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D6.3 Policy briefs

on the COSMOS Approach

Open schooling approach to science education

Deliverable Documentation Sheet

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Contents

1. Introduction to the Policy Briefs on the COSMOS Approach.....	7
2. COSMOS in a Brief for the European Commission: Open Schooling in Europe through Science Education (extended version).....	8
2.1 Executive Summary.....	8
2.2 Background and Context.....	9
2.3 Key Components of the COSMOS Approach.....	9
2.4 Outcomes and Benefits.....	10
2.5 Policy Recommendations.....	11
2.6 Challenges and Solutions.....	12
3. COSMOS in a Brief for Policy Makers: An Effective Model for Open Schooling through Science Education (extended version).....	13
3.1 Executive Summary.....	13
3.2 Background and Context.....	14
3.3 Key Components of the COSMOS Approach.....	14
3.4 Outcomes and Benefits.....	15
3.5 Policy Recommendations.....	15
3.6 Challenges and Solutions.....	16
4. COSMOS in a Brief for School Leaders: An Effective Model for Open Schooling through Science Education (extended version).....	17
4.1 Executive Summary.....	17
4.2 Background and Context.....	18
4.3 Key Components of the COSMOS Approach.....	18
4.4 Outcomes and Benefits.....	18
4.5 Policy Recommendations.....	19
4.6 Challenges and Solutions.....	19
5. COSMOS in a Brief for Teachers: Empowering Teachers for Open Schooling Transformation through Science Education (extended version).....	21
5.1 Executive Summary.....	21
5.2 Background and Context.....	22
5.3 Key Components of the COSMOS Approach.....	22
5.4 Outcomes and Benefits.....	23
5.5 Policy Recommendations for Effective COSMOS Implementation.....	23
5.6 Challenges and Solutions for Teachers.....	24
6. COSMOS in a Brief for the European Commission (condensed version).....	25

6.1 Executive Summary.....	25
6.2 Background.....	26
6.3 Key Components of the COSMOS Approach.....	26
6.4 Outcomes and Benefits.....	26
6.5 Policy Recommendations.....	27
7. COSMOS in a Brief for Policy Makers (condensed version).....	28
7.1 Executive Summary.....	28
7.2 Background.....	29
7.3 Key Components of the COSMOS Approach.....	29
7.4 Outcomes and Benefits.....	29
7.5 Policy Recommendations.....	30
8. COSMOS in a Brief for School Leaders (condensed version).....	31
8.1 Executive Summary.....	31
8.2 Policy Recommendations.....	32
8.3 Key Components of the COSMOS Approach for School Leaders.....	32
8.4 Outcomes and Benefits.....	32
8.5 Policy Recommendations.....	33
9. COSMOS in a Brief for Teachers (condensed version).....	34
9.1 Executive Summary.....	34
9.2 Background.....	34
9.3 Key Components of the COSMOS Approach for Teachers.....	35
9.4 Outcomes and Benefits.....	35
9.5 Policy Recommendations.....	36
10. Policy briefs available in several languages.....	37

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

1. 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.

In this document we present **two versions of each policy brief**: one more **expanded** (around four pages) and another more **condensed** (around two pages).

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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2. COSMOS in a Brief for the European Commission: Open Schooling in Europe through Science Education (extended version)

2.1 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.

2.2 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.

2.3 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.

