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USING OF STEAM TECHNOLOGIES IN PRESCHOOL EDUCATIONAL ORGANIZATIONS

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Abstract. The main difficulties identified were related to curriculum limitations, school infrastructure, and lack of resources, experience, and training in the STEAM approach. STEAM is an alternative approach to traditional teaching. This scientific research presents a survey focusing on pre-primary and primary STEAM education in six countries. The survey sought to identify: (a) the perceptions of teachers, parents, and professionals from STEM and the Arts (hereafter STEAM professionals) about the STEAM approach; (b) teachers' training needs; (c) teachers', parents', STEAM professionals' perceptions of the value of the STEAM's role in increasing the participation of young girls and disadvantaged students in STEM.

Key words: learning opportunities, digital materials, creativity, communication and collaboration, critical thinking, problem-solving skills.

Introduction. Data was collected through focus-group interviews and were qualitatively analyzed. Results showed that teachers, STEAM professionals, and most of the parents had positive perceptions of the STEAM approach; they believed that it increases children's motivation and engagement in learning, regardless of the child's gender; it increases creativity, self-confidence and offers good learning opportunities for both boys and girls, taking into consideration their emotional and social abilities. At the same time, children learn Science, Technology, Engineering, Art and Mathematics based on interdisciplinary connections and practical approaches. STEAM allows children to carry out project and research activities in and out of preschool. Through fun experiments, STEAM learning activities encourage children to hone their observation skills, find patterns, analyze results, and predict outcomes. Introducing this type of scientific thinking to little learners instills essential critical thinking skills, and helps them become better problem solvers. STEAM education is a holistic, interdisciplinary approach to learning that combines science, technology, engineering, arts and mathematics. It harnesses the natural symbiosis between these disciplines to foster creative problem-solving, collaboration and critical thinking. Use technology to introduce young children to diverse images of people and things. Explore digital materials through shared technology time [1]. Through shared book reading, you can create opportunities to engage with young children by talking to them and introducing new vocabulary. Technology can play a vital role in STEAM education, offering boundless capabilities and possibilities for creating high-quality learning experiences that foster students' innovation creativity, communication and collaboration, critical thinking, and problem-solving skills. Early childhood education is always changing, and this includes the curriculum we teach and how we teach the topics. STEM and STEAM are not new terms but newer since I started teaching in 2003. STEM education encompasses four different disciplines: science, technology, engineering, and mathematics. STEAM incorporates five: science, technology, engineering, art and math. A child's vehicle to learning is through play. With STEM and STEAM education it is easy to incorporate the four disciplines into a child's learning day. Lifelong scientific literacy begins with attitudes and values that you, as the teacher, establish in the early years [2].

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Because we are role models for our students our positive attitude towards these disciplines will reflect how our students feel about these areas of learning. The project approach involves a sustained, in-depth exploration of events, materials, themes or objects in a child's environment and is carried out in such a way that children are encouraged to raise questions and search for answers about a topic that holds their interest over time. Literacy and numeracy skills and higher-order thinking can be applied. It is normally 4-6 weeks but can last as short or long as you would like. Our classroom arrangement is important for many reasons. Opportunities for learning should abound throughout the entire classroom community. The way you set up your environment will more than likely change each year since you have different students, backgrounds and abilities. The ideas shared here are ONLY ideas to get you started thinking about how you can set your classroom to be a conducive learning community that involves STEM/STEAM disciplines. It takes a little time and creativity, but it is so worth it. It is truly bringing in another component of learning and enrichment for students [3]. This also allows for differentiation, hands on exploration, fun, excitement and adds depth to what you are already doing. Planning, Managing and Incorporating STEM/STEAM Learning Centers will dive deeper in to how to set up centers for STEM, STEAM learning.

