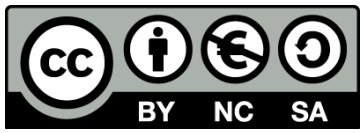
MANUAL OF GOOD PRACTICES



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1. Introduction of the project.

1.1. Overview of the project.

STEAM 4 Girls is a project specifically designed to address the gender gap in STEAM fields. The vision of the project focuses on providing interdisciplinary and gamified educational experiences, whose purpose goes beyond simply teaching STEAM principles. In addition, it seeks to inspire and empower young women. This project is not limited to the transfer of knowledge; It also focuses on fostering key skills, such as problem-solving, creativity and teamwork.
Through gamified challenges, it is intended to make learning engaging and relevant, trying to provide an educational environment that not only teaches, but also cultivates essential skills and motivates the participation of young women in STEAM. The overall vision of the project includes creating an inclusive environment where women are encouraged to explore, question and fully participate in STEAM activities.

1.2. Purpose of the manual.

The fundamental purpose of this manual is to provide educators with a comprehensive guide for the implementation of effective pedagogical practices in the field of STEAM (Science, Technology, Engineering, Arts and Mathematics) disciplines. Through a detailed presentation of activities and exercises, it seeks to offer concrete tools that allow education professionals to deepen the teaching of STEAM disciplines, as well as put into practice the skills acquired.

By addressing various educational practices, the manual aims to enrich the teaching-learning process in STEAM disciplines, fostering creativity, critical thinking, and problem-solving. In addition, it seeks to encourage the active participation of students, promoting the development of practical skills and the connection of theoretical concepts with real-world situations in order to enrich and complement the educational experience of the *STEAM 4 girls escape room.*

1.3. Importance of the inclusion of women in STEAM fields.

The inclusion of women in STEAM fields is essential to achieving equal representation and maximizing the creative and innovative potential in these fields. The diversity of perspectives and experiences enriches research, development, and problem-solving in these disciplines. By encouraging the active participation of women from an early age, it contributes to closing the gender gap in these areas, ensuring that women have a meaningful role in the creation and application of technologies, scientific discoveries, and advances in engineering and mathematics.
Moreover, the inclusion of women in STEAM not only benefits the women themselves, but also society as a whole. By providing equal opportunities, wider access to innovative solutions is ensured and global challenges are more effectively addressed. The active participation of women in STEAM fields also helps break down gender stereotypes, inspiring future generations of women to explore careers in traditionally male-dominated fields.

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2. STEAM Fundamentals

Understanding the fundamentals of STEAM (science, technology, engineering, arts, and math) is essential to addressing the complexity of this interdisciplinary educational approach. This section explores the definition and components of STEAM, highlighting its importance in education and examining the gender perspective within this framework.

2.1 STEAM Definition and Components

STEAM is an educational approach that integrates the disciplines of science, technology, engineering, arts, and mathematics to foster critical thinking, problem-solving, and creativity. Rather than addressing these disciplines in isolation, STEAM promotes the connection between them, recognizing the interdependence and synergy between science, art, engineering, mathematics, and technology.

Science and technology provide the framework for research and innovation, engineering sparks curiosity and solves problems, the arts inspire creativity, and mathematics provides the structural foundation. The combination of these disciplines enhances students' ability to face real-world challenges holistically.

Science relies on careful observation and conducting experiments to understand and explain natural phenomena. It helps us advance in various fields, from technology to medicine and health, allowing us to develop new medicines and improve people's quality of life.

Technology involves the creation and application of new or improved tools and systems to solve problems and improve efficiency in various areas of everyday life. From electronic devices that facilitate communication to advances in industrial automation that increase production, technology has a profound impact on the way we live and work. As technological innovation advances, so does our ability to address global challenges.

Engineering involves the creative application of scientific and mathematical principles to design and build practical solutions to complex problems. From the creation of architectural structures to the development of advanced technologies, engineering plays a crucial role in improving infrastructure and people's quality of life. Every engineering breakthrough represents an effort to innovate and find efficient solutions that address challenges in areas such as energy, health, communications, and the environment.

