SENSE. The New European Roadmap to STEAM Education

D6.2 - Report on Evaluation of social inclusion strategies for the SENSE Roadmap

May 2024

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Statement of Intent

The evaluation and monitoring report refers to the previously established social inclusion recommendations and guidelines of the D6.1 scoping report. Here, we look at the first results of the reported activities from within the SENSE.STEAM Labs and analyze the self-reflection exercises and lessons learned.

These insights will feed into the social inclusion toolkit (D6.3) as part of the learning companion and SENSE. Roadmap.

Table of Contents

List of Figures

List of Tables

1. Introduction

1.1. Purpose of the document

The purpose of this document is to analyze the reported activities of the SENSE.Steam labs which will provide collective feedback from the D6.1 social inclusion recommendations and guidelines. This analysis will help to shape what will become the future social inclusion toolkit as part of the learning companion and Roadmap.

1.2. Intended readership

The report will be publicly available and, as such, accessible by the stakeholders and beneficiaries. The intended readership is primarily the SENSE. consortium, which reflects our collective experiences and lessons learned from our highly diverse consortium.

1.3. Structure of the document

This document is structured in three further sections:

-Section 2 provides an overview and analysis of the evaluation and monitoring of activity reports from the consortium as a whole
-Section 3 highlights six STEAM labs within the consortium to take a deeper dive at specific contexts
-Section 4 draws conclusions and reflections and outlines the next steps towards the toolkit

1.4. Relationship with other deliverables

The evaluation and monitoring of social inclusion will feed directly into D6.3 Toolkits for social inclusion and gender awareness through and for STEAM Education. Findings in this report will also be relevant to WP4, and deliverables D4.2 Report on the implementation activities of the STEAM Labs, and D4.4, Recommendations for the Roadmap and the learning companion.

2. Evaluation & Monitoring of the SENSE.STEAM Labs

The following section is based on internal SENSE. documents that were used within the consortium to report upon activities and sequences (referred to as activities) within our STEAM Labs. These reports will collectively be referred to as “activity reports”.

2.1. Activity reports

After each activity in the STEAM labs, facilitators were asked to document their reflections for a variety of indicators. For social inclusion, this was broken down into three sections which will be described in the following sections: The Social Inclusion Marker, The Four ‘W’s (Who/What/Why/Where), and the 20 Social Inclusion Indicators.

2.2. Social Inclusion Marker

For each activity, facilitators were asked to indicate one of three options regarding social inclusion.

> Not targeted = 0: This means that within the STEAM sequence, social inclusion has been considered, but none of the social inclusion & gender guidelines have been explicitly targeted.
>
> Inclusion is significant = 1: This means that social inclusion is an important and deliberate objective, but not the principal reason for undertaking the STEAM activity
>
> Inclusion is Principal = 2: This means that social inclusion is the primary objective of the STEAM activity/sequence and is fundamental is its design and expected results. The activity would not have been undertaken without this objective.

Table 1. Social Inclusion

MARKER	COUNT
0 = NOT TARGETED	41
1 = INCLUSION IS SIGNIFICANT	56
2 = INCLUSION IS PRINCIPAL	19

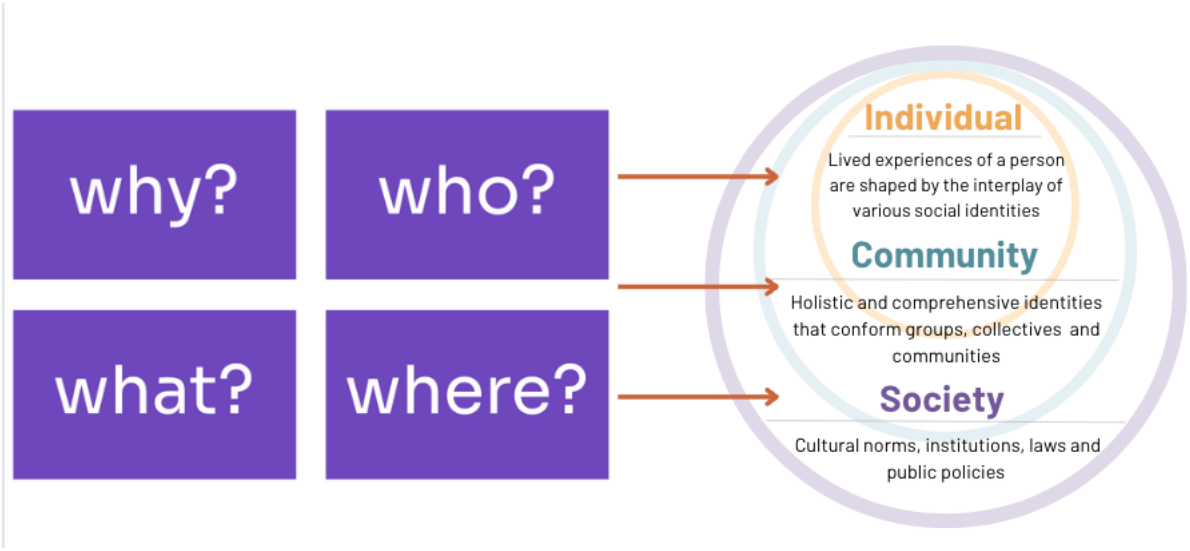
These markers refer to the D6.1 scoping report, where elements of social inclusion are described in detail. Table 1 shows that out of 116 reports, 41 activities (35%) were "not targeted", 56 (48%) considered social inclusion as "significant", and 19 (17%) considered inclusion as "principal".

It is important to note that the number of '0' markers does not necessarily signify that elements of social inclusion are not relevant nor important, (or that they were not represented); it merely indicates a self-reflection from the facilitator that it was not a targeted element when planning and implementing the activity.

2.3. The Four W's: Who/What/Why/Where

In D6.1, based on the social inclusion guiding principles, we outlined an exercise that supports a self-reflection process for the SENSE activities in the STEAM Labs. The exercise consisted of formulating four questions using the lens of social inclusion by asking "Who, What, Why, and Where" across three societal levels. These levels are comprised of the individual level (e.g., students or participants), the community level (the group with which the STEAM Lab is working), and the society level (the environmental conditions and context of the STEAM Labs). Figure 1 below illustrates the four 'W' questions, along with the three societal spheres.

Figure 1. The Four W's and the Individual, Community, Society spheres



Throughout the process of the activity, it was encouraged that facilitators periodically framed this set of questions to themselves with critical self-reflection. Guidelines and examples were provided, and we held periodic meetings to ensure lab facilitators felt confident in this activity.

It was emphasized to the partners that during these self-reflective questions, it is important to consider the elements of social inclusion, and the interconnectedness between these levels of society. We start at the individual level and move outward; the spheres are reflective of interactions that occur between these levels. Table 2 shows this section of the activity report, which is also referenced in the Annex.

Table 2. Activity Report, The Four W's section

Question:	Individual (e.g., students or participants	Community (the group with which the STEAM lab is working)	Society (the environmental conditions and context of the STEAM labs)
Why?			
Who?			
What?			
Where?			

2.3.1. Methodology

75 consortium activity reports were accessed, and data was organized in excel and the activity reports were analyzed for recurring words and phrases using Atlas.ti., a qualitative data analysis software that facilitates analysis of qualitative data. Using a qualitative approach, we grouped these terms into thematic categories. These were not pre-determined categories, as we used an inductive research approach to identify patterns within the reports. For example, words like "stimulations" or "senses" might form a sub-theme of "sensory experience" within a larger theme of "sensory awareness". We analyzed the reports wholly, then divided them by question and societal sphere to analyze different relations and perspectives. This iterative process continued until all documents were analyzed and there was an emergence of themes, which captured the key ideas and perspectives across the data set. This approach allowed us to identify not only the main themes, but also make connections and comparisons across them.

2.3.2. Analyzing the Four W's across societal spheres

The following picture shows a comparison of the four 'W' questions Why/Who/What/Where across each of the three levels of society. Divided into the four quadrants that mirror the self-reflection exercise, we identified patterns and concepts within each level of society. These themes are comprised of words or groups of words that occurred more than 10 times within the reported reflections throughout the activity reports, within each respective category (e.g., why at the individual level). These themes provide an insight into the most recurring perceptions from the activities.

