Fostering Innovations and Nurturing Diversity in STEM Education
- FIND STEM –

2024-1-EL01-KA210-SCH-000249907

Continuous Professional Development Curriculum and Teacher Training

Module 5: Addressing Gender Equality and Inclusivity in STEM

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Module 5: Addressing Gender Equality and Inclusivity in STEM

Description

This module aims to create a more inclusive and equitable STEM learning environment. Teachers will explore strategies to encourage girls' interest in STEM, integrate emotional intelligence, and promote self-expression while ensuring a safe and diverse classroom atmosphere.

Key Topics

- Encouraging girls' interest in STEM through interactive activities
- Integrating emotional intelligence and self-expression in STEM teaching
- Strategies for creating a safe and inclusive classroom environment
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General Learning Outcomes

Upon the completion of the module educators will:

- Develop strategies to encourage girls' participation and interest in STEM through role models, mentorship, and engaging activities.
- Incorporate emotional intelligence and self-expression in STEM teaching to create a more inclusive and supportive learning environment.
- Implement classroom practices that promote gender equality, diversity, and inclusivity, addressing stereotypes and biases.
- Foster a safe and welcoming STEM learning environment that supports all students, regardless of gender or background.

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Activities

<table>
<tr><th colspan="2">Activity 1</th></tr>
<tr><th colspan="2">Role Models in STEM</th></tr>
<tr><td rowspan="2">Specific Learning Outcomes</td><td>Identify key role models from diverse backgrounds in STEM.</td></tr>
<tr><td>Inspire girls to pursue STEM careers by discussing real-life success stories.</td></tr>
<tr><td>Teaching Methods and Approaches</td><td>Storytelling and Discussion; Group Work</td></tr>
<tr><td>Duration</td><td>20 min</td></tr>
<tr><td>Delivery format</td><td>Face to face/ online</td></tr>
<tr><th colspan="2">Activity description</th></tr>
<tr><td colspan="2">This activity emphasises the impact of role models in STEM education by engaging participants in group-based exploration and presentation of inspiring figures.

Session Flow:

1. Introduction to Gender equality and inclusivity in STEM:

Gender equity and inclusivity in STEM education refer to the equal and respectful treatment of all students - regardless of gender, background, ability, or identity- in science, technology, engineering, and mathematics classrooms. While there has been progress, significant disparities in STEM participation and achievement remain, especially for girls and underrepresented groups.
• Show the video: “Women Scientists Behind NASA’s Greatest Achievements.”
• Ask participants: “Why do role models matter in shaping aspirations, especially in STEM?”
2. Group Task “Who inspires you?”:
• Divide into small groups (3–4 participants).
• Provide each group with a list of diverse STEM role models (or allow independent research).
• Instruct each group to:
✓ Choose one role model.
✓ Create a short presentation including background, key contributions, challenges overcome, and how their story could inspire students.
3. Presentations:
• Each group presents to the full cohort.
• Encourage creative formats (e.g., short posters, quick storytelling).
4. Plenary Discussion:
• What common traits emerged across these role models?
• How can we ensure such stories are part of everyday STEM instruction?
• How might representation impact students differently depending on gender or background?

Expected Outcomes:
• Increased awareness of diverse figures in STEM.
• Practical strategies to integrate role model narratives in the curriculum.</td></tr>
<tr><td>Assessment Methods</td><td>• Group reflections on how role models influence student aspirations.</td></tr>
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	• Presentation of ideas on integrating role models into lessons.
Resources	Video: Women Scientists Behind NASA's Greatest Achievements: https://www.youtube.com/watch?v=Y5_C_sO9rPE

Activity 2	
Emotional Intelligence in STEM	
Specific Learning Outcomes	Integrate emotional intelligence into STEM teaching.
	Facilitate self-expression and empathy within STEM activities.
Teaching Methods and Approaches	• Interactive Exercises • Reflective Practices
Duration	20 min
Delivery format	Face to face

Activity description

This session introduces participants to emotional intelligence (EI) and explores its integration into STEM education to enhance empathy and resilience.

Session Flow:

1. **Warm-Up Reflection**:

- Ask participants to reflect individually: "Think of a time when emotions helped or hindered your learning. What happened?"
- Optional pair-share to build comfort and personal connection.

2. **Concept Input**:

- Introduce core EI components: self-awareness, self-regulation, empathy, social skills.
- Discuss why these matter in STEM (e.g., collaboration during group work, perseverance during problem-solving).

3. **Activity Design**:

- In pairs, design a mini-STEM task where students reflect on emotional responses at different stages (e.g., using emotion cards after team tasks).
- Prompt: "How will students be guided to name and process their emotions?"
- Include an emotional support strategy (e.g., 'frustration reset breaks').

4. **Group Sharing and Feedback**:

- Invite pairs to present their concepts.
- Facilitator and peers offer constructive feedback.

5. **Wrap-Up Discussion**:

- Ask: "How can integrating EI change classroom dynamics?"
- Record practical classroom strategies for building an emotionally aware STEM culture.

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6. Integrating Emotional Intelligence and self-expression in STEM teaching • Brief explanation about the integration of emotional intelligence and self-expression in STEM teaching. **Expected Outcomes**: • Teachers apply EI principles to design reflective, inclusive STEM learning experiences. • Awareness of how to normalise emotional expression in problem-based learning.	
Assessment Methods	• Peer feedback on proposed activities. • Self-assessment on integrating emotional intelligence.
Resources	Video: UNICEF – Girls Can Code: https://www.youtube.com/watch?v=C4SM9D-VmUo

Activity 3	
Inclusive STEM Practices	
Specific Learning Outcomes	Implement inclusive teaching practices in STEM education. Address stereotypes and biases within the classroom setting.
Teaching Methods and Approaches	• Group Brainstorming • Case Study Analysis
Duration	20 min
Delivery format	Face to face/ online
Activity description	

This activity addresses classroom biases and introduces inclusive teaching strategies through case study reflection and collaborative role-play.