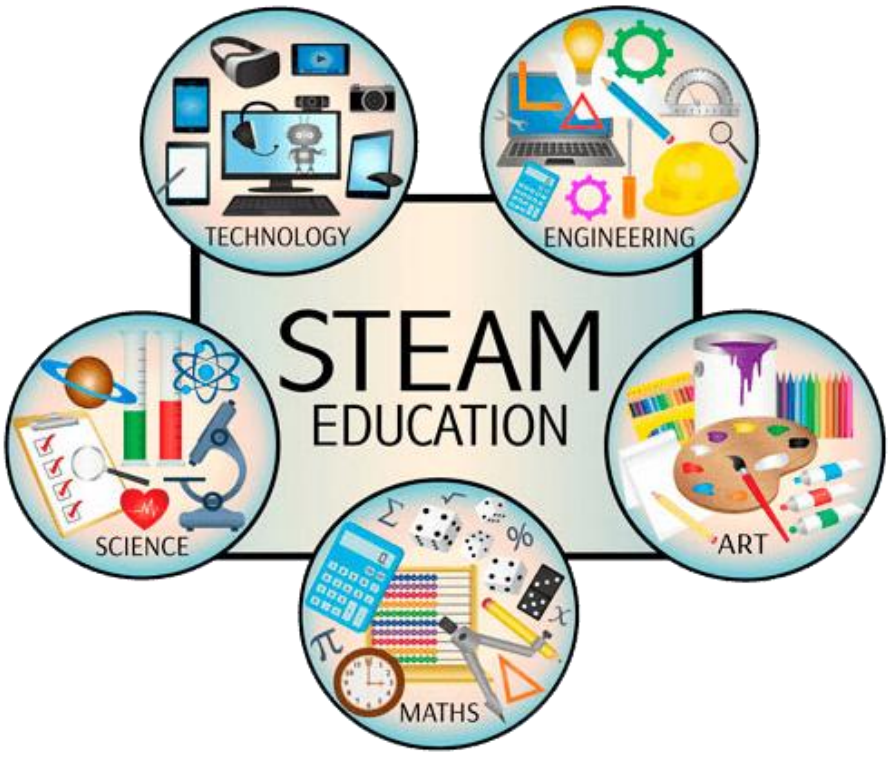

Figure 1. STEM educational structure

For far too long in education, we've been working with the presumption of teaching to ensure our students get a "good job". But what does that look like? We are preparing students for jobs that don't even exist. We are at a point where it is not only possible, but imperative that we facilitate learning environments that are fluid, dynamic, and relevant. None of us go outside and look at a tree and say, "that's a tree, so that's science" or, "the sky is blue, so that's art." Our world is a beautiful, complex, and intricate tapestry of learning all in its own right. Why do we believe that we have the ability or the right to box it in behind brick walls and classroom doors in a place called school? Integrating concepts, topics, standards and assessments is a powerful way to disrupt the typical course of events for our students and to help change the merry-go-round of "school." It takes what

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we do when we open the doors to the real world and places those same practices in our cycles of teaching and learning. So, we can finally remove the brick walls and classroom doors to get at the heart of learning. Recent research shows that STEAM is a promising approach to positively impacting student achievement and teacher efficacy. In a 2016 study, researchers investigated the impact of STEAM lessons on physical science learning in grades 3 to 5 in high poverty elementary schools in an urban district [4]. Findings indicated that students who received just nine hours of STEAM instruction made improvements in their science achievement. Results showed that students whose language arts curricula were infused with theater arts often outperformed their control group counterparts, who received no arts integration, in both math and language arts. STEAM utilizes the arts along with traditional STEM subjects as "access points for guiding student inquiry, dialogue, and critical thinking," according to Education Closet, a digital learning hub for educators. "The end results are students who take thoughtful risks, engage in experiential learning, persist in problem-solving, embrace collaboration, and work through the creative process," Education Closet continues. STEAM works by leveraging the benefits associated with STEM with the accessibility of visual art, poetry, music, and drama. Students can make connections and learn in a variety of ways, reaping the benefits that a STEAM education can provide. Educators support the use of STEAM in the classroom, according to Voices from the field: Teachers' views on the relevance of arts integration, a 2012 study from Lesley University. This two-year study featured data from 204 teachers in 19 states [5]. According to its findings, "teachers report that arts integration stimulates deep learning, creates increased student engagement, and cultivates students' investment in learning." In addition, STEAM approaches can help students learn skills relevant to the 21st-century, including innovation and cultural sensitivity. The study reports that a well-rounded approach to education also better enables teachers to use differentiated instruction to meet the needs of diverse learners. These findings are significant because they highlight the perspectives of teachers who are practicing STEAM in the classroom and seeing the benefits firsthand. As a result of the adoption of STEAM in classrooms across the country, new teaching methods have emerged [6]. You may have them playing William Shakespeare being interviewed about why he wrote the characters that he did. You may have students create collages of the characters. Approaches like these can all enhance their understanding of the book they read."