The most common themes across the four quadrants (Why? Who? What? Where?) at the individual, community, and societal levels can be synthesized as the following:

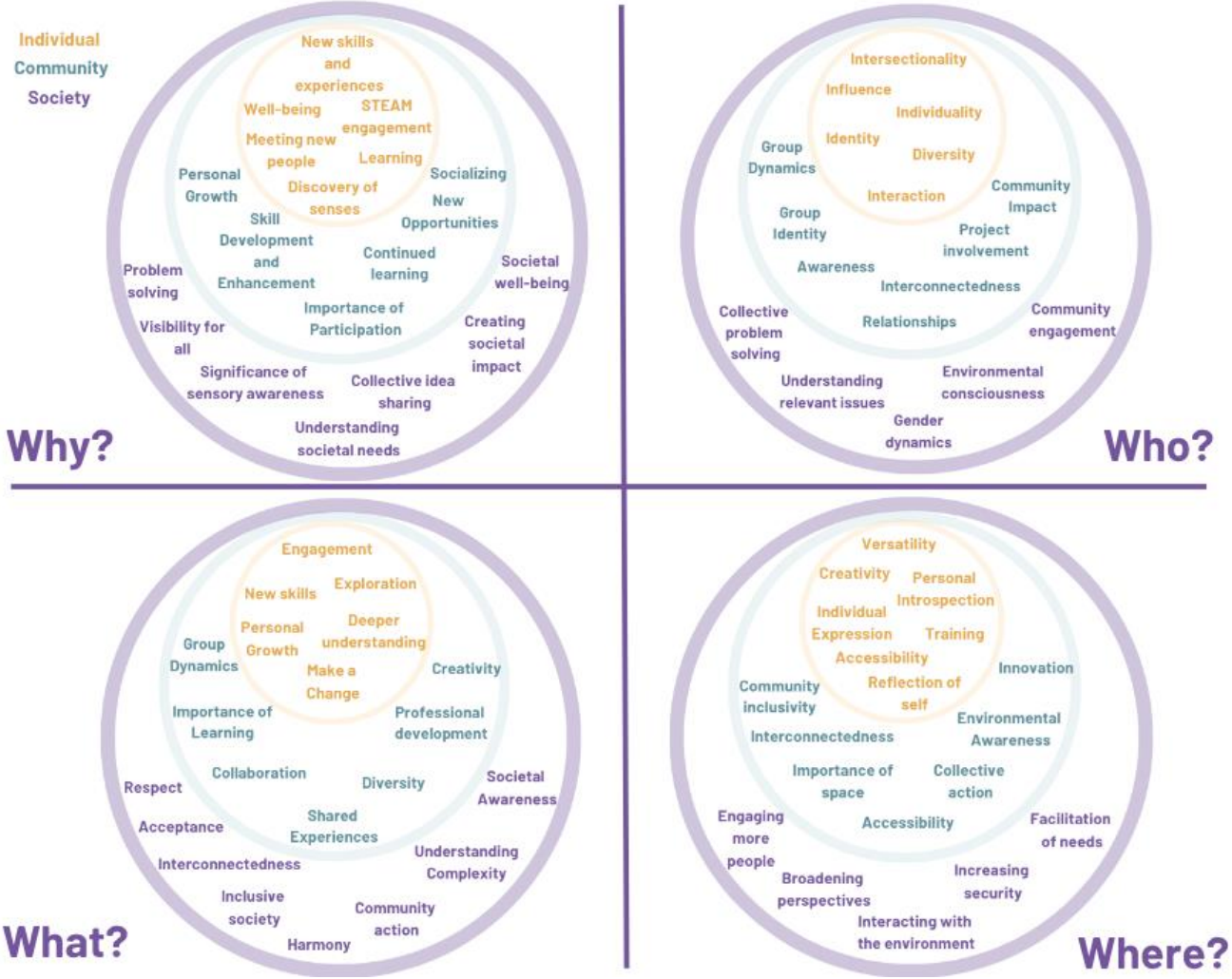
Why? The STEAM labs consider the individual's personal goals and motivations. At the community level, this reveals how partnerships can foster inclusion and ensure that the Labs align with local needs and aspirations. At the societal level, this reflects the broader values and goals, aiming to drive innovation and equity.

Individual: 'New skills and experiences', 'learning', and 'discovery of senses' are reflective of growth and pursuit of learning and continual engagement and skill-building, comprehension, critical thinking and problem-solving.

Community: At the community level, similar elements such as 'personal growth', 'skill development' and 'continued learning' reflect empowerment at the community level, reflecting that socializing, learning from others, and the 'importance of participation' enhance social inclusion.

Society: ‘Social well-being’, ‘creating societal impact’ and ‘visibility for all’ were elements that were recurring themes for societal motivation. These elements align with equity, respect, and horizontality that foster social inclusion.

Figure 2. The Four W’s and themes across societal spheres



What? Consider what are the individual motivations, skills, and backgrounds to personalize learning experiences. Examine the importance of collaboration to leverage community expertise and resources, fostering cohesion to address shared concerns. At the societal level, STEAM Labs should align with broader policies and resource allocation to reflect and contribute to societal goals.

Individual: 'Engagement', 'exploration', and 'personal growth' refers to actively participating in the STEAM Labs, with opportunities to explore individual curiosities and interests in various STEAM topics, leading to new discoveries and a deeper understanding of the world around them.

Community: 'Group dynamics', 'collaboration', 'diversity', and 'shared experiences' refer to working together on projects and sharing ideas, and groups with diverse backgrounds and skillsets can achieve more than comparatively homogeneous groups. These dynamics lead to a richer learning experience and more robust problem solving. These opportunities create new networks and foster a sense of community and trust between groups of people.

Society: 'Respect', 'acceptance', interconnectedness', 'harmony' promotes these values for all individuals and community groups, regardless of background or ability. These are fundamental values that promote inclusion and foster a sense of connectedness across all levels of society. 'Awareness' and 'complexity' raise awareness of complex social issues; by encouraging collaboration, critical thinking, and exploration of complex topics, individuals and community groups become more informed and empowered to contribute to a more positive, inclusive, and innovative society.

Where? To foster social inclusion within the STEAM Labs, inclusive spaces are where people feel comfortable expressing themselves and actively participating.

Individual: 'Versatility' reflects being adaptable and comfortable with different approaches to learning and sensing the world around them. 'Creativity' and 'individual expression' allows for individuals to contribute their unique perspectives to projects and collaborations. 'Accessibility' provides the space and possibility for a diverse representation of participants to contribute.

Community: 'Community inclusivity' and 'importance of space' emphasize the need for welcoming and supportive spaces within the community where diverse groups feel comfortable. This aligns with the importance of creating an environment where everyone feels valued and respected. 'Interconnectedness' and 'collective action' highlight the importance of co-creation and collaboration within the community. By working together and sharing ideas, communities can leverage

collective strengths to identify and address problems. 'Innovation' and 'awareness' refers to the creative approaches to solve these community problems from a diverse and empowered group.

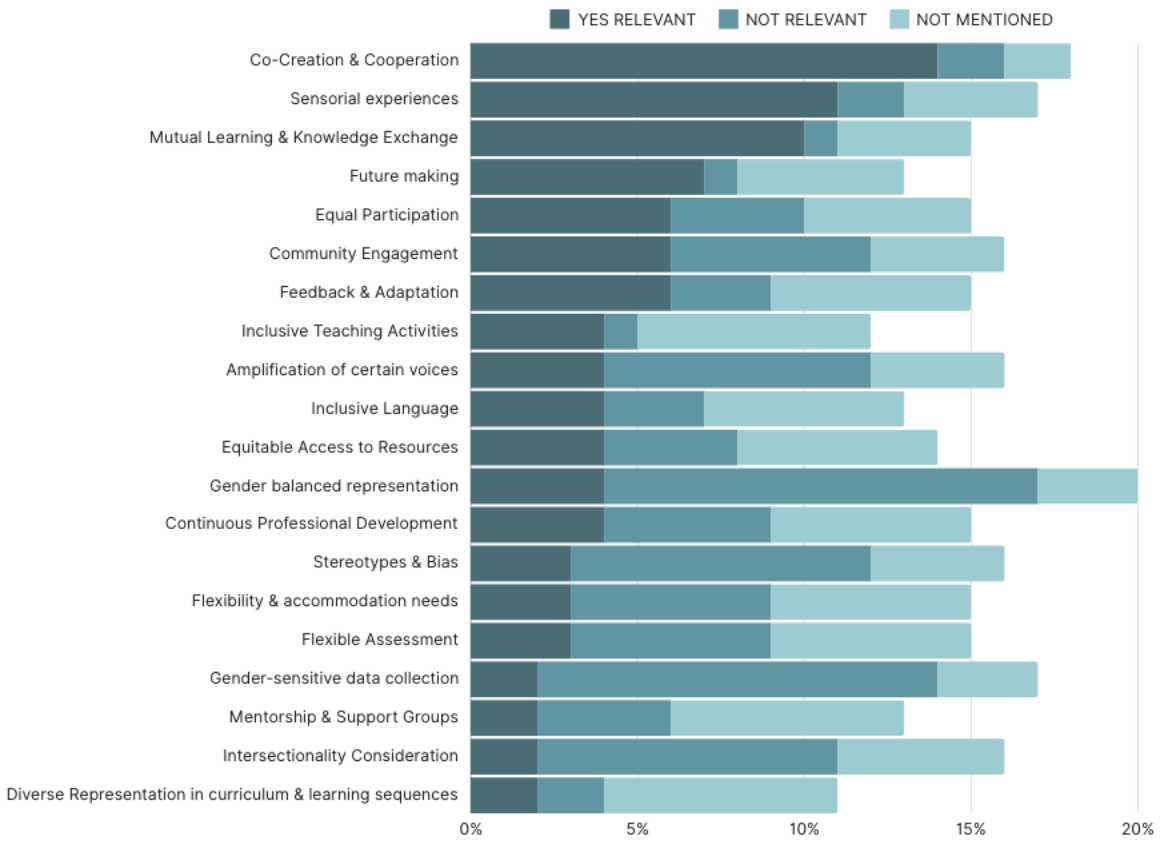
Society: 'Engaging more people' and 'Broadening perspectives' aligns with diversity being reflective within an inclusive society. 'Interacting with the environment' parallels the sensory experiences of SENSE. Additionally, it refers to groups of people coming together and collaborating to address a wider societal problem. 'Increasing Security' recognizes that a secure environment is essential for fostering participation and inclusion. 'Facilitation of Needs' reflects a wide-scale access within societal structures, such as public policies that address social inequalities and provide educational opportunities, therefore contributing to a more skilled and innovative workforce.