Session Flow:

1. **Case Study Reading**:

- Distribute a short scenario describing implicit gender bias in a STEM lesson.
- Ask: "What's the issue here? Who is affected and how?"

2. **Small Group Discussion**:

- In groups of 3–4, discuss:
  - What forms of bias are present?
  - How could a teacher effectively respond?
  - What systemic issues does the scenario reflect?

3. **Role-Play Creation**:

- Each group creates a short scene illustrating how a teacher might intervene in real time (e.g., affirming a female student's contribution, rebalancing group roles).
- Prepare a script or improvise a short performance.

4. **Role-Play Performances and Feedback**:

- Each group performs.
- Facilitator prompts reflection: "What was effective? How might students react?"

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5. Collective Strategy Building: • Groups contribute ideas to a shared "Inclusive STEM Checklist." • Discuss how to implement and revise it within participants' school contexts. **6. Strategies for creating a safe and inclusive classroom environment** • Strategies and examples for creating a safe and inclusive classroom environment. **Expected Outcomes**: • Participants recognise subtle classroom biases. • They leave with an actionable list of inclusive strategies tailored to their practice.	
Assessment Methods	• Group presentation of lesson plans. • Reflection on strategies for bias reduction.
Resources	• Case scenario examples (see Appendix 1) • Article: "Gender Stereotypes and STEM Education" (Bannikova et al., 2016)

Resources

- **TED Talk**: "Teach Girls Bravery, Not Perfection" by Reshma Saujani – A motivational talk on how our culture shapes girls to strive for perfection instead of bravery, and how that impacts their role in STEM.
- **National Geographic**: *Hidden Figures* Featurette – "Meet the Women Who Changed NASA" – A short documentary-style featurette about the real women behind *Hidden Figures*.
- **UNESCO Video**: "Girls Can Code" – Highlights programs empowering girls through coding across different countries.
- **SciGirls PBS Series**: "SciGirls: STEM Adventures for Girls" – A full educational series featuring real girls solving real problems using STEM.
  Twin Cities PBS. (n.d.). *Creature Features* [Online game]. PBS Kids SciGirls. https://pbskids.org/scigirls/games/creature-features
- Lyda Hill Philanthropies. (2025). *IF/THEN® Collection*. https://www.ifthencollection.org/
- UNESCO. (2019). *Resource guide: building girls' interest in STEM education*. https://unesdoc.unesco.org/ark:/48223/pf0000372310
  European Institute for Gender Equality. (2025). *Step-by-step toolkits*. https://eige.europa.eu/gender-mainstreaming/toolkits

Summary of key takeaways

- Promoting girls' interest in STEM through role models and mentorship can foster a more diverse future in STEM fields.

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- Integrating emotional intelligence into STEM lessons promotes a supportive and inclusive learning environment.
- Addressing gender biases and stereotypes within the classroom is essential for fostering inclusivity.
- Inclusive project design ensures that all students are actively engaged and represented.

References

Gay, G. (2018). *Culturally Responsive Teaching: Theory, Research, and Practice* (3rd ed.). Teachers College Press.

National Academy of Engineering. (2008). *Changing the Conversation: Messages for Improving Public Understanding of Engineering*. National Academies Press. https://doi.org/10.17226/12187

McGuire, L., Mulvey, K. L., Goff, E., Irvin, M. J., Winterbottom, M., Fields, G. E., Hartstone-Rose, A., & Rutland, A. (2020). STEM gender stereotypes from early childhood through adolescence at informal science centres. *Journal of applied developmental psychology*, 67, 101109. https://doi.org/10.1016/j.appdev.2020.101109

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Appendix 1

Case Study 1: The Coding Challenge
Scenario:
The teacher is instructing a robotics class for middle school students. The students are put in co-ed groups to program a robot. In the majority of groups, the boys jump on the laptops, and the girls are instructed to "help with the decorations" or "take notes."
The boys' programming skills are praised by the teacher, but she does not notice that the girls are not being given hands-on programming practice.

Implicit Bias
Assuming boys are stronger or more qualified to do technical work than girls.

Impact:
Girls may be dissuaded from attempting programming, reinforcing the idea that computer programming is "for boys."

Case Study 2: The Question Redirect
Scenario:
During a physics class in an upper-level high school, a girl poses an especially challenging question about magnetism. The teacher redirects the question to a boy and says, "He's very knowledgeable about this topic - explain it to us.".
Assuming the male student to be more capable of explaining the concept despite having taken the initiative by the female student.

Effect:
The female student's confidence is shattered, and the learning experience is channelled away from her.

Case Study 3: The Praise Gap
Situation:
Following a math competition, a teacher gives feedback to all students. Male students are told that they are "brilliant" or "naturally gifted," while female students are told that they are "hard workers" or "well organised."

Implicit Bias:
Associating math achievement with inborn talent in boys and work in girls.

Effect:
Girls can assume that they lack natural talent in math, even when they're performing equally as well academically.

Case Study 4: The Equipment Bias
Scenario:
A high school engineering teacher has students build a bridge model using power tools. The teacher unavoidably insinuates himself to guide female students more overtly than male students, doing the work for them "just to be safe."

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Implicit Bias:
Assuming girls are less competent or capable with hands-on devices.

Impact:
Girls can miss out on acquiring critical skills and begin doubting their competence at hands-on STEM experiences.

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