2.4 Outcomes and Benefits

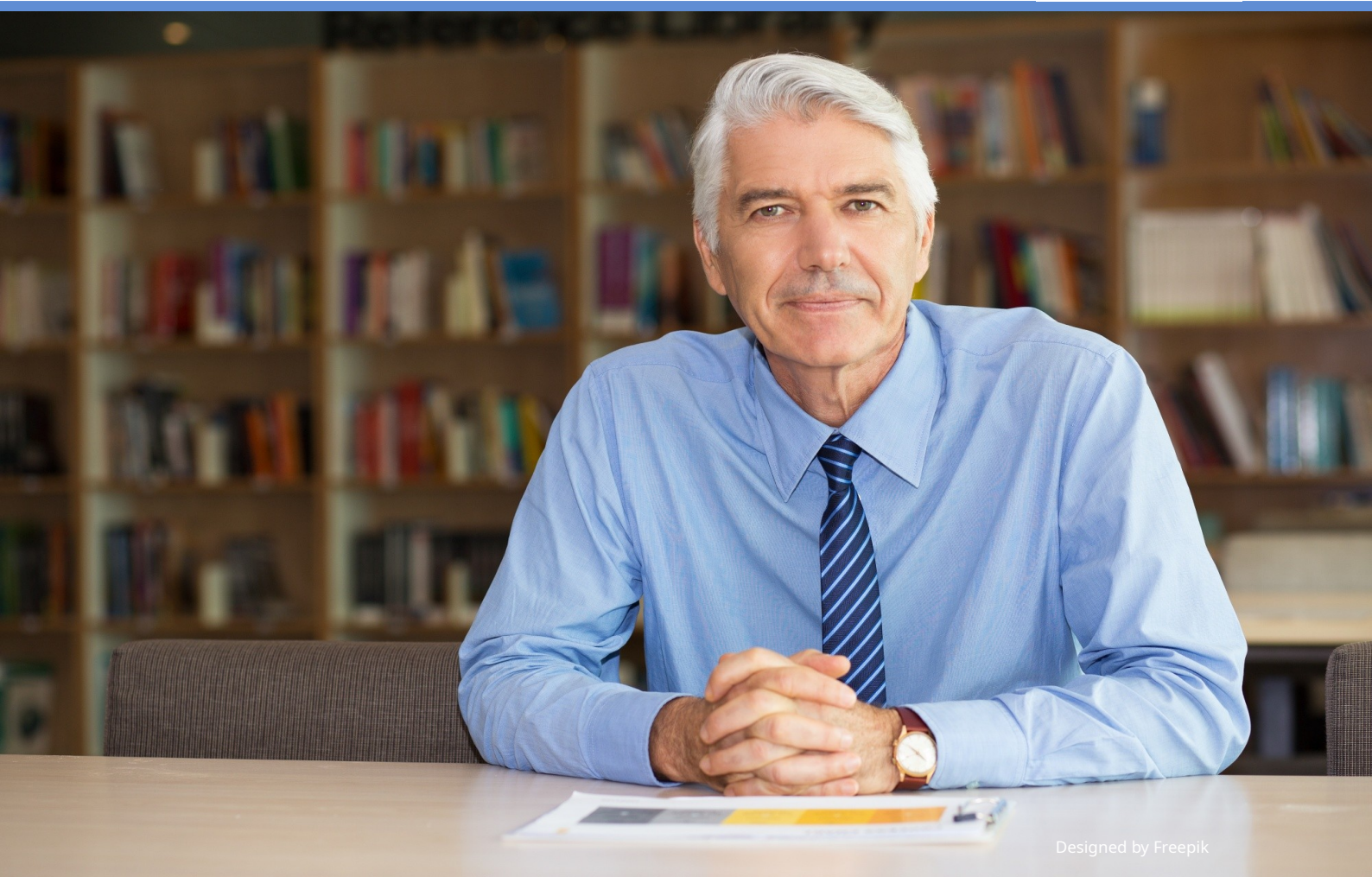
1. **Enhanced Student Engagement and Achievement:** COSMOS's open schooling model fosters student engagement by connecting education with real-life issues that matter to students and their communities. By participating in community connected inquiry-based projects, students become more invested in their 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.

2.5 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.

2.6 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.



3. COSMOS in a Brief for Policy Makers: An Effective Model for Open Schooling through Science Education (extended version)

3.1 Executive Summary

The COSMOS project provides an innovative model for open schooling that aligns science education with community engagement and socio-scientific inquiry. Aimed at policymakers, this brief presents the COSMOS approach and its potential to modernize education by embedding inquiry-based, community-driven learning within schools. COSMOS centres on four key components: CORPOS, CoP, SSIBL, and TPD, each supporting a framework that fosters critical thinking, ethical decision-making, action competence, and real-world problem-solving. The brief outlines policy recommendations to support COSMOS adoption, including encouraging partnerships with community organizations, integrating SSIBL into curricula, and providing funding for teacher training. Through these measures, policymakers can foster an educational system that aligns with EU goals for inclusive, innovative, and active citizenship. COSMOS empowers students to become engaged citizens capable of addressing today's socio-scientific challenges, making it a valuable model for policy-driven educational reform.

3.2 Background and Context

Education systems today face increasing demands to address complex global challenges like climate change, public health, and sustainability, which require a scientifically literate and socially responsible citizenry. Traditional education often fails to prepare students adequately for these socio-scientific challenges, emphasizing rote learning over critical engagement with real-world issues. COSMOS addresses this gap by fostering open schooling practices that connect schools with their communities, encouraging inquiry-based learning grounded in socio-scientific issues. This approach aligns science education with the needs of society, transforming students into active participants in their communities.

3.3 Key Components of the COSMOS Approach

1. **Core Organisational Structure for Promoting Open Schooling (CORPOS) or Open Schooling Team:** establishes a formal team within each school, including teachers, community members, and other stakeholders, to institutionalize open schooling practices. This organizational structure fosters sustained engagement by creating a network of support for implementing and maintaining COSMOS activities. CORPOS provides the infrastructure needed to connect educational goals with community priorities, ensuring that the open schooling model is embedded within the school's strategic vision.
2. **Community of Practice (CoP):** facilitates collaboration between educators and local stakeholders, such as scientists, health professionals, environmental experts, and business leaders. These partnerships enrich learning by bringing real-world expertise and perspectives into the classroom. CoPs foster a collaborative learning environment where students, teachers, and community members work together on projects that address local and global socio-scientific issues.
3. **Socio-Scientific Inquiry-Based Learning (SSIBL):** is a model that encourages students to explore complex socio-scientific issues through research and action. With stages including "Ask, Find Out, Act," SSIBL equips students to engage critically with topics like sustainability, public health, and civic responsibility. This framework promotes critical thinking, ethical decision-making, and problem-solving, preparing students to tackle real-world challenges.
4. **Teacher Professional Development (TPD):** COSMOS provides targeted TPD to support teachers in implementing SSIBL and CoP models. By enhancing teachers' skills in inquiry-based and community-centred approaches, TPD fosters an educational environment where teachers are prepared to lead COSMOS initiatives effectively. TPD emphasizes reflective teaching practices and collaborative learning, creating a sustainable model of professional growth that supports COSMOS goals.

