SENSE. The New European Roadmap to STEAM Education

D6.3 – Toolkit for social inclusion and gender awareness through and for STEAM education

October 2024

Funded by the European Union

Statement of Intent

Social creativity was initially categorized as “social inclusion”, but we have found that “social creativity” was a more appropriate term to encapsulate art, science, and inclusion as an approach for knowledge creation.

We envision the social creativity toolkit to be able to be used by teachers, educators, facilitators, or anyone who wants to be cognizant of social creativity when planning a learning activity.

In SENSE., we set out to design a social creativity toolkit for a variety of users that want to run any Science, Technology, Engineering and Mathematics (STEM) activity aligned with the SENSE. ambition and with the aim to enhance social inclusion in their activities.

At the crux, the toolkit is a guide to help users navigate learning activities, whether drawing upon examples within SENSE., or strategies to help reflect/build upon their own activities. This is a resource that can be used to facilitate self-reflective questions to consider throughout the planning, implementation, and post activity. This will hopefully improve the user’s own activities in a way that augments inclusion.

Ultimately, the toolkit encourages users to think and rethink about useful strategies to enhance social creativity relevant to their own context.

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1. Introduction

1.1. Purpose of the document

This task collects and critically reports the different strategies, methodologies, and practices to create a toolkit for furthering inclusion. The toolkit will be integrated in the SENSE.STEAM digital hub. The digital hub will be able to combine the elements herein presented and improve the user experience with graphic design and revised texts. As part of a wider ecosystem the User Experience (UX) and navigation will ensure the toolkit is embedded within SENSE. learning activities. This will be further enriched with links to further reading on underlying concepts, the SENSE. consortium's experiences and guidance through a Teaching and Learning Companion as well as the Spatial Inclusion Toolkit.

1.2. Intended readership

This document provides the first version of the social creativity toolkit. The basic elements of the toolkit are considered here in a linear manner to make the contents readable in a pdf file, but the digital version will consider complex interactions which are only possible in the digital format. The digital version of the toolkit will be shared with WP7 to implement into the future STEAM academy digital hub.

1.3. Structure of the document

After the introduction, the structure of the document begins with the architecture of the toolkit in three main sections. First, we look at the approaches to social creativity. Second, we describe the self-reflection activity of asking yourself questions. Third, we look at the five guidelines for social creativity. We conclude the document with a section on moving forward. In the supplementary information section, we include quotes and inputs from the SENSE. labs which will be integrated into the digital version of the toolkit.

1.4. Relationship with other deliverables

This document builds off previous deliverables such as D6.1 Scoping report on social inclusion and gender in STEAM (theoretical context) and the D6.2 Report on Evaluation of social inclusion strategies for the SENSE Roadmap (precise context), where there are results and shared experiences. These documents are foundational

references to this toolkit. Further, this builds on the SENSE. manifesto (D3.4) and design principles (D2.3). This deliverable will contribute to the D2.6 STEAM Academy Digital Hub along with D7.3 first version of the digitized educational materials and toolkits.

2. Architecture and goal of a social creativity toolkit

In SENSE., a social creativity toolkit facilitates understanding science, technology and mathematics (STEM education) in a way that the expertise of those involved is a shared, diverse, and inclusive experience. This framework goes beyond the context of the conventional classroom atmosphere to include the incorporation of artistic processes, a prioritization of sensory experiences, and the empowerment of individual identities.

The toolkit provides a self-reflective structure, examples, first-hand experiences, and recommendations for educators, community leaders, students, or anyone who wants to be cognizant of social creativity when planning a learning activity. The toolkit intends to cultivate environments where diverse perspectives and identities are valued. The toolkit follows an open-ended design which allows it to be adapted to various contexts, encouraging individuals from all backgrounds to contribute to an inclusive culture. The universal applicability ensures that anyone seeking to build inclusive, equitable learning spaces can benefit from the toolkit's resources.

Our approach to social creativity doesn't include rigid steps or a recipe to follow, but instead provides recommendations to supplement the learning companion and roadmap of SENSE.STEAM. This document reflects the first version of the toolkit; it may evolve to reflect new learnings and applicability, particularly when adapted to the digital hub in the SENSE. roadmap. Currently, this toolkit can be used as an accessory to envision social creativity in STEAM education through the lens of citizen science, social inclusion strategies, gender and intersectionality, and participatory art. The digital version of the toolkit will also further be enriched with personal and first-hand experiences from the SENSE. to increase user experience in general and, more particularly, to make the use of the toolkit a more vivid experience. A selection of these materials is available in the Supplementary Section.

2.1. A journey through the social creativity toolkit

The social creativity toolkit comprises three sections: approaches, asking yourself questions, and guidelines. We organize this document to reflect this journey, beginning with the concept of social creativity.

Social creativity allows people to maintain or achieve a positive social identity through re-interpreting intergroup relations. Social creativity can combine different approaches and can follow different guidelines, while centering the identities and

experiences of individuals to maintain positive distinctiveness in their approach to knowledge processes (van Bezouw et al. 2021).

These efforts can be most effectively pursued when we consider three interconnected approaches towards social creativity: citizen science, gender/intersectionality, and participatory art. Each of these approaches offers unique perspectives and methods for working towards inclusive and creative social environments, emphasizing collaboration, equity, and active engagement. By integrating these approaches, or at least by putting them at the same level, we aim to cultivate spaces for collective growth, where diverse voices and experiences shape the process of learning and creativity.

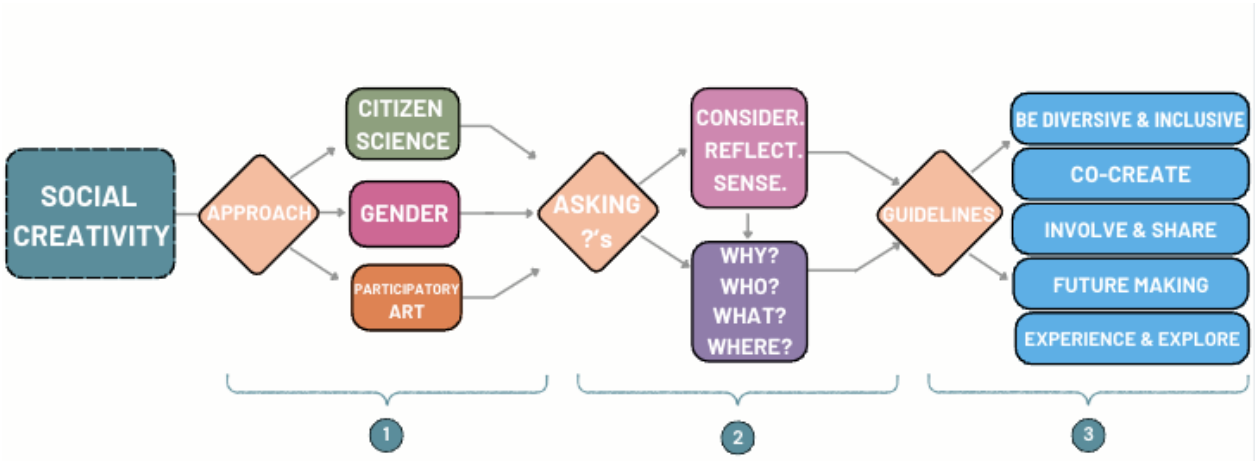

Figure 1: A journey through the social creativity toolkit

Social inclusion and social creativity are not fixed achievements; rather, they represent ongoing efforts that require continual reflection and adaptation. This is why the core of the toolkit is self-reflective; to encourage users to think and rethink about what they are creating, and to see themselves within the activity throughout the process. In the 'Asking yourself questions' section, we frame how to approach the self-reflection exercise, where you first Consider. Reflect. and Sense. to ask yourself four questions "Why, Who, What, Where" across three societal levels (individual, community, society).

