

Chapter 7

Applications of STEM Based on POE Learning Model to Increase Primary School Students' Understanding of Science Concepts

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ABSTRACT

The study proposes five Hands-on STEM and science activities designed using the Predict, Observation, Explain (POE) technique, which aligns with the Computational Thinking. The aim is to make the Hands-on STEM and science activities more functional for science teachers and students through the POE method. In the research, the following Hands-on STEM and science activities were designed: The Nightmare of thieves, design proposal, let's match the elements, design Proposal, atom, cat gene, mirror. The method of study is design-based research method. The Hands-on STEM and science activities were designed to be easily implemented by science teachers in the classroom, cost-effective, and practical. Given the limited presence of activities designed with the POE technique, suitable for the Hands-on STEM

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activities, and capable of supporting the development of Computational Thinking Skills in the literature, it is believed that the findings of this study will significantly contribute to enriching science teaching environments.

INTRODUCTION

Science education is an important tool for helping children understand the events, objects, and phenomena they encounter in their daily lives. Topics such as nutrition, water, air, body functions, and environmental interactions are taught using methods and techniques appropriate to children's interests and needs. Through science education, children develop creative thinking skills, gain a better understanding of their environment, and enhance their communication abilities. Additionally, science education improves children's language and logical reasoning skills. As children solve science problems and interact with science, their creativity and problem-solving abilities increase. Science education equips children with practical skills they can use in everyday life and makes it easier to learn other subjects. Furthermore, children engaged in science develop an interest in technology and the ability to benefit from technological advancements. Therefore better, science education should be a priority. What are the secrets to successful science education (if any)? Is there a “method”? For example, high-performance methods such as POE and STEM applications can be applied in science classes. What are the POE method and STEM applications?

The STEM education approach emerged as a method aimed at providing the essential skills and competencies needed in today's world. The term STEM is an acronym formed from the initials of the word's science, technology, engineering, and mathematics. From early childhood education to higher education, STEM education equips students with interdisciplinary knowledge and skills relevant to real life and prepares them for a knowledge-based economy (NRC, 2011). The goal of STEM, which is the integration of these four disciplines, is to offer a learning environment where students can apply the knowledge and skills required by the 21st century and integrate these skills into their daily lives (Bybee, 2013; Dugger, 2010; Kalogiannakis & Papadakis, 2023; Sanders, 2009). In an education system based on STEM education, teachers are the most essential resource, and understanding how to implement STEM education is crucial for its success. Integrated teacher education programs prepare teacher candidates with the knowledge, skills, and beliefs needed to apply STEM education. This enables teachers to enhance students' innovation abilities (Kalogiannakis & Papadakis, 2017; Cuadra & Moreno, 2005; NRC, 2011). Considering these factors, the study developed five lesson plans with STEM activities to serve as examples for science teachers. This approach aims to facilitate the integration of STEM into our lessons more effectively.

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