

Promoting Creative and Critical Thinking in Mathematics

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Abstract : The Japanese art of origami provides a rich context for designing exploratory mathematical activities for children and young people. By folding a simple sheet of paper, fascinating and surprising planar and spatial configurations emerge. Equally surprising is the unfolding process, which also produces striking patterns. The procedure of folding, unfolding, and folding again allows the exploration of interesting geometric patterns. When adequately and systematically done, we may deduce some of the mathematical rules ruling origami. As the child/youth folds the sheet of paper repeatedly, he can physically observe how the forms he obtains are transformed and how they relate to the pattern of the corresponding unfolding, creating space for the understanding/discovery of mathematical principles regulating the folding-unfolding process. As part of a 2023 Summer Academy organized by a Portuguese university, a session entitled "Folding, Thinking and Generalizing" took place. Twenty-three students attended the session, all enrolled in the 2nd cycle of Portuguese Basic Education and aged between 10 and 12 years old. The main focus of this session was to foster the development of critical cognitive and socio-emotional skills among these young learners using origami. These skills included creativity, critical analysis, mathematical reasoning, collaboration, and communication. Employing a qualitative, descriptive, and interpretative analysis of data collected during the session through field notes and students' written productions, our findings reveal that structured origami-based activities not only promote student engagement with mathematical concepts in a playful and interactive but also facilitate the development of socio-emotional skills, which include collaboration and effective communication between participants. This research highlights the value of integrating origami into educational practices, highlighting its role in supporting comprehensive cognitive and emotional learning experiences.

Keywords : skills, origami rules, active learning, hands-on activities

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