3.4 Outcomes and Benefits

1. **Increased Student Engagement and Motivation:** COSMOS's focus on real-world, inquiry-based learning makes education more engaging for students. By exploring issues relevant to their communities, students find greater purpose in their studies and are motivated to participate actively in learning.
2. **Enhanced Critical Thinking and Problem-Solving Skills:** The SSIBL approach cultivates students' ability to analyse information, weigh ethical considerations, and develop solutions to complex issues. These skills are essential for informed, responsible citizenship in a society that faces diverse socio-scientific challenges.
3. **Enhanced action competence towards sustainability:** COSMOS 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. **Stronger School-Community Connections:** Through CoPs, COSMOS promotes partnerships between schools and community organizations, including NGOs, businesses, and local government. These collaborations provide students with access to real-world expertise and resources, enriching the educational experience and fostering a sense of shared responsibility between schools and communities.

Continuous Professional Development for Teachers: TPD ensures that teachers are well-equipped to facilitate inquiry-based, community-connected learning. By providing ongoing professional support, COSMOS promotes a culture of reflective practice, empowering teachers to adapt and thrive in a dynamic educational landscape.

3.5 Policy Recommendations

1. **Promote Partnerships with Community Organizations:** Policies should encourage schools to build partnerships with local organizations, such as government agencies, NGOs, businesses, and scientific institutions. These partnerships are crucial for providing students with access to resources and expertise that enrich the learning experience. Early stakeholder involvement ensures that COSMOS initiatives are aligned with community needs and fosters broader support for open schooling practices.
2. **Integrate SSIBL and Open Schooling Principles into Curriculum:** National and regional policies should provide flexibility for schools to incorporate SSIBL and open schooling practices into the curriculum. This integration ensures that socio-scientific inquiry becomes a core part of science education, fostering skills that are essential for students' future roles as engaged citizens.
3. **Encourage Flexible Teaching Methods:** Policies should support teaching methods that allow for inquiry-based and project-based learning focused on real-world issues and

action. This flexibility empowers teachers to adapt their methods to students' interests and community contexts, creating a more relevant and engaging educational experience.

4. **Allocate Funding for Teacher Professional Development and Open Schooling**

Projects: When integrated into pre- and in-service teacher training, the COSMOS approach can contribute to boosting teachers' competencies to boost students' attitudes towards science and active citizenship. Sufficient funding and opportunities are critical to support teacher training in COSMOS principles and to cover the resources needed for open schooling projects. Investment in TPD ensures that teachers have the skills and knowledge to implement COSMOS effectively, while funding for projects enables schools to sustain and scale open schooling practices.

5. **Incentivize Schools to Adopt COSMOS Approach:** Governments should consider offering grants, recognition programs, or other incentives to encourage schools to adopt COSMOS. Such incentives can drive widespread adoption of open schooling practices and foster innovation in science education, ultimately benefitting both students and communities.

3.6 Challenges and Solutions

1. **Resource Limitations:** Open schooling initiatives require time, funding, and materials that may not always be readily available. Schools can mitigate these challenges by forming partnerships with local organizations that provide additional resources. Furthermore, governments can support open schooling by offering targeted funding for schools implementing COSMOS.
2. **Resistance to New Teaching Approaches:** Some educators and administrators may be reluctant to adopt SSIBL and CoP models due to unfamiliarity or perceived difficulty. Governments can address this challenge by promoting awareness of COSMOS benefits and providing TPD opportunities to ease the transition to new methods.
3. **Equity and Inclusion:** Open schooling practices should be accessible to all students, including those in under-resourced or marginalized communities. Policies must ensure that COSMOS initiatives prioritize equity, offering additional support for schools in disadvantaged areas to participate fully in open schooling.
4. **Balancing Open Schooling with Curriculum Requirements:** While COSMOS promotes flexibility, schools may find it challenging to balance curriculum demands with open schooling projects. A potential solution is to align SSIBL projects with curricular goals, ensuring that socio-scientific inquiry complements rather than competes with existing educational objectives.



4. COSMOS in a Brief for School Leaders: An Effective Model for Open Schooling through Science Education (extended version)

4.1 Executive Summary

This policy brief introduces school leaders to the COSMOS project's open schooling model, which connects science education with community and real-world socio-scientific issues. COSMOS provides a framework that supports school leaders in transforming educational practices through its four core components: CORPOS, CoP, SSIBL, and TPD. School leaders play a critical role in fostering a school culture that embraces community engagement, collaborative inquiry, and sustainable professional development. By adopting the COSMOS approach, school leaders can enhance student motivation, foster partnerships with local stakeholders, and create lasting educational impact. This brief offers strategic recommendations for school leaders to support COSMOS implementation, including establishing partnerships, integrating SSIBL into the curriculum, and allocating resources for teacher development. The COSMOS model empowers school leaders to lead an inclusive, responsive, and impactful open schooling transformation that prepares students for active, informed citizenship.