When this self-reflection exercise is applied across levels of society, a few things can happen. It allows to frame contextual nuances and orients the users to ask themselves questions and reflect on different environmental and spatial contexts, such as a neighborhood, a city, a country, a culture or any other conditions in which a learning activity is situated. Simply, asking these questions at the different levels of society can provide a perspective that reveals scalability and applicability of the activity reflective of a multiplicity of contexts and situations.

In considering the three approaches citizen science, gender, and participatory art, and completing the self-reflection exercise by asking yourself the four W questions, we also include five guidelines as recommendations on how to increase social creativity within activities. The five categories (Co-Create, Involve & Share, Experience & Explore, Future Making, and Be Diversive & Inclusive) are the most relevant (D6.2) from the 20 social inclusion indicators that we first presented in D6.1. They can be related to different parts of the SENSE. Manifesto from D3.4.

In the following section we present the texts that the toolkit will contain in its digital format. Once implemented, the texts will be carefully revised (even simplified) to enhance user experience. They will be complemented with first-hand experiences reported in the Supplementary Information section.

3. Contents of the social creativity toolkit

3.1. Social Creativity

Social creativity is a process that enables individuals to maintain or develop a positive social identity by reinterpreting intergroup relations. It involves a combination of artistic practices, co-creation, and citizen science, focusing on inclusion, collaboration, and the distinctiveness of individual identities. Social creativity is not a fixed achievement, but an ongoing, reflective effort that encourages adaptation and the active participation of diverse voices to foster collective growth and creativity in social environments.

3.2. Approaches to social creativity

3.2.1. Citizen Science

Citizen science plays a vital role in fostering social creativity by inviting individuals from diverse backgrounds to actively participate in scientific and social inquiry. Citizen science resonates with project-based learning, where hands-on projects and collaborative problem-solving become central tools for engaging citizens—students or community members alike—in the creation of knowledge. By involving people directly in research and decision-making processes, citizen science empowers participants, encouraging them to move from being passive recipients of information to active co-creators of new knowledge. This transition cultivates social creativity, as participants contribute unique perspectives that enrich the collective learning experience.

3.2.2. Gender

An intersectional approach to gender is essential to consider in social creativity, as it recognizes the complex, layered identities that individuals bring to collaborative spaces. This gender diversity approach actively works to close gaps in opportunity and representation, ensuring that everyone—regardless of gender identity—can participate fully. Integrating intersectionality within educational settings fosters a more inclusive and fair learning environment, where the unique experiences of participants are valued, and creativity thrives through diverse contributions.

3.2.3. Participatory art

Participatory art is reflected in cultivating social creativity by offering individuals the opportunity to experience oneself in unusual roles and perspectives. They engage and involve participants in unexpected ways and can give agency to people whose expertise might otherwise not be considered. It is not only the participants who benefit from this empowerment; ideally, participatory art can unleash potential so

that everyone can benefit from often untapped knowledge, experience and skills. Through unexpected, alternative scenarios, participatory art challenges traditional hierarchies and fosters a sense of agency among participants. Participatory art creates experimental forms of belonging, where people from different backgrounds—across generations, cultures, or social classes—can come together on equal footing. By bridging these divides, participatory art opens new avenues for the creation of new communities, identities, collaboration and shared knowledge, forging connection based on shared practices rather than predefined labels. It moves beyond the static discourse of social inclusion, which often reinforces existing stereotypes, to embrace a dynamic, creative mode of becoming. Participatory art empowers individuals and groups to collectively invent new ways of living, working, and creating together.

3.3. Asking yourself questions

Social inclusion and social creativity are not static destinations; rather, they represent ongoing efforts that require continual reflection and adaptation. You are invited to follow a self-reflection exercise, to ask yourself key questions across three societal levels (individual, community, society) and to reflect on different contexts and approaches to your own activities in three steps.

Consider. is the first step, providing background information to the process. Then, you are invited to Reflect., which is where you think of concrete aspects that might be relevant to building your own activities. SENSE. refers to experiences, reflections, and activities that you can access from the SENSE. project which can provide inspiration and lessons learned based on quotes from first-hand experiences.

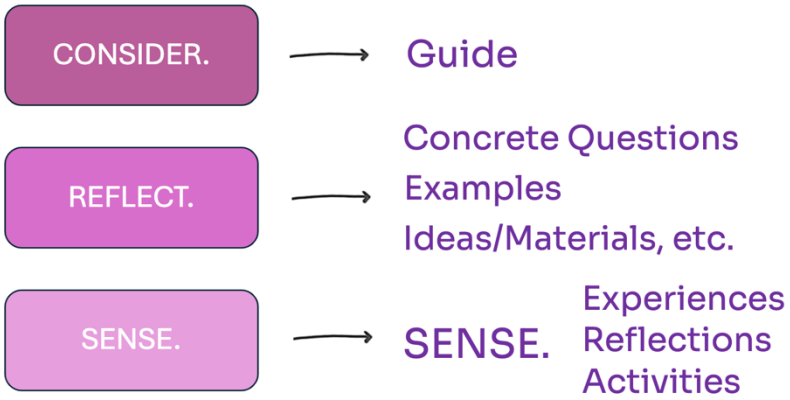

Figure 2: Three steps for asking yourself questions

3.3.1 The Four W's

You are encouraged to approach social creativity in learning activities through self-reflection that prompts you to ask yourself WHY? WHO? WHAT? WHERE? These questions will help you to examine deeper motivations, values, and goals you would like to achieve, which can give meaning and direction to activities.

You will ask yourself four questions, first starting from the perspective of the individual participants of the activity, with the possibility of reframing the questions to broader contexts. In this, you will reflect on motivations (why), the people involved (who), the actions and content (what), and the contexts (where).

WHY?

Encourages analytical flow and helps to shape motivations, purposes and value of doing an activity.

- At the individual level, the WHY? can be expanded to understand the personal impact and value of activities, questioning how they contribute to personal growth and well-being.

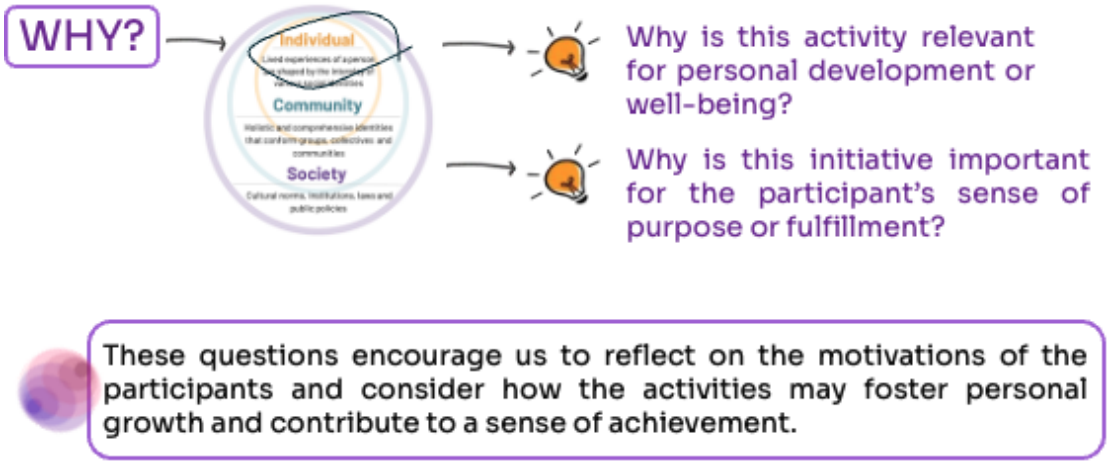

Figure 3: WHY? at the individual level

- At the community level, the WHY? question can be expanded to understand the collective impact and communal values of activities, questioning how they contribute to shared goals and community well-being.