2.4. The 20 Social Inclusion Indicators

In the D6.1 Scoping Report on Social Inclusion, SENSE outlines 20 Social Inclusion indicators. For the activity reports, we asked facilitators to indicate which of these 20 were the five most relevant, and which of these were the five least relevant, and why. You can find this part of the activity report template in the Annex, section 5.1; refer to the scoping report for the full description of these indicators.

As Figure 4 shows, each bar in the stacked bar chart functions like a mini survey for a specific aspect of the social inclusion pedagogy listed on the x-axis. In this chart, the total height of the bar is not significant, but rather it is the composition of the colored sections within the bar that reveals the distribution of opinions. The graph is organized in descending order on the 'Yes Relevant' category, where the total percentage of each category adds to 100%.

Figure 3. Relevancy of 20 Indicators



Here's a deeper look into how the color-coding translates to perceived relevance:

Dark Blue ("YES RELEVANT"): This segment reflects the percentage of respondents who consider this aspect a relevant component of the social inclusion recommendations. A higher dark blue section indicates stronger agreement that this aspect is crucial for inclusive practices.

Medium Blue ("NOT RELEVANT"): Conversely, the medium blue section represents the portion of facilitators who believe this particular social inclusion aspect is NOT relevant within their activities. A prominent medium blue section suggests that many labs do not view this aspect as essential for relevant strategies within their activities.

Light Blue ("NOT MENTIONED"): This section captures the percentage of responses who entirely omitted mentioning this aspect, possibly because they found it irrelevant or outside the scope of their understanding of social inclusion. A substantial light blue section could indicate a need for clarification or further discussion about that aspect.

Table 9 (see Annex section 5.4) shows the same datapoints, which show the count for each category. The results show that the three most relevant indicators are 'co-creation & cooperation', 'sensorial experiences', and 'mutual learning & knowledge exchange', whereas the three least relevant indicators are 'gender balanced representation', 'gender-sensitive data collection', and 'intersectionality consideration'.

Here, it is important to note that when we discuss most/least relevant, we do not infer this to signify 'importance'; rather, these could have several meanings, with their rating as indicated from the perspective of the facilitator. For example, 'Yes relevant' could refer to an indicator as being a primary objective within their activity, and 'No, not relevant' could refer to there being no time to address this component, or even that the indicator was not an objective of the activity – it's subjective to the facilitator. Furthermore, one should be careful of the interpretation of these results as there are some variations on how this data can be read, and there are implicit biases that can arise (see Figure 16 in the Annex in Section 5).

3. Context Studies

Within our consortium, we highlighted six partners to explore the social context of their STEAM labs. We chose these partners based on a variety of criteria: UB was chosen as they had the highest frequency of "2" for their social inclusion markers. WECF was chosen as they are the only partner who has all girl groups for participants. UEDIN was highlighted as they had multiple activities with the same group of participants throughout their STEAM labs, whereas most other labs had changing participants. ODY, CREDA, and GEYC were highlighted as their participants of their STEAM Labs represent a variety of stakeholders. The participants at ODY are educators who specialize in teaching vulnerable populations, such as migrants and migrant youth. CREDA has a wide variety of participants: students, educators, student-teachers, municipalities, and civic centers. GEYC works with students who have been identified as coming from a disadvantaged background (socioeconomic/geographically vulnerable).

We conducted these context studies first by asking these partners to contribute an essay that we referred to as "Deconstructing the Context" of approximately 500 words. To facilitate this, we provided a series of questions and sub-questions as a guideline. Following up on this, we then conducted semi-structured interviews with these partners, each of which lasted about an hour. Both the essay guidelines and the key words, themes, and ideas that were at the center of the interviews can be found in the Annex, Section 5.2.

Our goal was to have a deeper understanding of the context of the individuals and community groups that belonged to each of these six labs, examining relevant social

elements and demographics that might affect the potential for inclusion at an individual, community, and societal level. In our scoping report, we identified that in SENSE.STEAM, we view social inclusion through the lens of intersectionality. In this, we wanted to characterize the demographic of who was involved, examining demographics (age, socioeconomic status, cultural background) and diversity within both the labs and their broader communities.

We asked the facilitators their perspectives regarding the historical and current context of each community, including elements such as current and past struggles, cultural trends and conflicts. A critical focus lies on the relationship between the individuals and the communities. We gathered insights into individual or community challenges, along with potentially unmet societal needs. Additionally, we identified community resources and strengths that may be mobilized to address and mitigate these issues.

For each of the six context studies, the following sub-sections will explore individualized evaluation and monitoring utilizing three graphics. These graphics are parallel to the previous section, which instead reviewed the collective activity reports of the consortium as a whole.

Therefore, the following sub-sections will deconstruct each of the six context studies with three graphs:

Social Inclusion Marker (see Section 3.2)
The Four W's Across Societal Spheres (see Section 3.3)
The 20 Social Inclusion Indicators (see Section 3.4)

The description of how to interpret these graphs are similar to how they are described in their respective sections, with a slight modification to the second graph, "The Four W's across societal spheres". It is important to recognize that in assessing the data, there are several elements that are based on the interpretation of the facilitator of each activity report; this is their perspective. Then, in analyzing this data, there is one person that codes and interprets the data thematically. Therefore, while there is a systematic approach to the data, it is unavoidable that there is subjectivity and bias prevalent in the assessment.

3.1. CREDA

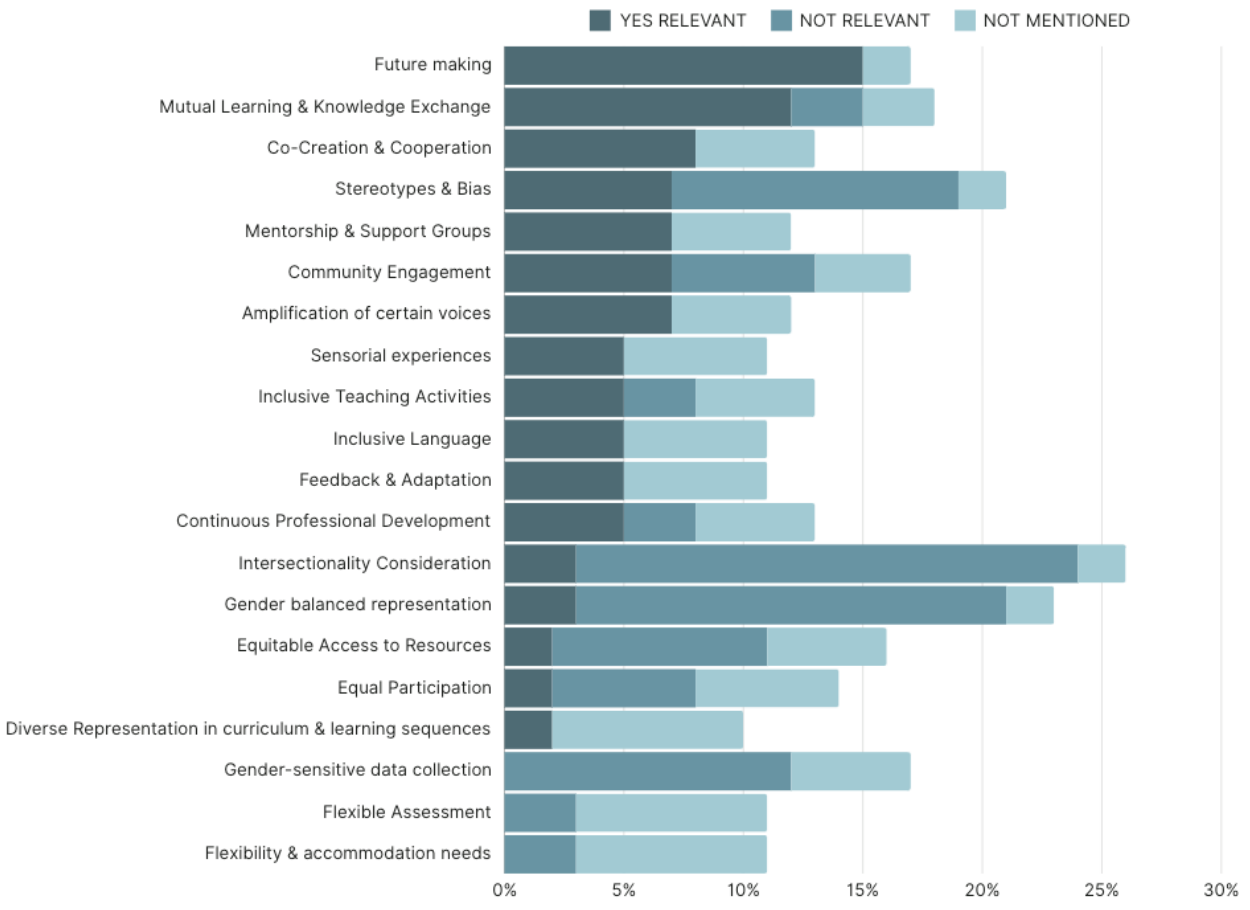
The STEAM lab at CREDA has diverse participants, from students to companies. They prioritize inclusivity and cater to different backgrounds. Their projects tackle real-world issues like climate change and aim to empower participants through hands-on learning.