Mathematics involves the creation and application of new methods and concepts to solve problems and improve efficiency in various fields of knowledge. From solving equations that model natural phenomena to optimizing processes in engineering, mathematics plays a critical role in our understanding and manipulation of the world around us.

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Art involves the creation and application of creative expressions to communicate ideas, emotions, and experiences in unique ways. From painting and sculpture to music and dance, art plays an essential role in our ability to explore and understand the diversity of the human condition. Each form of artistic expression provides a means to reflect on the world around us and offers unique perspectives that enrich our understanding of culture and history.

2.2 Purpose of STEAM education

The central objective of STEAM education is to cultivate the creativity and skills of the 21st century in students, stimulating scientific-technological growth and progress. This is achieved through an interdisciplinary education that integrates science, technology, mathematics, arts and engineering, linking the content with the life experiences of the students and promoting the fulfillment of educational objectives.

STEAM education offers an action-based approach to the teaching-learning process, driven by experiential play that breaks down barriers between disciplines, exploring the intersections between art, science, engineering, mathematics, and technology.

In STEAM, learning is conceived as a continuous and particular process, built and reconstructed as learners dynamically interact with their physical, social, and cultural environment. The construction of objects plays an essential role in this process, as students approach problems through research and design processes, using interaction and construction as keys in the creation of learning and knowledge.

Motivation plays a crucial role in these creative processes, stimulating interest, intellectual satisfaction, sense of accomplishment, curiosity, and wonder. The aim is to create pleasant, meaningful, fun, attractive and immersive learning environments that cater to both the cognitive and affective development of students. Collaborative construction is also valued, recognizing that learning is enriched through interaction between individuals, following the "think-compare-share" perspective. This comprehensive approach seeks not only to cultivate knowledge, but also to foster the personal and social development of students.

3. STEAM 4 Girls Methodology

The STEAM 4 Girls methodology focuses on providing an inclusive and stimulating educational experience, focused on STEM fields through gamification. This methodology is based on fundamental principles that seek not only to teach STEAM knowledge, but also to inspire and empower participants.

4.1 Basic principles of the methodology

The basic principles of the STEAM 4 Girls methodology are based on equity, inclusion, and stimulating women's interest in STEAM fields. These principles include:

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- **Gender equity**: ensuring equal opportunities and access for participants by actively addressing gender stereotypes and fostering an inclusive environment.
- **Personalized inspiration:** recognizing the diversity of skills and interests among participants, tailoring teaching to meet their individual needs and stimulate their curiosity.
- **Meaningful** gamification: incorporating playful elements in a meaningful way to make learning engaging, challenging, and relevant, using gamification as a motivating tool.
- **Interdisciplinary approach:** The STEAM 4 Girls methodology embraces an interdisciplinary approach by designing projects that integrate science, technology, engineering, art, and math synergistically. The projects are designed to reflect real-life situations and address complex problems, allowing participants to see the connection between different disciplines and apply knowledge in a practical way.

4. Boosting women's interest and participation in STEAM through gamified strategies

Teaching STEAM to women through gamified activities requires a strategic approach focused on active participation. When digital resources are already created, teaching STEAM to women through gamified activities becomes even more accessible and exciting. Here are some practical steps to achieve this:

4.1. Evaluation of digital resources:

- Analyze the available digital resources to identify those that align with the STEAM concepts you want to teach.
- Make sure resources are inclusive and challenging, promoting active participation.

4.2. Integrated Challenge Design:

- It integrates existing digital resources into different topics or educational challenges to give them a boost and added value.
- It designs separate activities that encourage the exploration and practical application of the concepts covered through digital resources.

4.3. Use of interactive platforms:

- Explore interactive digital platforms that complement existing resources.
- Take advantage of collaborative online tools that facilitate participation and enrichment among women.

4.4. Creative adaptation:

- Adapt digital resources to meet the needs and skill levels of participants.
- It fosters creativity by encouraging women to apply resources in novel ways to gamified challenges.