Figure 4: WHY? at the community level

- At the broader societal level, the WHY? can be furthered to understand the interplay between the learning activities and the broader societal context.

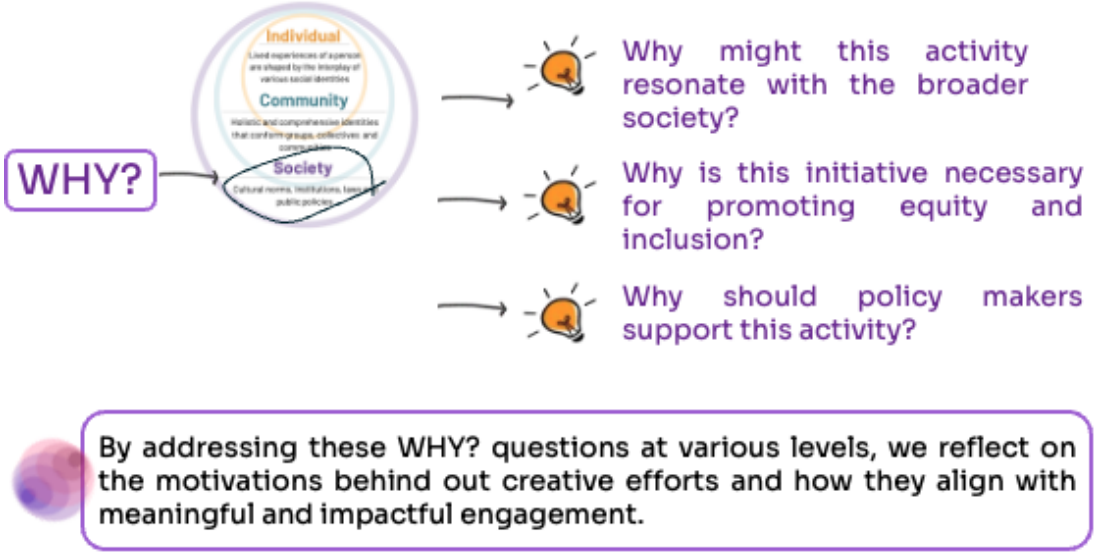

Figure 5: WHY? at the society level

WHO?

Consider the identity of those involved within different contexts, through a lens of intersectionality and the multiplicity of identities that each person experiences. It can allow you to appreciate the diversity, unique contributions, and needs of everyone involved.

- At the individual level, the WHO? helps to identify the participants, their identities, roles, and experiences, prompting deeper reflection on the uniqueness they bring to the activity.

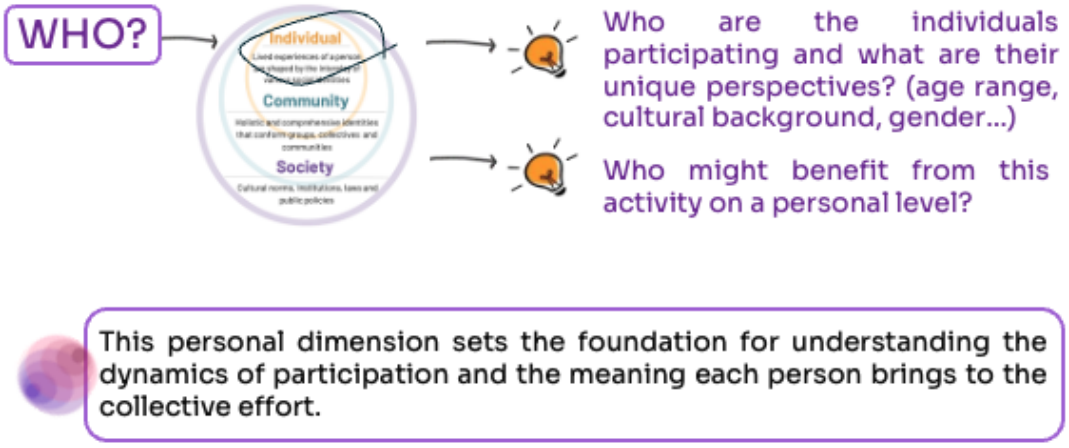

Figure 6: WHO? at the individual level

- At the community level, the WHO? reflects on the interaction between individual and community members, groups, or stakeholders in fostering shared goals.

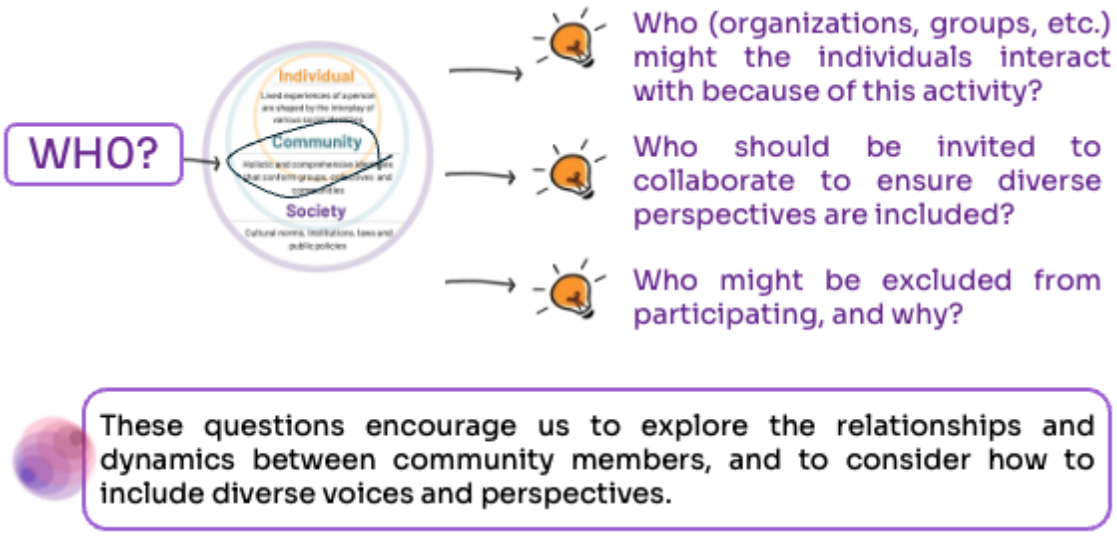

Figure 7: WHO? at the community level

- At the broader societal level, the WHO? question can be used to explore the larger-scale implications and situations in which an activity is situated.

