

## *International Projects: Tracing the Journey From Design to Community Use*

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### **Abstract**

Nowadays, we are witnessing a gender gap in ICT caused by stereotypes and misconceptions that need to be reversed. To this end, a group of European partners has developed a two-year project to involve girls aged between 14 and 16 in STEM subjects. Empower Girls Creativity Through Use of Digital Technologies (SparkDigiGirls) is an ERASMUS+ project that culminated in the creation of an online course. This course consists of 16 challenges spread across different types of technologies (Augmented Reality, Virtual Reality, Artificial Intelligence, Internet of Things, Robotics, Online Security). Students are challenged to learn about technology, apply it to real everyday situations or needs and present evidence. At a later stage, the course was converted into a MOOC for mentors and integrated into the Chair4Future platform, specifically designed to disseminate knowledge to IPT students and teachers, partner institutions and the community in general. This platform includes courses that can promote the main competences identified as lacking in the IPT's target population. As an institution with courses in the ICT area, capturing the interest of the female gender is increasingly important. In this article we will present how the work produced within the scope of SparkDigiGirls and its main results were integrated into the Chair4Future platform, in order to allow the community to access the knowledge developed. This resulted in the original materials being made available in Portuguese and English and a MOOC for mentors in Portuguese.

Keywords: International Projects, SparkDigiGirls, MOOC, Mentoring

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## **Introduction**

Careers in technology and engineering are associated with gender stereotypes and misconceptions that persist and contribute to the gender gap in ICT. This is a reality experienced by companies in the sector but also by higher education institutions. It is believed that teachers and educators have a crucial role to play in redefining this perspective, providing guidance and opportunities for girls to make informed decisions (Marques et al., 2022; Marques et al., 2023).

The SparkDigiGirls project, co-funded by the Erasmus+ program, was developed between 2021 and 2023 to address the under-representation of girls in the digital technologies sector. It involved partners from four European countries: Lithuania, Portugal, Slovenia and Greece (Marques et al., 2023). The aim was first to identify ways of reversing the current situation and then to produce digital content to help teachers and educators with this demand.

The SparkDigiGirls project produced content of relevance to the community, and the pilot study revealed very positive results with the students involved (Marques et al., 2024). It was considered imperative to find a solution that would allow it to continue beyond the project. Continuity in terms of maintaining the platform and open access to interested parties. To this end, a fourth phase was added to the project, which enabled the development of a Massive Open Online Course (MOOC) for mentors and the availability of the content produced on an open access platform.

In this paper, we will first recap the resources produced as part of SparkDigiGirls, followed by how they were integrated into the Chaire4Future platform through the fourth phase (community use), which was created after the end of the project. This will allow the content produced to be made available for use by students, as well as a version for mentors who wish to implement it.

## **SparkDigiGirls Project**

SparkDigiGirls “Empower Girls Creativity Through the Use of Digital Technologies” is an international project that was born from the partnership of institutions from different EU countries Lithuania, Portugal, Slovenia and Greece. It lasted two years and was co-funded by the Erasmus+ strategic partnership in the field of youth. The main aim of the project was to create a way to inspire girls between the ages of 14 and 18 to explore digital technologies by generating new and innovative ideas, taking advantage of their newly acquired digital knowledge to contribute creatively to the traditionally male-dominated STEM industry (Marques et al., 2023).

The SparkDigiGirls initiative unfolded in three main phases: 1) Diagnostic and Curriculum Definition; 2) Content Development; and 3) Pilot Study and Dissemination (Marques, Araújo, et al., 2024).

The first phase involved identifying barriers to girls' participation in ICT and collecting insights through focus groups conducted in the participating countries. The analysis highlighted key factors, such as:

- Visible female leaders in ICT inspire girls to imagine themselves in similar roles.
- Providing practical exposure to digital tools and technologies fosters interest and confidence.