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4.5. Narrative and contextualization:

- Create or adapt a narrative that connects digital assets to the STEAM challenges you want to address. Remember that digital resources are a proposal that can be fully adapted to your interests as a learning facilitator.
- It contextualizes teaching so that women can visualize the practical applicability of concepts in the real world.

4.6. Recognize STEAM stereotypes.

- Initial Awareness: Begins with awareness sessions for participants to recognize the gender stereotypes present in STEM fields. Explore common myths and misperceptions.
- Open Discussions: Encourage open and honest discussions about how these stereotypes can affect the perception of women in STEAM. It motivates people to share personal experiences and challenge prejudices.

4.7. Collaboration strategies:

- Use the collaborative functionalities of digital resources to promote interaction between participants.
- Design additional challenges that require virtual collaboration, encouraging teamwork and joint problem-solving.
- Open Discussions: Encourage open and honest discussions about how these stereotypes can affect the perception of women in STEAM. It motivates people to share personal experiences and challenge prejudices.

4.8. Continuous evaluation:

Implement continuous evaluation mechanisms by incorporating progress monitoring and measurement functions on digital platforms.
Collect regular feedback to adjust and improve gamified activities based on the experience of female participants.

4.9. Inclusion of role models:

Use digital resources as a platform to highlight the success of some STEAM women.
It incorporates inspiring and personal stories that can bring students closer to profiles of women close to their reality, who have also demonstrated to have left a significant mark on STEAM fields in the present.
Host events where women can interact with leading professionals in STEAM. Facilitate Q&A sessions to inspire through real-life experiences.

4.10. Guiding Learning: Teaching Strategies and Community in Action.

Guides participants on how best to take advantage of digital resources. Convey to them after each STEAM concept or content the relevance of taking advantage of additional resources such as films, documentaries, magazines and more bibliography related to the contents covered that can lead them to reflect and deepen the importance of this subject.
Take on a facilitator role, providing support and guiding women as they explore and learn with the resources. It highlights the importance of creating moments of sharing among participants,

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generating debates and opinions, encouraging the creation of a learning community where participants can share experiences, successes and challenges, facilitating interaction and the exchange of ideas between people.
Provide constructive feedback that highlights accomplishments and provides suggestions for improvements, encouraging growth and self-evaluation.

4.11. Additional Resources and Tools

Securing access to additional resources and appropriate tools is crucial to the success of STEAM projects. A guide to recommended bibliography, STEAM platforms and applications, as well as support and collaboration networks is provided here.

Recommended Bibliography

- "Hidden Figures" by Margot Lee Shetterly: This book highlights the contributions of African-American women at NASA, offering an inspiring perspective on overcoming barriers in STEAM.
- "Lab Girl" by Hope Jahren: An autobiography that chronicles the life of a geobiologist, offering an intimate look at the scientific world and how a woman can excel in it.
- "Women in Science" by Rachel Ignotofsky: This picture book features the stories of 50 women scientists who have left a significant mark in various fields.

    "Women of Science": 50 Intrepid Pioneers Who Changed the World" by Rachel Ignotofsky: The Spanish version of "Women in Science," this picture book highlights the lives and achievements of outstanding women in science.

- "The Confidence Code for Girls" by Katty Kay and Claire Shipman: Offers practical tips for building confidence in girls and young women by encouraging active participation in STEAM.

- "Goodnight Stories for Rebellious Girls" by Elena Favilli and Francesca Cavallo: This book features stories of inspiring women from different eras and disciplines, highlighting their accomplishments and contributions.
- "Ariadne's Thread" by Gemma Lienas: A novel that tackles the life of history's first programmer, Ada Lovelace, offering a unique insight into her contribution to science.

Audio-visual support resources

- "CODE: Debugging the Gender Gap": This documentary examines the gender gap in the world of programming and highlights efforts to close it.
- "Marie Curie: The Courage of Knowledge": A biopic chronicling the life and work of renowned scientist Marie Curie.
- "The Big Bang Theory": Although it's a comedy, this series features strong female characters involved in scientific and technical fields.