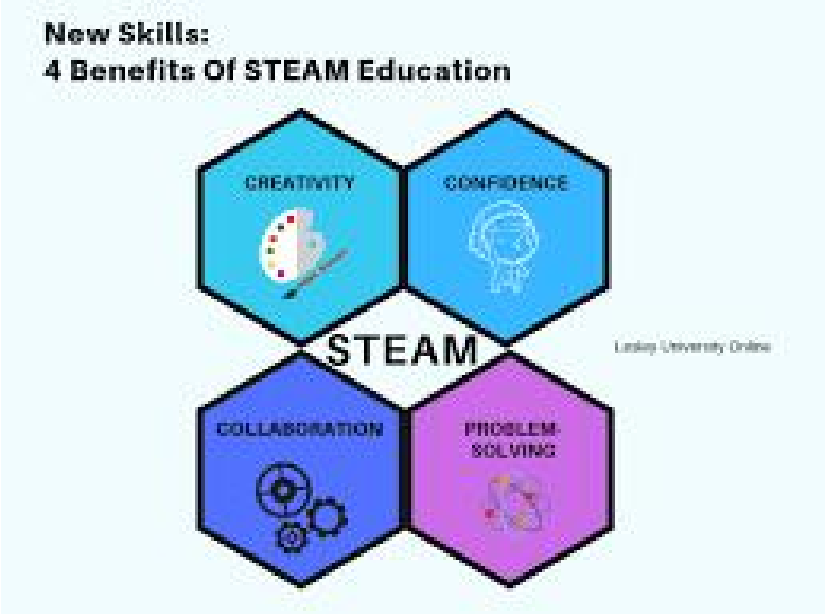

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Figure 2. New Skills: 4 Benefits of STEAM Education

For the data analysis, a deductive thematic approach was used to ensure unitary identification of the information targeted by the research questions, especially in the context of transnational research. Also, a deductive analysis helps maintain focus on the research purpose. This approach can be used when a researcher has a fair idea about the likely responses that will be received from the research subjects, and/or when the researcher is familiar with the research topic, or involved in the analyzed phenomenon. In our case, the researchers already had the frames of reference/cognitions that helped them identify the meanings of the answers considering the purpose of the research [7]. Given that all partner members involved in the focus-group interviews were familiar with STEAM in preschool and primary education and had the necessary information/cognitive frames for interview analysis, we considered this approach best suited for the data analysis of the focus-group interviews. The deductive approach to analyzing qualitative data is based on a structure predetermined by the researcher, which is also reflected in the design of the interview and the main topics covered by the interview questions.

Conclusion. In our study, the main topics became the themes used in the data analysis. Before starting the interview content analysis, they were presented and agreed upon within a transnational meeting with all research partners. Also, a template was developed and agreed upon within this meeting to clear up code definitions and eliminate unnecessary codes. This template led to a unitary identification of the codes in all nationally transcribed interviews, assuring intercoder reliability and maintaining alignment with the research questions.

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