

## Template

**Title:**

MUMABOT: Exploring disciplinary intersections in STEAM

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**Keywords (3–5 terms):**

transdisciplinarity, in-service training, ECEC professionals, preschool, STEAM

**Abstract:**

**Main objectives/goals**

The aim of this study is to evaluate a pilot course designed according to the first draft of the Transnational Curriculum for In-service Training (TITC) in the project “INTEC - Developing an innovative in-service training model for ECEC staff” (Erasmus+ KA2).

The course MuMaBot is aimed at ECEC professionals with the objective of developing design and technical skills to use STEAM disciplines as fields of experience. It's based on a

transdisciplinary and multimodal approach, focused on the intertwining of knowledge between music, mathematics and educational robotics (Tomlinson, 2013; Ludovico et al. 2017; Areljung, 2023).

This pilot is one of the training courses that the project partners are piloting in order to assess the innovative methodology developed in TITC. Bambini Bicocca will test the course in the form of Action-Research. Our research questions are: Is this course effective in giving ECEC professionals the ability to plan and implement STEAM activities in an transdisciplinary and multimodal approach in their services? What effect does it have on their ideas and practices about learning and disciplinary knowledge?

### **Theoretical framework**

In the first year of INTEC the study group examined the European indications for CPD, the national official references regulating further training in the INTEC partner countries and the findings of the literature review carried out. This analytical work resulted in the TITC for ECEC professionals with a specific European dimension, based on a child-centred and rights-based perspective, a holistic approach to learning and the centrality of well-being and teamwork.

The most important aspects for in-service training highlighted are: lab-based and experiential learning (Peleman et al., 2018; Peeters & Lazzari 2016); training experiences founded on scientific evidence (European Commission, 2021); the creation of a learning community (Jensen & Iannone, 2018). In this methodological framework we conducted theoretical and empirical inquiries on STEAM disciplines, multimodality and transdisciplinarity, which highlighted the perceived difficulty for ECEC professionals to implement these activities in their services, the need for training and support (Johnston et al, 2022), and the possibilities offered by a multimodal (Tomlinson, 2013; Ludovico et al. 2017) and transdisciplinary (Areljung, 2023) approach to give better access to knowledge and to work in new arenas.

### **Theoretical or/and empirical arguments (e.g. methodology and results for empirical studies)**

The INTEC work group identified two main areas of evaluation and assessment: the evaluation of the pilot training course by both trainees and trainers focused on the designed methodology; the assessment of the participants' learning and learning process.

The research group is currently perfecting some tools based on assessment being continuous, regulatory, distributed and mediated by instruments, situated, inclusive and sustainable (Boud, 2000). These tools include rubrics to evaluate the design and implementation of the course, questionnaires both on the topic of the course and on expectations/satisfaction with the course itself and observation grids. The aim is to assess: the participants' previous knowledge and experience and how it changes during the course; the changes in representations and practices.

## **Discussion**

Our research aims to assess if our training can support design and implementation of STEAM activities in a multimodal and interdisciplinary approach, and what changes occur in practice in terms of ideas about learning, teaching and disciplinary knowledge.

The tools identified by the INTEC group would provide useful data to analyze the methodologic design of the course and the feedback from the participants. In addition, we will design a psycholinguistic-based data analysis system, referring to the work of Balslev and colleagues (2015) to analyze the narrative materials (journals, field notes) produced by the participants during the implementation phase and a observation grid developed by researchers of the Department of Human Science (University of Milano-Bicocca) to codify the heuristics sought and experienced by children during robot-play in video-observations (Morettin, et al. 2024). Trainees will use the different documentation tools according to the principles of sustainability and contextuality of training of the TITC. Conclusion

The collected data will allow us to have an overview of the implications of an in-service training course designed and led according to the TITC principles through a transdisciplinary and multimodal approach on learning-teaching processes. It will also provide a way to assess limits and shortcomings of the process, thus opening new avenues of re-design and research in creating

new and interesting CPD opportunities for ECEC professionals. Finally, the results will be used to integrate the first version of the TITC.

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