BLOOMING
Inclusion and Diversity in STEAM

IT BLOOMING Project – Italy Report Summary

Partner: Università di Palermo - Dipartimento di Fisica e Chimica "E. Segré" (UniPA)
Timeframe: November 2024- April 2025
Work Packages: WP2 (Toolkit)+ WP3 (Storybook)

Testing of Educational Activities in Classrooms

Activity Title: *Blooming Toolkit – Stories of the Past and Present & Adapted Scientific Articles*
Target Group:

- Secondary school students (ages 13–14)
- High school students (ages 16–18)

Schools Involved:

- ICS Maredolce

- Gonzaga Campus

- Liceo Scientifico "A. Einstein"

Implementation Context:
At the ICS Maredolce, the Blooming project pilot was carried out within the framework of a dedicated mentoring initiative designed to support students in exploring and choosing their future careers in the scientific field. This activity was integrated into the broader set of project actions funded under the National Recovery and Resilience Plan (PNRR), to foster scientific vocation, enhance awareness of career opportunities, and strengthen the connection between education, research, and the labor market.

Two pilots were implemented at the Gonzaga Campus – Centro Educativo Ignaziano in Palermo: the first in the final-year classes of the STEM High School (Liceo STEM) and the second with the participants of the InfoDay in April. This choice of context was particularly meaningful, as the school represents a long-standing educational institution in the city, rooted in the Jesuit pedagogical tradition and well known for its strong commitment to academic excellence, personal growth, and social responsibility.

The fourth pilot of the Blooming project was conducted in a fourth-year class of the Liceo Scientifico Einstein, during the hours dedicated to Citizenship and Civic Education activities. This context provided a meaningful opportunity to explore issues of gender equality, inclusion, and diversity in STEM within a framework focused on responsible citizenship.

Student Demographics:

- **Secondary School (ICS Maredolce):**
   2 classrooms, about 20 students each (13–14 years)
- **Gonzaga Campus:**
   1 classroom, 18 students (17-18 years)

   16 participants to the InfoDay (13-18 years)

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- **High School "Einstein":**
  22 high school students (ages 16–17)

Content Tested:

- **Blooming Toolkit activities**:

  o Stories of the past and present (role models in STEAM)
  o Empathy maps and interviews with women in science
  o Adapted scientific articles authored by women in STEM

- Classroom interventions included:

  o Reading and discussing Blooming stories and articles in physics/chemistry and science courses

  o Student-led reflection activities (empathy maps, story-based discussion prompts)

  o Presentation of key ideas and stereotypes identified, followed by group Q&A

📚 Feedback on Scientific Articles & Classroom Activities

- **Student Engagement:**
  - Strong interest in personal stories and scientific journeys of female role models. Empathy map activities were especially popular.
  - High-school students valued the adapted scientific articles, noting their accessibility and relevance to current studies.
  - Particular attention was devoted to the scientific articles, which students explored in depth. Among these, the article on bioplastics captured the students' interest most, sparking lively discussions on sustainable materials and their applications.
  - Students could write short stories, dialogues, or even scripts for mini-presentations. After completing their narratives, they shared their stories with the class, fostering discussion on gender equality, representation in STEM, and the social impact of scientific work.

- **Teacher Feedback:**

The section "STEAM Women from the Past" was especially valued for its inspiring profiles of figures like Ada Lovelace, Hedy Lamarr, Katherine Johnson, Maria Telkes, and Rosalind Franklin—offering tangible role models for students and reinforcing the importance of representation. Additionally, the repository of STEAM Scientific Articles penned by leading women offered a rich, research-based resource that supports both teachers' lesson planning and students' independent exploration.
High educational value in the adapted scientific articles. However, improvements are recommended in:
  o Translation accuracy
  o Visual presentation (more photos, posters, videos)
  o Availability of editable resources (e.g., worksheets in Word)

📊 Key Outcomes – Young Learners

Indicator	Result
% of young learners (13–17) who used BLOOMING stories and felt inspired to pursue a career in STEAM	75%
% of young learners (13–17) who reported better awareness of gender stereotypes in STEM	
This result highlights the positive influence of relatable role models and inclusive teaching methods in inspiring students' future aspirations.	85%

📈 Outcomes of Training Activities

Indicator	Result
% of educators/teachers/professors and undergraduate students who improved awareness of inclusive teaching practices	~78%
% of educators/teachers/professors and undergraduate students satisfied with training activities (face-to-face & online)	~78%
% of educators who feel engaged in promoting inclusion in STEAM	90%

Teachers expressed high engagement with the BLOOMING content and acknowledged its potential to reshape classroom dynamics in favour of inclusion and gender equality.

By integrating the Blooming materials into the lessons, students could be encouraged to reflect not only on scientific achievements but also on the social and cultural dimensions of scientific participation. The project material allows them to discover and discuss the contributions of women in STEAM, fostering awareness of underrepresentation while promoting critical thinking and active engagement. This approach demonstrates how STEM education and citizenship education can complement each other to cultivate both scientific curiosity and social responsibility.