- Persistent biases dissuade girls from pursuing careers in STEM fields.
- Educators can play a critical role by actively encouraging girls to explore ICT.

These findings helped the definition of a curriculum to be designed to address these barriers through interactive and engaging methods.

During the second phase a course program, titled Unleash Your CreativITY with Technology, was developed. It consisted of 16 challenges delivered via a Moodle-based platform. These challenges covered various technologies, including Artificial Intelligence (AI), Augmented Reality (AR), Internet of Things (IoT), programming, 3D modeling, and blockchain. Each module (figure 1) included:

- Instructional videos explaining the technology and its applications.
- Tutorials with step-by-step guides for hands-on activities.
- Quizzes to test knowledge and reinforce learning.
- Tasks requiring evidence of completion, such as images, videos, or links.
- Participants earned certificates upon completing individual challenges. By completing challenges across six technology categories, they unlocked a Grand Certificate, symbolizing comprehensive mastery of the program.


**#7 Challenge: Futurist Artist**

"Girls are persistently underrepresented in computer science at all grade levels of school. Therefore, it is necessary to act from early age and add the computer science learning subject to the curriculum of 2nd and 3rd study cycles as well as technology subjects at grades, 10th, 11th and 12th."  
 (Vânia Ramos, Professor at University of Lisbon, Portugal)

**What is this challenge about?**  
 You are unique and so is your art! We all use social media and like to present our talent, but we also run the risk of someone appropriating our art. How can we prove that the work is really ours?  
 - NFT (Non-Fungible Tokens) are a recent technology based on blockchain that can be used to establish the authenticity of digital artworks. The Non-Fungible token represents something specific and individual and cannot be replaced, so it's perfect to provide you with a safe way to protect your masterpiece. In this challenge, you will create a gallery to exhibit your digital art with the potential of selling it.

**How long will it take?**  
 Assuming you already have art created, this will be a mini-challenge. You'll be amazed how quickly you can create your own virtual gallery and NFTs portfolio. This challenge will take around 2 hours. But you do have to dedicate many hours to creating your art, after all, is precisely what you love!

**What technologies will you use?**  
 #Blockchain / #Cloud Computing (Apps)



Step 1. Description of the Challenge: Futuristic Artist	Per completed Visualizer
Step 2. Discover Blockchain	Per completed Visualizer
Step 3. Understand NFTs	Per completed Visualizer
Step 4. Set Your Digital Wallet	Per completed Visualizer
Step 5. Display your Digital Art	Per completed Visualizer
Step 6. Upload your work	Per completed Visualizer Per completed Submission Indicator
Step 7. Complete the quiz	Per completed Visualizer Per completed Quiz score note

Figure 1: Challenge Example: Futurist Artist

To further inspire participants, the project incorporated testimonials from female ICT professionals and leaders, shared via the project's YouTube channel (Figure 2). These role models provided relatable examples of success in the tech industry, motivating girls to pursue similar paths.