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- "Women Scientists Count": This Spanish documentary highlights the contribution of women scientists in various fields, showing their work and the obstacles they have overcome.
- "Maria Montessori: A Life Dedicated to Children": This biopic chronicles the life of Maria Montessori, an Italian physician and educator known for her revolutionary educational method.

STEAM Platforms & Applications

- **Scratch:** A visual programming platform that allows participants to learn programming concepts in a playful and creative way.
- **Khan academy:** Offers interactive lessons in math, science, and programming, providing a solid foundation for STEAM participants.
- **Tinkercad:** A 3D modeling application that allows participants to explore design and engineering intuitively.
- **Google science journal**: Facilitates the collection of scientific data using sensors embedded in mobile devices, promoting experimentation.

Support Networks & Collaboration

- Women in STEM (WiSTEM): A global network that connects women in science, technology, engineering, and mathematics to foster collaboration and mutual support.
- Girls Who Code: An organization that works to close the gender gap in technology by providing resources and programs for girls interested in coding.
- STEMConnector: A platform that connects professionals, educators, and students in STEM fields, enabling collaboration and knowledge sharing.
- Local STEAM Partnerships: Encourages collaboration with local organizations and groups committed to promoting women's participation in STEAM.
- Mujeres Tech: A Spanish-language community that connects women in tech, providing networking opportunities and mutual support.
- Girls in Technology: An organization that promotes the participation of girls and women in the technological world, offering educational and mentoring programs.
- STEM-Mujer Network: A network that seeks to make visible and promote the participation of women in science, technology, engineering and mathematics in the Spanish-speaking world.

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5. Proposals for additional activities to deepen the contents covered in the escape.

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- Challenge 2. Spaghetti Tower
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Many of the challenges encompass challenges in which creativity plays an important role in solving them. And you may be wondering, why creativity?

Creativity provides us with solutions and ideas that allow us to adapt to a constantly changing environment, in your case, today, you are going to adapt to solve a challenge that we have proposed to you.

The intersection between creativity and STEAM disciplines not only drives innovation, but also expands the possibilities of understanding and applying knowledge in problem-solving. That is why, with this activity, we are committed to working on and developing this key aspect for the development of these disciplines.

But would you know how to define the word creativity?

Creativity refers to the ability to generate original and valuable ideas, concepts, or solutions, which often involve combining existing elements in new ways. It is a mental process that involves imagination, originality, and the ability to think beyond established conventions.

So what qualities should something creative have? Or, rather, what characteristics do we need to be creative and creative?

- ✓ Originality may be one of them.
- ✓ Flexibility. Flexibility is opposed to rigidity, immobility, and the inability to change behaviors, attitudes, or points of view.
- ✓ Fluency or productivity. That is to say, to present an advanced ability to associate elements – words, phrases or ideas – and to express their ideas.
- ✓ Elaboration, or the ability to translate an idea into a concrete plan so that it becomes a reality.
- ✓ Sensitivity to problems. This faculty is basic for the development of creativity and most researchers agree on it. The only way to implement a project, overcome a situation or find a result, is to detect failures.
- ✓ Open-mindedness. We have to ask ourselves over and over again about a problem, until we find the solution, without settling for initial or unique solutions.

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Imagination is the key component of creativity. Associating words with objects that are opposite to their meaning, or turning concepts that we know so well on their heads, are some of the examples that demonstrate imagination and the exposition of crazy ideas as an engine for the development of creativity.
Well, let's put all these qualities into practice through the different challenges proposed.