✅ Recommendations and Conclusions

- At the Gonzaga Campus, the Blooming pilot was able to build on the school's strong foundations in both scientific inquiry and values-based education, ensuring a fertile ground for reflection on inclusion, diversity, and gender balance in STEAM careers.

- The pilots demonstrated how the Blooming materials can combine theoretical knowledge with experiential learning, fostering both scientific curiosity and active participation.

- **Toolkit Improvements:**

  Address translation inconsistencies;

Enhance visual appeal;

Enhance interactivity – integrate more digital and multimedia elements (short videos, podcasts, interactive timelines) to increase student engagement.

- **Teacher Empowerment:**
  Offer teacher training modules – create short, practice-oriented workshops or online tutorials to help educators make the most of the toolkit.

  Encourage co-creation – provide templates for students to build and share their own digital stories or podcasts, creating a shared repository of peer-generated materials.

  Monitoring and feedback tools – include simple evaluation instruments (surveys, rubrics, reflection sheets) to help teachers and students track learning outcomes.

- **Dissemination Focus:** Encourage participation in local events, share outcomes on social media, and engage policy makers.

- **Sustainability Strategy:** Promote ongoing training via webinars and develop national-level partnerships with schools and education authorities; Incorporate Blooming Toolkit activities as regular interventions in the associated schools

Conclusion

The testing phase of the Blooming project, carried out between November 2024 and April 2025 across three different educational institutions in Palermo, has provided highly valuable insights into the potential of the toolkit and storybook to foster inclusion, awareness, and engagement in STEAM education. The pilots, conducted at ICS Maredolce, the Gonzaga Campus, and the Liceo Scientifico "A. Einstein", demonstrated the adaptability of the Blooming materials to different school contexts, age groups, and subject areas. Each implementation contributed uniquely to the project's objectives, highlighting the ways in which stories, role models, and adapted scientific articles can enrich students' understanding of both scientific knowledge and the social dimensions of scientific participation.

At ICS Maredolce, the integration of Blooming within the framework of a mentoring initiative aligned with the PNRR represented a powerful opportunity to guide younger students (ages 13–14) in reflecting on their future career paths. The focus on scientific vocation, coupled with discussions on role models, encouraged students to think critically about opportunities and stereotypes, while helping them envision their place in the world of science. At the Gonzaga Campus, the pilots were particularly meaningful given the school's strong educational tradition. Here, students were able to combine academic excellence with values-based discussions on diversity and inclusion, and the InfoDay further extended the project's impact by reaching a broader group of students. The pilot at Liceo Einstein demonstrated how Blooming can effectively complement Citizenship and Civic Education, fostering not only awareness of gender equality in STEM but also a sense of responsible and inclusive citizenship.

Student feedback clearly showed the impact of the activities: 75% of participants reported feeling inspired to pursue a career in STEAM after engaging with the Blooming stories and role models, while 85% stated that their awareness of gender stereotypes had increased. The empathy maps and story-based discussions were especially well received, as they allowed students to connect emotionally with the experiences of female scientists and to reflect critically on representation in STEM. Among the adapted scientific articles, the piece on bioplastics stood out, sparking animated

debates on sustainability and demonstrating how scientific research can be made both accessible and engaging for young learners.

Teachers emphasized the high educational value of the materials, particularly the section dedicated to "STEAM Women from the Past," which offered powerful examples of figures such as Ada Lovelace, Hedy Lamarr, Katherine Johnson, Maria Telkes, and Rosalind Franklin. At the same time, they noted areas for improvement, such as ensuring more accurate translations, enriching visual resources, and providing editable formats to better adapt the materials to classroom needs. Importantly, educators recognized Blooming as a resource not only for content delivery but also for promoting inclusive teaching practices, with 90% of them reporting a stronger personal commitment to fostering gender balance and inclusion in their classrooms.

The pilots also underscored the importance of linking scientific content with broader cultural and civic values. By situating Blooming activities within diverse educational frameworks—career mentoring, Jesuit pedagogy, and civic education—the project demonstrated its versatility and potential for long-term sustainability. The combination of scientific storytelling, empathy-based reflection, and critical discussion proved to be an effective methodology for inspiring students, while simultaneously supporting teachers in rethinking their approaches to STEAM education.

Looking ahead, several recommendations emerged from the pilots. First, improving the toolkit's usability by addressing translation issues, enhancing the visual and interactive dimension, and integrating more multimedia content will significantly increase student engagement. Second, empowering teachers through short, practice-oriented training modules and providing tools for monitoring outcomes will enhance both confidence and impact. Third, fostering co-creation by enabling students to produce and share their own digital stories or podcasts can expand the project's reach and relevance. Finally, sustainability will depend on disseminating results through local events, social media, and policy channels, while also building partnerships with schools and education authorities to integrate Blooming as a recurring educational intervention.

Overall, the Blooming pilots have proven that combining scientific content with narratives of inclusion and diversity is not only feasible but highly impactful. The project has successfully engaged both students and teachers in a process of reflection, discovery, and transformation. By connecting scientific knowledge with role models, social awareness, and civic responsibility, Blooming contributes to building a more inclusive and inspiring vision of STEAM education—one that can empower the next generation to challenge stereotypes, embrace diversity, and actively shape the future of science and society.