TRAINING PROGRAM FOR DECONSTRUCTING THE GENDER STEREOTYPES IN S T E A M

Equality in Science, Technology, Engineering, Art and Mathematics on the Cloud

Erasmus + Strategic Partnerships for School Education
Project number:
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- The European Schools are official educational establishments controlled jointly by the governments of the Member States of the European Union. They are legally regarded as public institutions in all of these countries. The mission of the European Schools is to provide a multilingual and multicultural education for nursery, primary, and secondary level pupils.

- Professional Foundation is a non-profit foundation with a view to promoting high quality in education, intercultural tolerance, and appreciation, life-long learning, human rights, social inclusion, fight against gender stereotypes and discrimination.

- Although Innovation Office's main focus is on creativity, ICT, and entrepreneurship, the organization encourages people to be active in many fields as innovations could be grown only if a person has an open mind and has a broad point of view, which is important not only in regular business but also in social entrepreneurship.

- The Vocational Art School is a public body, part of art education with the following specialities: the Visual Arts and the Architecture, Music, and Art of the actor, Graphic Art and Graphic Design. The teaching staff consists of 220 teachers of different subjects: Humanities, Sciences, Visual Arts, Architecture, Actor's Art and Music (including education in the most important instruments specific to the Classical Music). The students, in a number of 900, are enrolled in 3 educational cycles (primary, secondary and upper-secondary school).

- Orizzonti Social Cooperative was founded in 2003 by a group of Intercultural Mediators, Linguistic Facilitators, and Psychologists committed to intercultural relations and united by a human promotion and social integration project centred on the individual, which takes into account the exchange between cultures."

Reference

If you wish to refer to parts of this publication, please refer to this collection as: Angela Cotoara (2022). Training Program for deconstructing the gender stereotypes in STEAM

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INDEX

CHAPTER ONE: FOREWORD

WHY ESTEAM ON THE CLOUD PROJECT?

The world is changing at an unprecedented pace and there is a need to raise the awareness of teachers and policymakers on gender balance in STEAM in a much more specific way, providing them with resources and strategies that will support them in the promotion of gender equality in the classroom. The promotion of gender equality in and through education is a prerequisite to the achievement of equality between women and men in all spheres of life in society. The Council of Europe has promoted gender equality and non-stereotyped education at all levels. By shaping gender representations, attitudes and behaviours, early education is an essential factor to combat stereotypes and bring about social and cultural changes. Gender mainstreaming will play an active part in implementing awareness-raising and training on gender equality. Policymakers and educators worldwide should not underestimate the importance of school education on the development of deeply engrained gender norms. It is important to consider the cognitive and affective formation of gender identity. which develops in secondary and upper-secondary education. The types of skills, personality attributes, and career aspirations learned through teacher-student interactions can form stereotypical masculine and feminine attitudes toward gender roles, which develop before and during adolescence. By associating gender equality and STEAM focused on school, secondary and upper-secondary education the project addresses the underrepresentation of girls in STE(A)M (Science, Technology, Arts, Engineering and Mathematics) who will be the future women in STE(A)M careers.

What is the goal?

This project is concerned with gender equality in secondary and upper-secondary education and aims at contributing to increased capabilities to reduce stereotypes by developing a series of innovative and interactive materials, tested through a behavioural science lens for their potential to increase equality by amendment of practical everyday skills and social norms regarding attitudes and stereotypes, especially in STEAM and in what concerns teachers and youngsters.

WHICH ARE THE OBJECTIVES?

- Define unconscious biases and gender stereotypes in secondary and upper-secondary STEAM education by raising awareness of target groups: education professionals and decision-makers.

- Support secondary and upper-secondary school teachers by providing them training, materials to deal with diversity and gender-balance in their classrooms (e. g. helping them to design suitable education programmes, organise hands-on activity, promoting equality in STEAM and mentoring ...) and then engage more girls in STEAM education.
- Create a friendly ECOSYSTEM in class where girls will feel appreciated and motivated to participate in STEAM activities as equals both in number and in terms of responsibilities

The methodology used is that based on a behavioural sciences methodological framework. According to current reports, we can fully act on this age range to engage more girls in STEAM education. Behavioural Insight is a process that looks at Behaviours, Analysis, Strategies, Interventions, Change (BASIC). This approach will allow the project partners to get to the root of the problem (gender stereotyping and bias), gather evidence on what works, show support for innovation, and ultimately improve the situation. The testing will involve 75 teachers; Peer-mentoring 40 mentors and 40 mentees; 30 Business Mentors and 1124 students. The evaluation of the actual impact on teachers, decision makers and students should be done by discouraging a specific behaviour towards gender balance especially in STEAM subjects. Before-after self-assessment questionnaires, using the exact same target group can show us the amount of change in their behaviour. Adding intersectionality allows the fight for gender equality to become inclusive. Priority will be given to actions that help address diversity and promote – in particular through innovative and integrated approaches– ownership of shared values, equality, including gender equality, and social inclusion.

Ensuring girls and women have equal access to STEAM education and ultimately STEAM careers is an imperative from the human rights, scientific, and development perspectives.

Equality in Science, Technology, Engineering, Art and Mathematics (E-STEAM) focuses on secondary and upper-secondary, VET and non-VET teachers by developing a gender-sensitive interdisciplinary approach in class. It addresses the underrepresentation of girls in STE(A)M (Science, Technology, Arts, Engineering and Mathematics) who will be the future women in STE(A)M careers.

EIGE's study on the economic benefits of gender equality (2017a) shows that reducing gender segregation in STEM education alone could lead to an additional 1.2 million jobs in the EU. These jobs are estimated to occur mostly in the long term, however, as employment is likely to be affected only after new women STEM graduates choose to work in the STEM fields. In parallel, higher productivity associated with these STEM jobs is likely to result in higher wages for newly graduated women – affecting the gender pay gap as well as income and living standards of women, men, children and their extended families (European Parliament, 2015a).

To treat one group preferentially based on gender is seen as morally wrong; it seems downright irresponsible to ignore half the population when there is a skill shortage. Whatever argument you choose: ethical, pragmatic or philosophical it is clear that the STEAM fields cannot continue to ignore and be under representative of such a huge sector of the population both at national and European level.

WHAT PREVENTS GIRLS FROM CHOOSING STEAM?

Most of all cultural traditions and stereotypes. Stereotypes are insidious things and can manifest themselves in various ways, but one of the most damaging ways stereotypes can affect girls is through the implicit biases carried by their teachers.

WHICH ARE THE AIMS?

The project aims to:

I. establish synergies among schools and the labour market towards creative and meaningful engagement of girls in STEAM education (through a mentoring programme).

II. develop a virtual platform as a resource hub for practical and innovative learning solutions complementing schools' curricula.

III. exploit and disseminate personalised activities by promoting the use of the platform.

WHO ARE THE USERS?

The project will target 3 groups:

1. Teachers in secondary and upper-secondary education and especially teachers in STE(A)M, career advisors;

2. Decision makers, Policy formulators, Head teachers, school directors, teacher' training centres, representatives of regional/national and EU authorities.