Straight 1. Teleportation

Instructions of the challenge: you must pass the ping pong ball inside a glass in a COLLABORATIVE way, that is, participating all and using all the materials available in the tray (scissors, rope and a rubber band) and without touching the glasses with your hands or any other part of the body.
Video exemplifying the challenge: https://www.youtube.com/watch?v=QRs0KqC-tll
(At the end of the time, we look at who has achieved it and review the STEM of each challenge)

Concepts to be discussed:

- **Force Transmission**: When a force is applied to one end of a rope, this force is transmitted along the entire length of the rope. Each particle in the string experiences a tensile force that connects it to adjacent particles. This phenomenon allows for the efficient transmission of forces over distances.
- **Equilibrium in taut strings:** In an equilibrium system, the vector sum of the forces must be zero. In a taut rope, the tension at each end must be equal in magnitude and opposite in direction to maintain balance. This principle applies to situations such as ropes holding a mass in the air or ropes connected to pulleys.
- **Physics: Physics** is a scientific discipline that is dedicated to the study of the fundamental laws that govern the behavior of matter and energy in space and time. Through the mathematical formulation of these laws, physics seeks to understand and explain a wide variety of natural phenomena, from subatomic particles to cosmic structures. Divided into various branches, physics deals with specific aspects of reality, such as the movement of objects, the interactions between forces, and phenomena such as light and sound. Essentially, physics acts as a conceptual framework that allows us to interpret and predict the workings of the universe around us, providing answers to fundamental questions about the nature of reality.

Disciplines worked:

- S (rubber elasticity physics, gravity for the ball to land)
- T (what procedures we have used, instrument creation)
- E (start-up of our contraption, the force we needed to make)
- M (equivalence of forces, equal division of the rope, measuring distance and trajectory of the ball when falling).

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Challenge 2. Spaghetti Tower

Challenge instructions: You must try to build the tallest tower with the materials provided (20 spaghetti, 1m tape, 1m rope and a cloud). There is only one rule: the cloud must be at the top of the structure. Are you ready? Time!
Video exemplifying the challenge: https://youtu.be/xy54jxC_Z6A
(At the end of the time, we observe who has achieved it, measure the towers and review the STEM of each challenge)

Concepts to be discussed:

- **Equilibrium:** Equilibrium refers to a state in which opposing forces or influences compensate for each other, resulting in a stable or harmonious condition. In physical and mechanical terms, equilibrium relates to the stability of an object. For example, an object is in equilibrium if the forces acting on it are distributed in such a way that they do not cause any movement or change in its position.
- **Gravity:** Gravity is a fundamental force of nature that acts between all objects with mass. It is responsible for the attraction that exists between two bodies with mass, such as the Earth and everything above it. In simpler terms, gravity is what keeps us glued to Earth and what causes objects to fall to the ground when we release them.

Disciplines worked:

- S (forces between the spaghetti)
- T (shape of our tower)
- E (how we held it, what things we took into account)
- M (calculation of the length of the spaghetti, what geometric shape it has, etc.)

Challenge 3. Creative Geometry

Challenge Instructions: Your challenge is to create a work of art that incorporates fundamental elements of geometric shapes. Using the material provided, which includes 1 compass, square, bevel, angle protractor and ruler, acrylic paints and brushes, and pencil paints, you must make a mural following the following rules:

- Geometric figures should be the main inspiration for your work, exploring colors, shapes, and creative compositions.
- Minimum 3 regular polygons should appear.
- You should use the angle protractor at least once.
- There should be 3 circles drawn with compasses.
- Shadows and irregular shapes should appear somewhere in the mural.
- It should appear 2 trapezoids, 2 squares, 2 rhombuses, 1 parallelogram, 1 rectangle, and 2 triangles in it.

All these rules can be modified by the teacher as he or she wishes. They are simply an example of the dynamics of the activity.
Are you ready to get down to work with artistic creation? Time!

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Exemplary image of the challenge:

(At the end of the time, we will share and analyze the works, discussing the connection between art and mathematics and checking compliance with the rules of the challenge.)

Disciplines worked:

A: Visual creativity. Artistic expression and visual exploration of geometric concepts will be encouraged.

M: Geometric figures. Mathematical knowledge will be applied to design and represent geometric figures accurately, as well as the use of certain tools to carry it out will be encouraged.

Concepts to be discussed:

- **Geometric composition:** integration of geometric figures into artistic composition. Exploration of how shapes can convey visual messages.
- **Color theory:** Creative use of color to highlight and give depth to geometric shapes.
- **Proportions and Dimensions**: Application of mathematical concepts to maintain accurate proportions in artistic representation.

