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Educational activities for children on disaster preparedness and map use

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Abstract:

Educating young people on disaster awareness, preparedness, and protection from an early age is a key tool for fostering sustainable theoretical and practical knowledge essential for timely and effective response in crises. In various countries, including Bulgaria (Bandrova and Marinova, 2020; Bandrova et al., 2015) there is a growing emphasis on preparing children for emergency response through educational materials and specialized training (Kagawa and Selby, 2014). The Laboratory on Cartography and GIS at the University of Architecture, Civil Engineering and Geodesy (UACEG) in Sofia has been actively involved in such initiatives, organizing and conducting seminars, workshops, and training on disaster preparedness and response for children. One of the recent activities was an educational training on disaster response and map use, involving 26 children from 7 to 11 years old. The training was part of the Children's University program at UACEG in 2024, which aimed to inspire children's natural curiosity and critical thinking, to increase their interest in acquiring new knowledge and developing essential skills.

The educational training on disaster response and map use began with a lecture on types of natural disasters, common disasters in Bulgaria, and how to respond in an emergency. The lecture also introduced different types of maps and their main components. Preparation for map usage is crucial, as preventive activities and cartographic products that rely on the importance of geographic information in early warning and crisis management (Konecny et al., 2011) are used to visually present hazard distribution, potential risks, and possible outcomes under various circumstances and scenarios. Cartographic visualizations of hazards, vulnerabilities, risks, and warnings help improve disaster preparedness by making complex information understandable, fostering collaboration, and supporting effective communication among educators, communities, and decision-makers (Lienert, 2025; Bandrova and Marinova, 2020). Information is more easily perceived through the active participation of the audience. For this reason, the children were encouraged to engage in a lively discussion, think logically, and answer questions posed during the session.

After the theoretical session, the training continued with a workshop on disaster response and map use. The participants were divided into two age groups: Group 1 (ages 7-8) and Group 2 (ages 9-11, with only one child being 11). Group 1 received a questionnaire with five questions and one task, which they were required to answer using the knowledge they gained from the lecture. The children were also provided with additional informational resources such as natural disaster information boards and atlases, developed in the Laboratory on Cartography and GIS. While Group 1 worked on the questionnaire, Group 2 experienced Augmented Reality (AR) sandbox demonstrations, presenting terrain with hypsometric coloring and contours, and a flood scenario (Figure 1). During these demonstrations, the children deduced correct answers to the questions posed by logical thinking, even without prior specific knowledge. After completing the assigned tasks, the groups switched their activities. Group 1 participated in AR sandbox demonstrations, and Group 2 worked on the questionnaire.

Despite the age difference, both groups were asked the same questions to help us gather insights into how children of different ages use maps and process new information on disasters. Both groups successfully completed the questionnaire. The notable difference was in the time taken to complete it. The children in Group 2 did it more quickly because they already had experience with reading texts, which enabled them to absorb the information rapidly. For some questions, student volunteers guided the younger children in Group 1 on how to find answers. Undoubtedly, the most interesting part of the questionnaire for the children was drawing symbols for different types of natural disasters. The training concluded with additional interactive games and activities such as assembling map puzzles depicting historical disasters in Bulgaria.

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Further training sessions were conducted with children (ages 8-9) from the 2nd grade of the Progressive Primary School 1 in Sofia, who visited the Laboratory on Cartography and GIS. Their assistants were students, specializing in Cartography and GIS at UACEG.

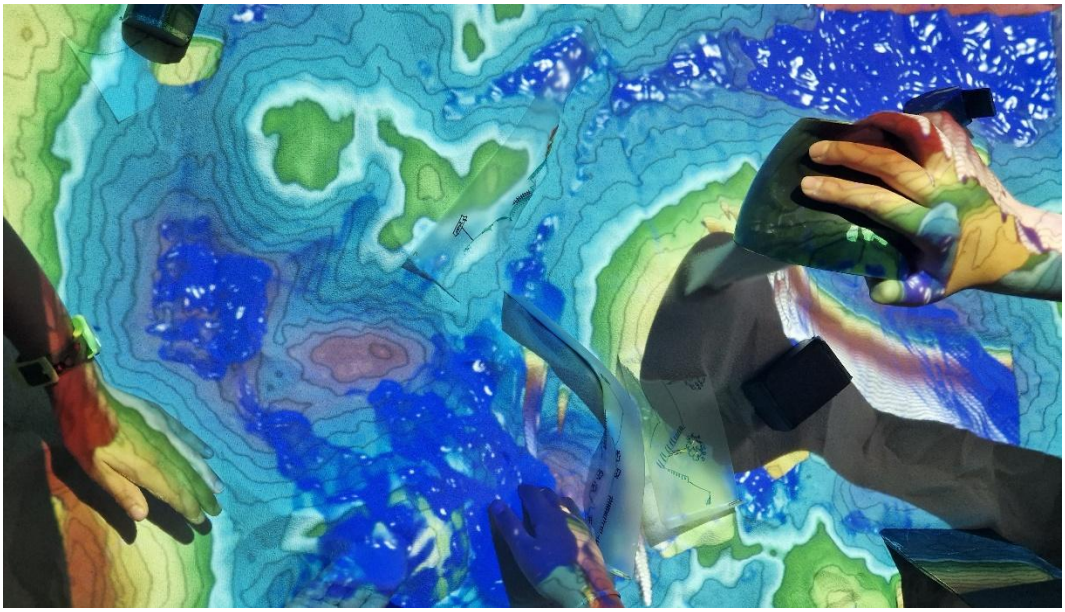

Figure 1. AR sandbox demonstrations.

The results of the two disaster response training initiatives were summarized and analyzed, providing insights into how children interact with maps and other educational materials. For cartographers, understanding children's cognitive processes is crucial to designing cartographic products with appropriate symbols, colors, etc. This is essential for the good preparation of children for disaster response and the use of thematic maps. The outcomes of these training activities highlight the importance of adapting educational materials to children's cognitive abilities and training specifics. Future work could focus on expanding these programs by incorporating other technologies such as virtual reality and global positioning systems for further engagement and understanding. Research could also be useful in assessing the long-term impact of training children in disaster response. Overall, the study provides a foundation for designing child-centered disaster education. To fully realize the potential of these educational tools, future work should include pre- and post-intervention assessments to measure changes in knowledge or preparedness, as well as longitudinal follow-ups to evaluate whether the training leads to sustained behavioural changes over time. By continuously improving educational strategies and tools, we can better prepare young people to respond to potential disasters with knowledge and confidence.

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