Table 3. CREDA, Social Inclusion Marker

MARKER	COUNT
0 = NOT TARGETED	0
1 = INCLUSION IS SIGNIFICANT	9
2 = INCLUSION IS PRINCIPAL	3

CREDA indicated that out of their 12 evaluated activities, nine of them considered social inclusion to be significant, with three more indicating that social inclusion is the principal objective. Their labs reflect participant-led engagement and encourage a diversity of backgrounds and experiences.

Figure 4. CREDA, Relevancy of 20 Indicators



Of the 20 social inclusion indicators CREDA identifies 'Future-making' and 'Mutual learning & knowledge exchange' as the most relevant with the highest number of frequencies. This reflects their labs, as they indicated that one of their primary goals is to transform the approach to schooling, away from more traditional educational practices, and in the direction of more artistic involvement with sensory development. Within their labs, an objective was for participants to learn from each other and to share expertise and insights, therefore 'mutual learning' was a highly relevant indicator. The least relevant that was indicated is 'Flexibility & accommodation needs' and 'Flexible assessment', which cited time limitations as the reasoning behind it being not relevant.

Figure 5. CREDA, The Four W's and the Individual, Community, Society spheres

Through this figure, we can identify key themes through the Four W's reflective activity. Their message is one that reflects respect across all dimensions, encouraging trust and cooperation in efforts to identify common goals. Furthermore, well-being is thematic across spheres, which is bolstered by elements of interconnectedness, mutual support and recognizing the importance of sensory awareness.

3.2. GEYC

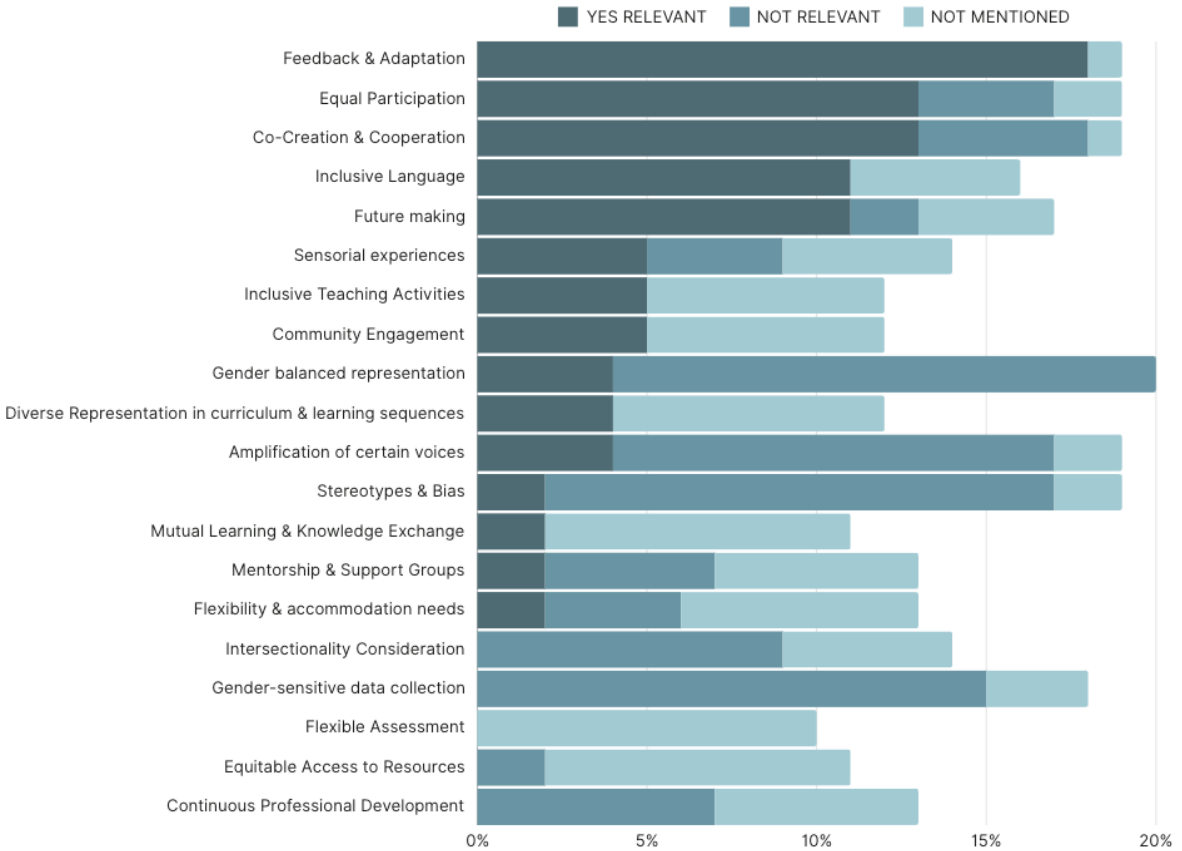
GEYC's STEAM Lab engages students aged 13-19 across various Romanian cities. Their diverse communities highlight the need for activities that cater to different backgrounds and local challenges.

Table 4. GEYC, Social Inclusion Marker

MARKER	COUNT
0 = NOT TARGETED	0
1 = INCLUSION IS SIGNIFICANT	10
2 = INCLUSION IS PRINCIPAL	3

Of their 13 reported labs, GEYC has identified three with the principal objective of social inclusion. The remaining 10 are classified as social inclusion being a significant, but not as the fundamental objective.

Figure 6. GEYC, Relevancy of 20 Indicators



GEYC has identified 'Feedback & Adaption' as the most cited 'Yes Relevant' social inclusion indicator. A primary goal of the activities was that the youth should be able to make suggestions to make changes and adjustments to the activities based on their own interests and desires. The indicator listed with the highest frequency as 'Not

relevant' is 'Gender-balanced representation', and it was cited that gender was not a controlled factor in the design and implementation of the activity.

Figure 7. GEYC, The Four W's and the Individual, Community, Society spheres

Through the Four 'W' self-reflective questions, themes of 'youth development and empowerment' are indicative across the societal spheres. There is an importance on 'space creation' and developing shared spaces to foster new connections and harness community expression.

3.3. ODY

The ODY STEAM Labs have participants that are adolescents, teachers, second-generation migrants, and unaccompanied minors from various backgrounds. All groups reportedly lacked community advocacy and resources.

