

# LEARNING SCENARIOS EXPERIENCES: A CASE STUDY

Nelson Quina, Mário Cardoso

*Research Centre in Basic Education (CIEB), Instituto Politécnico de Bragança (PORTUGAL)*

## Abstract

The technological advancement in the last decade leads to constant social (trans)formations that directly or/and indirectly affect the Educational System, and it's becoming increasingly clear that students need to get closer to future reality and its prosperity. The STEAM approach is gaining particular momentum in some points around the world, focusing in the 21<sup>st</sup> century skills (creativity, collaboration, communication and critical thinking). In the sense that the potential of artistic languages and sensibilities are incorporated, this case of study arises from the need and importance of think/reflect/investigate on the subject in the contemporary educative context, focusing on the development of educational activities, investigation and artistic creation under the vision of the STEAM (Science, Technology, Engineering, ARTS and Mathematics) approach. For this, the proposal is the creation of the STEAM Laboratory with the purpose of designing exploratory actions for the acquisition of skills (artistic, educational, and relational) through practical experiences, in a real context that poses successive challenges. These actions are eminently experiential, aimed at teachers and students (1<sup>st</sup> and 2<sup>nd</sup> cycles of Basic Education) providing opportunities for assimilation of sensations/emotions/learning in an embodied way (*"embodied cognition"* or *"embodied feeling"*). The construction and participation of teachers and students in a STEAM Lab, will be a key element in this study and will be subject of observation and systematic analysis by the researcher, making a survey of conceptions, concerns, and challenges on the subject under study and its applications in the classroom. Having as starting point all the intentional and motivational assumptions that underlie the realization of this work, which aims to: i) deepen the knowledge about activities of creation and research framed in a STEAM approach in the field of Basic Education; ii) develop activities of creation and artistic research in a STEAM approach in the educational context; iii) design and implement educational and scientific content / resources framed in a STEAM approach. It is expected that this STEAM Lab will be a space capable of creating opportunities for discussion, experiences and sharing, with the common purpose of deepening knowledge, improving practices and, consequently, the learning of the students involved.

Keywords: Steam, learning scenarios, learning experiences.

## 1 INTRODUCTION

The vertiginous changes and transformations of contemporary society provoke profound changes in traditional patterns of work, leisure, and social relations, to which education does not go unnoticed [1]. The need to accompany and add these patterns to education, guiding and preparing students to respond to the challenges and issues of the 21<sup>st</sup> century, is becoming increasingly evident. In this context, more and more research has dedicated its gaze and study to the role and impact of the STEAM approach in the educational universe. This concept stems from the combination and synergistic interaction of the arts to the set of scientific and technological STEM (Science, Technology, Engineering & Mathematics) disciplines. According to some authors [2], this simple addition of the arts to the STEM model, (re)configures the role of the arts and creativity in teaching specific subjects, especially STEM, and the potential for the languages and sensibilities of the arts to be fully incorporated. On the other hand, the addition of the arts can point to the recovery of educational goals and purposes beyond economic growth. That is, education through the arts and sciences can move beyond the ideas of prescription and enculturation, in which education is seen as preparation for a future that can be predicted, feared, or simply expected [3]. Instead, we focus on the idea of education as a stimulus to future-building thinking and practices, enabling people and communities to respond resourcefully and creatively to ongoing changes. The construction of a STEAM Lab emerges by virtue of different epistemological, methodological, and artistic variables. At the basis of its conception are the following motivational elements: the need for a (re)configuration of the curriculum and educational practices that can respond to the challenges and needs imposed by the present and future of education, the deepening in the discussion and reflection on the STEAM approach and its articulation with different artistic domains, the possibility to theorize, build and implement models of intervention and analysis that can build a fundamental tool for the development, understanding and impact of STEAM in the educational context, the possibility to promote culture of interdisciplinary and plurality in the educational context. There are

points around the globe where investment in creating the conditions for the STEAM approach has been a growing and a goal to strive for. The United States and China have been investing in the STEAM approach for over a decade, although the research has been on STEM. In China they are gathering all the information and knowledge possible about STEAM education because they believe that this will allow labels of the future to say, "Invented in China" instead of "Made in China" [4].

## **2 METHODOLOGY**

In this research, we will try to follow a research paradigm that allows us to recognize the interdependence of the processes of knowledge construction and the naturalistic context where the project is developed. All ethical procedures associated with research in the educational context will be guaranteed throughout the process. In this research will be explained to its recipients, in a simple, objective, and clear way, the shared responsibilities and commitments, based on trust and mutual respect between researchers and researched. Legal authorization procedures will be established ensuring the participants' informed consent, written or oral, about the research objectives, the data to be collected and disclosed, as well as the use of technologies for data recording, time, and eventual interlocutors. Thus, the investigative process will be carried out according to an approach of qualitative and interpretative nature developed through consecutive processes of (de)construction between all the theoretical information and the pedagogical and artistic elements that emerge from the empirical research. The construction of a STEAM Laboratory will be a fundamental element of the research, where teachers and students will work (1st and 2nd cycles) and will be subject to systematic observation and analysis by the researcher. This STEAM Laboratory consists of the organization of a space with an environment conducive to the flow of creativity, innovation, and creation, in a collective way. In this space, children experiment and experience scientific thinking, interpreting, and reflecting. According to Stake [5], this research is an aggregate study or inter-case study since it corresponds to the investigation of several instrumental cases. In each of the cases, we will try to survey the conceptions, concerns, and challenges of teachers about the theme under study and its application in the classroom. We will also try to understand what the teachers' expectations are in relation to the Laboratory (in the initial phase), as well as their balance of this involvement (in the final phase). Throughout the whole process, particular attention will be paid to the teachers' participation in the project, their professional performance, creating opportunities for discussion, experience and sharing, with the common purpose of deepening knowledge, improving practices and, consequently, the learning of the children and teachers involved, as well as teachers' perceptions. The very collaborative research nature of the work assumes that its planning, implementation, and review should be negotiated, at all stages, by all researchers involved and participants. To this end, the project should have an emergent research design, and carry out working sessions dedicated to: i) discussion of topics elected as relevant by the group participants. This choice will take into account, as a priority, teachers' difficulties in developing the STEAM approach. Other topics chosen will have to do with the search for more information, successively incorporating more elements that contribute to the reflection on the lessons and increasing the range of aspects that deserve attention by the teacher in a class. These discussions will always have a bibliographic support. ii) Planning tasks to be proposed in the Laboratory. iii) Reflection on practices. Video and audio recorded class observation will be a relevant element for this purpose.