3. Students 12-18(to engage more girls in STEAM careers).

WHY THIS TRAINING PROGRAMME?

Today's students will grow up to fulfill careers that do not exist yet. Today, more than ever,

it is crucial to prepare our students to become future-ready and have the confidence to invent the world they want to live in. To do this, we must equip them with 21st century skills (critical thinking, creativity, collaboration, communication) and STEAM - Science, Technology, Engineering, Art, and Maths - knowledge so they can be prepared for future challenges. Although some research shows that educational institutions have not kept pace with the changing nature of work, we hope to see an increasing number of schools now assimilating STEAM into their programmes - either fully integrated as part of core academic subjects or offered as part of after school and extracurricular activities.

As a result, we were able to delve more deeply into the types of programmes that are offered as part of STEAM education, and some of the best practices to ensure an effective and engaging implementation for education sector.

Following, you will find the results of this project, along with actionable strategies for school educators to start and scale their STEAM programmes.

FRAMEWORK /CURRICULUM FOR 21ST CENTURY LEARNING

It defines four unique learning and innovation skills with an emphasis on "4Cs": critical thinking and problem solving, creativity and innovation, communication, and collaboration. These skills help students prepare for the increasingly complex and unknown work environments of the future.

To think ***creatively***, students must call upon a wide range of idea creation and brainstorming techniques to create new ideas, then elaborate, refine, analyze, and evaluate those ideas. And they cannot do it alone; creativity is almost never undertaken solo. Students need to be able to work with others to develop and ***communicate*** new ideas effectively, be receptive to different perspectives, and integrate various ideas to create more effective and complete solutions for the problems they care about. Most importantly, creativity does not stop at idea creation. Students need the opportunity to ***act on their ideas***, take risks, make mistakes, learn from their failures, and continuously improve their inventions through a cyclical process. These 21st century skills are the cornerstones of STEAM education which describes a problem - and a ***project-based approach*** to learning that involves hands-on, collaborative, and active involvement of students in finding solutions to authentic problems they care about.

WHAT IS THE CULTURE OF STEAM EDUCATION?

The culture of STEAM education is built around collaboration and peer-to-peer interactions; it emphasizes the process of making rather than the final product. It often involves an interdisciplinary approach to instruction and learning: ***STEAM educators*** integrate visual arts, music, language arts, humanities, and social sciences into STEAM projects, giving students a chance to have a holistic experience with technology.

Importantly, the goal of STEAM education is not to turn every student into a programmer or an engineer. The world needs diversity, after all. Instead, STEAM education is meant to give every child an opportunity to learn about the technologies they use and to help them identify themselves as innovators and change makers that are capable of taking an active role in inventing solutions for problems they care about.

HOW CAN STEAM EDUCATION WORK WITH EXISTING CURRICULUM?

STEAM education provides opportunities for students to deepen their understanding of academic subjects such as arts, mathematics, sciences, language, and social studies. Through hands-on project-based learning, students will demonstrate what they know, reflect on their understanding and misunderstanding, and share their knowledge with the community.

The bottom line? If implemented in a meaningful and effective way, STEAM activities add to students' learning of core subject areas and never take away time.

The Invention Cycle has four easy to follow steps that help students solve an engineering problem:

1.CREATE: Brainstorm ideas, explore potential material, and create a first model or prototype.

2.PLAY: Test your prototype to identify what's working well and what needs to be improved.

3.REMIX: Improve or change your prototype to better solve the problem.

4.SHARE: Communicate your process ideas and final project.

WHY STEAM EDUCATION?

By adding art into STEM education (STEM + A = STEAM), not only are we making the programme relatable to more students both girls and boys, but we are also giving them the opportunity to engage in creativity and to express themselves through their projects while tinkering, making, sharing, and playing.

HOW TO USE STEAM ACTIVITIES

There are three main questions in educators' minds when planning an effective STEM/ STEAM programme:

(1) WHERE TO START,
(2) WHAT ARE THE BEST IMPLEMENTATION STRATEGIES
for an effective and accessible STEAM
programme, and
(3) HOW TO SCALE.

1.WHERE DO I START?

Many successful programmes start with one enthusiastic teacher, educator or media specialist who believes in the power of STEAM. These educators take an active role in introducing hands-on project based engineering, coding, and robotics into their schools. Here are some characteristics of successful STEAM proponents: for more information watch this video: https://www.youtube.com/watch?v=9JY2vuxdWnU

1.1.START SMALL

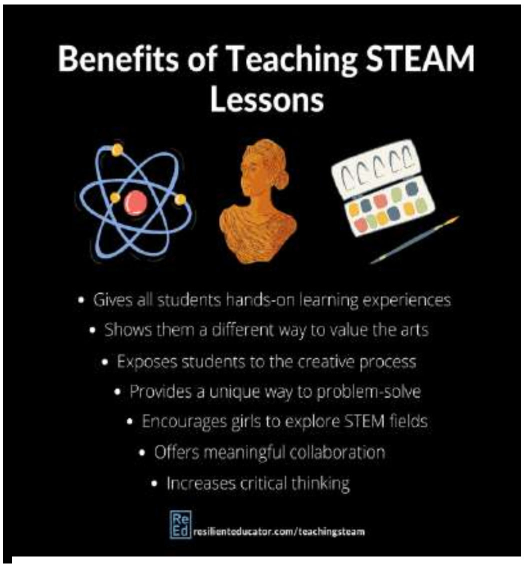
From a simple challenge for the students in their classroom or a project educators need to make sure they have the buy-in required from their schools and districts to be successful. They understand that students may take some time to get used to the programme, so they carefully examine what works and what might need some tweaking before they take on larger projects. Then, they work their way up to more complex implementations and lessons.

1.2. START SIMPLE

Successful STEAM programmes keep it simple and they make use of tools and materials with which students are already comfortable. By integrating interesting technology that is accessible to everyone, is easy to use, and can be integrated with other crafts materials in their classroom or library, they can help ease students, other educators, and administrators into STEAM.

1.3. START AND FAIL FAST, IMPROVE, AND KEEP ON GOING

Failing fast and forward is interwoven with maker and STEAM education culture. Educators who take an active role in starting STEAM programmes embrace this culture by trying different tools and programmes, failing, and learning from their failures. This cycle of invention encourages them to try new methods and ultimately come up with a solution that works for them.



WHAT ARE THE BEST IMPLEMENTATION STRATEGIES?

Every successful STEAM programme should be accessible to every student, no matter their background, gender, or comfort level with the technology. The key is to implement tools that have "low floors," meaning they are easy to pick up and start using without the need for extensive training.

These tools should also be gender inclusive and instead of dictating what girls or boys should like, allowing students to bring their own characters and personalities into their projects.

https://www.youtube.com/watch?v=vSAXJCPC5C4 TIME:2'47"

IMPLEMENT TOOLS THAT ARE CROSS-PLATFORM, REUSABLE, AND CAN BE INTEGRATED WITH OTHER MATERIALS

An important element of creative thinking is being able to come up with new ways to use the tools and objects around us. Therefore, the materials we choose for our maker space and STEAM programmes should allow for remixing, taking apart, reusing, and repurposing.