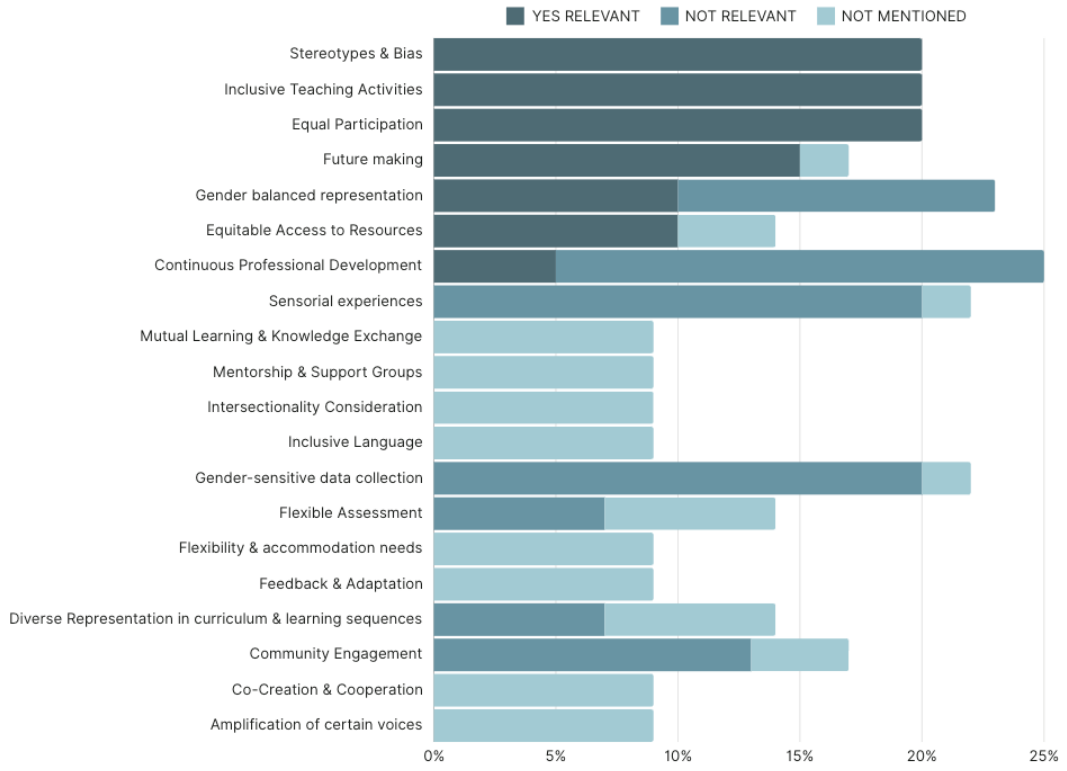
The activities primarily addressed gender stereotypes, and students questioned traditional roles for women in certain professions and childcare. Unaccompanied minors held stronger beliefs about male dominance. Even teachers expressed surprising stereotypes, attributing gender to scientific abilities and leadership roles.

Table 5. ODY, Social Inclusion Marker

MARKER	COUNT
0 = NOT TARGETED	5
1 = INCLUSION IS SIGNIFICANT	1
2 = INCLUSION IS PRINCIPAL	2

Of the eight evaluated activities, ODY identified five as not explicitly targeting social inclusion, one where social inclusion is significant, and two activities in which social inclusion is the principal objective.

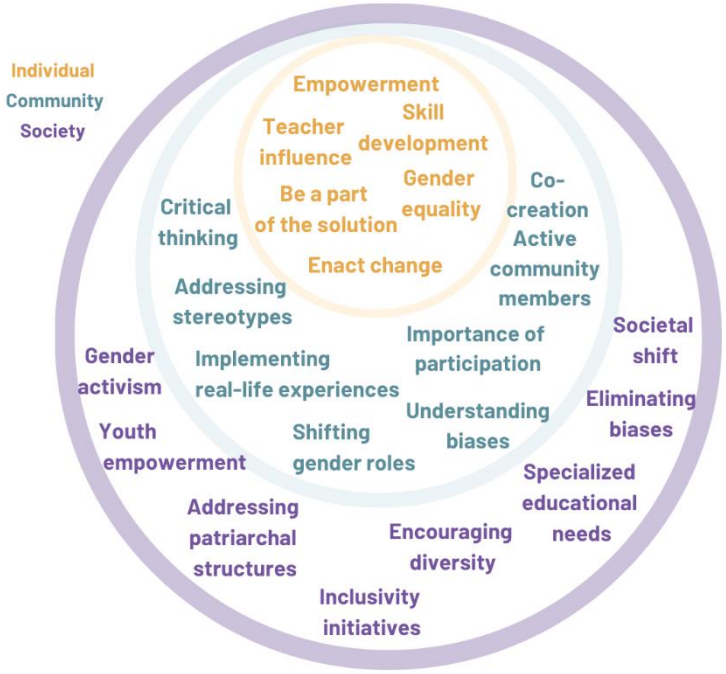
Figure 8. ODY, Relevancy of 20 Indicators



ODY identified three indicators as 'Yes Relevant' for all their activities. 'Equal Participation' and 'Inclusive Teaching Activities' were highly relevant as the objective of the activity was based on the participatory method, giving space for all participants to express their opinions. 'Stereotypes and Bias' was also elected as highly relevant, as the primary goal of the activity was to discuss beliefs about gender roles and occupations, and to address the stereotypes that perpetuate

these biases. The indicators that were found with the highest frequency of 'Not relevant' were 'Continuous Professional Development', 'Gender-sensitive data collection, and 'Sensorial experiences'.

Figure 9. ODY, The Four W's and the Individual, Community, Society Spheres



The emerging themes in this figure are shifting gender roles, promoting gender equality and gender activism. This is reflective of the nature of the activities which highlighted gender stereotypes and their origin. Furthermore, across the social spheres, ODY indicates a necessity for understanding biases, addressing, and eliminating these stereotypes and dismantling the patriarchal structures that reinforce them.

3.4. UB

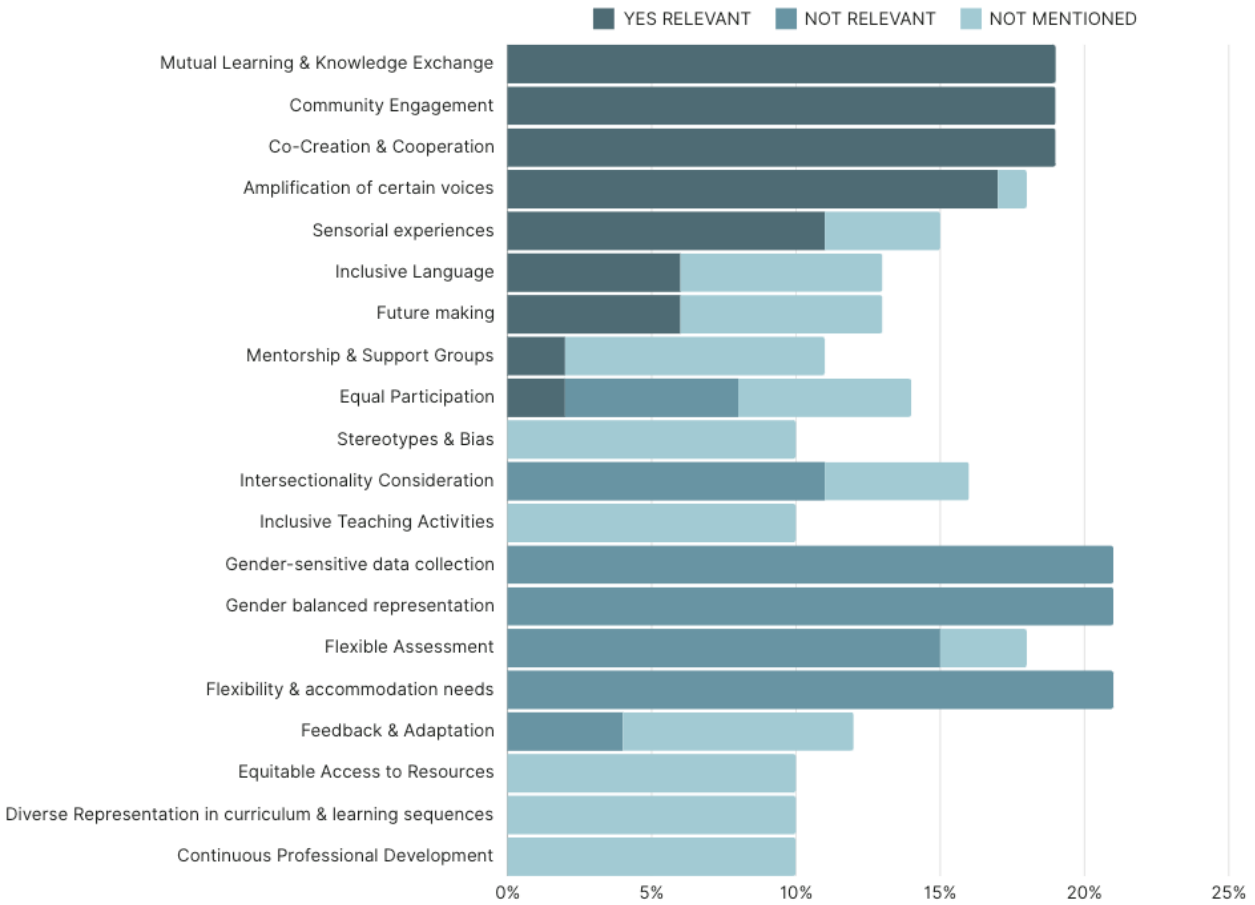
The STEAM Lab at the University of Barcelona prioritizes citizen science practices, emphasizing elements such as social inclusion, co-creation, access, and identity (read more about citizen science in D6.1).

