EUROPEAN

POLICYBRIEF

ENVISIONING THE FUTURE - TRANSFORMATIVE OPEN SCHOOLING FOR EMPOWERED CITIZENSHIP

As society faces unprecedented technological and environmental challenges, traditional models of education are falling short. The SENSE. project advocates for a stronger connection between open schooling and the education continuum, emphasising collaboration and community engagement to create learning environments that appeal to all ages and cultures. By integrating STEAM disciplines and promoting empathy in science learning, SENSE. empowers learners to become socially responsible and scientifically literate citizens.

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INTRODUCTION

In an era of global citizenship, rapid technological change and complex societal challenges - from the accelerating threat of climate change to unprecedented technological developments - traditional models of education are increasingly being challenged. Even more so, the need to strengthen democracy and ensure a highly skilled workforce requires a shift in thinking to engage with current challenges and disruptive forces, and to foster a culture of collaboration to drive future innovation. Open schooling has emerged as a transformative approach that emphasises collaboration, inclusivity and community engagement. It fosters horizontal relationships between educational institutions, practitioners, and diverse stakeholders, creating vibrant learning ecosystems in which students can thrive. This model not only improves access to education, but also prepares learners to become socially responsible and engaged citizens in a democratic society.

The SENSE. project embodies this shift, advocating for high-quality, future-ready education that integrates the disciplines of STEAM (Science, Technology, Engineering, Arts and Mathematics). By promoting a holistic approach that combines scientific inquiry with artistic expression, SENSE. seeks to challenge conventional ideas about education and address the urgent need for socially conscious and scientifically literate individuals. The project recognises the importance of sensory engagement in learning and encourages students to explore and make sense of the world through different modalities.

DEFINITION OF OPEN SCHOOLING

In recent years open schooling has emerged as an important concept in rethinking 21st-century education, aiming to transform schools into more relevant and adaptable institutions (EC, 2015, 2024; OECD, 2020). This redefinition has been driven by key reports from the OECD, which propose that schools should function as “hubs of learning”. This involves breaking down barriers between educational institutions and communities, fostering collaboration, and engaging in innovative research. Such an approach equips students with the knowledge, skills and values necessary to thrive in contemporary society and encourages responsible citizenship to address pressing social issues (Sotiriou et al., 2017). This shift necessitates comprehensive reform of school organization and curriculum, positioning open schooling as a transformative vision for education (Sotiriou et al., 2021).
The idea of schools connecting with communities is not new and can be traced back to thinkers such as Jane Addams or John Dewey. Recent literature, including studies on Community Schools (Dryfoos, 2000; Heers et al., 2016) and school-community partnerships (Furman, 2002; Valli et al., 2018), emphasizes the effectiveness of community-oriented learning. However, despite the importance of these discussions, systematic academic discourse on open schooling remains limited. This reveals a gap between current international policy reforms and rigorous academic exploration.

“Open schooling” refers to educational systems and practices prioritising accessibility, flexibility, and learner-centred approaches. It typically encompasses a variety of methods, including digital learning approaches and community-based education, aiming to meet diverse learners’ needs.

Several international institutions have actively promote open schooling:

- **UNESCO**: The concept of open schooling is supported by UNESCO's initiatives to promote inclusive and equitable quality education. According to the UNESCO Institute for Lifelong Learning, open schooling involves innovative approaches that can be adapted to local contexts to improve educational outcomes (UNESCO, 2018).
- **European Union**: The EU's Digital Education Action Plan emphasizes the importance of inclusive digital education, stating that open schooling can play a crucial role in providing access to learning resources and enhancing educational equity (European Commission, 2020).
- **UN SDG 4**: The United Nations' Sustainable Development Goal 4 emphasizes the importance of ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all, which aligns closely with the principles of open schooling.