HOW CAN YOU SCALE YOUR STEM / STEAM PROGRAMME?

Unfortunately, many innovative STEAM practices start – and stop – with a lead educator. To fully immerse an entire school or district in maker and STEAM education, lead educators need the buy-in from their admins, and admins need the buy-in from all their teachers, even teachers who are not tech-savvy.

Here are few practical tips to help educators get buy-in across the whole school or even a district.

CREATE A CULTURE AROUND STEAM

Many lead educators who successfully scale their innovative practices have done so by creating a movement behind their initiative. Having an end-of the-year competition across the school, showcasing students' projects at various school events, and celebrating students and teachers who make a difference in STEAM every day are great ways to cultivate the culture of making and innovating.

PROVIDE RESOURCES FOR PROFESSIONAL DEVELOPMENT

Teachers are on the front lines every day -- responsible for training students for the future of work. Often, these teachers have not had any formalized STEAM training, themselves. Principals and district admins can set these teachers up for success by ensuring that any STEAM programme they are looking to integrate includes professional development. The more teachers know, the more effectively they will be able to instruct kids.

MAXIMIZE COLLABORATION OPPORTUNITIES AMONG TEACHERS AND STEAM SPECIALISTS

Educators love to share their knowledge and are keen to hear from other educators about best practices. That's a great opportunity for school and district admins to facilitate ways for their lead tech-savvy educators to share their success stories with STEAM and spread the excitement among their colleagues.

STEAM implementation, includes four levels of INTEGRATION:

- Integration of STEAM topics within STEAM courses or extracurricular activities
- Integration of STEAM into all subjects within a specialized programmer
- Integration of STEAM as part of all subject areas throughout the school – but not necessarily using a whole-instruction approach for problem-based learning
- Problem-based learning and STEAM integration defines the instruction model for all subjects in the school and the mindset transcends beyond
- The school boundaries into the community at large.

Whether you are an enthusiastic educator taking an active role in introducing STEAM and coding into your school, or a leader accepting the challenge to scale a successful implementation beyond one classroom and into a whole school or district, it is important to plan not only for the tools, but also for professional development, and integration into core subject areas, extracurricular activities, and after school programs.

Video: https://www.youtube.com/watch?v=fiiox73jn2w Time:2c

CAN STEAM BE CONSIDERED A TEACHING METHOD?

Education in the 21st century, which has entered a disruptive 4.0 digital era, must continue to innovate. School education, as one of the knowledge institutions, must also be prepared to answer the challenges of this era. This type of education needs to make changes to both curriculum and learning methods. STEAM learning is considered to integrate the skills needed by children. STEAM encourages children to build knowledge about the world around them by observing, investigating and asking questions. The addition of 'Arts' (leading to the STEAM acronym), will give education the opportunity to describe the STEAM concept in creative and imaginative ways. This review finds a definition for 'A' or 'Arts' in STEAM showing that the making of art and the creative process is overshadowed by the emphasis on the final result or product. For example, a study by Perignat and Katz-Buonincontro (2019) explains that students use various techniques to solve problems and demonstrate learning, and this includes attention to the humanities (the 'A' in STEAM) because they created media art and short videos written to present their solution. The impact of this learning is that STEAM makes students more active and able to take initiative with their own knowledge, and teachers who are influenced by the integrated professional development of STEAM prompt children to be positively influenced by their teacher's professional learning.

Another finding is that experience of STEAM can increase self-confidence in students.

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Page | 41

https://youtu.be/ZImpuLyt4ew

Insights and tips for the adoption of STEAM in your school time: 10.21

STEAM – an Integrating approach

STEAM is an integrated approach to learning which requires an intentional connection between curriculum objectives, assessments, and lesson design/implementation.

To develop a successful programme, schools must consider a variety of factors, including:

- collaborative planning, including a cross-section of teachers on each team
- adjusting timetables to accommodate a new way of teaching and learning
- professional development for all staff in STEAM practices and principles
- STEAM mapping for the curriculum and assessment design process
- alignment and unpacking of standards and assessments

- seamless lesson implementation processes and strategies.

A STEAM lesson addresses all or most of the following components

- The lesson contextualises maths, science, and art.
- The lesson is collaborative.
- The lesson results in a technology that solves a real-world problem.
- The lesson allows for multiple solutions (there isn't one right answer to arrive at).
- The lesson is hands-on and artistic.

I. **E-SOC platform prototype.**

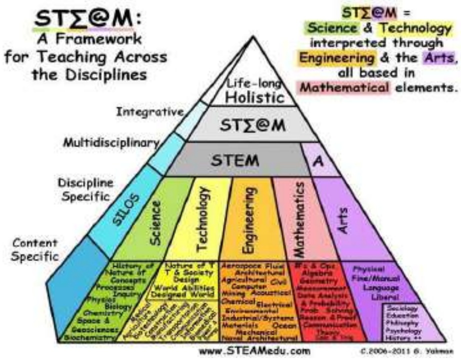
The **Test** is the final stage which must be considered as an interactive process, so that the results generated during the testing phase are often used to redefine one or more problems and inform the understanding of the users, the conditions of use, how people think, behave, and feel, and to empathize. After pilot sessions of this course and platform this stage results in the Exploitation guidelines.

CHAPTER TWO: CURRICULUM

WHAT KIND OF THE TRAINING PROGRAMME?

It will be a highly participatory and experiential course (TP). Although there will be a general course design, on the whole it will be a process course in which the facilitator(s) respond constantly to the ongoing needs and wants of the participants. Participant feedback will therefore be a major course design component, which will affect subsequent course planning.

The idea of the course is that education should be a personal journey which the learner can shape.



The main methodology used will be: Personalised Learning.

PERSONALISED LEARNING

Personalised learning demands teaching and learning strategies that develop the competence and confidence of every learner.

1. For students it means a focus on their repertoire of skills and their management of the learning experience.
2. Personalised learning requires a range of whole class, group and individual teaching, learning and ICT strategies to transmit knowledge, to instill key learning skills and to accommodate different paces of learning.
3. Personalised learning is not just about giving learners more choice. It means engaging learners in a highly interactive process of learning. Learning is not just the successful transfer of knowledge and skills. Learning comes through interaction in which the learner discovers for themselves, reflects on what they have learned and how. Effective learning has to be co-created between learner and trainer in which both invest effort and imagination.
4. ICT should be a tool for everyone to use in every lesson. Information technology creates a shared platform for learning, linking home and community, in which learners and trainers work together far more collaboratively. That is the way leading edge businesses already operate.
5. Curriculum's components

For more information watch the video: https://www.youtube.com/watch?v=6oLNLCO0vfI Time: 2.27

WHICH ARE THE LEARNING OUTCOMES?

