# The MaSCot project: Materials science communication in informal learning environments

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**Abstract.** MaSCot project aims to upgrade the informal science learning experiences regarding the communication of materials science developments through the collaboration of the Department of Primary Education and the Materials Science and Technology Department of the University of Crete. This paper presents the preliminary results of the analysis of the educational visits currently organized by the two departments, along with the analysis of the communicated scientific content, detecting the scientific concepts and applications related to societal aspects and students' ideas about those.

## Introduction

Rapid advances in materials science are anticipated to affect the lives of future generations, generating significant controversy and public concern, as in the case of most cutting-edge research topics [1]. Consequently, citizens' level of scientific literacy is of great importance to be able to make informed decisions on issues related to materials science as well as to cultivate positive attitudes towards cutting-edge scientific issues. Research centers and universities could meaningfully contribute to the development of future citizens' scientific literacy, as formal science education in schools is usually not sufficient. [2]. In addition, current communication strategies regarding cutting-edge research topics through informal learning environments such as science laboratories, research centers, etc. tend to support the active participation of visitors by adopting contemporary teaching approaches such as inquiry-based learning, interdisciplinary STEM approach, etc [4]. However, the learning opportunities provided by informal learning environments are frequently overlooked, as educators do not always acknowledge their contribution to connecting formal and informal learning settings [3]. To achieve the above, training programs based on the collaboration between teachers and scientists are needed, for out-of-school learning experiences and science communication to be updated.

## Theoretical Framework

Viewing learning as a learner-centered and lifelong process underlines the significance of informal settings like science centers in complementing formal education and fostering scientific and technological literacy [5]. However, teachers do not always recognize the importance of their intermediate role in harmoniously integrating such visits into science curricula. Recent literature indicates that there is a lack of any in-service or pre-service teachers' training regarding out-of-school learning contexts [3]. On the other hand, the development of informal learning experiences should be guided by a deep understanding of educational principles, considerations, and skills. This poses additional requirements for the science center staff (e.g. scientists), who have to take into account many other aspects and constraints, with which they are not familiar, to form informal learning experiences aimed at fostering meaningful visitors' engagement.

Model for Educational Reconstruction (MER) is a methodological framework that can be used for the design and development of any formal or informal learning environment [5] To be able to form educational goals for informal learning experiences, MER could be enriched with the model for the "Personal Awareness of Science and Technology" (PAST), facilitating their development through the interpretation of visitors' interactions with the informal learning experiences and the aims of the visits [6]. Based on the above, the research questions that guide the present study are the following:

1. *How can the most current knowledge on materials science be disseminated and communicated to students and the general public through informal learning settings?*
2. *How do materials science researchers, science education researchers and in-service teachers collaborate in formulating visits in informal learning settings?*

## Methods

*Context of the study*

The present study is part of the ongoing MaSCot project, currently in its first year. It consists of a partnership of two research groups from departments of the University of Crete, the Department of Primary Education (DEP) and the Department of Materials Science and Technology (DMST). Initially, the educational visits currently organized by both research groups in their infrastructures will be analysed. Based on this initial analysis, two complementary series of STEM inquiry-based learning activities, for exploring both contemporary materials science applications and the corresponding socioscientific issues will be developed by a Community of Learners (CoL). The CoL will consist of a. experts from the Materials Science field and science education & communication field and b. in-service teachers. The developed material will be implemented and evaluated through organized school-visits carried out by the participating in-service teachers.

*Data Collection & Analysis*

Data will be collected through a) audio recordings of CoL meetings during the development of the educational material, b) an observation protocol that will be used to record the educational visits, and c) semi-structured interviews with the in-service teachers that will be conducted after the visits.

## Expected findings and Conclusion

Upon completion of the MaSCot project, guidelines about how the most current knowledge on materials science can be disseminated and communicated to students and the general public through informal learning settings will be formulated. In addition, features of the collaboration of the members of the CoL will be defined to support the development of the teachers' training programs. However, preliminary results of the first phase, including the fundamental ideas of materials science and early STEM activities developed by the project partnership to communicate these ideas to students will be presented.

## References


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