EUROPEAN POLICYBRIEF

INTERIM POLICY BRIEF

OTTER (Outdoor Science Education for a Sustainable Future) is delivering its mid-term policy brief with recommendations drawn in the first 15 months of the project.

09.12.2022

INTRODUCTION

Much analysis has been carried out on the importance of science education both in schools and in higher education. However, science education outside the classroom, which refers to informal science education, and the science education effects of non-educational activities, are not well explored in terms of their nature and effects. Acquiring knowledge, and in particular, evaluating knowledge, often with the help of the Internet, is happening in reality frequently, and should be recognised for what it contributes in terms of more sophisticated consumers and scientific citizenship. Consideration of what is available and what is being learnt would be useful to understand how science education outside the classroom influences today's citizens.

In the short term, the proposed action should identify good practices outside the classroom. It should consider what impact this information might have on formal and informal science education for students and citizens. In the medium term, the results of the present action will help the EU to better understand the effects of science education outside the regular education institutions and will increase the range of innovative products in science education that reflect societal needs. In the long term the results of the research should contribute to considerations on accrediting the available information.

In August 2015, the European Commission published the Science Education for Responsible Citizenship report, which offers a 21st century vision of science for society within the broader European agenda and calls for a collaboration between formal and informal education for the purpose of enhancing scientific literacy.[1] Education Outside the Classroom (EOC) can provide a large number of various cognitive, affective, and psychomotor outcomes that contribute to the scientific literacy, as well as a wider range of educational benefits, competencies and skills in the perspective of lifelong learning. In addition, in 2018, the European Union has reaffirmed the eight key competencies in the field of education, including the citizenship competence related to sustainable development of our society and the cultural awareness related to arts (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)&from=EN).

[1] European Commission (2015). Science Education for Responsible Citizenship. Brussels: Directorate-General for Research and Innovation, Science with and for Society.
http://ec.europa.eu/research/swafs/pdf/pub_science_education/KI-NA-26-893-EN-N.pdf

OTTER takes into consideration EU defined competencies and plans to prove, through a set of pilot actions in four countries (Spain, Ireland, Finland and Hungary) and educational systems, how EOC can affect 21st Century skills of students ages 6 to 18 through integrated STEAM subjects that are focussed on big ideas such as sustainability and plastic waste. Through a comprehensive literature review and feedback from the teachers and experts on the OTTER Hub and related events, we complied the main conclusions that could inform policy at this stage. However, WP4 of the project will provide the comparison of performance and views of students who have been subject to additional EOC activities against students who have not, while WP5 will propose recommendations for assessment and accreditation guidelines of EOC activities at the end of the project.

Evidence and Analysis

Policy recommendations in this document are based on the first steps taken in the OTTER project, a European and international scientific literature and grey material review, and various events connected to the OTTER Hub that included teachers and other stakeholders. Underlying issues associated with creating networks of stakeholders and joining networking platforms were highlighted to be limited by the time that teachers have, accessibility and constraints related to curriculum and assessment obligations. However, the recommendations are flexible enough to be applicable in all school systems, yet impactful enough to fortify EOC approach and impact 21st Century Skills in students.

It is anticipated that the recommendations will be further refined and specified with evaluation results after pilots and mapping the possibilities for accreditation at the end of the project. The current set of key recommendations are a necessary basis for any other progress in the area of integration of EOC and increasing student participation in STEAM programmes and eventually STEAM related professions. The current recommendations also align with the European Education Area goals, as it encourages a holistic approach to education and training and emphasizes the role of all kinds of education and learning. We argue that while EOC is usually observed as a complementary approach and a form of learning that is left up to the capacities and inspiration of the educator, it should rather be embedded in the curricula, teacher professional learning opportunities and other innovative approaches for engaging student participation in STEAM subjects.

Policy Implications and Recommendations

- **EOC learning should be directly linked to the established curriculum**

The project has yet to prove based on its pilots the cognitive, affective, social and behavioural benefits of education outside the classroom and the direct effects on skills, scientific knowledge, as well as motivation of both teachers and students. However, for EOC to be successful, as the literature review outlines, there need to be pre- and post- learning opportunities and integration into existing lessons and learning outcomes has to be provided. For this, clear recommendations are needed on how to incorporate and evaluate these activities on the levels of national curricula.

- **Professional teacher training and development are necessary for successful implementation of EOC in sustainability**

Teachers need to be trained on EOC methodologies to be able to apply them and they need a strong background knowledge of sustainable development to be able to successfully integrate them into STEAM topics.