By the end of the course, participants should:

a) have made explicit and shared their own beliefs, attitudes and feelings about STEAM teaching through personalised learning, together with the impact of the course on their own activity

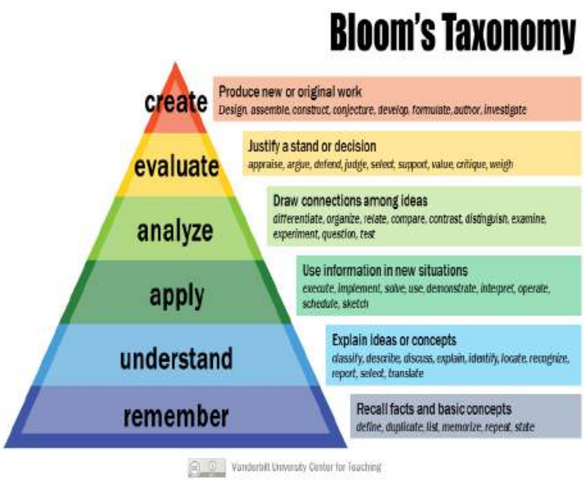
b) have knowledge about:

- concepts of STEAM related to their future career option
- the role of teacher in personalized learning (facilitator)
- counseling and mentoring techniques
- observation, observation tools and recording methods
- training styles and possible impacts (personalized learning)
- a wide range of activities and procedures for enabling girl-students acquire the needed skills
- assessment and evaluation: criteria, tools, processes
- a range of tools and activities for girls own development

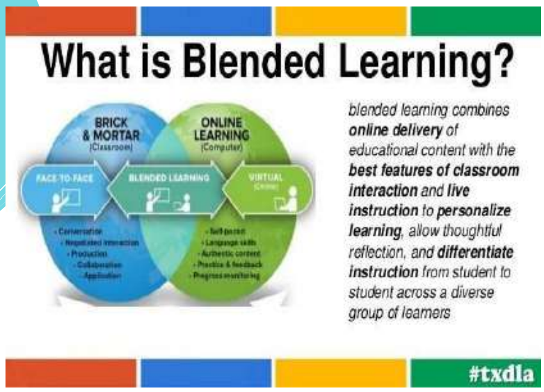
c) have practised skills and attitude in

- relationship management: forming, maintaining and ending
- active listening
- sensitive language use in counseling discussions
- assessing individual needs in order to select appropriate intervention style and activity, or provide concrete practical help
- helping girls become capable of independent self-evaluation
- assessing and evaluating girls work against the contextually accepted standard
- some tools and activities for their own development

The course will be a B-learning TP and will have two parts: a face to face one (12 classes) and an online part (30 classes) or totally on-line 21 sessions. For more information watch the video with Bloom's Taxonomy: https://www.youtube.com/watch?v=OOy3m02uEaE



What is Blended Learning?



CHAPTER THREE: THE TRAINING PROGRAMME'S METHODOLOGY

Constructivist approach teaching methods are based on constructivist learning theory.

Along with John Dewey, Jean Piaget researched childhood development and education. Both Dewey and Piaget were very influential in the development of informal education. Dewey's idea of influential education suggests that education must engage with and enlarge experience and the exploration of thinking and reflection associated with the role of educators. Piaget's role in the constructivist teaching suggests that we learn by expanding our knowledge by experiences which are generated through play from infancy to adulthood which are necessary for learning. Their theories are now encompassed in the broader movement of progressive education. Constructivist learning theory says that all knowledge is constructed from a base of prior knowledge. Children are not a blank slate and knowledge cannot be imparted without the child making sense of it according to his or her current conceptions. Therefore, children learn best when they are allowed to construct a personal understanding based on experiencing things and reflecting on those experiences.

WHAT ARE THE CHARACTERISTICS OF THE CONSTRUCTIVIST THEORY?

One of the primary goals of using constructivist teaching is that students learn how to learn by giving them the training to take initiative for their own learning experiences. According to Audrey Gray, the characteristics of a constructivist classroom are as follows:

- the learners are actively involved;
- the environment is democratic;
- the activities are interactive and student-centered;
- the teacher facilitates a process of learning in which students are encouraged to be responsible and autonomous.

EXAMPLES OF ACTIVITIES

Furthermore, in the constructivist classroom, students work primarily in groups and learning and knowledge are interactive and dynamic. There is a great focus and emphasis on social and communication skills, as well as collaboration and exchange of ideas. This is contrary to the traditional classroom in which students work primarily alone, learning is achieved through repetition, and the subjects are strictly adhered to and are guided by a textbook. Some activities encouraged in constructivist classrooms are:

- **Experimentation:** Students individually perform an experiment and then come together as a class to discuss the results.
- **Research projects:** Students research a topic and can present their findings to the class.
- **Field trips:** This allows students to put the concepts and ideas discussed in class in a real-world context. Field trips would often be followed by class discussions.
- **Films:** These provide visual context and thus bring another sense into the learning experience.
- **Class discussions:** This technique is used in all of the methods described above. It is one of the most important distinctions of constructivist teaching methods.

CONSTRUCTIVIST THEORY AND ONLINE LEARNING

Constructivist approaches can also be used in online learning. For example, tools such as discussion forums, wikis and blogs can enable learners to actively construct knowledge.

WHICH ARE THE CHARACTERISTICS OF TRADITIONAL CLASS VERSUS CONSTRUCTIVIST CLASS

A contrast between the traditional classroom and the constructivist classroom is illustrated below:

The Traditional Classroom

Begins with parts of the whole – emphasizes basic skills. Strict adherence to fixed curriculum Textbooks and workbooks Instructor gives/students receive, Instructor assumes directive, authoritative role, Assessment via testing / correct answers. Knowledge is inert Students work individually.

The Constructivist Classroom

- Begin with the whole – expanding to parts
- Pursuit of student questions / interests
- Primary Sources / manipulative materials
- Learning is interaction – building on what students already know

- Instructor interacts / negotiates with students.
- Assessment via student works, observations, points of view, tests. Process is as important as product.
- Knowledge is dynamic / change with experiences
- Students work in groups

Source: Thirteen Ed Online (2004)

Because existing knowledge schemata are explicitly acknowledged as a starting point for new learning, constructivist approaches tend to validate individual and cultural differences and diversity.

WHAT IS THE ROLE OF TEACHERS?

In the constructivist classroom, the teacher's role is to prompt and facilitate discussion. Thus, the teacher's main focus should be on guiding students by asking questions that will lead them to develop their own conclusions on the subject.

Parker J. Palmer (1997) suggests that "*good teachers join self, subject, and students in the fabric of life because they teach from an integral and undivided self, they manifest in their own lives, and evoke in their students, a capacity for connectedness*".

David Jonassen identified three major roles for facilitators to support students in constructivist learning environments:

I. Modeling
II. Coaching
III. Scaffolding

A brief description of the ***Jonassen major roles*** are:

Modeling – Jonassen describes Modeling as the most commonly used instructional strategy. Two types of modeling exist: behavioural modeling of the overt performance and cognitive modeling of the covert cognitive processes. Behavioral modeling in Constructivist Learning Environments demonstrates how to perform the activities identified in the activity structure. Cognitive modeling articulates the reasoning (reflection-in-action) that learners should use while engaged in the activities.