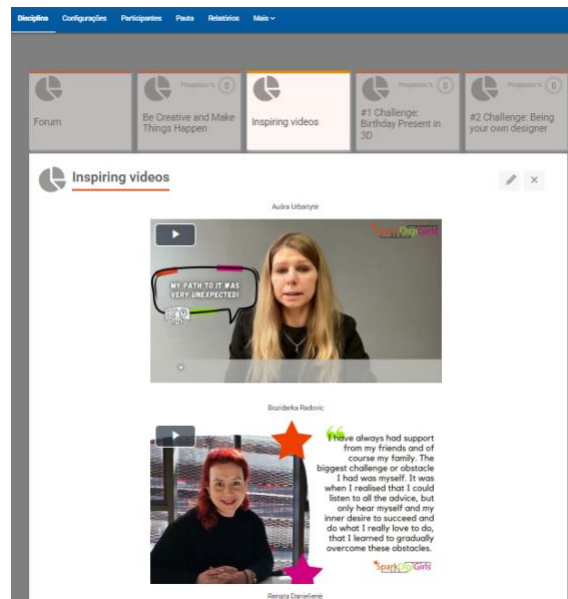


Figure 2: Inspiring Videos Module

The pilot phase involved 279 girls from the four partner countries participating in the program over two months (Marques, et. al., 2023). While initially designed for online delivery, some partners adapted the methodology to include face-to-face sessions, creating a blended learning experience. This approach proved effective in motivating participants and fostering collaboration. It verified that the program promoted high levels of engagement and enthusiasm among participants. The variability in challenge completion rates highlighted the areas for content refinement. Was verified that the blended learning formats combining online modules with in-person support was the most valuable approach.

Based on these findings, the project produced an e-guidebook to assist educators and youth workers in replicating and sustaining the program (Marques, Araújo, et al., 2024). The guidebook includes:

- Strategies for mentoring and empowering girls in digital technologies.
- Best practices from the pilot study.
- Resources and toolkits to enhance teaching and learning activities.
- Outcomes and Impact

The SparkDigiGirls project achieved success in its mission to empower girls through digital technologies, by enhancing interest in ICT, creating capacity building methodologies for educators and providing a sustainable model. The participants demonstrated increased curiosity and confidence in using digital tools, with many expressing a newfound interest in pursuing technology-related careers (Marques et al., 2023). The e-guidebook equips educators with practical tools and strategies to support girls' creativity and engagement in ICT (Marques, Araújo, et al., 2024). The project's resources and blended learning approach provide a scalable framework for future initiatives targeting gender diversity in STEM.

The need to promote the free use of content by the community after funding led to a fourth phase of the project (Community Use). In this way, we expect to attract more female students to the field of technology.

## **Methodology**

Upon the completion of the SparkDigiGirls project, a fourth phase (Community Use) was introduced to ensure broader accessibility to the resources developed during its implementation. The primary goal of this phase was to facilitate community access to the content while also engaging potential mentors who could deliver the activities to groups of students. While the E-guidebook proved to be a valuable resource that sparked significant interest among educators and mentors, it became clear that creating a MOOC for mentors could provide an even more engaging and scalable solution.

The fourth phase of the project was meticulously designed and executed to achieve these objectives. First, a suitable platform was identified to host the MOOC, ensuring ease of access and user-friendliness for the target audience.

There is a process in place for the transformation of courses into MOOCs, which is in line with the Agile Methodology. This approach is increasingly being used in online education because of its emphasis on flexibility, collaboration and incremental progress. It is ideal for creating adaptable online courses that meet the evolving needs of students. (Salza et al., 2019). A five-phase process was designed for the creation and implementation of courses using Agile principles:

1. **Analysis:** A multidisciplinary team, including trainers, instructional designers, and content specialists, created video templates with institutional branding. These templates were validated by the coordinators responsible for digital content production.
2. **Design:** A course design workshop was conducted with teachers to support the preparation of MOOC content. The design model for all courses was developed and approved by the team.
3. **Development:** A media production workshop was held to assist teachers in creating multimedia content. Feedback was provided by instructional designers and content specialists.
4. **Implementation:** Pilot courses were tested with a student group to gather performance data and refine the content based on identified challenges. Final courses will then be launched.
5. **Assessment:** Final feedback and performance data will be collected to measure course success and ensure continuous improvement.

This structured approach ensures that the courses are responsive, effective, and tailored to students' needs.

Following this, a specialized module for mentors was developed using Agile Methodology. This iterative approach allowed for continuous refinement of the module, ensuring it met the needs of mentors effectively. The module content was tailored to equip mentors with the necessary skills and knowledge to implement the project activities confidently and successfully.

To validate the MOOC and identify areas for improvement, a pilot test was conducted with four carefully selected participants who met the project's requirements. These participants provided valuable feedback on the structure, content, and usability of the MOOC. Based on their input, further enhancements will be implemented to optimize the course's effectiveness and user experience.