Challenge 4. Creation of an informative account:

Taking advantage of social networks to disseminate science is one of the best tools to bring science closer to society in a simple and visual way. Leveraging this strategy correctly is up to us.

To create an informative account you must take into account:

- Describe your idea in a clear, agile, and useful way so that everyone can understand it.
- What is the purpose of its creation? Publicize scientific activities that take place in your city, create publications that talk about the history of science, publish videos and concepts of experiments intended to be done at home...
- Define what content you would like to show in it, specify the type of format you will use, the type of audience it will be aimed at and the frequency of publication of each post. Setting the topics to be discussed and the temporality in a schedule will be of great help to you.
- Before creation, do some research on the social networks of the informative accounts that stand out the most. I'm sure they can inspire you.

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- Be creative and use inspiration and your imagination to create a name, logo or image that is eye-catching and identifying with the brand image you want to convey to your audience.

- And that's it! Now all you have to do is get to work. Create the first 3 posts and upload it to the account so that the rest of the colleagues can enjoy and learn from your creation.

Challenge 5. STEAM game.

The objective of this activity is the development of a prototype of a game or tangible tool whose contents are or are related to women scientists, giving voice and recognition to the great brilliant minds who stood out in STEAM disciplines, favoring the dissemination of their names and stories through a gamified educational tool.

To create a board game you must take into account…:

- It starts with a simple idea. Board or cards? Online or offline?

- What's the story? What is the goal? Who are the characters? What are their skills? How do you relate the cards to the theme of your game? Where are we going to get the information from?

- Study the mechanics of the game To what extent does the game depend on luck? How do players win? What actions can players take? How do players interact with each other? It stipulates rules and regulations that can be modified as the game develops.

- Be original.

- Test and test.

Retop 6. STEAM social initiative.

The objective of this challenge is the implementation of a social initiative related to the promotion of women in STEAM disciplines.

To develop a social initiative you must take into account…:

- Have you ever stopped to think about the problems present in society today that are not covered by any solution or alternative? Is there something that society needs that no entity will offer? Perhaps, through these questions, the idea and reflection on what social initiative to create can be born.

- You can focus your initiative on neighbourhood, local, metropolitan, state, European level...

- Describe your main goal in a clear, agile, and helpful way so that everyone can understand your idea.

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- Who can help you with your idea? (Crowdfunding, agents and societies, your city council, search and creation of partners...) Is there a deadline for carrying it out?
- What activities, resources or help would you like to provide through your social initiative? What is your project's main target audience? Before creation, do some research on the internet and social media, surely it can inspire you.
- Be creative and use inspiration and your imagination to create a name, logo or image that is eye-catching and identifying with the brand image you want to convey to your audience.
- And that's it! Now all you have to do is get to work. Create a sketch of the website and the first publications so that it can be presented in a real way or through a power point to the rest of the colleagues, so that they can enjoy and learn from your creation.
- Here are some examples

Challenge 7. The Periodic Table of Women Scientists

On November 2, 2017, the United Nations proclaimed 2019 as the International Year of the Periodic Table of Chemical Elements.
Months later, chemical engineer Teresa Valdés-Solís published the article The Periodic Table of Women Scientists on the Naukas platform, in which she proposed a special periodic table composed of the names of female scientists. Teresa commented in her post that, among the many periodic tables that exist on such varied subjects, no one had yet dedicated one to scientific ones.
With no small amount of work, Teresa has created the Periodic Table of Women Scientists, placing a female scientist in each place of the periodic table. He has organized them into different disciplines and has reserved rare earths for Spanish earths, which are unfortunately very little known. Each symbol is linked to a biography of the aforementioned scientist.
The Periodic Table of Women Scientists - Naukas

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FOOD FOR THOUGHT

Did you know about this outreach project? Today we are telling you about it here, but what if now you have to be the one to bring this project closer to the rest of the citizens?