Coaching – For Jonassen the role of coach is complex and inexact. She acknowledges that a good coach motivates learners, analyzes their performance, provides feedback and advice on the performance and how to learn about how to perform, and provokes reflection and articulation of what was learned. Moreover, she posits that coaching may be solicited by the learner. Students seeking help might press a "How am I Doing?" button. Or coaching may be unsolicited, when the coach observes the performance and provides encouragement, diagnosis, directions, and feedback. Coaching naturally and necessarily involves responses that are situated in the learner's task performance (Laffey, Tupper, Musser, & Wedman, 1997).

Scaffolding - Scaffolding is a more systemic approach to supporting the learner, focusing on the task, the environment, the teacher, and the learner. Scaffolding provides temporary frameworks to support learning and student performance beyond their capacities. The concept of scaffolding represents any kind of support for cognitive activity that is provided by an adult when the child and adult are performing the task together (Wood & Middleton, 1975) similar to **Mentoring**.

Constructivist learning environments (CLEs)

Jonassen has proposed a model for developing constructivist learning environments (CLEs) around a specific learning goal. This goal may take one of several forms, from least to most complex:

- Question or issue
- Case study
- Long-term Project
- Problem (multiple cases and projects integrated at the curriculum level)

Jonassen recommends making the learning goals engaging and relevant but not overly structured.

In CLEs, learning is driven by the problem to be solved; students learn content and theory in order to solve the problem. This is different from traditional objectivist teaching where the theory would be presented first and problems would be used afterwards to practice theory.

Depending on students' prior experiences, related cases and scaffolding may be necessary for support. Instructors also need to provide an authentic context for tasks, plus information resources, cognitive tools, and collaborative tools.

ASSESSMENT

Traditionally, assessment in the classrooms is based on testing. In this style, it is important for the

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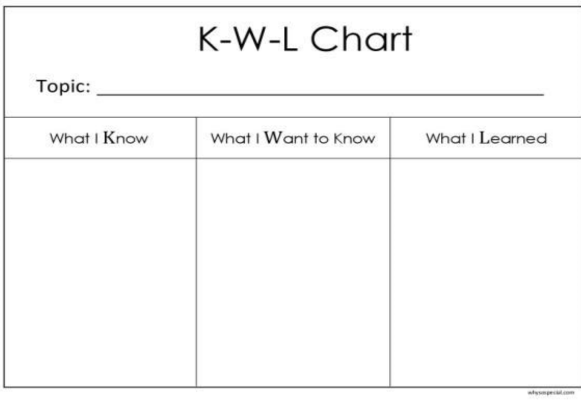
student to produce the correct answers. However, in constructivist teaching, the process of gaining knowledge is viewed as being just as important as the product. Thus, assessment is based not only on tests, but also on observation of the student, the student's work, and the student's points of view.

Some assessment strategies include: **Oral discussions**. The teacher presents students with a "focus" question and allows an open discussion on the topic.

KWL(H) Chart (What we know, What we want to know, What we have learned, How we know it). This technique can be used throughout the course of study for a particular topic, but is also a good assessment technique as it shows the teacher the progress of the student throughout the course of study.



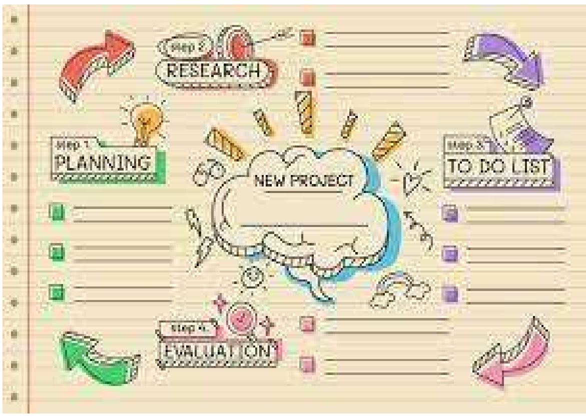
K-W-L Chart

Topic: ______________________

What I Know	What I Want to Know	What I Learned

Mind Mapping

In this activity, students list and categorize the concepts and ideas relating to a topic.



Hands-on activities. These encourage students to manipulate their environments or a particular learning tool. Teachers can use a checklist and observation to assess student success with the particular material.

Pre-testing. This allows a teacher to determine what knowledge students bring to a new topic and thus will be helpful in directing the course of study.

SPECIFIC APPROACHES TO EDUCATION BASED ON CONSTRUCTIVISM

An approach to learning based on the constructivist learning ideologies was presented by Jean Piaget (Harel & Papert, 1991). In this approach, the individual is consciously engaged in the construction of a product (Li, Cheng, & Liu, 2013). The utilization of constructionism in educational settings has been shown to promote higher-order thinking skills such as **problem-solving and critical thinking** (Li et al., 2013).

WHICH ARE THE GUIDED INSTRUCTIONS?

A learning approach in which the educator uses strategically placed prompts, cues, questions, direct explanations, and modeling to guide student thinking and facilitate an increased responsibility for the completion of a task (Fisher & Frey, 2010).

WHAT IS PROBLEM BASED LEARNING?

A structured educational approach which consists of large and small group discussions (Schmidt & Loyens, 2007). **Problem-based learning** begins with an educator presenting a series of carefully constructed problems or issues to small groups of students (Schmidt & Loyens, 2007). The problems or issues typically pertain to phenomena or events to which students possess limited prior knowledge (Schmidt & Loyens, 2007).

The first component of problem-based learning is to discuss prior knowledge and ask questions related to the specific problems or issues (Schmidt & Loyens, 2007). Following the class discussion, there is typically time in which students individually research or reflect on the newly acquired information and/or seek out areas requiring further exploration (Schmidt & Loyens, 2007).

After a pre-determined amount of time (as outlined by the educator), students will meet in the same small groups that were composed prior to the class discussion (Schmidt & Loyens, 2007).

In the first meeting, groups will spend between one and three hours further discussing the problems or issues from class in addition to presenting any new information collected during individual research (Schmidt & Loyens, 2007). Following the first meeting, students will independently reflect on the group discussion, specifically in comparing thoughts regarding the problems or issues in question (Schmidt & Loyens, 2007).

Typically, groups will meet a second time to critically analyse individual and group thoughts and discussions and will attempt to synthesize the information in order to draw conclusions about the given problem or issue (Schmidt & Loyens, 2007).

Within the educational setting, problem-based learning has enabled students to actively construct individual understandings of a topic using both prior and newly acquired knowledge (Schmidt & Loyens, 2007). Moreover, students also develop self-directed and group learning skills which ultimately facilitates the comprehension of the problems or issues (Schmidt & Loyens, 2007).

WHAT IS INQUIRY BASED LEARNING?

An educational approach associated with problem-based learning in which the student learns through investigating issues or scenarios (Hakverdi-Can & Sonmez, 2012). In this approach, students pose and answer questions individually and/or collaboratively in order to draw conclusions regarding the specific issues or scenarios (Hakverdi-Can & Sonmez, 2012).

Within the educational setting, **inquiry-based learning** has been beneficial in developing student inquiry, investigation, and collaboration skills, in turn, increasing overall comprehension of the issue or scenario (Hakverdi-Can & Sonmez, 2012).

Effective essential questions include student thought and research, connect to student's reality and can be solved in different ways (Crane, 2009). There are no incorrect answers to essential questions, rather answers reveal student understanding (Crane, 2009).