4.2 Background and Context

The need for open schooling has become more prominent with shifts towards inquiry-based, context-aware, and community-driven learning approaches. Traditional education systems often struggle to address socio-scientific issues that are both global and local, such as climate change, public health, and sustainability. COSMOS addresses these gaps by equipping schools with tools and strategies for engaging students in meaningful, science-based community projects.

4.3 Key Components of the COSMOS Approach

1. **Core Organisational Structure for Promoting Open Schooling (CORPOS) or Open Schooling Team:** acts as an open schooling leadership group within each school, typically including teachers, community members, and school leaders. This structure facilitates collaboration between internal and external stakeholders, fostering a culture of shared responsibility and continuous adaptation to local needs.
2. **Community of Practice (CoP):** CoPs connect educators, students, community members, and experts, enabling collaborative learning. These communities encourage a partnership-based approach where local stakeholders actively contribute to and enhance the learning experience, ensuring that education is both relevant and impactful.
3. **Socio-Scientific Inquiry-Based Learning (SSIBL):** SSIBL promotes critical engagement with socio-scientific issues, encouraging students to "Ask, Find Out, and Act". Through this approach, students explore scientific inquiry in real-world contexts, making science education more engaging and relevant to societal challenges.
4. **Teacher Professional Development (TPD):** COSMOS includes robust TPD initiatives to help educators integrate open schooling and SSIBL practices into their teaching. TPD encourages teachers to adopt collaborative, reflective approaches to learning, thus strengthening their ability to facilitate inquiry-driven, community-based education.

4.4 Outcomes and Benefits

1. **Enhanced Student Engagement:** By involving students in community-relevant scientific inquiries, the COSMOS approach increases student engagement and motivation to learn. This approach allows students to see the real-world impact of their studies, fostering a deeper commitment to their education.
2. **Improved Critical Thinking and Problem-Solving Skills:** SSIBL emphasizes critical thinking, enabling students to tackle complex socio-scientific issues. By analysing and addressing real-world problems, students develop skills that are essential for their future roles as engaged citizens.
3. **Enhanced action competence towards sustainability:** COSMOS 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. **Stronger Community Ties:** CoP initiatives connect schools with local stakeholders, creating partnerships that enhance learning and deepen community bonds. This collaboration promotes mutual understanding and builds a supportive network for sustainable educational practices.
5. **Teacher Professional Development:** TPD initiatives help teachers integrate SSIBL and CoP models effectively, fostering continuous professional growth and collaborative teaching practices. This ongoing development empowers teachers to become leaders in implementing innovative educational approaches.

4.5 Policy Recommendations

1. **Partnerships with Community Organizations:** Policies should encourage schools to form partnerships with local governments, businesses, NGOs, and other stakeholders. Early stakeholder engagement fosters support and provides valuable input, enriching the educational process.
2. **Integration into Curriculum:** Policies should allow flexibility for curriculum adaptations that support SSIBL and open schooling practices. This will enable educators to incorporate real-world issues into teaching, making learning more relevant to students.
3. **Flexibility in Teaching Methods:** Schools should have the freedom to adopt teaching methods like inquiry-based and project-based learning. Such flexibility supports innovative educational models and prepares students to tackle real-life challenges.
4. **Funding Support:** Adequate funding and opportunities are essential for teacher development and open schooling projects. Financial support for these initiatives ensures that schools can effectively implement the COSMOS approach without compromising other resources.
5. **Incentives for Schools:** To encourage adoption, schools that implement COSMOS should receive grants or recognition. This incentive structure will foster a commitment to educational innovation and community engagement.

4.6 Challenges and Solutions

1. **Resource Limitations:** Implementing open schooling models requires time and financial resources. Schools can mitigate resource constraints by establishing partnerships with community organizations, which often provide support in various forms, such as funding, expertise, or materials.
2. **Resistance to Change:** Adopting new teaching methods may encounter resistance from educators and administrators. Training sessions and workshops on the benefits and processes of COSMOS can build support and ease transitions.

3. **Equity and Inclusion:** COSMOS should be accessible to all students, regardless of background. Policies must ensure inclusivity, offering additional support for schools in under-resourced areas to participate fully in open schooling initiatives.



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5. COSMOS in a Brief for Teachers: Empowering Teachers for Open Schooling Transformation through Science Education (extended version)

5.1 Executive Summary

The COSMOS project, supported by the EU's Horizon 2020 programme, introduces an open schooling approach that brings community-focused, inquiry-based learning into science education. This policy brief provides teachers with a guide to the COSMOS framework, highlighting its essential components: CORPOS (Core Organisational Structure for Promoting Open Schooling), Communities of Practice (CoP), Socio-Scientific Inquiry-Based Learning (SSIBL), and Teacher Professional Development (TPD). By integrating SSIBL and community partnerships into the classroom, teachers can inspire student engagement, foster critical thinking, develop action competence, and promote active citizenship. COSMOS equips teachers to connect science education with real-world socio-scientific issues, enabling students to address local and global challenges with curiosity, responsibility, and purpose. This brief also

offers practical recommendations to support teachers in implementing COSMOS effectively, including fostering partnerships, adopting flexible teaching methods, and engaging in ongoing professional development.