Table 6. UB, Social Inclusion Marker

MARKER	COUNT
0 = NOT TARGETED	0
1 = INCLUSION IS SIGNIFICANT	5
2 = INCLUSION IS PRINCIPAL	10

From their 15 evaluated activities, UB has identified social inclusion to be the primary objective of 10 of their activities, with the remaining five classified as significant, but not the principal objective. This is reflected in the co-creative, participant-led practices that are prioritized within their lab.

Figure 10. UB, Relevancy of 20 Indicators



Of the 20 social inclusion indicators, UB identified three as 'Yes relevant' for every activity. These were 'Mutual learning & knowledge exchange', 'community

engagement', and 'co-creation & cooperation'. This is highly reflective of the fundamental elements of citizen science, and therefore they are primary objectives within the UB STEAM Lab. There were several indicators that received 'Not relevant' for each of the activities, such as 'Gender balanced representation' which was outside the control of the facilitators for the activities, as the labs were conducted either at schools (where gender is decided by the school system), or at public centers, where participation was voluntary.

Figure 11. UB, The Four W's and the Individual, Community, Society spheres

The emergent themes within this figure are about exploration and identifying real-world issues. Public engagement and establishing common goals can create a link of interconnection between community groups, while community building, and collaboration facilitates addressing these societal problems. In this, the use of public spaces is representative of a broader opportunity for networking and interaction with other stakeholders for impactful problem-solving.

3.5. UEDIN

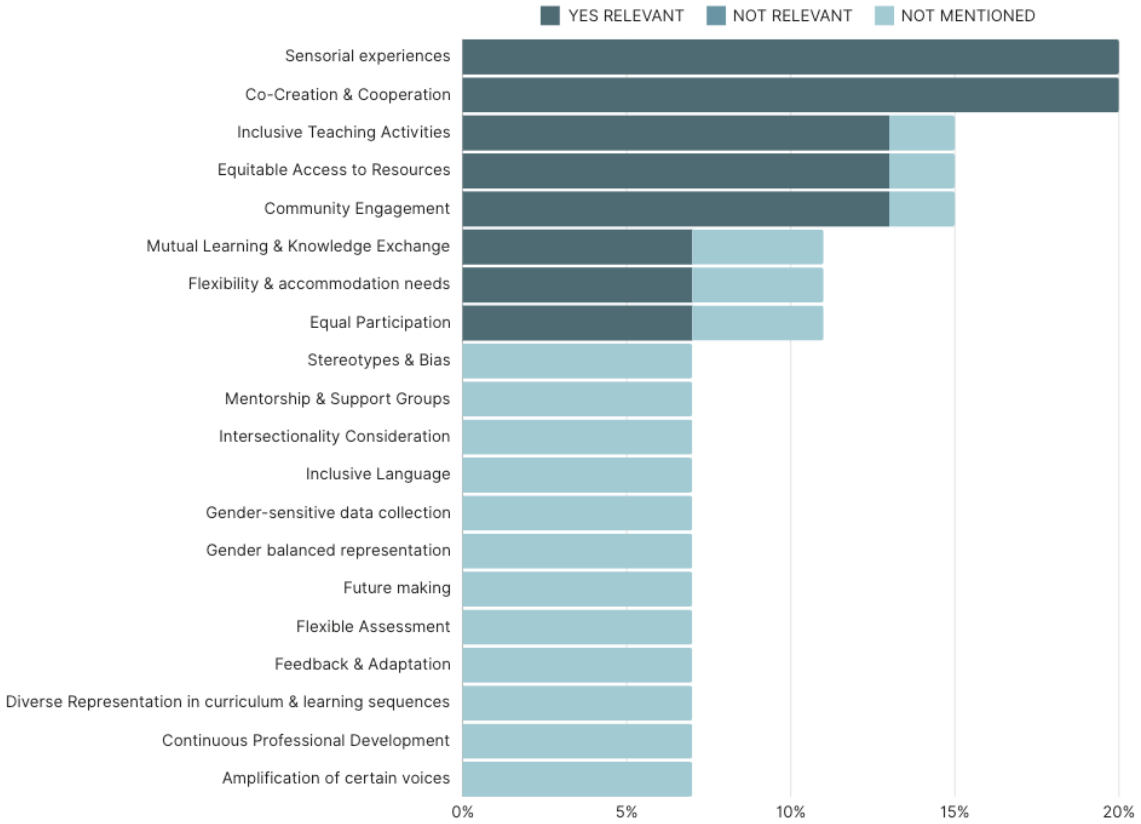
The STEAM Lab facilitated by the University of Edinburgh is a gardening program involving eight 12–13-year-olds, mostly girls from low-income backgrounds. The school itself struggles academically and lacks amenities. Despite these challenges, the students actively participate in STEAM activities that combine gardening, cooking, and art. They use the garden as a safe space for learning and collaboration.

Table 7. UEDIN, Social Inclusion Marker

MARKER	COUNT
0 = NOT TARGETED	16
1 = INCLUSION IS SIGNIFICANT	4
2 = INCLUSION IS PRINCIPAL	0

Of the 20 evaluated activities, UEDIN has identified 16 of them to not have explicitly targeted social inclusion, with the remaining four as having social inclusion as significant: an important and deliberate objective, though not principal. As mentioned in a previous section, social inclusion as 'not targeted' does not indicate that social inclusion elements have not been considered.

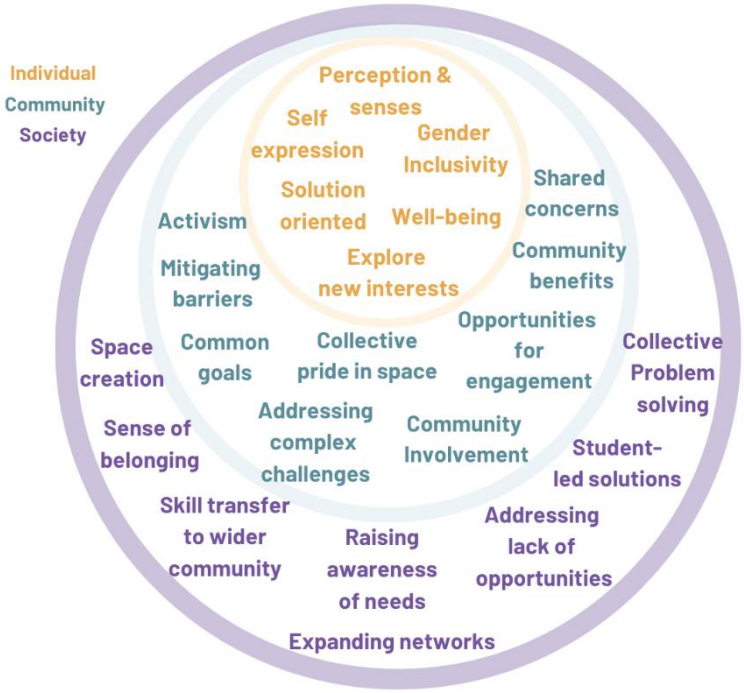
Figure 12. UEDIN, Relevancy of 20 Indicators



UEDIN identified two indicators as most frequently 'Yes Relevant': 'Sensorial experiences' and 'Co-creation & cooperation'. In UEDIN activities, sensorial experiences are continuously encouraged, and emphasized by engaging in sensory exploration, such as comparing touch and smell of different garden herbs. These are

found to lead to critical questions and discussions around topics such as food activism. Co-creation & cooperation is highly relevant in these activities as students come together to share their cooking. These collective endeavors give the pupils a sense of pride and achievement, along with increasing the value of the garden space and a heightened sense of belonging. UEDIN did not explicitly indicate 'not relevant' indicators.

Figure 13. UEDIN, The Four W's and the Individual, Community, Society spheres



The themes that emerge in this figure indicate that the gardening program fosters a sense of self-expression, and a collective pride in space and community engagement. Students are aware of local issues like litter and vandalism and are taking action by planning a plant sale and inviting families to help maintain the garden. This highlights student-led solutions and collective problem solving which advocates for their wider community.

3.6. WECF

WECF facilitates a STEAM Lab in Akhmeta Georgia, where their participants are girls aged 12-19. Despite local limitations and the limitations of traditional gender roles, the girls are passionate about engaging in STEAM activities; they build technological solutions to address community needs and collaborate with the local government.