The phase will culminate with the MOOC being made available online. This resource not only extends the reach of the SparkDigiGirls initiative but also empowers mentors to contribute to its mission of fostering student engagement and learning through innovative methodologies.

MOOC for mentors was developed in the second half of 2024 and a pilot test was carried out with a small group of trainees. The aim was to evaluate the content produced and detect possible improvements.

## **Results**

The first step was to identify a platform with the necessary characteristics to facilitate widespread community use and engagement. After careful consideration, the Chair4Future platform (Figure 3) was selected. This platform was developed as part of the STRONG (Resilient Skills and Teachers Focused on the Next Generations) project, it is specifically designed to host digital resources and MOOCs that are accessible to the general community (Marques, Mateus & Araújo, 2024; Marques, Mateus, Araújo, Nata, et al., 2024). The creation of MOOCs on this platform follows the five-phase process using the agile principles mentioned above. By choosing this platform, we ensured that the SparkDigiGirls project aligned with a robust and user-friendly solution.

The Chair4Future platform is built on Moodle (Modular Object-Oriented Dynamic Learning Environment), an open-source learning management system (LMS) that is widely recognized and utilized for educational purposes. Moodle's reputation for flexibility and versatility made it an ideal choice for this initiative. Its core features allow for the creation, organization, and management of courses, providing a range of tools for developing interactive resources such as quizzes, forums, and assignments.

To further enhance the platform's functionality, it was integrated extensions such as H5P, a content creation tool that supports the development of interactive and visually appealing learning materials. Additionally, the medal gamification tool was activated to make the learning experience more dynamic and engaging. This gamification feature encourages user participation by allowing trainees to earn feedback and medals as they progress through their activities, fostering motivation and a sense of achievement.

By leveraging these features, the Chair4Future platform not only meets the project's technical requirements but also creates an interactive and supportive learning environment. This ensures that both mentors and students can benefit from an accessible, engaging, and effective educational experience, reinforcing the platform's role as a key enabler for the project's success.

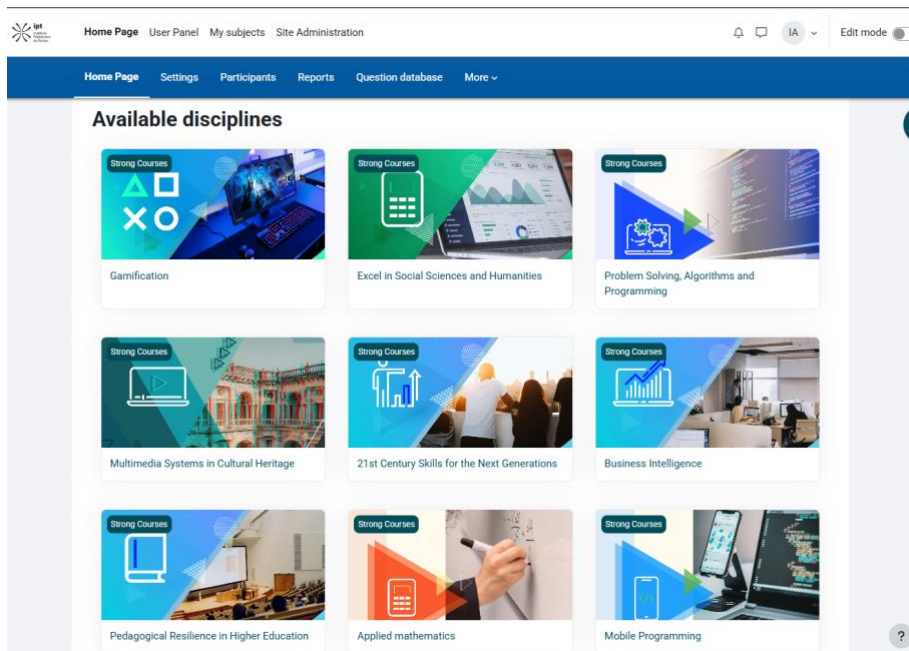


Figure 3: Chair4Future Platform

Three additional courses have been added to the set of MOOCs available on the Chair4Future platform as part of the ongoing process. The MOOCs included are:

1. Unleash Your CreativITy with Technology - Portuguese version;
2. Unleash Your CreativITy with Technology - Mentor Version (available only in Portuguese);
3. Unleash Your CreativITy with Technology - English version.