- Read and research more about the project, its goal, and its author.
- Do you think any of these women can serve as an inspiration to you or others? Highlight some of the works and scientists that have caught your attention the most. Dive deeper into some of them through your area of study.
- Do you think your role was easy in the past? How did these women break the stereotypes that existed in their time? Contextualize your audience in the reality that women scientists lived in those years, and even add, if you have found during your research, an anecdote that brings the public closer to their story and keeps them hooked.

Now prepare a script and rely on an audiovisual tool to disseminate this project, its objective, and its protagonists, to the rest of the public.

Consider the following factors:

- Select the **right channel** to tell your project.
- If you convey passion, you will create interest.
- Be aware of who your audience is going to be, and **adapt your language** to them.
- Provides **Close Knowledge**
- Base your information on **reliable sources of dissemination** and provide your personal, authentic, truthful, creative and even humorous point of view.

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- Being spontaneous doesn't mean improvising.

- Rely on a **presentation**, poster, image, word... Some of the interesting formats in which to present them are...

  We encourage you to explore different media and formats and use interactive tools for research presentations such as PowerPoint, Prezi, Genially, Slideshare, Google Slides, Padlet, Mentimeter, Board... but it can also be through a docuvideo or an infographic Easel.ly or Piktochart.

Challenge 8. Campaign Presentation 2: #NOMOREMATILDAS

It is a campaign launched in January 2021 with the purpose of making visible in school textbooks of all educational stages women scientists who have been forgotten by history, and at the same time creating references that awaken STEAM vocations in girls and young women.
The initiative promoted by the Association of Women Researchers and Technologists (AMIT) with the support of the Office of the European Parliament in Spain also seeks to denounce the so-called "Matilda effect", which refers to the invisibility of women's scientific findings and which are sometimes attributed to their fellow scientists or even their partners.
Consult the campaign's website, to work with the resources generated, among them, a free downloadable Annex has been prepared #NoMoreMatildas with biographies of 18 women scientists. #Nomorematildas

FOOD FOR THOUGHT
Did you know about this outreach project? Do you think any of these women can serve as an inspiration to you or others?

- Read and research more about the project, its goal, and the entity(ies) that authored it.
- Do you think any of these women can serve as an inspiration to you or others?

It develops an educational tool that allows future teachers to keep in mind at all times women scientists with their milestones and stories of the past.
To do this, we propose a series of ideas:

- Create from the appendices and information that appear on the website...
  a) Quiz the contest
  b) Interactive gameplay (e.g., flashcards as infographics and timeline as board)
  c) Docuvideo
  d) Infographics or flashcards
  e) Story
  f) Puppets
- In the project you create, a timeline should be reflected that helps to place them to the era to which they belong.
- In addition, they must also be clearly divided according to the discipline to which they belong.

The rest is up to you!

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Develop your imagination and try to be creative. What resources do you think help you better understand the concepts? Visual, sound? Take advantage and use them as part of the resources for your project.

Consider the following factors:

- Select the **channel** you think you can best navigate. (docuvideo, quiz, graphic...)
- If you convey passion, you will create interest.
- Be aware of who your audience is going to be, and **adapt your language** to them.
- Provide **close knowledge.**
- Base your information on **reliable sources of dissemination** and provide your personal, authentic, truthful, creative and even humorous point of view.
- Develop your **imagination** and try to be **creative**. What resources do you think help you better understand the concepts? Visual, sound? Take advantage and use them as part of the resources for your project.

  We encourage you to explore different media and formats and use interactive tools for research presentations such as PowerPoint, Prezi, Genially, Slideshare, Google Slides, Padlet, Mentimeter, Board... but it can also be through a docuvideo or an infographic Easel.ly or Piktochart.

Challenge 9. The interview.

Women scientists didn't just stand out in the past. The fact that we are looking to give them more recognition is just one example of what those who due to the conditions of the time were silenced and forgotten for so long really deserve. Today, women scientists are an integral part of the scientific field, contributing to the development of advances in the field, thanks to the achievements of their female scientists in the past.

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However, there is still a clear gender gap today, reflected in the lower percentage of women dedicated to STEAM disciplines. That is why, in order to gain a direct understanding of the experience of those women scientists who have contributed or are contributing to this sector, we propose to conduct an interview.