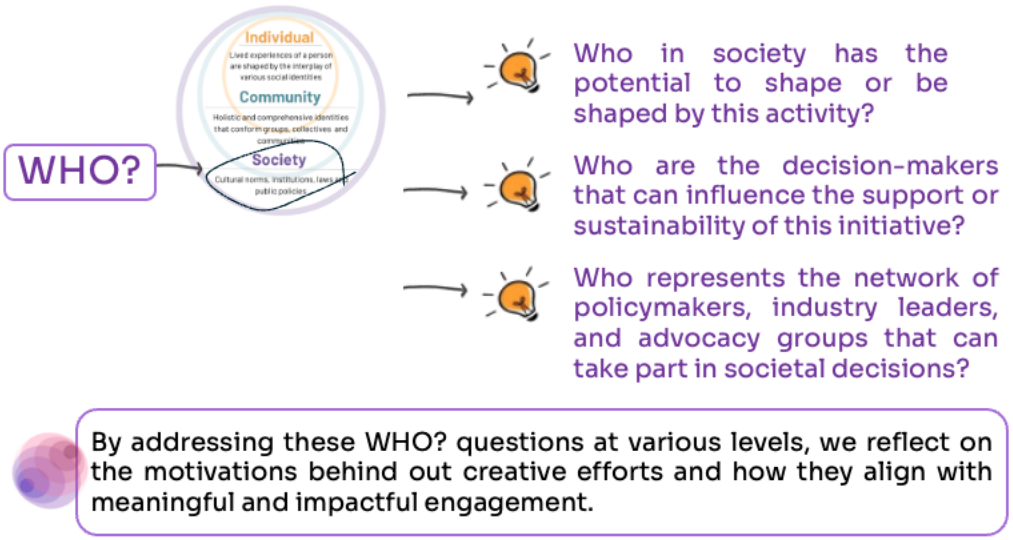

Figure 8: WHO? at the society level

WHAT?

Helps to clarify what is the topic of concern. Understanding WHAT? we are doing provides a foundation for assessing the value and relevance of our activities.

- At the individual level, WHAT? understands the personal interests, values, experiences, and skills of the participants, and how these may shape the activities content and approach.

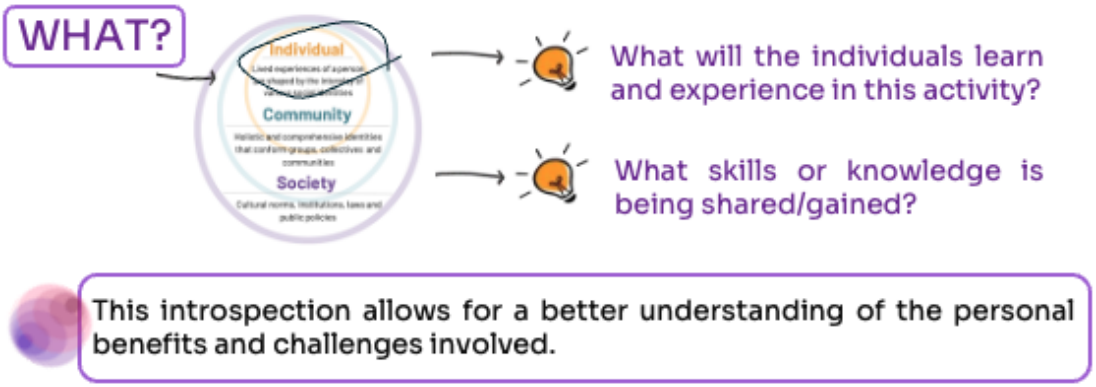

Figure 9: WHAT? at the individual level

- At the community level, WHAT? shifts to focus on the shared activities and processes that contribute to collective goals. It also explores the practical aspects of collaboration and resource sharing within the community.

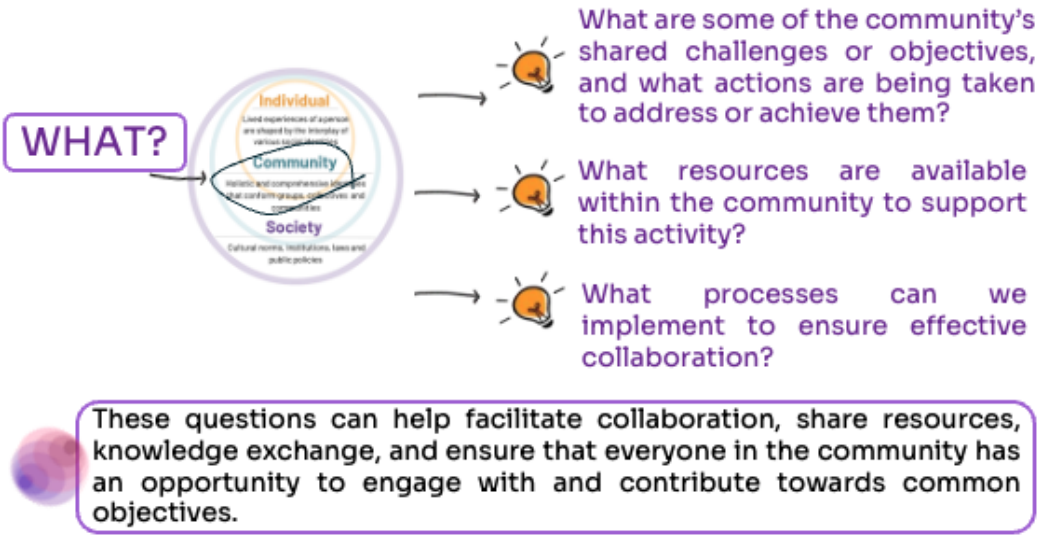

Figure 10: WHAT? at the community level

- At the broader societal level, the WHAT? explores the larger context of the activity and its impact on society. This level of questioning helps to assess the relevance and scalability of the actions taken.

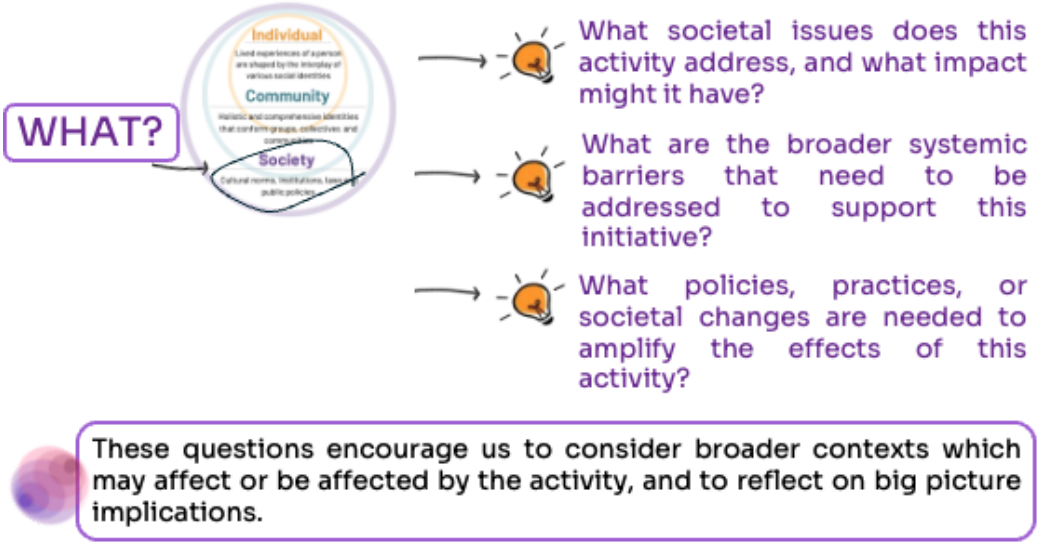

Figure 11: WHAT? at the society level

WHERE?