5.2 Background and Context

Contemporary education increasingly calls for learning experiences that go beyond traditional classroom boundaries, bridging school with community and real-life issues. COSMOS addresses this demand by equipping teachers to foster inquiry-based learning aligned with local and global challenges like environmental sustainability, public health, and civic responsibility. The COSMOS approach helps teachers empower students as active citizens who understand and address socio-scientific issues through practical, community-centred education. With the support of open schooling frameworks, COSMOS cultivates a learning environment that emphasizes collaborative inquiry, ethical reasoning, and critical thinking.

5.3 Key Components of the COSMOS Approach

1. **Core Organisational Structure for Promoting Open Schooling (CORPOS) or Open Schooling Team:** is a collaborative, school-based team that fosters an open schooling culture within the school environment. Composed of teachers, school staff, and community stakeholders, CORPOS supports the planning, implementation, and sustainability of COSMOS initiatives. For teachers, CORPOS serves as a structural backbone, facilitating access to community resources and interdisciplinary support, thus creating a consistent framework for engaging students in socio-scientific issues.
2. **Community of Practice (CoP):** connects teachers with a broader network of community experts, including scientists, local business owners, health professionals, and civic leaders. This community collaboration enhances the relevance and impact of COSMOS-based learning activities by bringing real-world expertise and resources into the classroom. Through the CoP, teachers can develop dynamic, project-based learning opportunities that address authentic local and global challenges, fostering a sense of student agency and responsibility.
3. **Socio-Scientific Inquiry-Based Learning (SSIBL):** is at the core of COSMOS, equipping teachers with a structured approach for integrating scientific inquiry with social relevance. Through the stages of “Ask, Find Out, Act”, SSIBL guides students in researching and addressing real-world problems, fostering skills in critical thinking, problem-solving, and ethical decision-making. Teachers using SSIBL frameworks can transform science education into an interactive, impactful experience that helps students connect theoretical knowledge with practical solutions to community issues.
4. **Teacher Professional Development (TPD):** Recognizing the role of teachers as facilitators of COSMOS initiatives, the project offers resources that provide ongoing support in integrating SSIBL and CoP models into teaching. TPD activities focus on enhancing teachers’ competencies in inquiry-based learning, open schooling

collaboration, and reflective teaching practices, ensuring they are equipped to lead innovative, community-driven science education.

5.4 Outcomes and Benefits

1. **Enhanced Student Engagement:** COSMOS encourages active student participation in learning that is relevant to their lives. Through inquiry-driven projects, students engage deeply with topics such as environmental conservation, health awareness, and sustainable practices, making learning more meaningful and enjoyable.
2. **Development of Critical Thinking and Problem-Solving Skills:** By exploring complex socio-scientific issues, students learn to analyse information, evaluate perspectives, and propose solutions. The SSIBL framework strengthens their ability to think critically and make informed, ethical decisions—a skill set essential for active, responsible citizenship.
3. **Enhanced action competence towards sustainability:** COSMOS 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 Community Connections:** COSMOS promotes partnerships with local experts and stakeholders, transforming learning into a collaborative effort between schools and communities. Teachers play a central role in building these connections, fostering mutual support that enhances educational outcomes and community cohesion.
5. **Continuous Teacher Professional Growth:** The COSMOS approach encourages teachers to engage in reflective and collaborative practices, enhancing their teaching strategies and understanding of community-centred education. By participating in TPD, teachers gain confidence and skills that help them implement open schooling models effectively, thereby enriching their professional development.

5.5 Policy Recommendations for Effective COSMOS Implementation

1. **Establish Local Partnerships:** Teachers are encouraged to collaborate with community organizations, such as local government bodies, charities, environmental agencies, healthcare providers, and NGOs. Building relationships with these partners enhances the authenticity and relevance of SSIBL projects, providing students with diverse perspectives and real-world applications of scientific knowledge.
2. **Integrate SSIBL into the Curriculum:** Teachers should incorporate SSIBL activities that allow students to investigate and address real-life issues within their local contexts. This integration promotes active, hands-on learning experiences that bridge classroom

science with community needs, empowering students to contribute meaningfully to their surroundings.

3. **Support for Flexible Teaching Methods:** Schools should enable teachers to adopt inquiry-based and project-based teaching methods, which foster critical engagement with socio-scientific issues. This flexibility allows teachers to tailor their approaches based on students' interests and community challenges, ensuring that learning is both engaging and relevant.
4. **Commit to Teacher Professional Development (TPD):** Effective implementation of COSMOS relies on ongoing professional support for teachers. Schools should provide TPD opportunities focused on SSIBL, CoP engagement, and reflective teaching practices, enabling teachers to sustain COSMOS activities and adapt to evolving community contexts.

