3:

The role of the moderator

One of the persons participating in the gathering has the role of the moderator. This person is chosen through a dialogue, and their function is to ensure egalitarian participation of everyone. It is not necessary to be an expert in a subject of science to give clarifications and explanations, like in a class, which would create a unilateral, question-answer dialogue or an unequal relationship of ignorant-expert (Freire, 1970)¹. It is sufficient that the person moderating the session has knowledge about the proper functioning and criteria of SDGs to facilitate collective meaning-building. The participants bear the responsibility to discuss,

exchange views and come up with questions. The main function of the moderator, therefore, is to maintain the order of interventions and, as mentioned earlier, to prioritise the participation of people with more difficulties speaking in public while their preference is not to do so. The moderator is responsible for ensuring a fair, equal distribution of the available time.

Other points for the moderator to take into account are:

- To never impose their opinion
- To not explain or present the content or judge the interventions.

¹ Page 63 "If the educator is the one who knows and the learner the ignorant, he should, then, the first one, give, deliver, carry, transfer his/her knowledge to the second one". To know stops being a knowledge of "fulfilled experience" to be a knowledge of narrated and transferred experience.

Section 4:

What do we read at the Scientific Dialogic Gatherings?

The people participating in SDGs are the ones who choose the works read and shared. This is based on a selection of proposals using the following criteria:

- Classical texts from the scientific field must be selected, and when selecting current texts, they must be published in journals with scientific impact, validated by the international scientific community.
- The authors must be figures whose contributions have had global impact.
- The impact classification of scientific journals should be taken into account.
- The works must be original texts belonging to the original source or author.
- The works must have some criteria of excellence.
- The works must make a social contribution.
- In the case of translated texts, the quality of the translation must be ensured.
- The participants' ability to work on a text with a certain level of difficulty must not be underestimated as in these cases, there are much greater opportunities for understanding and reflecting together.

SUGGESTED BOOKS:

- Darwin, C. On the Origin of Species.
- Galileo, G. Letter to Mrs. Cristina de
- Lorena, Grand Duchess of Tuscany.
- Galileo, G. Dialogue Concerning the Two Chief Ptolemaic and Copernican systems in the world.
- Galileo, G. The Gazette Sidereal (Contains Conversation with the Sidereal Messenger of Johannes Kepler).
- Copernicus, N. On the Revolutions of the Heavenly Spheres.
- Kepler, J. The secret of the universe.
- Levi Montalcini, Rita (2011). Praise of Imperfection. Barcelona: Tusquets. (Original published in 1987: Praising dell'imperfezione).
- Kandel, R. (2007). In Search of Memory: The emergence of a New Science of Mind. NY: Norton & Company.
- Hawkings, S. Great design.
- Hawkings, S. The theory of everything.
- Hawkings, S. The dreams that stuff is made of.
- Hawkings, S. A briefer History of Time.
- Hawkings, S. God created the integers.
- Ramon y Cajal, S. Rules and advices on scientific investigation.
- Ramon y Cajal, S. Recollections of my life.
- Ramon y Cajal, S. Histology of man and vertebrates nervous system.
- Descartes, R. Discourse on the Method.
- Lucretius, T. De Rerum Natura.
- Newton, I. Mathematical Principles

Section 5: Criteria of the Scientific Dialogic Gatherings

There are a number of criteria to be taken into account for the correct functioning of the gatherings:

“I used to cut people of, you know, mid-sentence and was argumentative. I now listen to what people say, I wait my turn... This helps me with my relationships.”
SDG participant

1. The chosen readings are the best works of reference in their scientific fields or the scientific articles with the greatest impact.
2. The participants in the gatherings are people without a higher academic background, demonstrating that the best scientific contributions of humanity belong to everyone, and anyone can understand and share them.
3. The opinions of all the participants are respected, and everyone addresses others appropriately.
4. All opinions are accepted, provided that human rights are respected.
5. It is also important to moderate the duration of interventions, not allowing interventions that are excessively long to take up all the time, as this monopolises the discussion.
6. Turns must always be respected; this is the responsibility of the moderator. The moderator assigns the participants their turn to speak.
7. Discussions between two participants should be avoided, and discussions should always be aimed at integrating all

the participants. If two people start a conversation parallel to that of the group, the moderator is responsible for encouraging them to share these comments with the rest of the participants and to return to the gathering.



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DI
GALILEO GALILEI LINCEO
 MATEMATICO SOPRAORDINARIO
 DELLO STUDIO DI PISA.
E Filosofo, e Matematico primario del
 SERENISSIMO
GR.DVCA DI TOSCANA.

Done ne i congressi di quattro giornate il difcorre
 sopra i due

MASSIMI SISTEMI DEL MONDO
TOLEMAICO, E COPERNICANO;

*Propoendo indetreminatamante le ragioni Filosofiche, e Naturali
 tanto per l'una, quanto per l'altra parte.*

CON PRI  VILEGI.