Allows you to identify the spaces—both physical and conceptual—where the activities take place and understand how the environment influences the outcomes. Understanding WHERE? we are situated helps us adapt our approach to the specific conditions, needs, and opportunities. For further inspiration, explore the SENSE.

Space Toolkit (D5.3) for self-experimentation exercises and design principles for STEAM spaces.

- At the individual level, WHERE? question can be expanded to examine the personal environments in which participants engage in the activity. This could refer to physical spaces, such as a workspace, as well as the internal mental or emotional settings that may influence participation.

Figure 12: WHERE? at the individual level

- At the community level, WHERE? considers the collective spaces in which interactions and collaborations take place. It explores the community settings and environments that support shared activities, such as public spaces, virtual forums, or gathering places.

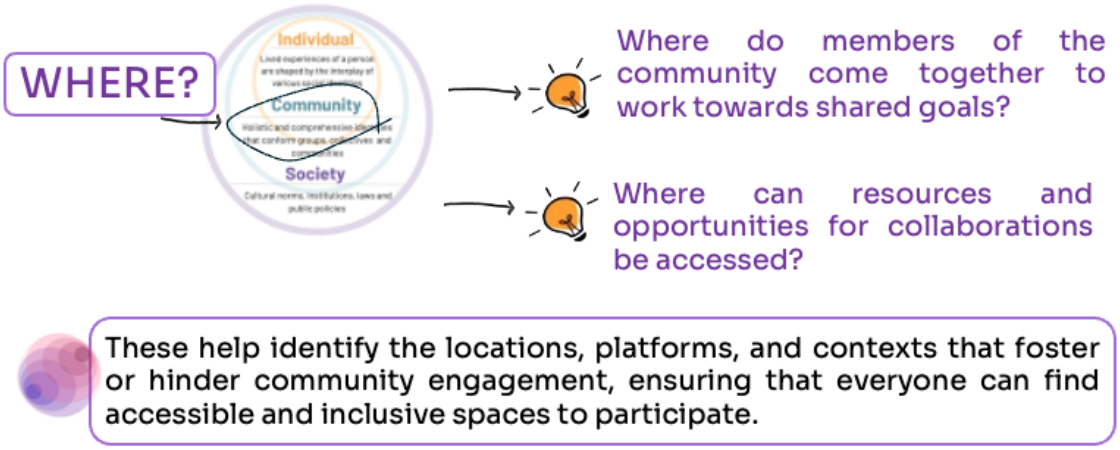

Figure 13: WHERE? at the community level

- At the broader societal level, WHERE? explores the larger spatial and contextual factors that impact the activity on a systemic scale. It considers the socio-political and cultural spaces that shape, enable, or limit the activities.

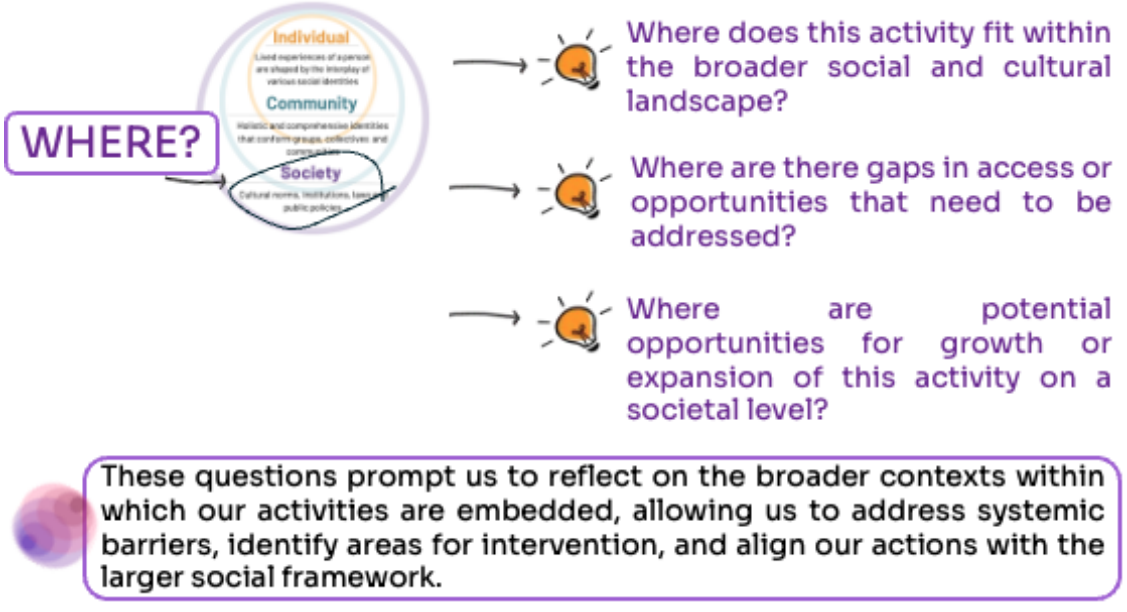

Figure 14: WHERE? at the society level

3.4. Guidelines for social creativity

We have selected practical guidelines based on SENSE. previous evaluations of social inclusion practices. Inspired by these experiences and the SENSE. manifesto, we have

seen that Co-Create, Involve & Share, Experience & Explore, Future Making, and Be Diversive & Inclusive are key guidelines on how to make learning more collaborative, creative, and open to everyone.

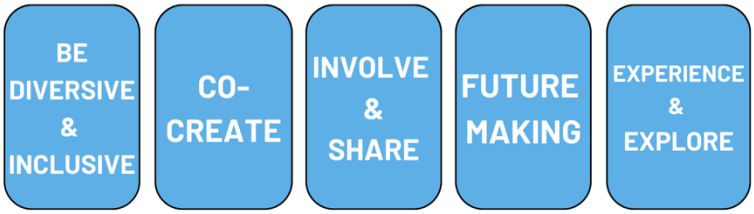

Figure 15: Five guidelines for social creativity

The table is not a checklist, but you can find useful recommendations to augment social creativity within learning activities. You will be able to focus on working together, celebrating diversity, and being flexible, so that people from all backgrounds can have a voice and be part of shaping the future of education and society.

Guideline	Recommendations
Co-Create	Promote active, creative approaches: Incorporate art-infused and citizen science practices, fostering shared ownership of knowledge and learning. Ensure clear communication: Maintain transparency so all participants understand the process and goals at every stage. Engage the community: Involve local members, parents, and guardians through outreach and activities in public spaces, encouraging active participation in STEAM.
Involve & Share	Acknowledge and respect experiences: Embrace horizontal learning approaches where all participants benefit and contribute equally. Promote Open Science: Foster transparency and collaboration in research and learning. Encourage curiosity: Use hands-on, creative, and playful methods to spark interest and knowledge seeking.
Experience & Explore	Center the human experience: Focus on the body and human-scale elements in all learning activities, integrating individual experiences with scientific concepts. Encourage dialogue: Facilitate conversations between qualitative and quantitative data to foster critical reflection. Promote agency and creativity: Activate a sense of agency in learning spaces through art-infused and citizen science practices that reshape perception.