The notion of "openness" emphasizes the active role of schools within their communities, fostering democratic citizenship and social responsibility. Key features of open schooling include:

- Schools collaborating with stakeholders to enhance community well-being
- Families being engaged as genuine partners in school activities
- Professionals from various sectors participating in real-life projects within the classroom

Reports from the European Commission (EC, 2015) and the OECD (2020) primarily link open schooling to science education, aiming to boost students' motivation in science and encourage scientific careers. The EC advocates for partnerships among teachers, students, researchers, and industry professionals to tackle real-world challenges and explore associated ethical and social issues.

In the context of SENSE. the research consortium reviewed the existing definitions and examples of open schooling and developed a definition that aligns closely with the goals and methodologies outlined in the SENSE. methodology, which seeks to transform science education to be more inclusive, engaging, and open for all learners.

Open schooling is an educational approach cantered on the collaboration among educational institutions, practitioners, and a diverse array of stakeholders. It is based on **horizontal relationships** that include partnerships and interactions based on equality, mutual respect, and shared goals. This model promotes collaboration, exchange, and resource sharing, fundamental condition of an educational environment where stakeholders inspire and understand one another."

SENSE. exemplifies the principles of open schooling by fostering collaborative, inclusive, and innovative educational practices. By reshaping science education to promote accessibility and social consciousness, SENSE. not only aligns with the goals of open schooling but also sets a compelling model for future educational reforms. The integration of the arts, spatial design, and community involvement within this framework underscores the transformative potential of open schooling in developing a more engaged and scientifically literate society.

There are many different definitions of open schooling, which we grouped loosely into three distinct - albeit overlapping – categories: Institutional opening, methodological opening and spatial opening. The SENSE. approach is relevant to each of these interpretations:

1. **Opening of the Institution to Collaborate with Other Educational Stakeholders**

SENSE. emphasizes the active collaboration of schools with a broad range of stakeholders, including students, educators, businesses, and community organizations. This approach aims to reshape science education by integrating real-world projects and perspectives into the learning environment. By establishing 12 STEAM Labs across Europe, the project creates platforms for ongoing local and international collaboration. Many of the labs brokered new connections between educational partners, promoting the idea that schools should become vibrant community engagement and innovation hubs. This collaborative approach to education not only enhances the relevance of STEAM education but also fosters a shared commitment to developing socially conscious and scientifically literate citizens.

2. **Opening up to Innovative Educational Methods**

SENSE. advocates for innovative educational practices that challenge conventional science education. By integrating the arts, social inclusion, and hands-on activities into the curriculum, the project seeks to move away from traditional, standardized teaching methods - promoting a wide range of approaches without being normative. This opening up of educational methods encourages diverse ways of learning, catering to various learner needs and styles. It also fosters a more engaging and interactive learning experience, motivating students to explore scientific concepts through multiple lenses, thereby enhancing their understanding and retention.

3. **Spatial Opening / Networked Education**

SENSE. advocates for spatial experimentation, transforming traditional educational settings, such as the typical classroom, into dynamic learning landscapes formed by active reflection and interaction. SENSE. advocates spatial opening in multiple ways:

- Encouraging educational practitioners to review existing physical spaces to facilitate collaboration, interaction and flexible uses, thereby creating environments conducive to STEAM learning. By moving beyond standardized educational environments and furniture settings, SENSE.STEAM enables a more flexible and adaptive approach to education.
- Providing tools and guides to promote an active reflection of the learning environment and how it can be appropriated and turned into an active means of experimentation. This supports both improved education and an expansion of the spatial skills of students ("spatial literacy"), which is crucial for mastering the complexity of science innovation.
- Promoting networked education that treats every environment as a possible place of education enabling collaboration that spans many locations and spaces. This networked approach enhances accessibility and broadens the scope of learning opportunities available to students, supporting their development as engaged, scientifically literate professionals.

