SOCIAL INNOVATIONS THROUGH THE EXPLOITATION OF STEAM EDUCATION AND ROBOTICS IN A SUSTAINABLE KINDERGARTEN

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INTRODUCTION

Introduction
This case study concerns the "openness" and collaboration of European schools from six different countries: Estonia, Greece, Latvia, Lithuania, Poland and Romania, in the context of their participation in a e-Twinning project, entitled "Winter is Fun". According to the opinion that "there are no inappropriate weather conditions, but inappropriate clothing", the pedagogical innovation of the project lies in the fact that the learning modules of the curriculum, related to early education are approached by organizing collaborative activities outside the classroom, especially in the winter.. The progress of the research includes qualitative and quantitative collection data methods and is completed by evaluating and disseminating the learning outcomes of the project to the local and extended community.

The aim of research
The main research topic is to investigate the existence of a positive correlation between the expansion of the learning environment outside the classroom to the Natural, Social and Cultural Environment with the experiential approach of the Sustainable Development Goals (SDGs).

Objectives
Based on the Activity Theory and the belief that the natural, social and cultural environment is an important source of knowledge, the organized learning process includes formal, non-formal and informal types of education, in order to approach the learning modules of the curriculum, related to early education.

The methods of the research

During the planning and implementation phase are applied action research and field research (Cohen L. – Manion L., 1994). In this socio-cultural approach of Science teaching (Plakitsi 2012), technology, educational robotics, engineering, arts and mathematics are utilized as methodological and mediating tools. This action research organizes STEAM education as an activity aimed at the sustainable development (Plakitsi 2018). In this context, Nature, Socio-cultural and Historical Environment of the students are used as an extended classroom, while the Sustainable Development Goals are approached experimentally.

Theoretical background

The theoretical background of the project is based on the Cultural Historical Activity Theory (CHAT) and the belief that learning is the result of interaction with the natural, sociocultural and historical environment of the students.
In this framework, the planned activities are structured according the principal components of the triangle model of CHAT theory (Figure 1), including:

- the Subject
- the Object
- the Mediating and Methodological tools
- the Rules
- the Community
- the Division of Labor and the
- Outcomes of the activity system adapted from Engeström (1987).

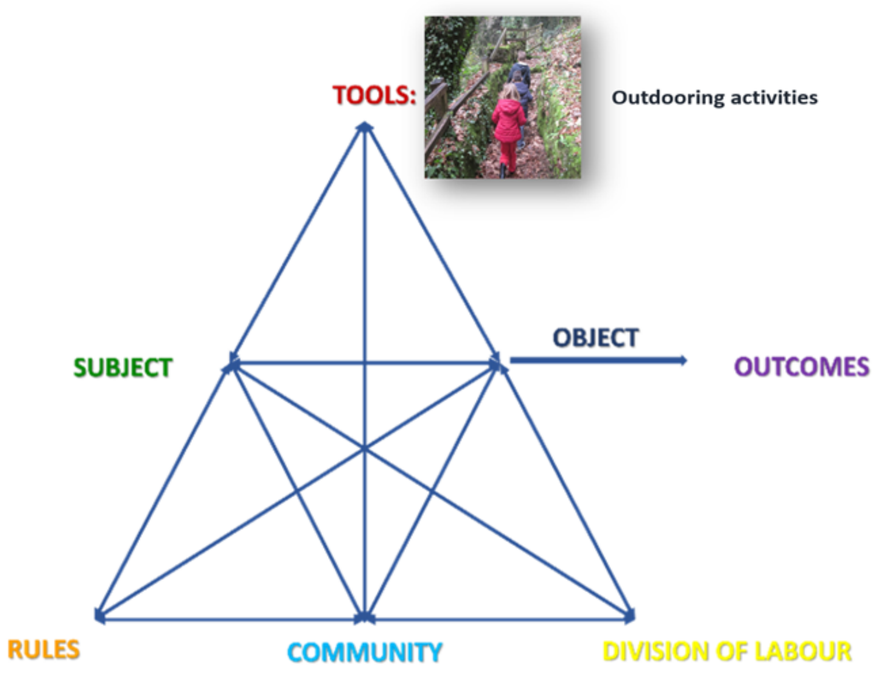

Figure 1. Triangle model analysis of CHAT theory (Engeström, 1987)

Main findings

The planned and emerging activities emphasize on the expansive learning, the exploitation of STEAM education and robotics while they are connected with all the learning areas of the curriculum related to early childhood (Ministry of Education, (2021). In particular, through the openness of the school and the socio-cultural use of the methodological tools are approached with playful activities:

- the goals of the sustainable development, focusing on the topics of sustainable communities, climate change, partnerships for goals
- the local history and culture, "adopting" the local post-Byzantine monuments of the region
- the social/personal and emotional development, cultivating intercultural skills, democratic and global citizenship, interaction and collaboration with European Schools
- the written and oral speech, enriching students' vocabulary
- expressive arts, creating the dimensional map and robotic models (Figure 2)
- computational and algorithmic thinking, promoting the robot coding (Figure3)
- physical development, implementing outdooring activities.

Figure 2. Dimensional map of the local post-Byzantine monuments

Figure 3. Robotic models and collaborative coding activities

MAIN RESULTS AND CONCLUSIONS

Main results and Conclusions
The results are consistent with the corresponding research question. Particularly, the implementation of social innovative practices in teaching and learning, such as the openness of the school to the community, the socio-cultural approach of STEAM education and robotics support preschool children to approach the sustainable development goals in an interdisciplinary way.
It is essential to note that through the implementation of social innovative projects the school was awarded United Nations, Educational, Scientific and Cultural Organization (Hellenic National Commission for UNESCO), honored as Sustainable, Ecological and ICT oriented School, awarded with National and European Quality labels from the eTwinning community, with the European Label of Code Week Schools and as "Ambassador School of the 17 Sustainable Development Goals".
Based on the positive results of the research, it is planned the extended dissemination of this effective practice.

References
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