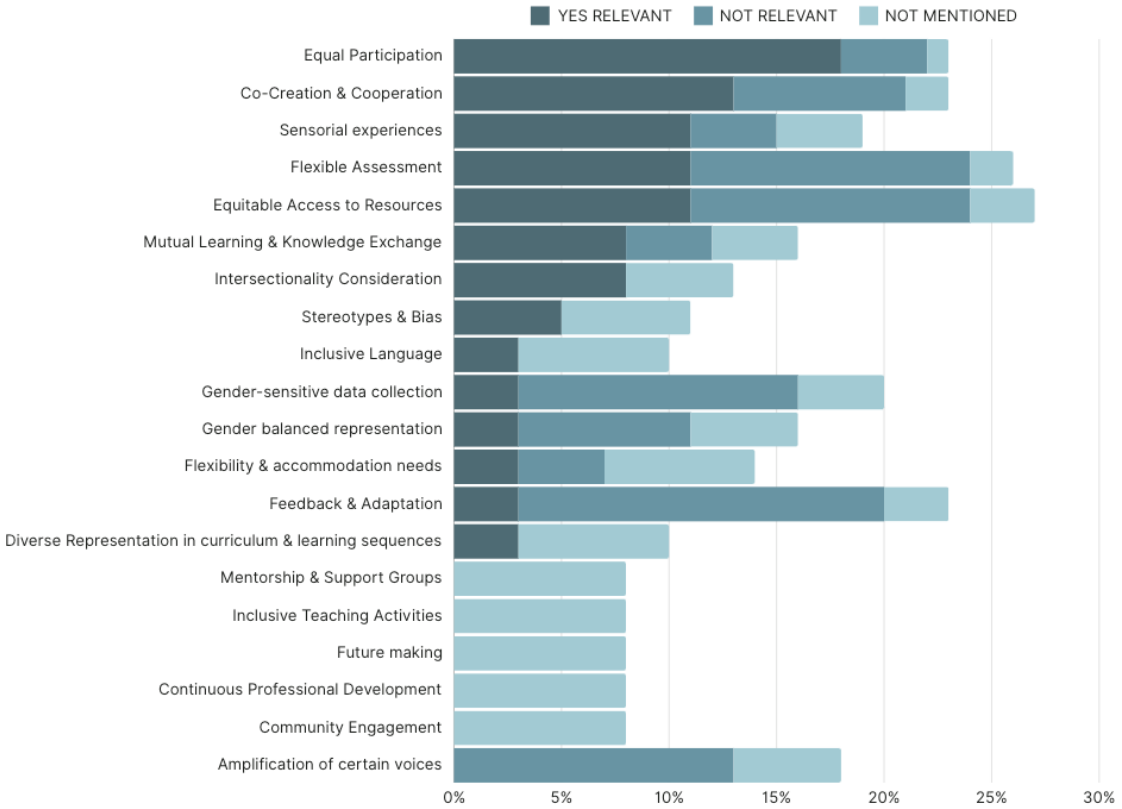
Challenges include lack of resources and awareness about women's health. The lab fosters a welcoming environment and empowers girls to pursue STEM careers, breaking down stereotypes and inspiring future generations.

Table 8. WECF, Social Inclusion Marker

MARKER	COUNT
0 = NOT TARGETED	1
1 = INCLUSION IS SIGNIFICANT	5
2 = INCLUSION IS PRINCIPAL	0

Of their six evaluated activities, WECF has identified five as social inclusion being significant, with one activity as social inclusion as not targeted.

Figure 14. Figure 14. WECF, Relevancy of 20 Indicators



Of the 20 Social Inclusion Indicators, WECF identified 'Equal Participation' as the highest frequency of 'Yes Relevant'. In the implementation of the activities, it was important that each participant was equally engaged, gained new knowledge, and shared personal interests, challenges and needs. Furthermore, the participants were

from different backgrounds, and encouraged to engage and voice their opinions during the activity. The indicator with the highest amount of 'Not relevant' was 'Feedback & adaptation', which was attributed to a few issues: the first being that the students found the feedback method (survey) challenging, and that participants were shy with collective feedback, despite it being an anonymous approach. Adaption to the activity proved to be challenging considering the available resources and materials and the skill level of the participants.

Figure 15. WECF, The Four W's and the Individual, Community, Society Spheres

The emergent themes that are highlighted are equality and justice, particularly when empowering women and girls, and eliminating stereotypes and stigmas in the community and broader society. Respect for the other, amplification of choices, and having an active impact to effect system change at a broader scale are recurrent throughout their activities and reflective exercises.

4. Conclusions

Relevant recommendations

The output of this report is not an explicit set of instructions for evaluating social inclusion strategies. More so, this is a compilation of insights of social inclusion through the lens of self-reflection exercises that were implemented pre-during-post the STEAM Lab activities. This evaluation and monitoring report has proven to be a dynamic process to reflect on progress and adapt strategies as needed.

Identifying a Social Inclusion Marker calibrates motivations and goals for designing the activity. In this, you can optimize inclusion considerations and reflect whether further initiatives can be made to increase inclusion measures.

Asking yourself 'Who?/What?/When?/Why?' throughout the activity centers and clarifies the objectives of your activity. When these questions are embedded within the three societal spheres, a shift occurs, where transversal visions of the individual can be transformed and shared into the wider community. It is how these levels interconnect that is important; societies are reflective of these interactions.

Generally, it is useful for consistent self-reflection on what is relevant and what is not; this facilitates a feedback loop for adaptability and adjustment. For the 20 Social Inclusion Indicators, we analyzed which were reported to be the most and least relevant. Additionally, we identified which indicators were 'not mentioned', and observed the relationship of 'not mentioned' between the indicators that were perceived to be relevant or not. These interactions showcase limitations in a binary 'yes/no relevant' analysis, which is further discussed in the Annex in Section 5.4. Despite limitations, it is beneficial to have insight into what the consortium found to be relevant or not for their activities. This was enhanced when partners included a 'why', thus providing a more robust understanding of the context (see Annex, Section 5.1).

The context studies showed the variance that can occur across countries, participant groups, and activity types – we wanted to deconstruct the context and understand what (if anything) remained constant across scenarios. This dissection provided outcomes of both disparities and similarities between partners – but overall, we have clearer idea of emergent trends throughout the STEAM Labs.

This report provides baseline data and outcomes that will advance our next steps in building the social inclusion toolkit. We have compiled insights from a highly diverse consortium – and we have found commonalities and perspectives that were shown across these labs. Moving forward, these elements that have been collectively evaluated from the consortium will be implemented into a self-reflective toolkit and will be incorporated into the guidelines for the SENSE.STEAM roadmap.

5. Annex

5.1. Social Inclusion Activity Report Template

Part One: Who/Why/What/Where, Across societal levels

Instructions:	During the SENSE. Activities, facilitators should begin with a self-reflection process. The exercise consists of asking yourself four general questions at three different levels, through the lens of social inclusion. *When filling out this table, refer to the document Samples & Examples for the Evaluation & Monitoring Template.		
Question	Individual (e.g., students or participants	Community (the group with which the STEAM lab is working)	Society (the environmental conditions and context of the STEAM labs)
Who?			
Why?			
What?			
Where?			

Part Two: Relevancy of 20 Indicators

Instructions:	Identify 5 elements that are most relevant to each activity and why. Which were the 5 most challenging and why? Refer to Tables 3 & 4 in the D6.1 Scoping Report or within the Summaries_Social Inclusion.	
Elements of Social Inclusion	Relevant? Indicate 5 Yes & 5 No	Why?
Equal Participation		
Gender balanced representation		
Amplification of certain voices		
Flexibility & accommodation needs		
Gender-sensitive data collection		
Future making		
Sensorial experiences		
Continuous Professional Development		
Feedback & Adaptation		

Community Engagement		
Intersectionality Consideration		
Stereotypes & Bias		
Inclusive Language		
Flexible Assessment		
Mentorship & Support Groups		
Equitable Access to Resources		
Inclusive Teaching Activities		
Mutual Learning & Knowledge Exchange		
Co-Creation & Cooperation		
Diverse Representation in curriculum & learning sequences		

5.2. Context Studies

Highlighted Partners

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
Group of the European Youth for Change	GEYC	Bucharest, Romania

Semi-Structured Interview & Keywords

Interview & Keywords
Keywords: Artistic Intervention, salient memories, asking facilitators their experiences, and collective memories
Goal: We want to understand the connectedness between Individual >> Community >> Society. We start with the individual, but then move outward through the concentric circles of society.

How do the facilitators perceive.... 1. The intersectionality of the participants 2. Defining objectives of inclusive education... how is this shaped by the social spheres? (Cultural trends (current/historical), age, trends, socioeconomic statis, rural/urban, etc.) 3. Can the "outcome" of the Labs or activity be recognized as innovative? 4. As something new within the community, organization, or networks? 5. Are there newly established relationships/dynamics within the community? 6. If yes, can this "novelty" scale-up? Inspire other communities or networks? 7. Has there been (or is there the potential for) the participants to become more "visible" within the community through the SENSE. Activity? 8. Is there potential for participants to have agency in changing/shifting use of public spaces (interacting with the community, society, world around them)? 9. Referring to artistic practices within your STEAM lab/activities? 10. Did you find any struggles in implementing this element? 11. What was useful and/or relevant when considering artistic elements? 12. Overall, what works or doesn't work within the activities/labs?