METHODOLOGY

The SENSE. Consortium has developed the following policy recommendations for the specific categories essential not only to open schooling but also to the wider aims of the project:

- Accessibility through STEAM
- Education continuum
- Strengthening of civil society
- Blending formal, non-formal and informal education
- Intergenerational dialogue

Under each recommendation we have considered the needs of various stakeholders, defined in the project's beginning, to showcase how they can be involved in the open schooling approach. Stakeholders include:

- Students aged from 13 to 18 years old, who need to make decisions on their future studies.
- Students 19-25, who need to decide about further study and/or choose a professional career
- Girls who are afflicted by gender stereotypes limiting their access to science-related studies and professions
- Parents, who are involved in supporting the education and decision-making processes of their children aged 18-26
- Private and public sector employers and businesses: who need to have work-ready and creative students matching new job profiles related to digital and green transitions
- Schools, teachers and educators, in formal and informal settings as well as science museums who need to be equipped with hands-on pedagogical tools to implement STEAM in curricula
- Cultural and artistic institutions as spaces for the learning of science in relation to society. We want to bring to the fore and make explicit their role as legitimate and powerful informal learning spaces where science and the arts can productively meet
- Academic staff in higher education and research to promote and integrate STEAM inquiry and research methodologies in PhD programmes and research projects including Horizon Europe.
- Policy makers and decision makers who derive education policies and curricula embedding STEAM throughout the learning continuum.
- The general public: the development of a scientific literate citizenry is a fundamental goal of SENSE. Social challenges are best dealt with by informed and scientifically literate citizens who have made lifelong learning their way of life

POLICY RECOMMENDATIONS

Accessibility through STEAM

Policy Recommendation: Creation of an inclusive and effective STEAM education framework that enhances accessibility for all learners.

To enhance accessibility in STEAM education, we recommend the establishment of open schooling environments that facilitate collaboration among diverse stakeholders, including students, educators, parents, businesses, and cultural institutions. Schools should act as community hubs, actively engaging with local organizations to co-create learning experiences. Integration of artistic practices is of utmost importance. Educational institutions should develop interdisciplinary programs that encourage creative exploration alongside scientific inquiry. This can be facilitated through partnerships with cultural and artistic organizations, which can provide resources and expertise in delivering innovative curricula. Finally, to ensure that STEAM education is accessible to all, tailored educational pathways must be created for diverse learners taking into consideration their gender and background.

SENSE. example: We created 12 STEAM Labs across Europe that served as collaborative spaces where students educators, businesses, and cultural institutions came together to engage in project-based learning that integrates scientific inquiry with artistic practices. These labs acted as innovation hubs that encouraged experimentation and the integration of artistic and aesthetic activities into science education, challenging conventional teaching methods. To create a holistic learning experience, we integrate arts and aesthetics into STEAM education, and we used cultural and artistic institutions as informal learning spaces where students can engage with STEAM subjects in meaningful ways. In our labs, we highlighted the successes of women in STEAM to inspire all students, particularly girls, and address gender stereotypes in these fields.

Education continuum

Policy Recommendation: Establishing a collaborative open schooling framework for the education continuum

We recommend the development of a collaborative Open Schooling framework that bridges formal and informal education, fostering partnerships among educational institutions, practitioners, and diverse stakeholders. This framework should be designed to support students across the education continuum from early education through higher education and into lifelong learning.

How can SENSE. support this effort? SENSE. provides educators and learners with valuable resources and support tailored to diverse educational environments, including classrooms, museums, and practical settings like drilling rigs by establishing a STEAM learning companion the “New European Roadmap to STEAM Education”. The digital hub created by SENSE. will serve as a central repository where practitioners can access innovative, evidence-based educational practices. This can facilitate collaboration among stakeholders by providing them with tools and methodologies that enhance STEAM engagement across different contexts and ages. (see Fig. 1) The digital hub will also allow for the exchange of ideas, experiences, and best practices, reinforcing the collaborative spirit of Open Schooling. Through this initiative, SENSE. not only facilitates the implementation of the collaborative Open Schooling framework but also strengthens the overall education continuum, ensuring that students are well-prepared to navigate their future studies and careers in an increasingly complex world.