WHAT IS ANCHORED INSTRUCTION?

An educational approach associated with problem-based learning in which the educator introduces an 'anchor' or theme in which students will be able to explore (Kariuki & Duran, 2004). The 'anchor' acts as a focal point for the entire task, allowing students to identify, define, and explore problems while exploring the topic from a variety of different perspectives (Kariuki & Duran, 2004).

WHAT IS COOPERATIVE LEARNING?

A variety of educational approaches focusing on individuals working together to achieve a specific learning outcome (Hsiung, 2012).

WHAT IS RECIPROCAL PEER TEACHING?

A **cooperative learning** approach wherein students alternate roles as teacher and learner (Krych, March, Bryan, Peake, Wojciech, & Carmichael, 2005).

The utilization of **Reciprocal Peer Teaching (RPT)** in educational settings has been effective in the development of teamwork, leadership, and communication skills in addition to improving students' understanding of course content (Krych et al., 2005).

WHAT IS JIGSAW LEARNING?

A highly structured cooperative learning approach which is implemented in four stages: introduction, focused exploration, reporting and re-shaping, and integration and evaluation. In the introduction stage, the class is divided into heterogeneous 'home' groups consisting of between three and seven students (Karacop & Doymus, 2013).

Upon establishing the 'home' groups, the teacher will discuss the subtopics pertaining to the subject matter (Karacop & Doymus, 2013). In the focused exploration stage, each student within all 'home' groups selects one of the subtopics (Karacop & Doymus, 2013).

Students from each 'home' group that have selected the same subtopic will form a 'jigsaw' group (Karacop & Doymus, 2013).

It is in the 'jigsaw' group that students will explore the material pertaining to the subtopic and will prepare for teaching it to their 'home' group, the reporting and re-shaping stage (Karacop & Doymus, 2013).

The approach concludes in the fourth stage, integration and evaluation, wherein each of the 'home' groups combine the learning of each subtopic together to create the completed piece of work (Karacop & Doymus, 2013).

If you want to know more go to this video: *Curriculum Development and Course Design*

https://slideplayer.com/slide/1585514/

WHAT IS PROJECT BASED LEARNING?

- Project-based learning can target one or more content areas.
- We may start small with our target group teachers in their first implementations and pick only a couple of content areas to target. However, as teachers and students become more PBL-savvy, STEAM can be a great opportunity to create a project that hits science, math, technology, and even art content.
- You could also integrate science, art, and a foreign language, for example—you're not limited to the subjects in the STEAM acronym.
- For more information watch this video: https://www.youtube.com/wa

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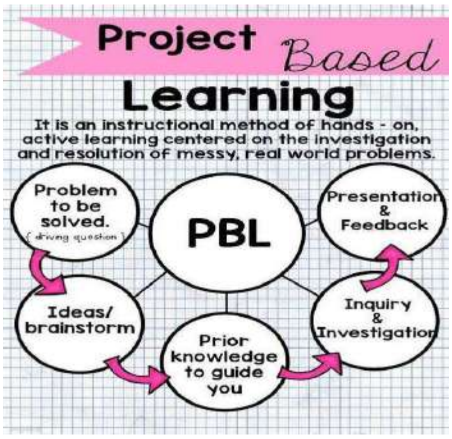

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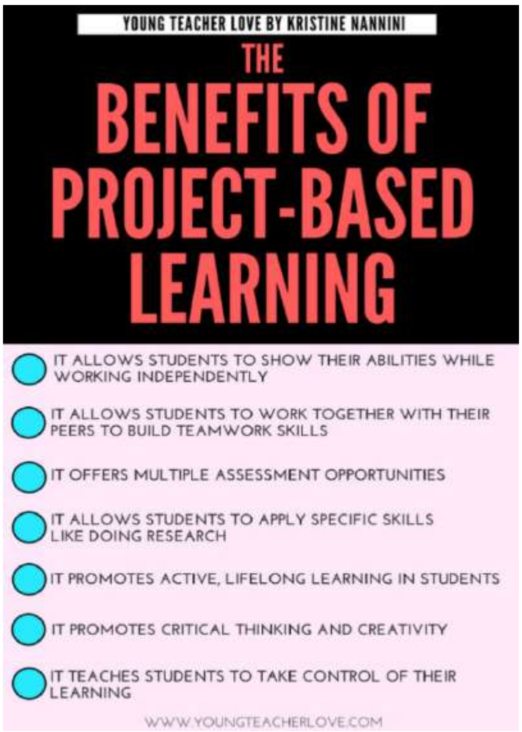
- https://pt.slideshare.net/JessicaLura/deeper-learning-through-projectbased-learning-and-steam



PBL can teach and assess the 21st-century skills embedded in STEAM Skills like:

- collaboration,
- creativity,
- critical thinking,
- problem solving

needed for students to be effective.

- 21st-century skills are part of **the glue of STEAM education**.

CHAPTER FOUR: STEREOTYPES & COUNTER ARGUMENTS

ORGANISING A WORKSHOP - A SPRINGBOARD FOR HIGHLIGHTING STEREOTYPES

"The OECD pinned the blame for the disadvantage for girls in maths and science on low expectations among parents and teachers, as well as lack of self-confidence and what it called the ability to "think like a scientist" in answering problems".

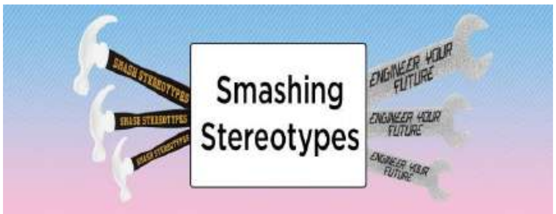
Workshops for spotting unconscious and conscious stereotypes are paramount to assure a springboard for the Training Programme. Facilitating a Gender Sensitive Training Workshop can be challenging in terms of handling a situation when a heated debate starts to take place. The tension in a sensitive debate can be eased when a facilitator is able to emphasize facts instead of opinions. That being said, both facts and opinions should be welcomed as part of an engaging and fruitful group discussion.

An essential skill of a trainer is to overcome biases and de-escalate sensitivities by noticing and addressing confusions between facts and views, without hurting the feelings of the concerned participants.

WHICH ARE THE THINGS TO CONSIDER?

There are many factors that encourage or inhibit people's participation such as language, experience related to the topic, and experience speaking in public, but also power relations related to people's social and economic position. Age and gender are also among the factors that may affect a person's capacity to be at ease speaking publicly. As workshop leader, you are able to identify potential issues at the start of the workshop in an effort to create a safe space for all the participants.

Target groups are indeed invited to participate in workshops and intellectual outputs production. They will have the opportunity to raise their awareness about the role they can play in contrasting gender stereotypes in STEAM education and contribute to the co-creation of a personalised and innovative solution, which will enable them to concretely change and improve their teaching- guidance and practices and make them more gender friendly. We hope that these directly involved beneficiaries will act as mentors and promoters of the solution within their own working environment and communities (teachers' networks and associations as well as virtual communities).