Future Making	Understand and empower learners: Recognize learner expectations, enhance knowledge ownership, and create spaces for speculation and imagination throughout the learning process. Promote transformative practices: Integrate science and technology relevant to learners' local contexts and provide gender-responsive teaching and social inclusion training for educators. Foster diverse connections: Offer mentorship opportunities, include diverse role models in STEAM, and establish support networks and training for professionals at all career stages.
Be Inclusive	Diverse and inclusive teaching methods: Employ various participatory strategies, such as collaborative learning and peer teaching, to accommodate different learning styles and ensure no one is left behind. Community-focused support: Address the needs of vulnerable communities by collaborating with local organizations and providing necessary resources, while remaining flexible and attentive to participants' concerns. Foster a positive learning environment: Create a safe, no-judgment space that celebrates achievements and assigns different roles to students, promoting engagement and collaboration.

Table 1: Guidelines and recommendations for social creativity

4. Moving Forward

We envision implementing this toolkit in its digital format as part of the SENSE.STEAM Digital Hub. We will also incorporate quotes and texts from SENSE. experiences, which are compiled in the Supplementary Information section below. The translation to the digital sphere will certainly ask for a deep revision of the texts enclosed in the previous sections. Also, we will continue to further develop graphics to enhance the usability of the toolkit in its digital format. We also plan to test user experience in several iterations when implementing the digital version of the toolkit.

Supplementary Information

To showcase the three sections (Approaches, Asking yourself questions & Guidelines) of the social creativity toolkit, we provide insights from the SENSE. consortium.

Partner	Acronym	Location
Centro Ricerca Educazione Documentazione Ambientale	CREDA	Monza, Italy
Odyssea	ODY	Athens, Greece
University of Barcelona	UB	Barcelona, Spain
University of Edinburgh	UEDIN	Edinburgh, Scotland
Women Engage for a Common Future	WECF	Tbilisi, Georgia
Hawkins\Brown	HB	London, England
Louvre	Louvre	Paris, France
Velvet	Velvet	Tallin, Estonia
Western Norway University of Applied Sciences	HVL	Bergen, Norway
University of Education Weingarten	PHW	Weingarten, Germany
Group of the European Youth for Change	GEYC	Bucharest, Romania

Quotes from SENSE.: Approaches to social creativity

Approach	Partner	STEAM LAB
CITIZEN SCIENCE	UB	Cròniques de la calor (Heat Chronicles), where students co-design heat walks within their neighborhood to address local issues and develop proposals for transformative change to public spaces.
	CREDA	Festival Parco di Monza, Launch event with community engagement and outreach with teachers and educators. The goal was to teach and incorporate STEAM techniques and collaborate with the broader community
ARTISTIC PRACTICES	UEDIN	Students plant, grow, and cultivate vegetables in their school garden, creating projects where the students learn to prepare and cook with the vegetables. Students also think outside the box and use the soil to make homemade watercolors to paint with
	H\B	Architecture students will learn fundamentals and basic physics of light and learn how to observe the way it reacts with different objects to cast certain shadows. The groups will also engage the students into modelmaking activities as groups where they will use materials from within the space/room to test and explore light and shadow while recording it at the same time
GENDER	WECF	Akhmeta Institute promotes girls within a Tech Club; they use the makerspace to build and create in effort to engage with community issues and combat gender limitations and stereotypes

	ODY	Participants of all backgrounds have workshops about identifying gender roles and stereotypes that often define and normalize certain characteristics for boys and girls within their cultures and community; participants discussed and learned ways to mitigate this gender bias

Quotes from SENSE.: Asking yourself questions

The following tables of the four W's include quotes from selected SENSE. activities.

WHY?

Partner	Individual	Community	Society
HB	Students can explore creative and critical thinking in an environment that encourages exploration with no wrong questions or answers.	Teamwork and learning how to better communicate and collaborate with other people are crucial skills that the workshop can demonstrate and outline	More freeing / less constrained format of learning. Not being told what to do and produce. Allows freedom to explore interests.
Louvre	The workshop is bringing together artists and teachers from the network of Theatre of Research, who are dealing with, are interested in the art of measuring. The intentions are to combine science and art in practice, to make education empowering and inclusive, to have professional exchange and make contacts.	Teachers, but increasingly also artists, live in a work environment that is continuously measuring and evaluating on every level: students are graded, teachers and schools are evaluated. It is important to bring a sense of self determination and empowerment to the practice of measuring: What should be measured, how do we want to measure it and how is this practice itself changing the social environment?	Measuring is the foundation of science. At the same time, it is one of the least questioned areas of knowledge and is seen as not creative and boring. To bring Art and Science together in an art of measuring is therefore confronting crucial problems of STEAM at the root.
ODY	On a personal level it was important for the teachers to participate in this workshop as their personal beliefs in relation to gender equality affect both their personal lives and what they pass on, even if unconsciously, to their students.	At the community level, this workshop contributed to the development of teachers' critical thinking on the issue of gender equality. After all, teachers are active members of the school and teacher community, as well as the wider community in which they are part.	This workshop has an impact on society, as teachers often act as multipliers of their beliefs and stereotypes.

PHW	School students interested in educational careers. University students interested in seeing live STEAM activities.	Learners interested in modern, creative ways of science teaching / learning	Teachers to-be are change agents – they might become our early adopters & advocates for STEAM education.
UB	The people joined based on dissemination of the event, they were interested in the activities in their community center, and wanted to learn more about either citizen science or the heat walks within Barcelona	They wanted to connect and engage with local issues	The participants recognized that the issues were not just neighborhood based, but were also through Barcelona as a whole
VELVET	The youth are there because they are interested in using the makerspace and tools to carry out their own projects (to build or create something). It's their after-school activity. Some of them are also there to socialise. They have signed up for this specific workshop to take part in a guided activity/project.	VIVITA is there to offer a child-friendly, open-plan workshops and innovation studios where kids can discover, experiment and create by themselves. They have organised the snow city building workshop to 1) offer a more specific activity to youth (who might not have their own idea or project to work on) and 2) to provide a valuable service to the local government.	The local government has decided to build a snow city in the heart of the city and they have asked youth from VIVITA to first create the design for it and then also build it. The idea probably stems from the desire to make public space in the city more attractive for citizens and also experiment with participatory approach – having youth design something for themselves.
WECF	Gaining knowledge and/or developing new skills, expanding network nationally and internationally	Helping to co-build a community where all community members have opportunity to develop, be healthy and successful	Contribution to co-build more equal, just and stereotype and stigma free society

WHO?

Partner	Individual	Community	Society
CREDA	They are young students who have chosen to study visual arts. They are very interested in photography. The background is heterogeneous. There are three students with special educational needs.	Considering the class as the community, they are teenagers, and they are quite aware of the topic of the project (climate change)	Every participant will have a resonance among friends and family. The majority lives outside the town.