5.6 Challenges and Solutions for Teachers

1. **Limited Resources and Time Constraints:** COSMOS-based initiatives require time and resources that may be difficult to accommodate within existing school schedules and budgets. Teachers can mitigate these challenges by forming partnerships with local organizations that provide financial or material support, using digital tools to facilitate CoP meetings, or starting with smaller projects that can be expanded over time.
2. **Resistance to Change in Teaching Methods:** Some teachers and administrators may be hesitant to adopt new approaches like SSIBL and CoP models due to unfamiliarity or perceived difficulty. Schools can address this challenge by offering workshops and TPD sessions that introduce COSMOS concepts and showcase their benefits, building understanding and support for innovative teaching practices.
3. **Equity and Inclusion:** To ensure all students benefit from COSMOS, teachers must be mindful of diverse student needs and contexts. This may involve adapting SSIBL projects to address issues relevant to different cultural or socioeconomic backgrounds, ensuring inclusivity in both project design and execution.
4. **Balancing Curriculum Requirements with Open Schooling Activities:** While COSMOS emphasizes flexibility, teachers may face challenges in balancing curriculum demands with open schooling projects. A possible solution is to align SSIBL activities with curricular goals, thereby integrating socio-scientific inquiry within the curriculum rather than treating it as an extra activity.



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6. COSMOS in a Brief for the European Commission (condensed version)

6.1 Executive Summary

The COSMOS project, funded by the EU's Horizon 2020 programme, presents a transformative model for science education that connects open schooling with socio-scientific inquiry and community partnerships. This policy brief provides the European Commission with recommendations to support and scale COSMOS across member states. COSMOS's four main components—CORPOS, CoP, SSIBL, and TPD—create a framework that fosters civic engagement, action competence, scientific literacy, and community-connected education, aligning closely with EU priorities for active citizenship and inclusive learning.

6.2 Background

The EU's vision for education emphasizes inclusive, innovative, and responsive systems that prepare citizens to address complex socio-scientific issues, such as sustainability and public health. COSMOS supports this vision by embedding community engagement and inquiry-based learning into science education. This model fosters active citizenship and prepares students to become responsible, scientifically literate citizens who contribute positively to society.

6.3 Key Components of the COSMOS Approach

- **Core Organisational Structure for Promoting Open Schooling (CORPOS) or Open Schooling Team:** establishes a support system within schools to ensure that open schooling practices are embedded institutionally. By bringing together educators, administrators, and community representatives, CORPOS enables sustainable COSMOS initiatives and aligns them with school priorities.
- **Community of Practice (CoP):** facilitates partnerships between schools and community stakeholders, such as environmental organizations, health agencies, and local businesses. These collaborations provide students with access to real-world expertise, deepening the impact of open schooling by fostering meaningful connections between students and their communities.
- **Socio-Scientific Inquiry-Based Learning (SSIBL):** engages students in exploring socio-scientific issues through inquiry-based learning. It encourages critical thinking, ethical reasoning, and problem-solving, preparing students to address real-world challenges with informed, actionable responses.
- **Teacher Professional Development (TPD):** supports teachers in implementing SSIBL and CoP models effectively, equipping them with the skills needed to create engaging, community-connected learning experiences. Ongoing professional development fosters a culture of continuous improvement and adaptability in the classroom.

6.4 Outcomes and Benefits

1. **Enhanced Student Engagement and Achievement:** COSMOS makes science education relevant by linking it to students' lives and community challenges, fostering interest, motivation and deeper learning engagement.
2. **Increased Critical Thinking and Problem-Solving Abilities:** SSIBL helps students develop essential skills for evaluating complex issues, making informed decisions, and proposing innovative solutions.
3. **Increased Student Action Competence:** COSMOS develops student's knowledge, confidence and willingness to act towards a more sustainable future.

4. **Strengthened School-Community Ties:** CoPs create partnerships that bring valuable expertise and resources into schools, enabling students to learn from local stakeholders and contribute meaningfully to their communities.
5. **Sustainable Professional Development for Teachers:** TPD equips teachers to implement COSMOS's inquiry-based, community-oriented approaches, enhancing teaching quality and supporting student success.

6.5 Policy Recommendations

1. **Promote COSMOS as a Best Practice for Open Schooling:** Encourage EU member states to adopt COSMOS as a model for integrating community engagement and socio-scientific inquiry in education.
2. **Incentivize Schools to Implement COSMOS Principles:** Provide grants and recognition for schools that adopt open schooling practices, encouraging a culture of innovation and collaboration in science education.
3. **Support Funding for pre- and in-service Teacher Training and Community Projects:** Invest in TPD and COSMOS initiatives to ensure schools have the resources needed to sustain open schooling and inquiry-based learning, creating a foundation for long-term educational improvement.



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7. COSMOS in a Brief for Policy Makers (condensed version)

7.1 Executive Summary

The COSMOS project offers an open schooling model that integrates community engagement and socio-scientific inquiry into science education, aligning with EU goals for inclusive, innovative learning. This brief presents policymakers with recommendations to support COSMOS implementation across schools, focusing on its core components: CORPOS (a structured team within schools), CoP (community partnerships), SSIBL (inquiry-based learning around socio-scientific issues), and TPD (teacher development). COSMOS fosters critical thinking, action competence, problem-solving, and civic awareness, preparing students for today's socio-scientific challenges.