Interview with a woman scientist in STEAM disciplines.

Create a 10-question interview with a woman scientist you know, family member, friend, or even a professor. The only condition is that you are engaged in one of the 5 STEAM (science, technology, art, and math) disciplines.

This exercise can be done in groups of 3-4 people, and the information collected will then be shared with the whole class.

Some of the possible questions...:

- How do you perceive the presence of women in your scientific field compared to when you started your career?
- Have you ever experienced that being a woman has negatively affected your career path?
- Can you share any specific challenges you've faced as a woman in science?
- What was your motivation to study and dedicate yourself to this particular STEAM discipline?
- Have you noticed a change in the perception of the presence of women in your area over the years?
- What message or advice would you give to young women considering entering STEAM disciplines?
- How has the participation of women in your work environment evolved since you started?
- Do you think society properly values the contributions of women in your field?
- Are there any initiatives or changes that you think could drive greater female participation in STEAM disciplines?
- What aspects would you highlight as personal and professional achievements in your scientific career?

Reto 10. Rol & Rol

The documentary explores the role played by the media, advertising and fiction in the construction of female roles and how these models affect society's way of thinking and decision-making. Can a less stereotyped and more realistic representation positively influence the visualization of women as leaders and the construction of a more egalitarian society?

This same documentary is proposed with English subtitles for English-speaking students, or alternatively, Marie Curie: The Courage of Knowledge. A biopic that chronicles the life and work of renowned scientist Marie Curie.

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SOME TIPS TO KEEP IN MIND WHEN PREPARING PROJECTS:

COMMUNICATE THE RESEARCH

No matter how good research you are, if you don't communicate effectively, no one will know about your existence. Pay attention to the language used, it must be understandable, easy to understand and adapted to the audience to which you want to communicate your research and the chosen medium.

ORAL COMMUNICATION

Some tips for making a good oral presentation:

- Briefly state the **reason for** the exhibition, what you intend to achieve with it, the reasons that led you to do this research, etc.
- Make sure at all times that the message you are trying to send is well **ordered** by stages and in a coherent way.
- Emphasize**, play with tone of voice**, or take short pauses.
- It is advisable **to repeat words and phrases** that help capture the attention of the interlocutor, and thus enable a better understanding of the message.
- Try to present the ideas in the **clearest and simplest way** with an appropriate vocabulary, avoiding bombastic words, technical expressions, etc., and using short paragraphs and sentences.
- It's important to keep **it brief and focus on** the topic.
- **Take care of the elements of non-verbal language:** gestures, posture, appearance, facial expressions, etc.

WRITTEN COMMUNICATION

Keys to effective written communication of research:

- **Plan, design, and organize content.**
- **Make appropriate use of language:** precision, synthesis and correctness.
- **Carry out an effective structure of an academic-scientific writing:** introduction, development and conclusion and arguments to have coherence in the discourse.
- **Keep it short and clear.**
- **Use hyperlinks to make the interlocutor's work easier.**
- **Respect the use of punctuation marks**, which make it easier for our interlocutor to understand the text.
- **Don't overuse capital letters and follow the spelling rules.**

AUDIOVISUAL COMMUNICATION

Nowadays, we use this type of communication very often, so it is necessary to know how to communicate our research in various sectors such as radio, television, cinema, advertising or social networks, where production, photography, voice-over, editing or visual and graphic design tasks can be carried out.

- **Choose the most appropriate audiovisual support for your research and knowledge.**
- **Prepare a good script** with the message you want to convey in mind. You can create a storyboard, which clearly reflects all the ideas of your research through images.

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- **Make a good production plan.** Take into account how to resolve possible unforeseen events for the production and/or recording of the contents.
- **Limit the duration**. It is vital before starting any audiovisual project to have in mind what its duration is going to be and on which channel you are going to project it.
- **Be aware of the resources available to you.**
- **Take care of the post-production details.** Audiovisual post-production consists of editing the material of the recording, adding sound, **voice-over, music, transitions or special effects.**

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