GEYC	Students (14-20) and teachers from Câmpina, Prahova.	Youth House Câmpina, Local organisations, educational centres, community associations, civic centres.	Stakeholders, local authorities, schools, colleges, universities.
HB	Students of mixed gender, similar age group, that all have an inclination towards the Arts. Most students with an inclination towards Architecture.	The students do not all know each other, some are more familiar and comfortable with other students. They come from different classrooms/subjects/areas of inclination as they were mixed and selected rather randomly by the school.	It is our understanding that the students mostly come from and reside in the local area
HVL	Representatives from various NGOS and academics interested in Friluftsliv/outdoor education	Higher education, non-governmental sector	Oslo, Norway. An event for those interested in outdoor education.
ODY	We chose a fairly large non-profit organization and extended an open invitation to all its teachers. Therefore, their participation was a result of their personal desire to work on the issue of gender equality.	This organisation provides shelter and education to children from vulnerable backgrounds. We therefore felt that they would act as multipliers for the project.	Gender roles and our perspectives
PHW	University students from the STEAM course, academic staff that takes turns in facilitating the STEAM seminar.	University students that are teachers/ educators to be. Staff from physics dept.	Science educators in different stages of their career.
WECF	Tech girls club + students from different school between ages 13-19	Akhmeta Innovation Center, Schools, municipality, educational institutions	Local government, mayor's office, ministry of education, international and national educational institutions specialising in STEM

WHAT?

Partner	Individual	Community	Society
CREDA	It is a way to discover more about themselves and their	Interact with the other classmates and teachers. They experience trust in each other	Respect other's ways and places to discover the world. Being more inclusive.

	senses, and the environment around them.		
GEYC	Personal interests in personal development, getting to know people, using personal skills	Common interests for the development of local community members and for providing them with new development opportunities.	Include the needs expressed by young people in public policies that encourage youth involvement; society contributes through the spaces provided for activity.
HB	The students will learn fundamentals and basic physics of light and learn how to observe the way it reacts with different objects to cast certain shadows. The groups will also engage the students into modelmaking activities as groups where they will use materials from within the space/room to test and explore light and shadow while recording it at the same time	The group will learn the importance of lateral thinking and that strength can be found in teamwork.	Skills of teamworking, problem-solving, observation and ability to adapt around open-ended concepts and issues
PHW	They experienced creative hands-on science activities – and how they turned out.	The learners in very different stages of (possibly) choosing an educational career path experience how art-integration in science could work.	Considerations about how inter-/ transdisciplinary courses in school & university might be a thing for the future came up – rethinking curricular structures.
UB	The participants are there to learn about what is happening in their immediate community	They are looking at the real-life issues and seeing how this takes place within their own neighborhood	They are learning about this data on a wider scale, as a global problem, as a city problem, as a neighborhood problem.
UEDIN	Common concerns have emerged for the students which are linked to school and local community – litter and vandalism in the garden space, the lack of tools etc. In this session the access and availability of resources was apparent.	This session further highlighted the nature of control and structure in school spaces, and how introducing some flexibility and adaptability can lead to more inclusive practice for young people.	This session further highlighted the nature of control and structure in school spaces, and how introducing some flexibility and adaptability can lead to more inclusive practice for young people.

WECF	Learn how natural and artificial light affects mental and physical health	Identifying needs of community members, such as students, older people, hospital works and help develop light devices for their needs	Raise questions locally (municipality) or/and nationally on better mental and physical health policymaking

WHERE?

Partner	Individual	Community	Society
CREDA	Tinkering doesn't require special settings: a place with tables, electricity, and chairs is all you need. The location complies with accessibility standards.	might be important to consider accessibility in broader terms	libraries, community spaces etc.
GEYC	Spaces for young people, headquarters of local organisations, classrooms.	Public places; local authority premises; theatres, educational centers	Low interest in offering community development opportunities is a c challenge to this STEAM lab.
HB	The space can be stimulating due to the abundance of physical objects of different makes, textures and sizes that the students can use as part of the exercise. The fact that this is the DT room/lab proved to be stimulating for 'making', exploration and self-reflection.	Afterschool club making a mark within the school? The space was suited to the activities as there was ample space that allowed students to cluster into groups, as well as stimulate the students with space's the nature of 'craft' and 'model-making'	Families of the children? Or schools interacting with other schools The activities can be replicated elsewhere and can engage more people into exploring and observing. For example, at the end of the activities, students were encouraged to take what they have learnt during the workshop into their own lives outside of the teaching space and school. They were encouraged to observe their surroundings more and allow time and space for open-ended exploration.
UB	River Besòs	Community that is created alongside the river, in the parks, surrounding neighborhood	Barcelona and perhaps other cities with rivers

VELVET	In school and at home youth need to play certain roles and follow the rules they might not always agree with – there is hierarchy in place. They are looking for a place that is safe and lets them be in charge of bringing their creative ideas to life.	VIVITA labs and makerspace provide youth with a third place to spend their time and belong to a community of other youth that are not their everyday friends or classmates. If they are for example bullied in school, they can break away from that role in the makerspace – the same social roles of the school don't apply in VIVITA.	The location of the snow city – the Freedom Square is one of the most democratic spaces in the city – it is a meeting place for all kinds of people from different age groups and it is the space where the main events but also happenings happen or where the citizens can raise their voices the most (most of the demonstrations or events supporting a cause happen in this location). This is a perfect place in the city center to express yourself and create something unique and engaging.
WECF	Being outside formal education walls, such as centers, NGOs, as they free to express themselves and voice their needs and interests	Changing the environment would be beneficial for lab work. Some activities are already done at different schools, and it would even better to use more outdoor space where we can invite all key stakeholders in the region	Changing the environment would be beneficial for lab work. Some activities are already done at different schools, and it would even better to use more outdoor space where we can invite all key stakeholders in the region
LOUVRE	The theatre is known to many teachers and artists. It is centrally located in the lesser privileged part of the city and easy to reach by public transport.	Theatre of Research is known as a space to bring together heterogeneous groups of people to do research together on eyelevel. Theatre of Research addresses everybody in these groups as equally knowledgeable and provides tools and formats for everybody's equal participation. Often these groups are intergenerational. In this case the group is only bridging the gap between art, science and education.	Theatre of Research is fighting for more than two decades – with some success - to be able to allocate a part of its budget to what we call everybody's' research. However, there are all kinds of barriers and limits when it comes to that. Funding regulations and the bureaucratic barriers between art and science make this a constant struggle, an obstacle course.

Quotes from SENSE.: Guidelines for social creativity

Guideline	Partner	Quotes
CO-CREATE	CREDA	"This activity creates an opportunity for active participation in addressing a "real-world" issue occurring within their community"
	HB	"The activity encouraged co-creation and cooperation as done in groups during the first task in observing and exploring light and shadow – the students stimulate one another's ideas in a creative use of material and manipulation of objects available to them."
INVOLVE & SHARE	CREDA	"This activity fosters mutual learning and knowledge sharing among students by encouraging them to share their expertise and insights with one another"
	UB	"In this activity, the students are the experts in their field, they design where the heat walk will take place—therefore, the facilitators share about particular heat data, and the students decide how to apply this knowledge in the community sphere"
EXPERIENCE & EXPLORE	Louvre	"This activity was specifically conceived from a collective and participative approach based on sharing experiences and technical and aesthetic discoveries"
	UEDIN	"Sensorial experiences are continually encouraged, and some participants engage in sensory exploration naturally. It is a shift in approach for [some facilitators], but they are eager to integrate this element, despite it contrasting with some approaches from their formal teacher education and in school context"
FUTURE MAKING	HVL	"The activity created a space for participants to use their imagination – there was a reimagining and making of a new space within their school, they [students] took on a new identity and role"
	UB	"This [activity] felt like an opportunity for increased support and networking amongst community members—there was a diverse group, from different ages and backgrounds coming together"
BE INCLUSIVE	GEYC	"With diverse groups, we used inclusive teaching activities to create equal opportunities to each participant"
	ODY	"The activity was inclusive. The whole activity is based on participatory practices and methods. We prioritized giving space to everyone to express their opinions"