IN FIRENZA, Per Gio: Batista Landini MDCXXXII.

CON LICENZA DE' SUPERIORI.

Section 6:

Theoretical Framework: Dialogic Learning

“In the gatherings, we do not judge who says things, [...] and as you are not judged by what you say, you are free.”
SDG participant

Scientific Dialogic Gatherings (SDGs) are based on the seven principles of Dialogic Learning (Flecha, 1997; Aubert et al., 2008) as people learn from interactions and dialogue with others. In this way, knowledge is built collectively among everyone participating in the same gathering. The seven principles are as follows.



1. **Egalitarian dialogue.** Everyone participating in the dialogue is considered to be equal. Their contributions are valued according to the validity of the arguments they present and not according to whom is making the contribution. In this way, the arguments, whether they come from a participant without an academic background or from a professional or scientist attending the gathering, are valid.

“We read very important things, especially the articles and topics for us [...] who do not have university studies. [...] You have the idea that we will not understand. [...] Thinking this is a mistake.”
SDG participant

“There are many ways to understand an article. [...] We do not expect to understand an article as scientists do, [...] but we understand it at our level as we can associate it with our experiences.”
SDG participant



2. Cultural intelligence. People know different things learned, in particular, in academic, practical or cooperative contexts: everyone has the capacity to learn thanks to cultural intelligence. The contributions are taken into account by equally appreciating the origins of different opinions and knowledge. It might occur that the participants have strong knowledge of a certain field (e.g. physics or chemistry) due to their work, even though they perform non-academic work.

“I found it most interesting, how different people explain the same text differently. And every view is valid. I love that.”
SDG participant

“At first, I was a bit afraid to participate in the scientific gatherings as I do not have a very rich vocabulary in scientific words, [...] and I said that I would not know anything. [...] When we read it, with my language ability, I am interpreting it my way. [...] When we discuss it, [...] you learn things that you have not asked yourself.”
SDG participant



3. Transformation. Through their involvement, the participants have the capacity to overcome social, working and educational exclusion on their own by producing their own transformation. In the case of SDGs, it is necessary to take into account the traditional difficulty of accessing scientific knowledge and, therefore, the achievement and the evolution of the participants in the present process.

“Newton’s letter has been the most difficult text. [...] It was a very interesting gathering as we thought nobody would speak, and then we did not stop talking during the whole gathering. [...] It was a very difficult topic, but we contributed many ideas.”

SDG participant

“Now I can read a text and more or less understand it. [...] Now I do not think I cannot read it.”

SDG participant

“The gatherings were a lot better than what I had initially expected. Today we talked about the greenhouse effect, which had a big impact on me. I will try to change some of the bad habits I have, like leaving the lights on, and try to recycle more from now on.”

SDG participant



4. Instrumental dimension. People decide dialogically what they want to learn, which allows them to acquire instrumental knowledge. For example, it is usual for people to be interested in understanding current news and everyday issues related to science that directly affect them, including scientific advances that can improve their quality of life. That is why it is important that the content is chosen by the participants.

“With this model of gatherings that we have here, [...] we understand many things, and we have a lot of vision [...] and] a lot of interest in searching for information on the internet or in some encyclopaedia.”
 SDG participant

“Since I joined this project, I look for scientific issues more on the internet and I especially look for explanation of certain words, thus expanding my understanding and vocabulary.”
 SDG participant

“I started looking into the roots of scientific discoveries. I learnt so much and I can talk to my friends and now I can explain things to them.”
 SDG participant



5. Creation of meaning. Through participation, the attendees see a space of connection and possibilities for participating actively, giving meaning to the present process. The participants who have historically been excluded from the scientific world may feel that new interests are opening up for them as they gain insights into new topics.

“When you talk, above all, you see that they listen to you, and even someone gives you a sign saying that you are right. [...] That makes you feel better, especially as a woman.”
SDG participant

“Last time we talked about psychology and ever since there has not been a single day passed that I have not studied a bit more about it. I was always interested in psychology but never felt like taking the first step. Now I feel like the gathering gave me the boost I needed to get more involved.”
SDG participant

“Sometimes at home, they laugh because, of course, I have texts that are very complicated, so they say, “Wow, do you understand something?” [...] “Where are you reading this?” [...] My husband often reads them, [...] and we talk about the subject. [...] It’s another source of conversation.”
SDG participant



6. Solidarity. During the gatherings, the participants have a rule to help each other, leaving aside any individualism. The support of colleagues is the basis for understanding that science is accessible to all and is a way for the group to understand contents that would be difficult to understand individually.