5.3. Deconstructing the Context Essays

Prompt to the partners

Instructions to the partners: Please write at least 500 words (but it can be as long as needed) to describe the local context of your STEAM lab. Below are some things to consider, prompt questions & examples. These are framed through the lens of the participants both individually, but also seen as a community group. You do not necessarily have to answer all the questions, this is just to provide some structure.
Prompts & Questions:

• Who is involved in your STEAM labs? (i.e., target group/community group)
  ○ Do you know the general background of the individuals? If so, please describe
  ▪ This could be age range, cultural background, socioeconomic composition
  ▪ (e.g., we primarily work with immigrant or first-generation children)
  ○ Describe the level of diversity within the labs, and also wider community as a whole

• What is the history of the community group?

○ How has the community changed over time? What do you anticipate for the future of the community ○ Describe relevant historical struggles, political conflicts, etc. ▪ Are you working in an area that could be considered "vulnerable"? • (e.g. we work with participants that are from areas of low socioeconomic status, or highly industrial zones, with government subsidized housing, etc.)
• What is the relationship to the community like in relation to these individuals, or this group of people? ○ Do these individuals have any particular social support systems? Or community resources? ▪ (e.g. we work with students through a program that works with "high risk" students, so that they don't drop out of school) ○ What, if any, are some of the unmet needs or gaps in resources? ○ Do you have a general sense of the broader community perspective of the group? ▪ (e.g. There is local tension between the long-term residents of this neighborhood, and the students who attend the school) ○ Do these groups interact and contribute to the broader community? ▪ (e.g., we work with students who interact with the local municipality to problem-solve local issues)
• What, if any, are some of the biggest challenges facing the community right now? ○ Were there any topics/perspectives/themes that came up throughout the activities? ▪ (e.g. We had students that kept talking about lack of future job possibilities, and how they would not be able to find work if they stayed in the area) ○ What are some potential opportunities for growth and development?
• What are some unique strengths and assets that the community possesses? ○ Are there any traditions, skills, or talents that the community members share? ▪ (e.g. In the neighborhood in which we work, there is a strong sense of community, they are very artistic, and they have a community cultural festival every year where most people are highly involved in making art, putting on concerts, etc.)
• What do relationships with outside groups look like? ○ Do you know how individuals or the community perceives outside groups?

- (e.g. The neighborhood that we work are highly involved in activism against gentrification and outsiders, as they are wary of their neighborhood being sold off for industrial expansion)

- What personal experiences can you share about the community?
  - How do you feel when you're there? How do the people involved interact with you?
  - Is there anything else you would like to share? Reflections? Perspectives?

5.4. More data visualizations

Table 9. More data, Relevancy of 20 Indicators

Elements of Social Inclusion	Yes Relevant	Not Relevant	Not Mentioned
Co-Creation & Cooperation	52	5	19
Sensorial experiences	40	6	30
Mutual Learning & Knowledge Exchange	38	3	35
Future making	28	2	45
Equal Participation	24	12	40
Community Engagement	24	17	34
Feedback & Adaptation	21	8	46
Inclusive Teaching Activities	17	2	56
Amplification of certain voices	16	23	36
Inclusive Language	15	8	52
Equitable Access to Resources	15	12	50
Gender balanced representation	14	39	22
Continuous Professional Development	14	15	46
Stereotypes & Bias	12	26	37
Flexibility & accommodation needs	11	19	46
Flexible Assessment	10	17	49
Gender-sensitive data collection	9	37	29
Mentorship & Support Groups	7	11	57
Intersectionality Consideration	6	28	41
Diverse Representation in curriculum & learning sequences	6	7	62

Table 9 shows the same data as the stacked bar chart in Figure 3. but indicates the count rather than the percentage. It is also organized in descending order on the 'Yes Relevant' category. The light/medium/dark shades of blue correspond to frequency, with the highest frequency being the dark blue, and light blue representing the lowest frequency.

Figure 16. More data, Relevancy of 20 Indicators

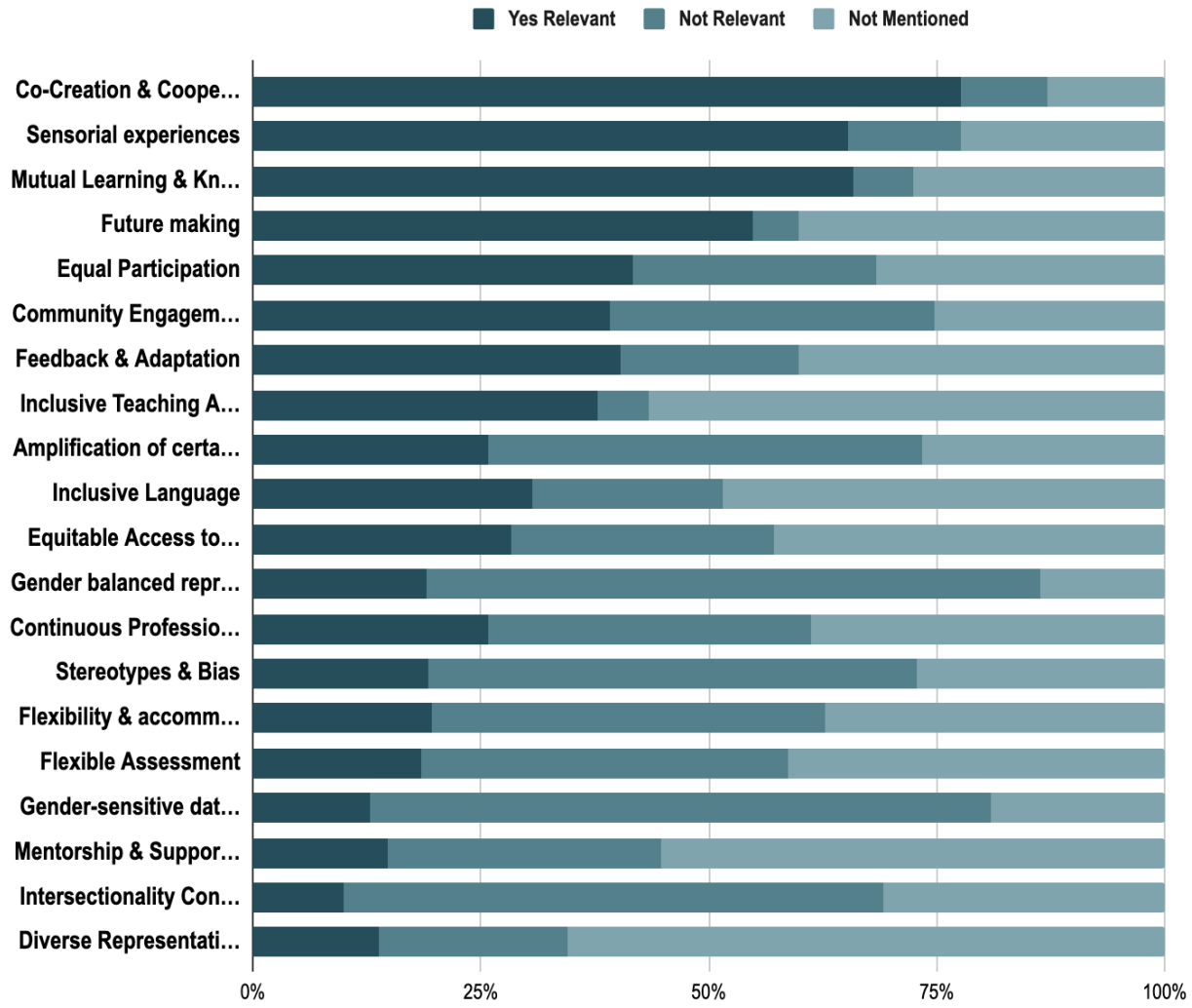


Figure 16: Shows the same datapoints as Table 9 and the stacked bar chart in Figure 3. The data is organized in nearly the same way, with the colors aligning with the same values. The difference in this table is that the rows sum to 100%. Figure 3 provides an interpretation bias, where the focus is on the value of the 'Yes' Relevant indicators and minimizes the presence and relation with the indicators that are 'Not mentioned'. Figure 16 gives more weight to the 'Not mentioned' indicators, which shifts the meaning of the data. This can shift interpretations and relationships between some of the indicators, rendering this dataset an interplay of three crucial variables (Yes/No/Not mentioned) rather than the more "focused" binary of (Yes/No) that is represented in Figure 3.

6. Formalities

Project information

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Copyright information

Revision History

Date	Version	Author	Comment
01.04.2024	V0.01	Rebekah Breding, UB	Creation of the first document outline
10.05.2024	V0.02	Rebekah Breding, UB	First draft of content section 1 and 2
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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

Glossary

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	(Haklay *et al.*, 2021)

	even to describe various forms of participatory action research and digital volunteerism.	
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 vision to a broader audience. This manifesto provides a clear direction that fosters cohesion and resonance within the collective, while	D.3.4

	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 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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