Case 3: Building Confidence and Belonging Through Coding Clubs

(Based on Girls Who Code Clubs PATHWAYS curriculum tracks)

This case study looks at situations where girls' participation in mixed-gender STEM activities was lower than expected despite equal access. This pattern was not universal, but appeared most clearly among younger participants and beginners, particularly in coding and other technical activities often perceived as male-dominated.

The case is based on the PATHWAYS club model developed by Girls Who Code, a non-profit organisation founded to address gender gaps in technology and computer science. PATHWAYS offers beginner-friendly coding programmes for girls and young women, combining creative projects, mentoring, and community-building, with a strong focus on confidence and belonging. Rather than suggesting that girls cannot participate in mixed settings, this case explores how age-related, social, and cultural factors can influence confidence and engagement, and how girls-only or girls-first formats, used temporarily and contextually, can help reduce these barriers and support long-term participation in STEM.

THINKING Question:
Why some girls feel uncomfortable in mixed-gender STEM activities?

1. Age-related and developmental factors
During early and mid-adolescence (approx. 13–18):
- peer comparison becomes stronger;
- fear of making mistakes in front of others increases;
- confidence is more fragile, especially in areas socially labelled as "male".

In this phase, some girls reported:
- fear of being judged as "not good enough";
- reluctance to ask questions publicly;
- pressure to perform or prove competence.

2. Social and group dynamics
In mixed groups, girls often experienced:
- boys dominating technical tasks or speaking time;
- assumptions that boys were "naturally better" at coding;
- subtle discouragement (interruptions, dismissive comments, taking over tasks).

Even when unintentional, these dynamics reinforced feelings of not belonging.

3. Stereotype threat and cultural expectations
In many cultural contexts, STEM and coding are still implicitly framed as masculine, competitive and requiring prior informal exposure.

Girls reported feeling they had to be "perfect" to justify their presence and avoid mistakes to not confirm stereotypes.

This effect varied by country and culture, but was present across multiple contexts.

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How the clubs were designed differently?

To address these barriers, the organisation introduced girls coding clubs, inspired by the Girls Who Code model, targeting girls and young women aged 15–25, with particular focus on beginners.
The clubs aimed to function as:
• confidence-building spaces, not replacements for mixed learning;
• environments where mistakes and learning curves were normalised.

Beginner-friendly, non-competitive learning culture

Activities focused on:
- creative coding projects;
- personalisation and experimentation;
- collaboration rather than speed or comparison.

This reduced performance pressure and supported gradual skill development.

What facilitators did differently ?

Facilitators used identity-affirming language, such as:
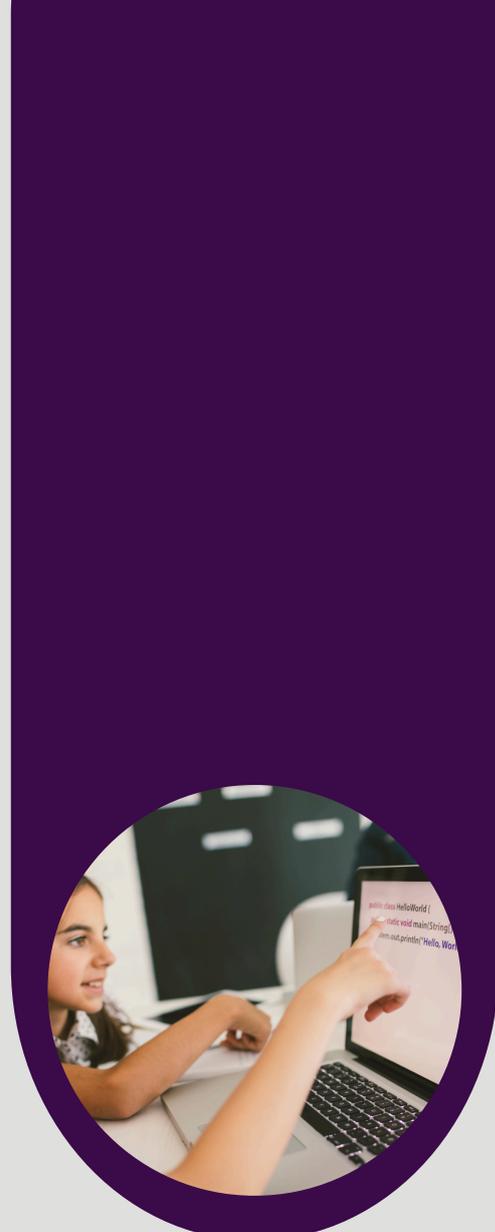
"You're thinking like a developer."
"That's computational thinking."
"This is how programmers debug."