“I used to think old people were lagging behind, not keeping up with the times – especially in science. Man was I proved wrong!”
 SDG participant

“When giving my opinion, I was very shy because of the fear of making a fool of myself. But then you learn that everyone can say something and that nobody makes a fool of himself. [...] Finally, everything is shared.”
 SDG participant

“I like it especially because you try to control the way you talk. [...] In the gathering, we learn to respect turns. That seems very easy, but it is not.”
 SDG participant



7. Equality of differences. The diversity of people is valued, identifying difference as a positive aspect, based on the value of equality. The plurality of the participants is considered to be positive, as the diversity of their previous experiences and scientific knowledge improves the quality of the gathering, eliminating prejudices and stigmas.



Digression 1 (Section 6.1):

The Dialogic Gatherings, a Successful Educational Action

The largest research project in the humanities and social sciences carried out by the European Commission, Strategies for inclusion and social cohesion in Europe from education (2006–2011), identified Successful Educational Actions (SEAs) that help to improve educational policies. SEAs differ from good practices or best practices as they are universal and transferable to different contexts and levels of education, producing similar results and contributing to better learning and solidarity among all participants at the same time.

Within the framework of this project, SDGs were defined as a SEA due to their collective construction of knowledge based on dialogue in many different fields, such as literature, music, art and mathematics. The main purpose of this action, which has even been studied in a doctoral thesis conducted at Harvard University (Soler, 2001), is to give the participants an opportunity to read, reflect and be a part of a process in which collective learning is developed through dialogue, favouring the participation of people regardless of their age, gender or culture, so that different viewpoints and experiences create an understanding beyond the individual. Through this action, the participants not only acquire skills through interactions with other people but also develop a great capacity for argumentation. In addition, this activity promotes coexistence as people with diverse profiles form groups, which must share a space in which mutual respect is favoured. In fact, gatherings favour the participation of people without academic qualifications traditionally excluded from this type of activities.

Digression 2 (Section 6.2):

Scientific Dialogic Gatherings:
What they are and what they are not

WHAT THEY ARE

An activity in which scientific works and articles are read, reflected, and collective learning is created through dialogue.

We work on texts of authors with a scientific impact.

There is an egalitarian dialogue, that is, contributions are valued according to the validity of the arguments and not according to who performs them.

WHAT THEY ARE NOT

A formative meeting on scientific works and articles.

Any type of scientific text is worked on.

Contributions are valued depending on the academic level of the person performing them.

WHAT THEY ARE

Solidarity and joint learning are promoted, the main goal being that everyone learns the maximum possible.

Decisions regarding the activity, such as the selection of works and articles, frequency of sessions, selection of moderator etc. are taken dialogically between the participants.

The moderator is not necessarily an expert in the scientific field, he or she is the one who has knowledge about the functioning and criteria of SDGs, and maintains the order of the activity.

WHAT THEY ARE NOT

Each person tries to learn the maximum possible individually.

Participants do not participate in decision-making regarding the activity.

The moderator is an expert in the scientific field who offers respective explanations to other people.

Section 7:

ScienceLit Project: ScienceLit Literacy for all

The ScienceLit project is an Erasmus+ project developed to meet a current European challenge: to promote and disseminate scientific knowledge among every culture and sector of society. It is thus regarded as a contribution to bringing science closer to adults, especially those at risk² of exclusion. It has targeted unemployed participants, particularly those older than 55 years old and young people (18–34 years old).



² 'At risk of poverty or social exclusion, abbreviated as AROPE, refers to the situation of people either at risk of poverty, or severely materially deprived or living in a household with a very low work intensity. The AROPE rate, the share of the total population which is at risk of poverty or social exclusion, is the headline indicator to monitor the EU 2020 Strategy poverty target' (Eurostat, [http://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:At_risk_of_poverty_or_social_exclusion_\(AROPe\)\)](http://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:At_risk_of_poverty_or_social_exclusion_(AROPe)))).

The objectives of the project are to:

- 💡 Facilitate access to scientific knowledge to adults, especially those at risk of social exclusion, offering them tools that enable them to understand, interpret and analyse science with autonomy
- 💡 Develop the ScienceLit methodology to transfer scientific knowledge to adults
- 💡 Connect European science institutions with at-risk adults to help bring science closer to society
- 💡 Develop key competencies by participating in SEA, such as SDGs





The ScienceLit methodology developed in the project is based on communicative methodology and Dialogic Learning (Flecha, 1997; Aubert et al., 2008) and is pursued in the follow-up to one of its Successful Educational Actions (SEA): Dialogic Gatherings, in this case, applied to the scientific theme.

Through this project and the aforementioned methodology, the participants seem to have achieved the following goals, (according to their statements):

- They've acquired a basic scientific knowledge
- They've learnt how to read and interpret scientific language
- They've understood scientific problems and language

"After the meetings, my self-confidence grew. I expanded my vocabulary and I can get my point across more efficiently at my workplace."

SDG participant

Section 8:

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