CHAPTER FIVE: LESSON PLANS FOR UPPER-SECONDARY LEVEL

LESSON 1.

E-SOC Lesson Plan

Learning Objectives:	To describe what are the factors which impede girls and women to choose STEAM jobs in "masculine" settings. To identify possible teaching strategies for addressing the issues within the classroom that reduce girls' interest in pursuing a STEAM career considered masculine. To apply the digital methodology used to teach the lesson content in the classroom.
Learning outcomes:	By concluding this session/class participants will have: **Knowledge:** To identify the factors that withdraw girls and women from STEAM studies and jobs. To describe the factors that motivate girls and women to study STEAM subjects and careers. To indicate how digital technologies promote gender-inclusive classrooms. **Skills:** To develop initial ideas about a teaching activity to address the issues that withdraw girls from STEAM studies. **Attitudes:** To value how their teaching strategies could enhance a gender-inclusive STEAM class.
Stereotype and	**S3 Hard science is still profoundly associated with masculinity.**

counter arguments	CA1 Girls have the potential to excel in STEAM subjects. CA2 There is a new (somehow imposed) attitude towards girls and women in STEAM career paths.
Target group:	Upper - Secondary School Teachers School students (choose from 15-18+)

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 2hs in total
1.Getting to the core of girls' interest for STEAM	This activity consists of an escape room designed with Genially (https://app.genial.ly/) and a board uploaded in Jamboard (google). The class will be divided into pairs preferably mixed: woman/man or girls/boys. Each pair of participants will be a team. The participants will be given the link to the escape room and the jamboard. In the escape room, there will be information regarding the factors that have a positive and a negative impact on girls' participation in STEAM subjects, and careers. The trainer will give a general explanation to the participants indicating the time they have to solve the escape room and the nature of this activity. An escape room is an activity that has several tasks that participants have to solve in order to obtain a key that gets them to "get out" of the room.	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable In case of not having access to technological devices, the teacher can elaborate a	1h

	The trainer/teacher should suggest the teams take notes on the jamboard during the escape room about the information that catches their interest. On the board, each team will choose a number and write down their names in the column that corresponds to that number. Also, they may write their ideas concerning the contents learnt in the escape room. There is more than one board so if participants do not find room in one board they can use the order board (or page). The facilitator has to indicate to the participants to write down their thoughts and ideas about the possible teaching strategies that come to them during the escape room experience. When each team ends the escape room they will write their ideas about what are possible teaching strategies to undertake in a classroom to make it gender-inclusive.	questionnaire with the escape room contents	
2. Reflections on teaching strategies for increasing girls' interest in STEAM.	Once every team has finished the escape room the trainer/teacher will open the discussion to the class about the proposals for the teaching strategies to undertake in a classroom to make it gender-inclusive. For this purpose, the trainer/teacher will project the board to the entire class to generate a discussion and exchange ideas and insights. The aim of this activity is to reach a conclusion about the suitable strategies to address the factors that withdraw and promote girls' interest in STEAM.	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable In case of not having	1 h

		access to technologi cal devices the teacher can invite participant s to write their ideas on a board or flipchart	

Annexes:

Link to the genially escape room

https://view.genial.ly/636a93f026d5eb001a83a9e9/interactive-content-lesson-plan-uji-ltta

Link to the draft of the Jamboard
https://jamboard.google.com/d/1_9ho-f_VOQ8i4pILA9FWkofvvjOt9Z7Irb-ewVfRfGs/edit?usp=sharing

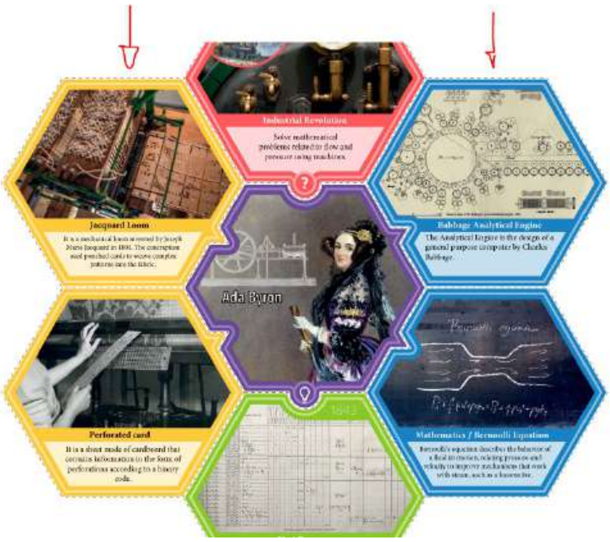
LESSON 2.

E-SOC Lesson Plan

Learning Objectives:	To demonstrate women's contribution to computing science. To identify opportunities for women's abilities in Math, Programming, and creativity. To apply the digital methodology used to teach the lesson content in the classroom.
Learning outcomes:	By concluding this session /class participants will have: **Knowledge:** To define the motivation of girls and women to study STEAM subjects and careers. **Skills:** To explain the issues that prevent girls from STEAM studies by using a blended teaching methodology **Attitudes:** To value blended teaching strategies to enhance a gender-inclusive STEAM class.
Stereotype and Counter arguments	**S 4.** *There are not enough successful examples of females in STEAM careers.* CA1. Mostly men's achievements are popularised in media, posters, and invitations to school lectures. CA2. There is a need to focus on career awareness and planning in order to empower girls to pursue a STEAM profession
Target group:	Upper - Secondary School Teachers School students (choose from 15-18+)
	Lesson periods: 1. Lesson preparation 30 min 2. 2 periods x 45 min. = 90 min.

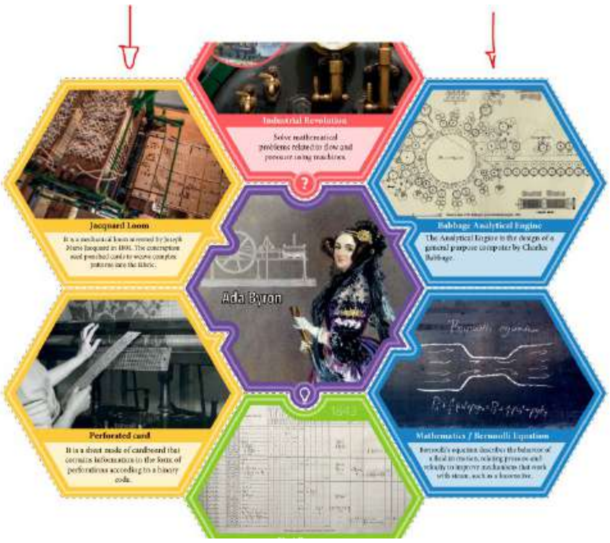
Activity Title & number	Short description of the activity	Resources needed	Time 2hs in total
1. Lesson preparation	1. Before starting, the teacher should take the following into consideration: 1.1. Have the yellow and blue cards of each scientist grouped in pairs. The following document should be printed: Material_complete version.pdf, and the yellow and blue cards cut separately. The teacher will make sure that the yellow or blue cards given to each person belong to the same scientist. 1.2. Have the file of the scientists' cards and their biographies (Scientists Biographies.pdf). 1.3. Have the PDF file of the results/invention cards open on the classroom computer (Scientific Inventions_results.pdf). 1.4. Have the PDF file of the historical contexts cards open on the classroom computer (Historical Contexts.pdf). 1.5. Have as many sheets of Annex 1 as teams can be formed. 1.6. Have blank sheets of paper to hand out to the students. 1.7. Share with the class the link to the Jamboard "Team Labelling" (https://jamboard.google.com/d/1ApdkMRh22TRnMakaJg6m7gKgkFZufu0CfT8ISFRdgnM/edit?usp=sharing). 1.8. Share with the class the link to the Jamboard "Women Scientists Puzzles" (https://jamboard.google.com/d/1m5ME0cDYpsx_VwAsM_O92okT6TVf7tSZToLgDbVHcv0/edit?usp=sharing) 1.9. Have prepared a Mentimeter survey with the names of each inventor (see model Mentimeter https://www.menti.com/alsbx8mxzcvm).	Printer Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Paper sheets Post-it block (or equivalent) In case of not having access to technological devices the teacher can elaborate all the digital	30 minutes