## **3 RESULTS**

When starting a research project, publication should play a major role in the validation of all the structural elements of the work, at the theoretical, conceptual, and methodological levels. We should define as the ideal case the insertion in our work of the contents after validation and enrichment, at the level of submission, presentation, and discussion in different scientific conferences or in international and national periodicals with peer review and relevant impact factor for the scientific area in which it is inserted. The ideal moment to perform these tasks should take place after the interpretation of the results obtained by the collection methods and instruments. In terms of the publication of articles in international and national journals, a means that allows us to share fundamental elements for our research project, to substantiate and validate all our work, we will make known the results obtained during this journey, which will be the target of submission during the third phase of our research. This submission will have as a criterion the sufficient maturity of this research so that it can show in a valid way all the conclusions reached. As previously mentioned, the contact, survey and updating of knowledge with the different peers of the scientific community, both at the level of specificity and interdisciplinarity of this area, will have in the publication a channel of excellence for the establishment and exchange of information carried out by the different members. The submission and participation in national and international

congresses/conferences will represent an oracle for the *latu sensu* validation of this work. The experiences and works of artistic creation developed during this project will be the target of publication/presentation. All the complementarity and articulation with the educational component will be a fundamental element, to consolidate and deepen the whole theoretical and technical body that will result from this research that we intend to develop and present. The research, publication and teaching activities may be complemented with artistic and performing activities (artistic installations and live performance) resulting from the various phases that constitute this project, which may be presented in socio-cultural centers, local museums, auditoriums, etc.

## 4 CONCLUSIONS

This study opens the possibility of art being reconfigured into an experimental scientific field in search of new learning, encompassing Science, Technology, Engineering, Art, and Mathematics, with the STEAM approach being the "standard-bearer" of innovative thinking for the educational system, for the future of its students and, consequently, for the ever-changing world. Additionally, there is evidence that the employability sectors need people with creative skills, knowledge and understanding, that leads them to visualize, communicate, question, experiment, create and execute. These are the needs of the future and for the future. According to Cultural Learning Alliance [2] innovation "happens when convergent thinkers ... combine forces with divergent thinkers - those who professionally wander, who are comfortable with discomfort and who seek what is real". The STEAM approach, directly linked to collaborative and cooperative work, summons to teaching, common sense, responsibility, the role of the citizen in today's society, in a creative and innovative way, taking into account the individuality of those involved to break boundaries. Art is an area of study that until now has been seen as an adornment or a hierarchically inferior area in relation to other disciplines, when it can be the agglutinating element of pedagogy for the 21st century. It is essential that educational contexts create conditions for skills and competencies to be worked on and developed in an integrated manner. In this, STEAM Labs, as integrated teaching-learning scenarios, offer the possibility of developing pedagogical practices and teaching modalities, becoming necessary spaces in schools, designed for students to engage the doing, sharing, giving, learning, instrumentalizing, playing, participating, supporting, and changing [6]. The encouragement for the "movement of creation" in the education system has been described by Anderson [7] as "the new industrial revolution", encompassing a wide variety of activities, from traditional crafts to high-tech electronics, to create something new. Learning connects with reality, preparing students to respond in their future life with different ways of being and doing in the world. STEAM Labs can be defined as integrated learning scenarios intentionally organized for the flow of creativity, innovation, and creation, in a collective way, where children experience and live scientific/artistic thinking, interpreting, and reflecting. These spaces can be important for reflection, creation, and research on the subject in the contemporary educational context, with a view to developing activities and educational practices of artistic creation framed in a STEAM approach. In line with the current Portuguese benchmark "Profile of students at the end of compulsory education" (Despacho n.º 9311/2016, 21 July), the current world in which education faces numerous challenges with the dizzying development of science and technology, issues related to identity, security, sustainability, interculturality, innovation and creativity are at the center of the current debate. This document for the organization of the Portuguese education system is structured by Principles, Vision, Values, and Competence Areas. It is mainly in the agglomeration of these points that STEAM can make a difference and help create complex combinations of knowledge, skills, and attitudes to learn and continue learning throughout life. Therefore, in the pursuit of education for all and to ensure quality education by providing the best educational opportunities, it is important to create conditions that balance knowledge, understanding, creativity, and critical thinking in the face of others, the diversity of the world, change, and uncertainty.

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