Reflection prompts helped participants recognise growth:
"What did you figure out today?"
"What challenge did you overcome?"

Why this approach worked?

The girls-only format worked in this specific context because it:

- reduced fear of negative comparison;
- allowed girls to take technical risks;
- normalised asking questions and making mistakes;
- built confidence that later transferred to mixed settings.

Importantly, older participants (18–25) and those with higher confidence often expressed readiness to move into mixed or professional environments after this phase.

What impact does the initiative have?

- Increased retention of girls in coding activities
- Higher self-confidence in technical abilities
- Greater willingness to participate in mixed STEM environments later

Participants reported:
"I realised I'm not 'bad at coding' — I just needed time and space to learn."

Conditions for Applicability (important for youth workers)

STEM spaces designed exclusively for girls or with priority for girls are most appropriate when:

- working with teenagers (aged around 13–18);
- participants have little previous experience with STEM;
- mixed groups show clear dominance or imbalance;
- confidence and belonging are major barriers.

They may be less necessary when:

- working with older youth (20–29);
- groups already demonstrate inclusion dynamics;
- participants express strong confidence and initiative.

How could you apply the model in your context?

1. Start with Observation and Evidence (Before Designing the Activity)

Youth workers should not assume that girls need separate spaces. Instead, begin by observing and collecting evidence in your specific context.

Practical actions:
- Observe mixed-gender sessions:
  - Who speaks most?
  - Who takes control of technical tasks?
  - Who asks questions, and who stays silent?
- Track participation and retention by gender and age.
- Collect informal feedback through:
  - short anonymous questionnaires;
  - focus groups;
  - one-to-one conversations.

Key questions to ask:
"Do participants feel comfortable making mistakes here?"
"Do some participants hold back or withdraw?"
"Are learning dynamics unintentionally competitive?"
Girls-only or girls-first formats should be considered only if concrete barriers are observed.

2. Frame the Space Carefully (Language Matters)

How you communicate the purpose of girls-only or girls-first spaces is critical.

Recommended framing:
"A space to build confidence and skills."
"An entry point for beginners."
"A supportive learning environment to experiment and learn."

Avoid framing such as:
"Girls learn better without boys."
"This is needed because girls are weaker at tech."

Key message to participants:
"This space exists to support learning and confidence — not because of ability, but because of learning conditions."

3. Design the Learning Experience to Address the Actual Barriers

Girls-only spaces alone are not sufficient. The learning design must respond to the identified challenges.
Focus on:
- beginner-friendly tasks;
- creative, open-ended projects;
- collaboration instead of competition;
- visible normalisation of mistakes.

Practical facilitation strategies:
- Rotate roles within teams.
- Celebrate learning attempts, not speed or perfection.
- Use identity-affirming language consistently.
- Make troubleshooting collective rather than individual.

4. Adapt to Cultural and Local Contexts

Gender dynamics vary significantly across:
- countries;
- communities;
- schools;
- socio-cultural backgrounds

Youth workers should:
- avoid copying models without adaptation;
- consult local stakeholders (teachers, parents, youth);
- reflect on cultural norms around gender and education.

What works in one context, may need adjustment, require additional explanation or be inappropriate elsewhere.

Girls-only or girls-first STEM spaces are not a goal in themselves, but a responsive tool to address specific, observed barriers related to confidence, belonging, and participation, particularly at certain ages and learning stages.

Instead of a blanket recommendation, use this framing:
"Consider girls-only or girls-first STEM spaces if you observe confidence gaps, strong comparison with boys, or unequal participation — especially among younger adolescents or beginners."