The activities in the central repository of the roadmap are tested with a wide range of age-groups and from the reports of the labs it is evident that they can be used successfully with participants at different stages of their education. For example, the activity “Shadow and Light” hunting was carried out by two Labs (Weingarten and Dublin) with pupils as young as 12 and university students well in their twenties. While the outcomes were different the setup and basic objective – that of systematic creative exploration – was well understood and appreciated independent of participant age. (Fig.1)

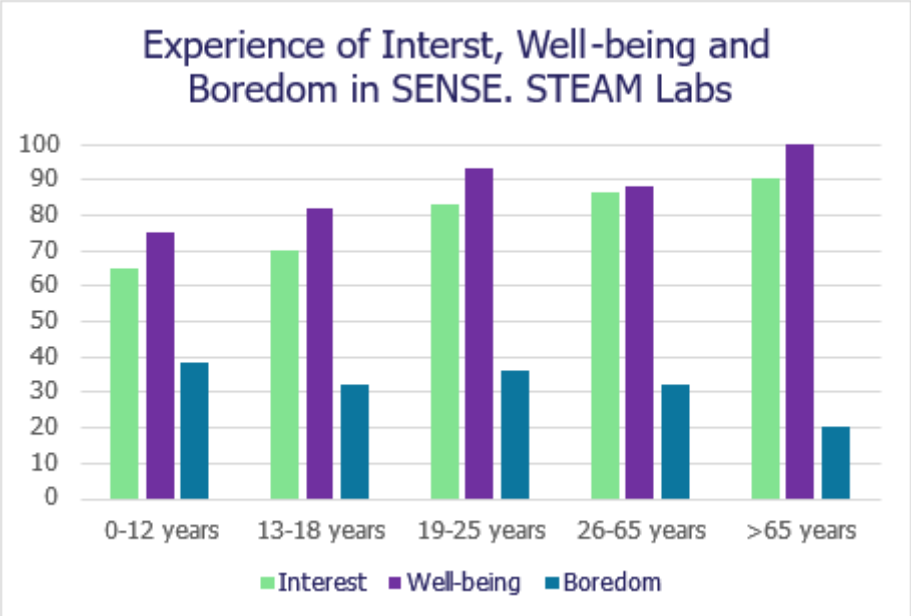

Figure 1. Level of interest, well-being and boredom participants experienced in the STEAM Labs by age group in percentage.

Strengthening of civil society

Policy Recommendation: Strengthening the connection with civil society organisations through collaborative educational practices

To strengthen civil society, it is essential to foster collaboration among educational institutions, community organizations, and diverse stakeholders. SENSE. proposes the implementation of community-based educational initiatives that engage students and citizens in meaningful civic activities thus promoting social responsibility, critical thinking, and active participation in democratic processes. Through the involvement of students, parents, educators, local businesses, and community organizations in civic education initiatives, the participants can cultivate a shared commitment to societal well-being and social justice.

Through its labs, SENSE. project cultivates and promotes partnerships with civil society organisations, providing opportunities for students to apply and test their knowledge and skills by bringing real-life projects to the classroom. One of these labs is VilVite Bergen Science Centre in Norway, which is one of the largest of its kind in Scandinavia and is regularly visited by families, students and businesses. VilVite's large exhibition comprises interactive exhibits to explore themes such as energy; body and health; earth and climate and ocean. VilVite has interacted with the SENSE. project coordinator HVL to implement the SENSE.STEAM approach in engagement with, and training of HVL students who spend short praxis periods at VilVite every semester. This is expected to not only provide an opportunity for students to get more hands-on experience in acquiring scientific skills, but also to strengthen the inter-institutional and networked education model in the community.

