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Policy brief for the European Commission on the COSMOS Approach

Open schooling approach to science education



COSMOS (Creating Organizational Structures for Meaningful Science education through Open Schooling for all) / cosmosproject.eu

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Contact e-mail: preis@ie.ulisboa.pt

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Contents

Introduction to the Policy Briefs on the COSMOS Approach.....	4
COSMOS in a Brief for the European Commission: Open Schooling in Europe through Science Education.....	5
Executive Summary.....	5
Background and Context.....	6
Key Components of the COSMOS Approach.....	6
Outcomes and Benefits.....	7
Policy Recommendations.....	8
Challenges and Solutions.....	9

Introduction to the Policy Briefs on the COSMOS Approach

This document compiles a series of policy briefs developed as part of the COSMOS project, an EU-funded initiative under the Horizon 2020 Research and Innovation programme. Each policy brief is designed to address the unique needs and perspectives of key stakeholders – **teachers, school leaders, policymakers, and the European Commission**. The goal of these briefs is to provide clear, evidence-based recommendations that promote the adoption of the COSMOS open schooling approach across various educational and policy contexts.

The development of these policy briefs was guided by a structured framework (D2.1 COSMOS Framework; Sarid, et al. 2024¹) that emphasized conciseness, actionable insights, and alignment with the COSMOS project's objectives. The guidelines ensured each brief focuses on the essential components of COSMOS: Core Organisational Structure for Promoting Open Schooling (CORPOS), Communities of Practice (CoP), Socio-Scientific Inquiry-Based Learning (SSIBL), and Teacher Professional Development (TPD). Together, these elements form a cohesive model that fosters educational innovation, community engagement, and critical socio-scientific inquiry within schools.

To create these briefs, we drew on the insights and recommendations from the COSMOS open schooling roadmaps (D6.2 Open Schooling Roadmaps), as well as implementations and lessons learned from this work at the primary (D3.1/D3.2) and secondary school level (D4.1/D4.2), case studies from schools implementing COSMOS across Europe (D6.1 Report on case studies, developed by partners, centred on particularly interesting SSIBL-CoP implementations in their countries during Round 1 and 2), and extensive research during the entire process (D7.1 Final Evaluation of COSMOS). Each brief highlights the specific benefits, expected outcomes, and tailored policy recommendations suited to its target audience. This document provides a comprehensive resource to guide educational stakeholders in understanding, implementing, and sustaining the COSMOS approach to science education reform, enhancing both student learning and community collaboration.

¹ A. Sarid, J. Boeve-de Pauw, A. Christodoulou, M. Doms, N. Gericke, D. Goldman, P. Reis, A. Veldkamp, S. Walan & M. C. P. J. Knippels (2024). Reconceptualizing open schooling: towards a multidimensional model of school openness. *Journal of Curriculum Studies*, 1–19. <https://doi.org/10.1080/00220272.2024.2392592>



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COSMOS in a Brief for the European Commission: Open Schooling in Europe through Science Education

Executive Summary

The COSMOS project, funded under the EU's Horizon 2020 programme, represents a strategic model for transforming science education across Europe through open schooling practices that integrate socio-scientific inquiry and community involvement. This policy brief provides the European Commission with insights into the COSMOS framework, emphasizing its alignment with EU educational goals, including fostering scientific literacy, civic engagement, action competence, and community partnerships. COSMOS's four main components—CORPOS, CoP, SSIBL, and TPD—create a tangible framework for modernizing science education by connecting classrooms with local stakeholders and addressing real-world issues. The COSMOS approach is unique in that it examines and facilitates open schooling through science education at different levels. It considers how the open schooling transformation process can be supported and facilitated at the school organisational level accounting for *organizational*, *pedagogical* and *communal* aspects of school openness. It leverages science education and the SSIBL pedagogical model as a means of achieving this transformation process by engaging with communities in addressing relevant, real-world issues stemming from the development, implications and applications of science in society.

The brief outlines recommendations for the Commission to support the scalability of COSMOS, such as promoting partnerships, incentivizing open schooling adoption, and providing dedicated funding for teacher training and community projects. By endorsing the COSMOS model, the European Commission can drive a Europe-wide shift toward inclusive, innovative, and responsive education, preparing students for active, responsible and informed participation in society.