The Mentor's MOOC aims to provide educators with comprehensive explanatory content to help them better implement and present the challenges to groups of young learners. In addition to providing this content, our platform also serves as a tool for educators to effectively present the SparkDigiGirls challenges to students.

### **Unleash Your CreativITy With Technology – Mentor Version**

In its original version, the set of challenges created as part of SparkDigiGirls only has material for young people who want to discover new technologies. As mentioned above, an e-guidebook has been created for educators who want to put this set of challenges into practice (Marques, Araújo, et al., 2024).

In the mentor version made available through Chair4Future, we decided to use the Agile methodology to create a specific module for educators, tutors or mentors who want to apply the proposed challenges with young people.

The module created to help the mentors is based on the e-guidebook created by the project and is subdivided into the following topics:

- Introduction to the project - explaining the origins of the project, the main results achieved and how the digital content created for the girls is structured. The participants have access to all content of the project, including the e-guidebook produced.

- The mentor/tutor role - where mentors are invited to better understand their role by presenting examples achieved during the project and some testimonies. This topic also describes the learning approaches tested during the project, so that the mentor can choose the one that best suits their context, through a final reflection.
- Digital resources - These include tutorials on how to use some of the tools available during the challenges, such as H5P. This is to enable mentors to adapt the resources if they detect any outdated content or want to adapt to a specific context.
- Final challenge - where mentors are invited to carry out the challenges created, and can see examples already created by participants in the project and ask the instructors any questions they may have.

After the pilot test at the end of 2024, we are still analyzing the information gathered. This will be followed by the implementation of improvements. In this way, we can make the content created available for the community to use. By having access to these resources, we expect that educators, tutors and mentors will be able to inspire and guide students through innovative and technological challenges, contributing to a more dynamic learning environment.

## **Conclusion**

The SparkDigiGirls project represents a significant step toward bridging the gender gap in ICT by providing young girls with the skills, knowledge, and inspiration needed to explore their creative potential in the digital world. Through its innovative learning program, mentorship initiatives, and practical resources, the project empowers girls to become creators and innovators, not just consumers of technology. As a model for future efforts, SparkDigiGirls highlights the importance of inclusive education and diversity in shaping the future of technology (Marques, Araújo, et al., 2024).

Once the project's funding ended, it was considered important to include the resources created on a platform for the Portuguese community. To this end, the Portuguese team added a fourth phase to the initial project, by creating a MOOC for mentors that was made available through Chair4Future. This is an LMS platform based on Moodle for making content available to participants outside the institution. In this way, we have contributed to the development of courses that can be attended by students wishing to apply to the institution, but also by anyone else who is interested.

Thus, three versions of the original course were added, the original version in English and the one in Portuguese, as well as a new version for mentors in Portuguese.

Through the Chair4Future platform it is possible for anyone who is interested to access the courses, without having to be an internal student of the institution. This provides the necessary conditions for the community to benefit from content created by the IPT.

With its strong emphasis on empowerment, collaboration, and creativity, SparkDigiGirls has set the stage for a more equitable and inclusive ICT industry, fostering a generation of talented young women ready to lead in the digital age. In this way, IPT aims to maintain its relationship with the community by promoting essential skills for the labour market. We believe that this case exemplifies this commitment to the community, promoting open access to content that can develop essential skills for the region's economic development.



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