The OTTER methodology provides clear steps and guidelines on EOC integration for specific age groups, however, professional learning opportunities for teachers is important, especially in ever-changing topics such as environmental sustainability and plastic waste and recycling, where novel approaches emerge and creativity in students should be encouraged. By 2025, the European Commission highlighted the importance of highly competent and committed teachers and trainers for ensuring the quality of education in society, especially on STEAM where there is a shortage workforce[2] (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0625&from=FR).

- **Technology can complement EOC when investigating issues related to sustainability**

EOC does not exclude use of technology, on the contrary, technology can complement this methodology. Possibilities include use of the apps to identify plants or using virtual reality to "visit" sights that are not accessible – especially through the lens of climate change and plastic waste in oceans. This merged approach has the capacity to increase interest in abstract concepts among students and potentially open doors to innovative local approaches, especially with more experienced learners who can potentially offer their own digital solutions. The use of technology in this way is also connected to teacher training, as teachers need to be equipped to integrate and utilize digital solutions in EOC, especially in STEAM subjects.

- **Gender equality, inclusion and diversity needs to be taken into consideration for students studying STEAM subjects**

It is important to ensure equality, especially when we are talking about STEAM. Analysis of the literature revealed that the majority of the research did not control or assess for effects of gender or geographical difference. The recommendation of this project would be to fully explore these differences in perceptions, motivation and educational approaches and assess the potential solutions and methodologies to promote inclusion and diversity. To promote inclusion in education, equal opportunities should be given to all genders and also to reduce inequalities between countries, between rural and urban areas or between students belonging to different socio-economic backgrounds (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0625&from=FR).

Sustainability and Legacy

Currently, OTTER has a Hub developed where various materials on challenges, innovative pedagogies and benefits of EOC, science education and sustainable development/plastic waste are shared and discussed by the teachers and other experts in the field. OTTER learning platform with the practitioners' toolkit, teacher training and guidelines for teachers are to be developed in the later stages.

Research Parameters

The overall objective of the OTTER project is to enhance the understanding of EOC practices and pedagogies and how they can help improve the acquisition of scientific knowledge and transferable skills in students, specifically in the field of environmental sustainability and the reduction of plastic waste. It aims to increase interest in scientific topics among young people, while also contributing to the range of innovative educational projects and the increase of scientific citizenship and proficiency within the EU.

OTTER is connecting experts mainly from four different regions within the continent (Finland, Hungary, Ireland and Spain), but also from other participating countries (France, Cyprus, the Netherlands) to collaborate and discuss ideas related to EOC. Conclusions of these discussions, along with the set of materials developed within the consortium, will provide a basis to carry out a programme of EOC pilot schemes and analyse the effects they have on the performance of participating students. Investigating students 21st Century Skills, scientific knowledge of the Sustainable Development Goals (especially SDG 4) and awareness

of appropriated behaviour related to inclusion and diversity will provide an insight into the benefits and challenges associated with EOC and its complementarity/compatibility with formal education.

Pilot completion will be followed by the analysis that will seek to highlight any complementary approaches in students' performance across different geographical locations and gender differences. Comparisons will be drawn between those students who participated in the pilot schemes and those who were taught through formal educational methods only. The project will further aim to identify methods for measuring, assessing and accrediting the knowledge and skills developed via education outside the classroom and will seek to enrich the inventory of tools available for future methods of accreditation beyond the end of the project. On the horizon 2025, it was stated by the European Union that: "*non-formal learning, including volunteering helps gain life and professional skills and competences. These skills and competences need to be fostered, valued, and recognised in full*". Thus, OTTER goal is to contribute in a unique manner to address the place of outside the classroom learning activities and their assessment in our schools and societies.

PROJECT IDENTITY

PROJECT NAME	Outdoor Science Education for a Sustainable Future (OTTER)
COORDINATOR	Jelena Kajganović, Geonardo Environmental Technologies LTD, Budapest, Hungary jelena.kajganovic@geonardo.com
CONSORTIUM	Bridge Budapest Egyesulet – BB – Budapest, Hungary Cardet Centre For The Advancement Of Research & Development – CARDET – Lefkosia, Cyprus Fondation Européenne de la Science – European Science Foundation – ESF – Strasbourg, France Learning Scoop - Oppimisen Osuuskunta – LS – Kangasala, Finland Rijksuniversiteit Groningen – RUG – Groningen, Netherlands The Big Van Theory – TBVT – Castellbisbal, Spain University of Limerick – UL – Limerick, Ireland
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BUDGET	EU contribution: €1,598,748.75

WEBSITE

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FURTHER READING

D2.1 Literature review and compendium of successful practices
D3.3 Guidelines to develop OTTER Outdoor Lab
D4.1 Monitoring and evaluation framework for the whole project

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