Background and Context

The European Union faces urgent challenges that demand a scientifically literate and socially engaged population. Issues such as climate change, public health crises, and sustainability require citizens who can think critically, engage with scientific issues, and act responsibly. However, traditional education systems often fall short in preparing students to address these complex, real-world problems. COSMOS addresses this gap by advancing open schooling practices that connect science education with community needs and global challenges, fostering inquiry-based learning and collaboration. This model supports the European Union’s objectives of promoting inclusive, innovative, and responsive education systems that equip students to contribute to society’s well-being.

Key Components of the COSMOS Approach

- **Core Organisational Structure for Promoting Open Schooling (CORPOS) or Open Schooling Team:** This organizational team within schools, designed to facilitate and sustain open schooling practices, can include educators, school leaders and administrators, students, community representatives, and external stakeholders, creating a collaborative environment where open schooling becomes a strategic priority. The CORPOS empowers schools to systematically incorporate community involvement and socio-scientific inquiry into the curriculum, ensuring that the COSMOS approach is integrated into school policies and sustained over time.
- **Community of Practice (CoP):** provides a structured partnership between schools and local communities, bringing together educators, students, scientists, health professionals, NGOs, and business leaders. This collaboration enriches the learning experience by making it authentic, allowing students to engage with real-world expertise and perspectives. Through CoPs, students can participate in projects that address local and global issues, fostering a sense of agency, responsibility and connection to their community.
- **Socio-Scientific Inquiry-Based Learning (SSIBL):** This pedagogical model is at the heart of COSMOS, equipping students with a framework to explore and address socio-scientific issues. Through the stages of “Ask, Find Out, Act”, SSIBL puts focus on three distinct types of inquiry (scientific, social and personal) and promotes ethical reasoning, problem-solving, informed decision-making—skills, and action competence towards lifelong learning and active citizenship.
- **Teacher Professional Development (TPD):** COSMOS supports educators through TPD, which builds teachers’ capacity to facilitate open schooling initiatives and implement SSIBL and CoP models effectively. TPD programs emphasize reflective teaching practices and equip teachers

with tools for community engagement, collaborative learning, and inquiry-based education. By strengthening teachers' professional competencies, COSMOS creates a sustainable model that benefits both educators and students across Europe.

Outcomes and Benefits

1. **Enhanced Student Engagement and Achievement:** COSMOS's open schooling model fosters student engagement by connecting education with real-life issues that matter to students and their communities. By participating in community connected inquiry-based projects, students become more invested in their learning, boosting their interest in science at school and the perceived relevance of science beyond school. Ultimately, this can lead to a greater sense of purpose and improved academic performance.
2. **Increased Critical Thinking and Problem-Solving Skills:** The SSIBL approach strengthens students' abilities to analyse, interpret, and respond to complex socio-scientific issues. Through guided inquiry and collaborative projects, students develop skills that enable them to think critically, consider multiple perspectives, and propose solutions to real-world problems.
3. **Enhanced action competence towards sustainability:** COSMOS's approach develops students' knowledge about their own possibilities to contribute to a more sustainable future through individual and collective action, boost their self-confidence in their capacity to create an impact regarding SSIs, and ultimately to feel empowered and driven to engage in action taking.
4. **Strengthened School-Community Relationships:** COSMOS encourages schools to build partnerships with local stakeholders, fostering a sense of shared responsibility between schools and their communities. By involving community organizations, teachers and students gain access to resources and expertise that enhance their teaching and learning experience and foster stronger, more supportive school-community relationships.
5. **Sustainable Teacher Professional Growth:** TPD ensures that teachers are well-prepared to implement COSMOS principles and contribute to a culture of continuous improvement within schools. This professional development not only benefits individual educators but also supports long-term, system-wide improvements in teaching quality and student outcomes.
6. **Alignment with EU Educational and Social Objectives:** COSMOS supports EU goals for inclusive and equitable education systems by providing adaptable, community-centred learning frameworks. This alignment fosters an educational model that is both innovative and responsive to regional, national, and European priorities, making it an effective tool for advancing EU educational policy.

