

FROM STORY TO STEM: EMPOWERING STUDENTS THROUGH DIGITAL STORYTELLING IN GENDER EQUALITY EDUCATION

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Abstract

This paper presents findings from the piloting phase of the *Digital Stories* set developed within the Erasmus+ project *Digital Bridges Over the Gender Gap* (2024–2026), an international initiative promoting gender equality and inclusion in school education through innovative digital pedagogies. The project's central objective is to bridge gender disparities in career aspirations—especially in STEM fields—by integrating digital storytelling into teaching practice. Digital storytelling was introduced in four European partner schools as both a creative learning method and a tool for social reflection. The *Digital Stories* set features narratives of women who have achieved success in traditionally male-dominated fields such as science, technology, and engineering. The piloting involved teachers and students aged 13–18, who participated in classroom-based and online activities combining digital story creation, viewing, and discussion. To assess the educational and motivational impact, data were collected through semi-structured interviews with teachers and focus group interviews with students. The results indicate that digital storytelling significantly enhanced students' engagement, empathy, and reflection on gender stereotypes. Teachers described the method as an innovative and flexible pedagogical approach that encourages creativity, collaboration, and digital competence development. Students found the stories emotionally compelling and relatable, reporting that they could “see themselves” in the protagonists' experiences. Many expressed a renewed interest in exploring STEM-related studies and careers, attributing their motivation to the immersive and authentic nature of the digital stories. The process of co-creating and interpreting stories also strengthened learners' narrative, media, and communication skills. These findings suggest that digital storytelling can serve as a transformative educational strategy that connects narrative meaning-making with social change. It enables teachers to foster inclusive learning environments and supports students in developing both digital literacy and self-efficacy. The *Digital Bridges* project demonstrates how transnational collaboration can generate sustainable pedagogical innovations addressing gender equality, inclusion, and digital transformation in education.

Keywords: *Digital storytelling, gender equality, STEM motivation, inclusive education, Erasmus+.*

1. Introduction

Persistent gender disparities in students' educational choices and career aspirations in science, technology, engineering, and mathematics (STEM) remain a well-documented challenge across Europe. Despite sustained policy efforts at the European and national levels, girls and young women continue to be underrepresented in many STEM pathways, particularly in technology and engineering fields (European Commission, 2023; OECD, 2023). Research consistently shows that these disparities emerge early in adolescence and are strongly shaped by gender stereotypes, social expectations, and students' developing academic identities rather than by differences in ability (Eccles & Wang, 2016; UNESCO, 2024).

Traditional educational interventions aimed at reducing the gender gap in STEM have often relied on informational approaches or exposure to role models, such as presenting biographies of successful women scientists or organizing career talks. While such initiatives may temporarily raise awareness, evidence suggests that their impact on students' long-term motivation and self-concept is limited when not accompanied by deeper reflective and identity-oriented learning processes (Cheryan et al., 2017; Master et al., 2021). Students may recognize the achievements of female role models without perceiving these trajectories as personally attainable or relevant to their own lives.

Syntheses of empirical studies indicate that digital storytelling supports learning outcomes across cognitive, affective, and social domains, including academic achievement, engagement, communication skills, and reflective capacity (Moreau et al., 2018; Nasir et al., 2024). Crucially, the strongest and most sustained effects are observed when learners actively create or co-create digital stories rather than passively

consume them, when reflection is explicitly scaffolded through prompts or frameworks, and when implementation extends over sufficient time to allow for iterative development.

Despite the expanding literature on digital storytelling in education, important gaps remain. First, there is limited empirical research that explicitly examines digital storytelling as a pedagogical strategy for gender equality education within school-level STEM contexts. Much of the existing work focuses on higher education, teacher education, or language learning, leaving secondary education underrepresented. Second, relatively few studies adopt a dual-perspective approach that captures both student and teacher experiences, particularly within transnational educational initiatives where contextual diversity and transferability are critical considerations.

The aim of this study is to explore how digital storytelling supports student engagement, reflection on gender stereotypes, and motivation towards STEM pathways within upper primary and secondary education. The study addresses the following research questions:

1. How do students perceive digital stories portraying women in STEM careers?
2. How does digital storytelling influence students' reflection on gender stereotypes?
3. How do teachers evaluate digital storytelling as a pedagogical tool for gender equality education?

2. Methods

This study adopted a qualitative, exploratory, multi-site case study design to investigate digital storytelling as a pedagogical intervention in authentic educational contexts. The research was embedded within the Erasmus+ project *Digital Bridges Over the Gender Gap* (2024–2026), which promotes gender equality and inclusion in school education through innovative digital pedagogies. A case study approach enabled the exploration of how digital storytelling was experienced and interpreted by students and teachers across different national and institutional settings (Yin, 2018).

The study was conducted in four schools in different European countries. Participants included students aged 13–18 from upper primary, lower and upper secondary levels and teachers from STEM-related and transversal subjects. The intervention focused on a Digital Stories set portraying women in traditionally male-dominated STEM fields, highlighting authentic career trajectories, challenges, and turning points. Data were collected through semi-structured interviews with teachers and focus group interviews with students to capture in-depth perspectives on engagement, reflection, and perceived impact. Ethical standards for educational research were observed, including informed consent, voluntary participation, anonymity, and secure data handling.