The Cròniques de la Calor (Heat Walks) with the Universitat de Barcelona STEAM Lab analyses local areas greatly affected by urban heat islands. The lab organises outreach to local communities, through schools, libraries, civic centres, and neighbourhood associations, representing a diverse demographic, including school children as young as eight years old, to adults of all ages and backgrounds. The participants have active engagement throughout the activities and take on leadership roles such as collectively deciding on spaces and routes in which to measure temperature, collecting and interpreting data, and contributing their personal perceptions with a scientific protocol. In this STEAM lab, civil society is engaged by identifying a community issue and involving the residents of the community in co-creating and designing approaches to understand and develop proposals for transformative change to public spaces.

Blending formal, non-formal and informal education

Policy Recommendation: Linking formal, non-formal and informal learning to promote STEAM education and encourage students to further their interests outside the school setting.

To fully understand how bridging formal, non-formal and informal learning one should clarify firstly their distinction. That distinction does not only take into consideration the physical space, for instance a strict school classroom but also other factors such as context, structure and assessment. Non-formal education shares structures and arrangements relevant to the formal education however differentiates in terms of motivation as it is usually voluntary, less guided form of learning. Informal learning on the other hand, occurs incidentally, it has a voluntary nature, and it is promoted through non-direct teaching behaviours without being recognised through qualifications.

Informal learning is influential, accounting for an estimated 70−90% of all learning (Latchem, 2018). It operates in complementarity with the formal and non-formal learning and can encourage the development of social skills through shared activity and social interaction (Läänemets et al., 2018)

To enrich STEAM education and provide out-of-school learning opportunities, non-formal and informal learning environments can complement formal education so that there is a continuation of learning and an intrinsic engagement from the students.

The lab run by WECF in cooperation with the Akhmeta Technology Center in Georgia is an example how civil society was instrumental to blending formal, non-formal and informal education. The Lab was able to conduct

activities in formal school settings, engaging students, in STEAM activities. The involvement of the CSO WECF was instrumental to facilitate the process. The Akhmeta Technology Center blends non-formal and informal education naturally. The state affiliated institution offers after school activities, non-formaland completely self-determined (children can develop their own 3D or robotics projects). In cooperation with WECF, after school SENSE. activities were offered with a focus on girls. These attracted high interest, demand and engagement. Close cooperation with formal schools , who recognize and value the high-quality and innovative science education that the Technology Center offers to learners of all backgrounds from the region was established. Teachers attended sessions with WECF and are eager to engage in the SENSE.Roadmap.

Intergenerational dialogue

Policy Recommendation: Cultivation of intergenerational learning as a strategy to promote STEAM education across different age groups thus fostering lifelong learning.

Across the implementation of SENSE. and its activities, the consortium partners involved participants representing various age groups and categories. This demonstrates that STEAM is a dynamic learning experience where everyone grows together. Throughout the 244 implementation activities that occurred during the lifespan of the project, 95 activities involved students between 13-18 years old as well as 60 activities involved students between 19-25. Almost 17% of the overall participants in the various STEAM implementation activities represent parents, educators, teachers and academic staff. Out of these activities, in certain labs such the “STEAM Garden 12: Gardening with Family” organised by the University of Edinburgh, collaborative STEAM educational activities were proven to be engaging and relevant for all ages of participants that were involved. This type of engagement may lead to creativity and the cultivation of curiosity for lifelong learning. Intergenerational learning may also involve participants from younger age groups. Almost 500 children (at least the 125 of the overall participants) below 13 participated in implementation activities, albeit not originally foreseen as beneficiaries. Velvet conducted the STEAM Lab “Building a Rube Goldberg Machine” with two different age groups and involved among other employers and educators while made sure that there is a gender balance among the participants. During implementation, it is evident that the intergenerational approach needs to be combined with other aspects. Intersectionality is needed when designing and implementing STEAM learning experiences to include in the end representatives of all groups.

PROJECT IDENTITY

PROJECT NAME	SENSE. The New European Roadmap to STEAM Education [SENSE.]
COORDINATOR	Lydia Schulze Heuling, Western Norway University of Applied Sciences (Høgskulen på Vestlandet, HVL), Bergen, Norway, lshe@hvl.no
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WEBSITE	https://sense-steam.eu/

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FURTHER READING

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