Policy Recommendations

1. **Encourage Widespread Adoption of Open Schooling Models:** The European Commission should promote the COSMOS model as a best practice for science education. This could involve creating guidelines that encourage schools across Europe to adopt open schooling practices that connect education with socio-scientific issues relevant to their communities.
2. **Support Partnerships with Community Organizations:** The Commission can play a vital role in supporting partnerships between schools and local stakeholders, such as NGOs, scientific institutions, healthcare providers, and businesses. These partnerships provide schools with access to expertise, funding, and resources that are essential for implementing COSMOS successfully.
3. **Promote SSIBL and Open Schooling Integration into Curricula:** Policies should allow flexibility for schools to incorporate SSIBL and open schooling into their curricula. This integration will ensure that inquiry-based and community-centred learning become fundamental components of science education across Europe, fostering skills that are essential for active citizenship within and beyond the science curriculum.
4. **Allocate Funding for Open Schooling and Teacher Training:** The Commission should provide dedicated funding for COSMOS projects, focusing on teacher training and open schooling initiatives. Sufficient financial support will ensure that schools and educators have the resources and capacity necessary to implement COSMOS practices and sustain these models over time.
5. **Encourage Schools to Implement COSMOS Principles:** The Commission can encourage schools to adopt COSMOS by offering grants, awards, and recognition for institutions that successfully implement open schooling and SSIBL models. Incentives can motivate schools to embrace COSMOS practices, fostering a culture of innovation and community engagement in education.
6. **Establish Metrics and Monitoring Systems for Open Schooling Impact:** The Commission should support the development of impact metrics to assess the effectiveness of COSMOS in enhancing educational outcomes. By establishing clear, data-driven indicators through both qualitative and quantitative data/methods, policymakers can measure the impact of open schooling on student engagement, critical thinking, and community relationships, guiding further policy improvements.
7. **Facilitate in depth research into the processes and outcomes of open schooling:** E.g. launch calls for Research & Innovation Actions (RIA) that have this in focus, or include open schooling, through COSMOS tools and approaches, as a principle in other funded research in which schools are engaged as partners.

Challenges and Solutions

1. **Resource Limitations:** Implementing open schooling requires time, funding, and materials that may not be readily available in all schools. The Commission can address this by allocating targeted funding for resource-constrained schools and facilitating partnerships with community organizations that can provide additional support.
2. **Resistance to New Teaching Methods:** Some educators and administrators may be hesitant to adopt SSIBL and CoP models due to unfamiliarity or perceived difficulty. The Commission can support awareness campaigns, workshops, and training sessions that build understanding of COSMOS benefits, easing transitions to these innovative approaches.
3. **Equity and Inclusion Across Diverse Regions:** COSMOS should be accessible to all schools, including those in disadvantaged or rural areas. The Commission should prioritize policies that ensure all students have the opportunity to benefit from open schooling, offering additional support for schools in under-resourced regions.
4. **Aligning Open Schooling with Standardized Curricula:** While COSMOS promotes flexibility, some educational systems may find it challenging to integrate open schooling within standardized curricula. A potential solution is to align SSIBL activities with curricular goals, positioning socio-scientific inquiry as complementary to existing educational objectives.

Glossary

Alma Löv	Museum of Unexp. Art
BBC	Beit Berl College
COSMOS	Creating Organisational Structures for Meaningful science education through Open Schooling for all
CORPOS	Core ORganisational Structure for Promoting Open Schooling
CoP	Community of Practice
HEI	Higher Education Institution
IE-UL	Instituto de Educação da Universidade de Lisboa
KdG	Karel De Grote Hogeschool katholieke hogeschool
KU	Karlstad University
MoE	Ministry of Education
SDG	Sustainable Development Goals
SSI	Socio-Scientific Issue
SSIBL	Socio-Scientific Inquiry-Based Learning
SOTON	University of Southampton
STEM	Science Technology Engineering Mathematics
TPD	Teacher Professional Development
UU	Utrecht University
WP	Work Package
WSC	Winchester Science Centre

Project partners



Utrecht University, Freudenthal Institute (Project Coordinator)
The Netherlands



University of Southampton
England



Karel de Grote University of Applied Sciences and Arts, Centre of Expertise in Urban Education, Belgium



Karlstads University, Research Centre SMEER (Science, Mathematics, Engineering Education Research), Sweden



University of Lisbon, Institute for Education, Portugal



Beit Berl College, Faculty of Education, Israel



Euroface Consulting, Czech Republic



Universiteits Museum Utrecht



Winchester Science Centre & Planetarium



Winchester Science Centre (WSC), England



Alma Löv Museum, Sweden



Ciência Viva, National Agency for Scientific and Technological Culture, Portugal



Ministry of Education, Department for Research and Development, Experiments and Initiatives