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Formalities

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01.07.2024	V0.01	Rebekah Breding, UB	Creation of the first document outline
15.07.2024	V0.02	Rebekah Breding, UB	Sections based on previous deliverables
03.09.2024	V0.03	Rebekah Breding, UB	Establishing architecture of the toolkit
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Abbreviations and acronyms

Abbreviation or acronym used in this document	Explanation
STEAM	Science, Technology, Engineering, Arts and Mathematics
STEM	Science, Technology, Engineering, Mathematics
WP	Work Package

Term	Definition used or meaning in the SENSE. project	Reference or source for the definition if applicable
Access	In this deliverable, access refers not only to physical accessibility, such as resources, objects, and places, but also to intellectual access, such as ideas and knowledge.	D.6.1
Activity	An activity in education is a distinct and specific task or action undertaken as part of a larger educational practice.	D.3.4
Agency	Agency within a space refers to individuals' capacity to make choices, exert control, and influence their environment. In inclusive spaces, individuals, regardless of their background or identity, should feel a sense of agency over their surroundings.	D.6.1
Artistic practices/Art intervention/Art-infused practice	A creative and sensory process encompassing research, exploration, translation, or production. An artistic practice can also be an artistic intervention if it transcends conventional artistic boundaries and deliberately engages with contexts, issues, or spaces with the aim of catalyzing meaningful impact or provoking critical discourse.	D.3.2, D3.4, D3.5
Co-Creation	Non-hierarchical knowledge exchange and co-production, recognizing that learning is not one-directional, but benefits all involved. Co-creation and collaboration promote collective and participatory practices and recognizes the importance of shared ownership and meaningful engagement.	D.6.1
Community	In the context of social inclusion, we determine the community to represent a holistic and comprehensive set of identities that conform groups, collectives, and communities.	D.6.1

Citizen science	The term is commonly used to describe different forms of participation in scientific knowledge production and even to describe various forms of participatory action research and digital volunteerism.	(Haklay *et al.*, 2021)
Citizen social science	The term can be defined as co-designed research driven by groups sharing a social concern.	(Perelló, 2021)
Gender Inequality	A persistent and multifaceted social issue that affects individuals within all spheres of life, including education, employment, health, and other societal interactions. It reflects historical injustices and marginalization that individuals have experienced based on their gender identities.	(European Institute for Gender Equality, 2013)
Identity	Identity refers to qualities, beliefs, personality traits, appearance, and can encompass elements such as gender, sexual orientation, religious affiliation, nationality, and ethnicity, among others.	(Covington, 2015)
Individual	In the context of social inclusion, we determine the Individual to represent the lived experiences of a person shaped by the interplay of various social identities.	D.6.1
Persons or groups in a vulnerable situation	Individuals or groups that might be in a vulnerable situation such as women and girls; children and young people; refugees; stateless persons; national minorities; migrant workers; sick or disabled persons; elderly persons; and LGBTQIA+. This is not an exhaustive list, but it demonstrates a range of vulnerable situations that any person might face.	D.6.1
Roadmap	Step-by-step process for providing an implementation for future STEAM education. There are three phases of the Roadmap: Awareness, Action, and Advocacy.	D.3.4
SENSE. Manifesto	A living document that succinctly articulates the partners' shared principles, values, and goals, serving as a guiding framework that unifies members' efforts and communicates their distinctive perspective or transformative	D.3.4

	vision to a broader audience. This manifesto provides a clear direction that fosters cohesion and resonance within the collective, while signaling its distinctive contribution to STEAM to the larger discourse.	
STEAM practice	A STEAM practice in education refers to a comprehensive and systematic approach that includes activities and strategies based on principles used to achieve STEAM educational impact.	D.3.4
Social Creativity	Social creativity allows people to maintain or achieve a positive social identity through re-interpreting intergroup relations. Social creativity can combine different approaches and can follow different guidelines, while centering the identities and experiences of individuals to maintain positive distinctiveness in their approach to knowledge processes.	(van Bezouw et al. 2021)
Social Inclusion	Social inclusion is a multidimensional concept that refers to the fair and equitable engagement of all individuals in society, regardless of their background, abilities, or identities. Social inclusion, social cohesion, and social justice are intertwined concepts that seek to create equitable and inclusive societies. Social inclusion relates to complex topics such as power relations, social justice, non/hierarchical decision-making, identity, public visibility, stigmatization and even accessibility.	(Silver, 2015) (Cornwall and Jewkes, 1995) (Bisson *et al.*, 2022)
Society	In the context of social inclusion, we determine the society to represent cultural norms, institutions, las and public policies.	D.6.1

The SENSE. project

There is a widespread understanding that the future of a prosperous and sustainable Europe depends to a large extent on the quality of science education of its citizens. A science-literate society and a skilled workforce are essential for successfully tackling global environmental challenges, making informed use of digital technologies, counteracting disinformation, and critically debunking fake news campaigns. A future-proof Europe needs more young people to take up careers in science related sectors.

Research shows that interest in STEM subjects declines with increasing age. This effect is particularly pronounced among girls and young women; even those of them who take up science studies gradually forfeit their motivation. But despite all image campaigns and efforts to remove the awe of science only “one in five young people graduates from STEM in tertiary education” and only half as many women as men, according to the European Skills Agenda.

The disinterest in science is striking and evokes the question of its causes. Stereotypes and lack of female role models seem to be only a part of the explanation. Nor is there a lack of career prospects that could explain a reorientation despite initial interest.

SENSE. has identified two major problems in current science education that need to be addressed: a) A distorted teaching logic that progresses from abstract models to procedural applications (“reverse ontology”) and b) The inability to implement a learner-centred pedagogy linking students’ everyday knowledge to science-based knowledge, thus promoting motivation, self-directed and life-long learning.

SENSE. advocates for the development of a high-quality future-making education that is equally accessible to all learners and promotes socially conscious and scientifically literate citizens and professionals. SENSE. aims at radically reshaping science education for a future-making society. By promoting the integration of all human senses into exploring and making sense of the world around us we will challenge conventional ideas of science and science education. Considering the pitfalls of current science education practices and the advantages of artistic and aesthetic activity, this innovative approach also considers social inclusion and spatial design as core components for a new STEAM education paradigm. With ‘SENSE.STEAM’ future science learning will be moving away from the standardized classroom shapes and furniture layout entering new learning landscapes.

The project seeks to develop an accessible educational roadmap promoting socially conscious and scientifically literate citizens and professionals. It addresses outdated perceptions of current science education as well as gender stereotypes by

integrating the arts, social inclusion and spatial design as its core components. SENSE. will establish 13 ‘STEAM Labs’ across Europe to develop and evaluate the ‘SENSE. approach’ to STEAM subjects alongside students, educators, teachers, businesses, and other stakeholders.

The ‘New European Roadmap to STEAM Education’ will take the shape of a STEAM learning companion to support tomorrow’s educators and learners – be it in the classroom, in a museum or on a drilling rig. A digital hub will be established, where practitioners from all ages and backgrounds across Europe will be able to access tried and tested educational practices to increase engagement within these subjects.

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