STEM Forward: Narrative-Driven Digital Science Communication in the Science Girl Project

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Abstract:
There is a growing global demand for specialists in STEM fields (Science, Technology, Engineering, and Mathematics) (Batchelor *et al.,* 2021), yet numerous studies report a decline in students' interest in science during early adolescence (Potvin & Hasni, 2014; Hámori, 2018). This decrease appears to be driven by subject-related stereotypes, negative school experiences, and the lack of authentic female role models. At the same time, several countries treat STEM education as a national strategic priority (Kayan-Fadlelmula *et al.,* 2022), emphasizing the development of digital, critical, and creative thinking as key competencies for addressing global challenges (Martín-Páez *et al.,* 2019).

This study examines *Science Girl* (Tudóslány), a ten-episode multimodal video series aimed at upper-primary and secondary school students in Hungary. The project was designed to increase interest in STEM, particularly among girls, by presenting scientific concepts through formats that resonate with students' everyday media environments. The series is grounded in constructivist, authentic, and culturally relevant pedagogical principles and offers an alternative to traditional frontal instruction by integrating pop culture elements, interviews, storytelling, and participatory learning activities. This approach positions students as active meaning-makers rather than passive recipients of knowledge. A key feature of the project is the visibility of female scientists, whose presence offers students more accessible and inclusive representations of STEM career pathways.

The research used a mixed-methods design involving pre- and post-intervention questionnaires, open-ended student reflections, qualitative feedback from students across multiple grade levels, and platform analytics. The study examined how the series influences students' attitudes toward STEM subjects, how female role models affect identification processes, and how multimodal narrative elements support conceptual understanding and classroom engagement. These questions provide a novel perspective on the relationship between science communication and school-based attitude formation.

Results indicate short-term improvements in both cognitive outcomes and student attitudes following the intervention. The strongest gains were associated with humor-driven and narrative elements, suggesting that culturally embedded metaphors and visual framing can enhance recall, reduce subject-related anxiety, and increase engagement across different achievement levels. Findings also suggest that multimodal, youth-oriented science communication may positively influence both cognitive and affective dimensions of STEM learning. In addition, post-intervention responses reflected more positive and confident perceptions of women in scientific careers, as well as a stronger sense that STEM pathways are accessible.

The findings highlight the potential of multimodal science communication as a practical and scalable approach to supporting STEM motivation and identity development both within and beyond the classroom. Results suggest that students' scientific interest can be strengthened through youth-oriented, multimodal content. By offering an out-of-classroom learning experience, the series can be meaningfully integrated into formal education and can complement pedagogical approaches such as PBL (project-based learning), IBL (inquiry-based learning), and DBL (design-based learning). The visibility of authentic female role models may further contribute to increasing girls' interest in STEM careers and broadening students' perceptions of belonging in scientific fields. Overall, the approach

offers useful insights for educators, researchers, and curriculum developers seeking innovative strategies to support the next generation of learners without requiring large-scale systemic educational reform.

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