Data analysis followed a reflexive thematic analysis approach (Braun & Clarke, 2021), combining deductive and inductive coding. Initial codes focused on engagement, empathy, reflection, and STEM-related self-efficacy, with inductive coding used to identify emergent themes.

3. Results

The qualitative analysis yielded four interrelated themes addressing students' and teachers' experiences of digital storytelling in the context of gender equality and STEM education. Students across all participating schools perceived the digital stories as *relatable*, *authentic*, and emotionally engaging. The narrative format and multimodal elements enabled students to connect more strongly with the protagonists, often describing the women portrayed in STEM as “people like us” rather than distant role models.

Focus group data revealed clear evidence of dialogic reflection. Students compared their prior assumptions about gender and STEM with the perspectives presented in the stories, frequently questioning stereotypical associations between masculinity and technical competence. In several cases, reflections developed towards emerging critical reflection, particularly when students discussed structural influences such as social expectations or limited encouragement for girls in STEM. Such depth of reflection was most evident when discussions were supported by guided prompts and peer dialogue, echoing earlier findings on the role of digital storytelling in fostering critical engagement with gender norms (Moreau et al., 2018).

From the teachers' perspective, digital storytelling was evaluated as a pedagogically valuable and flexible approach for addressing gender equality in STEM education. At the same time, teachers identified challenges related to limited instructional time and lack of technical support - common implementation constraints reported in digital storytelling research (Moreau et al., 2018; Nasir et al., 2024).

4. Discussion

The findings confirm that digital storytelling can support affective engagement and reflective learning in upper primary and secondary education. Students' emotional resonance with the narratives and

shifts in perceptions of gender and STEM careers align with prior research highlighting the importance of narrative relevance and personal identification in digital storytelling-based learning (Kendrick et al., 2022).

The results also reinforce the distinction between active meaning-making and passive exposure identified in the literature. Although students responded positively to viewing digital stories, deeper reflection—especially dialogic and emerging critical reflection—occurred primarily when viewing was embedded within guided discussion and reflective prompts. This supports evidence from reviews indicating that digital storytelling yields stronger learning and reflective outcomes when learners actively interpret and discuss narratives rather than merely consume them (Moreau et al., 2018; Nasir et al., 2024).

Several limitations should be noted. The qualitative, exploratory, and pilot-scale nature of the study limits generalisability, and reliance on self-reported perceptions may reflect short-term effects. Moreover, the absence of longitudinal data prevents conclusions about sustained impact on students' STEM choices. Future research should therefore employ mixed-methods and longitudinal designs and explore stronger integration of story creation alongside viewing, as co-creation and iterative storytelling have been shown to foster deeper reflection and learner ownership (Nasir et al., 2024).

5. Conclusions

This study demonstrates that digital storytelling can function as a meaningful and effective pedagogical approach for promoting student engagement, reflective thinking, and motivation towards STEM pathways. By presenting socially relevant narratives of women in STEM and embedding them in guided, dialogic learning activities, digital storytelling enabled students to critically examine gender stereotypes and to envision more inclusive possible futures for themselves.

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References

- Braun, V., & Clarke, V. (2021). *Thematic analysis: A practical guide*. SAGE.
- Cheryan, S., Ziegler, S. A., Montoya, A. K., & Jiang, L. (2017). Why are some STEM fields more gender balanced than others? *Psychological Bulletin*, 143(1), 1–35. <https://doi.org/10.1037/bul0000052>
- Eccles, J. S., & Wang, M.-T. (2016). What motivates females and males to pursue careers in mathematics and science? *International Journal of Behavioral Development*, 40(2), 100–106. <https://doi.org/10.1177/0165025415616201>
- European Commission. (2023). *She figures 2023: Gender in research and innovation*. Publications Office of the European Union.
- Kendrick, M., Early, M., Michalovich, A., & Mangat, M. (2022). Digital storytelling with youth from refugee backgrounds: Possibilities for language and digital literacy learning. *TESOL Quarterly*, 56(2), 483–509. <https://doi.org/10.1002/tesq.3064>
- Master, A., Cheryan, S., & Meltzoff, A. N. (2021). Computing whether she belongs: Stereotypes undermine girls' interest and sense of belonging in computer science. *Journal of Educational Psychology*, 113(3), 544–556. <https://doi.org/10.1037/edu0000465>
- Moreau, K. A., Eady, K., Sikora, L., & Horsley, T. (2018). Digital storytelling in health professions education: A systematic review. *BMC Medical Education*, 18, 208. <https://doi.org/10.1186/s12909-018-1320-1>
- Nasir, W. M. F. W. M., Halim, L., & Arsad, N. M. (2024). Digital storytelling learning outcomes and critical factors: A scoping review. *International Journal of Learning, Teaching and Educational Research*, 23(1), 1–25. <https://doi.org/10.26803/ijlter.23.5.17>
- OECD. (2023). *Bridging the digital gender divide: Include, upskill, innovate*. OECD Publishing.
- UNESCO. (2024). *Girls' and women's education in STEM: Closing the gender gap*. UNESCO Publishing.
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE.