

Visual narratives for development of STEAM identity before stereotypes set in young children

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By age 6, children already believe that boys are better at computer science and engineering.

The stereotype is in place before girls ever meet formal STEAM pathways. This work builds the case for reaching children first, through visual stories in which they can see themselves.



Strongest in engineering-type fields

A preregistered meta-analysis of 98 studies (145,204 children, 33 countries) found only weak math stereotypes, but clear pro-boy beliefs about computer science, engineering and physics, already present at age 6.

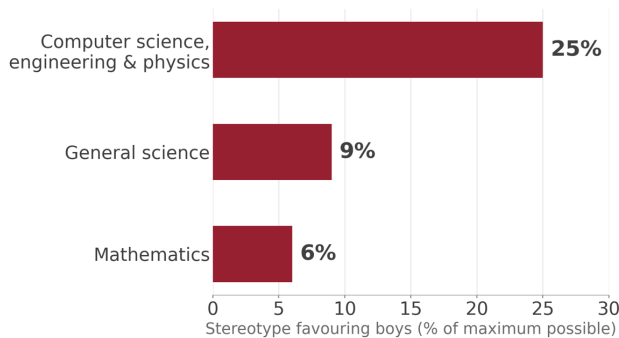


Figure 1 – Mean stereotype score by domain (scale -1 to +1, shown as % of maximum). Data: Miller et al. (2024).

By age 10–11, girls draw more men

Across 78 Draw-A-Scientist studies (N = 20,860), girls drew mostly women at age 6 but switched to drawing mostly men around ages 10–11, even as children's magazines showed more women in science (Previs, 2016).

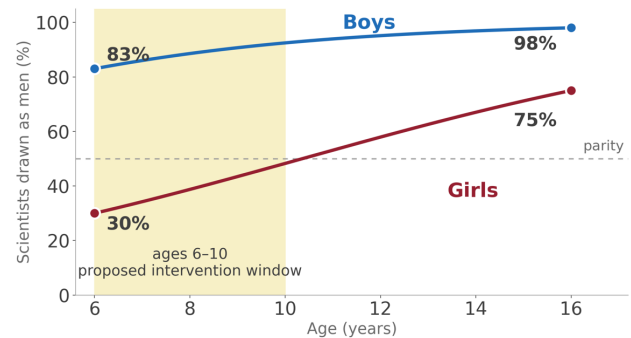


Figure 2 – Scientists drawn as men, U.S. studies 1985–2016. Curves interpolate the estimates reported for ages 6 and 16. Data: Miller et al. (2018).

From evidence to design

Each finding from the literature (top) leads to a design choice for the comic (bottom).

1 Stereotypes form early

Gender stereotypes about ability are in place by age 6 (Bian et al., 2017; Miller et al., 2024).



Ages 6–10, with engineering and technology, not only maths.

2 Shared stories matter

Narrative identity has its roots in stories children share with adults (McAdams & McLean, 2013).



Read it in class, with teachers guiding the conversation.

3 Role models help

Seeing counter-stereotypical women weakens automatic gender stereotypes (Dasgupta & Asgari, 2004).



Tell the stories of real women in STEAM, starting in Portugal.

4 Doing beats being

Presenting science as something you do, not something you are, raises girls' persistence (Rhodes et al., 2019).



Child heroes, girls and boys alike, who investigate and build.

5 Manga travels

Comics engage through images and characters (Farinella, 2018); manga travels through localisation (Brienza, 2016).



Manga style, written in Portuguese and set in Porto.

Proposed intervention



Figure 3 – AI-assisted concept pages: four children discover Carolina Beatriz Ângelo, the first woman to vote in Portugal (1911). Planned: a 50-page comic, 500 copies for 1.º ciclo schools in Lordelo do Ouro e Massarelos (ABA proposal to Porto's Orçamento Colaborativo 2026).

Next steps and open questions

- Complete the literature review for each of the five building blocks
- Test whether manga-style characters support identification for Portuguese children aged 6–10
- Evaluate the comic with pre/post Draw-A-Scientist and stereotype measures
- Check that “exceptional woman” stories challenge stereotypes rather than confirm them as exceptions

References: Bian, Leslie & Cimpian (2017) Science · Brienza (2016) Manga in America, Bloomsbury · Dasgupta & Asgari (2004) J. Exp. Soc. Psychol. · Farinella (2018) J. Sci. Commun. · McAdams & McLean (2013) Curr. Dir. Psychol. Sci. · Miller, Nolla, Eagly & Uttal (2018) Child Dev. · Miller, Lauer, Tanenbaum & Burr (2024) Psychol. Bull. · Previs (2016) Sci. Commun. · Rhodes, Leslie, Yee & Saunders (2019) Psychol. Sci.

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