7.2 Background

European education systems are evolving to meet the demands of an interconnected world, where citizens must address complex global issues, including climate change, public health, and sustainability. The COSMOS model bridges science education with real-world socio-scientific inquiry, connecting schools with communities and aligning with EU priorities for scientific literacy and active citizenship. By supporting COSMOS, policymakers can create education systems that are both responsive to societal needs and capable of fostering a scientifically literate and civically engaged population.

7.3 Key Components of the COSMOS Approach

1. **Core Organisational Structure for Promoting Open Schooling (CORPOS) or Open Schooling Team:** is a school-based team designed to support open schooling, with members from the school and the community. This team structures and sustains COSMOS activities by creating collaborative frameworks that embed community engagement and inquiry into the school's curriculum.
2. **Community of Practice (CoP):** connects educators with local experts and community stakeholders, such as scientists, healthcare professionals, and NGOs. This collaboration provides students with access to real-world expertise and resources, enriching science education by making it relevant to local and global issues.
3. **Socio-Scientific Inquiry-Based Learning (SSIBL):** is a structured inquiry model that engages students in socio-scientific issues through three stages: "Ask, Find Out, Act." It encourages students to critically analyse information, consider ethical dimensions, and develop solutions to complex problems, connecting scientific inquiry with societal relevance.
4. **Teacher Professional Development (TPD):** COSMOS includes resources to support educators in implementing SSIBL and CoP approaches. TPD helps teachers build competencies in inquiry-based learning and community engagement, ensuring COSMOS practices are integrated effectively into classroom instruction.

7.4 Outcomes and Benefits

1. **Enhanced Student Engagement:** COSMOS makes learning relevant by connecting science education with issues that matter to students, fostering interest, motivation, deeper engagement, and ultimately, improved academic performance.
2. **Improved Critical Thinking and Problem-Solving Skills:** Through SSIBL, students develop skills in analysing complex socio-scientific issues, preparing them for active and informed participation in society.
3. **Increased Student Action Competence:** COSMOS develops student's knowledge, confidence and willingness to act towards a more sustainable future.

4. **Stronger School-Community Relationships:** CoPs establish lasting partnerships between schools and local organizations, creating a supportive ecosystem where students learn from and contribute to their communities.
5. **Sustained Teacher Development:** TPD provides teachers with skills in open schooling and community-centred education, improving teaching quality and enhancing student outcomes.

7.5 Policy Recommendations

1. **Encourage Community Partnerships:** Promote policies that encourage schools to partner with local organizations such as NGOs, scientific institutions, and healthcare providers, making learning experiences richer and more relevant.
2. **Support Flexible Curriculum Integration:** Allow schools to incorporate SSIBL and open schooling principles into curricula. Flexibility fosters an inquiry-based approach, building critical skills for responsible citizenship.
3. **Fund Teacher Development and Open Schooling Projects:** Provide targeted funding for COSMOS initiatives, ensuring educators have the resources needed to implement and sustain open schooling practices.



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8. COSMOS in a Brief for School Leaders (condensed version)

8.1 Executive Summary

This policy brief introduces school leaders to the COSMOS project, which provides an open schooling framework that connects science education with community engagement and socio-scientific inquiry. COSMOS supports school leaders in leading educational transformation through four components: CORPOS (a school-based structure for open schooling), CoP (community partnerships), SSIBL (inquiry-based learning around socio-scientific issues), and TPD (teacher development). By adopting COSMOS, school leaders can foster a school environment where students tackle meaningful societal challenges, enhancing educational outcomes and building stronger community ties.

8.2 Policy Recommendations

The demands of the modern world require educational approaches that go beyond theoretical learning, preparing students to become active participants in their communities. COSMOS addresses this need by helping schools embed community engagement, collaboration, and inquiry into science education. School leaders play a vital role in establishing a supportive environment for COSMOS initiatives, ensuring that open schooling practices are aligned with school priorities and sustained over time.

8.3 Key Components of the COSMOS Approach for School Leaders

- 1 **Core Organizational Structure for Promoting Open Schooling (CORPOS) or Open Schooling Team:** is a school-based team, led by school staff and external stakeholders, that supports open schooling initiatives. It provides a structure for institutionalizing COSMOS within the school's strategy, fostering a collaborative approach to implementing community-connected science education.
- 2 **Community of Practice (CoP):** connects schools with local experts, such as environmental agencies, health professionals, and local businesses. This partnership allows students to engage with real-world expertise, making science education more relevant and impactful.
- 3 **Socio-Scientific Inquiry-Based Learning (SSIBL):** provides a structured inquiry model where students investigate socio-scientific issues through stages like "Ask, Find Out, Act". This model enhances critical thinking and problem-solving by connecting science with social issues.
- 4 **Teacher Professional Development (TPD):** helps teachers develop the skills needed to deliver COSMOS effectively, supporting them in adopting inquiry-based, community-centred learning practices.

8.4 Outcomes and Benefits

- 1 **Enhanced Student Engagement and Achievement in Science:** COSMOS makes learning relevant by connecting science education with issues that matter to students, boosting interest and perceived relevance of science, and deeper engagement with scientific concepts and issues stemming from them.
- 2 **Development of Critical Thinking Skills:** SSIBL enhances students' ability to think critically, analyse information, and propose solutions to real-world challenges.
- 3 **Increased Student Action Competence:** COSMOS develops student's knowledge, confidence and willingness to act towards a more sustainable future.
- 4 **Stronger School-Community Partnerships:** CoPs build relationships between schools and local stakeholders, enhancing learning while fostering community collaboration.

- 5 **Professional Development for Teachers:** TPD ensures that teachers are well-equipped to lead COSMOS initiatives, improving both teaching quality and student outcomes.

8.5 Policy Recommendations

- 1 **Implement a CORPOS Structure:** School leaders should establish a CORPOS team to guide COSMOS implementation, facilitating cross-disciplinary collaboration and ensuring sustainable open schooling practices.
- 2 **Encourage Community Engagement through CoP:** Foster partnerships with local organizations that bring real-world insights into the classroom, enriching students' learning experience.
- 3 **Support Teacher Development in Open Schooling:** Encourage teachers to participate in COSMOS TPD to enhance their skills in inquiry-based learning and community engagement.



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9. COSMOS in a Brief for Teachers (condensed version)

9.1 Executive Summary

The COSMOS project, part of the EU's Horizon 2020 program, introduces an innovative, open schooling framework that engages students in science through real-world, community-centred inquiry. This policy brief provides teachers with an overview of the COSMOS model's essential components—CORPOS (a school-based team to support open schooling), Communities of Practice (CoP), Socio-Scientific Inquiry-Based Learning (SSIBL), and Teacher Professional Development (TPD). These elements empower teachers to inspire student engagement, develop action competence, foster critical thinking, and encourage civic responsibility by making science education relevant to socio-scientific challenges such as climate change, public health, and sustainability.

9.2 Background

Traditional science education often focuses on theoretical knowledge, which can leave students disengaged and disconnected from real-world applications. COSMOS addresses this gap by

embedding open schooling principles into the classroom, connecting scientific inquiry with societal issues. Through community partnerships and inquiry-based learning, COSMOS enables students to apply scientific knowledge to address local and global challenges. This approach prepares students to become active, informed citizens capable of tackling complex issues.

9.3 Key Components of the COSMOS Approach for Teachers

1. **Core Organizational Structure for Promoting Open Schooling (CORPOS) or Open Schooling Team:** establishes a school-based team comprising teachers, school staff, and external stakeholders to support the COSMOS approach. This structure facilitates collaboration and helps teachers incorporate community-relevant content into the curriculum.
2. **Community of Practice (CoP):** brings together educators and local community members, including scientists, health professionals, and business leaders, to enhance learning. This partnership provides teachers with real-world resources and expertise, supporting hands-on, community-connected projects.
3. **Socio-Scientific Inquiry-Based Learning (SSIBL):** uses the “Ask, Find Out, Act” stages to guide students in investigating and responding to socio-scientific issues. Teachers facilitate critical, inquiry-driven projects that promote students’ ability to analyse information, weigh ethical considerations, and propose solutions.
4. **Teacher Professional Development (TPD):** COSMOS offers TPD resources to support teachers in implementing SSIBL and CoP models effectively. These resources foster professional growth by equipping teachers with skills in inquiry-based learning, collaboration, and reflective teaching practices.

9.4 Outcomes and Benefits

1. **Increased Student Engagement and Achievement in Science:** COSMOS engages students by making science education relevant to their lives and supporting deeper conceptual understanding. By exploring socio-scientific issues, students become more interested in learning science and experience a boost in perceived relevance of science beyond school. Ultimately this can lead to a greater sense of purpose and improved academic performance.
2. **Enhanced Critical Thinking Skills:** SSIBL strengthens students’ ability to analyse and evaluate information, preparing them for the challenges of an interconnected world.
3. **Increased Student Action Competence:** COSMOS develops student’s knowledge, confidence and willingness to act towards a more sustainable future.
4. **Stronger School-Community Connections:** Through CoPs, teachers can foster meaningful partnerships that bring real-world perspectives into the classroom, enriching learning and strengthening community bonds.

5. **Professional Growth for Teachers:** TPD supports teachers in developing inquiry-based, community-centred teaching practices, enhancing both student learning and teacher satisfaction.

9.5 Policy Recommendations

1. **Build Local Partnerships:** Teachers should collaborate with local stakeholders to provide students with access to real-world expertise and resources. These partnerships make learning relevant and empower students to engage with community challenges.
2. **Incorporate SSIBL to Foster Inquiry:** By using SSIBL's structured inquiry model, teachers can guide students in exploring issues that connect science with society, fostering skills in problem-solving, ethical reasoning, and decision-making.
3. **Engage in TPD for Open Schooling and Inquiry Practices:** Teachers are encouraged to participate in COSMOS TPD programs to deepen their understanding of community-centred and inquiry-based approaches, enhancing their teaching and the impact of open schooling.

10. Policy briefs available in several languages

The policy briefs have been translated into the various languages of the COSMOS partners. They are available in:

- Arabic
- Dutch
- English
- Flemish
- Hebrew
- Portugues
- Swedish

The policy briefs can also be accessed via the COSMOS website: www.cosmosproject.eu

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



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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