Activity Title & number	Short description of the activity	Resources needed	Time 2hs in total
		documents on paper. Material_complete version.pdf Scientific Inventions_results.pdf Scientists Biographies.pdf Historical Contexts.pdf Jamboard "Team Labelling" Jamboard "Women Scientists Puzzles" Mentimeter survey Annex 1	

Activity Title & number	Short description of the activity	Resources needed	Time 2hs in total
2. Getting started	2. For this lesson the teacher will divide the classroom according to the material Material_complete version.pdf. Depending on the number of students per classroom, the teacher will assign at least two cards of the same colour (yellow or blue) per student (there are 24 yellow and 24 blue cards). Having at least 12 teams. The teacher will make sure that the yellow or blue cards given to each person belong to the same scientist.  3. After handing out the cards, the teacher asks the students to get into teams of two. The teams will have one person with blue cards and one person with yellow cards. The teams should be all-girl and/or mixed teams. 4. Once the students have been grouped, the teacher will hand out the recording sheet (Annex 1) and a blank sheet of paper to take notes. 5. The teacher will then ask the students to fill in the following data: Name and Surname of each team member Names of the cards that each team member has been given.	Material_complete version.pdf Annex 1 Paper sheets	10 minutes.

Activity Title & number	Short description of the activity	Resources needed	Time 2hs in total
	6. The teacher will ask the team members to talk to each other and comment: 6.1. About the content of their cards. 6.2. Whether or not there is a relationship between each card, resource/starting point or tool described on each card.		

Activity Title & number	Short description of the activity	Resources needed	Time 2hs in total
2. Team Labelling	7.1. Team members should also indicate if there is a clear relationship between the cards. If not, they should think of a possible relationship. The teacher can give an example, such as the following: *This is a team of an aeroplane and a punch card and our relationship is not very clear.* *A possible relationship between our cards is that the card is a punched boarding pass for a flight on an aeroplane.* While the students are working, the teacher should project the Jamboard "*Team Labelling*" shared with the students. This activity will help students to analyse the elements and their possible uses. 7.2. The teacher then instructs the students to give a name to their team, e.g. punched aeroplane. Students should be instructed to access the shared Jamboard. Each team should choose a number (in a column) and in that column, on the post-it, write the name of their team.	Annex 1 Jamboard "*Team Labelling*" Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Paper sheets	10 minutes.

Activity Title & number	Short description of the activity	Resources needed	Time 2hs in total
3. Giving a historical context to the team	8. The teacher asks the class to give a historical context to their "cards (blue and yellow)" i.e. the resources/starting points (yellow cards) or tools (blue cards) they have been given.  8.1. To do this, the teacher will project the historical contexts on the board (Historical Contexts.pdf) so that the teams can take notes and generate ideas about the historical context of each "card". (See example below)  8.2. After the projection of the historical contexts on the board, the teacher will give about 5 minutes for them to determine: Which of the historical contexts are related to their resources/starting points or tools were	Historical Contexts.pdf Annex 1 Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Paper sheets	10 minutes.

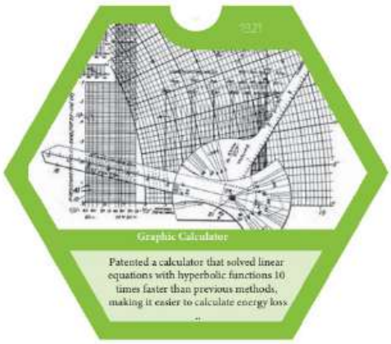
Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 2hs in total
	created. These ideas will be written down on their sheets (Annex 1). 8.3. If they are not sure of the contexts, they should write down the contexts they think they could be.		

<table>
<tr><th>Activity Title & number</th><th>Short description of the activity</th><th>Resources needed</th><th>Time

2hs in total</th></tr>
<tr><td>4. Choosing an invention for the team</td><td>
9. The teacher will then instruct each team to post their characteristics, and their historical contexts on a post-it on the Jamboard. Below the first post-it with the name of their team.

This is helpful for them to find other similar or related cards.

10. After 10 minutes, the teacher will explain that (s)he will project on the board the inventions or results (Scientific Inventions_results.pdf) that correspond to the yellow and blue cards. One of those inventions match a unique pair of cards of each colour. That is, there is only one invention for a pair of yellow cards and a pair blue card.



10.1. The class will be told that while the inventions are being projected, each team should take notes. So, at the end of the projection they can generate ideas about the results/inventions to which each "pair of cards" of their team may belong.

10.2. After the screening the teacher will point out that each pair of cards (blue or yellow) can only belong to one outcome.

10.3. The teacher will then allow about 5 minutes for each team to discuss which outcome they think their resources /starting points (yellow cards) or tools (blue cards) belong to. They will write these ideas down on their record sheet (Annex 1).
</td><td>Computers
Tablets
Smartphone
Video projector
TV 32' screen or above
HDMI cable
Scientific Inventions_results.pdf
Jamboard "Team Labelling"
Annex 1</td><td>10 minutes</td></tr>
</table>

Activity Title & number	Short description of the activity	Resources needed	Time 2hs in total
	10.4. They will then put a post-it on the Jamboard "*Team Labelling* "indicating the outcomes or inventions they think their cards belong to. 10.5. In addition, indicate that while they are working or at the end of their review, each team will be able to read the "board" and see the information of the other teams.		

Activity Title & number	Short description of the activity	Resources needed	Time 2hs in total
5. Adding people to the team	11. After each team has written their inventions or results on the Jamboard, the teacher will tell the class that each team should meet with other teams to get to know them. 11.1. The teacher should indicate that the aim of meeting other teams is to form a larger team of 4 people (two people with yellow cards for available resources / starting point; two with blue cards for tools) who have a common historical context / historical challenge (brick-coloured card) and a common result / invention (green card). 11.2. The teacher will indicate that before meeting with other teams, each team must write in **a post-it on the Jamboard** the following: What they are looking to find out from other teams (other available resources / starting point and/or tools). The teacher may indicate the following example: *"perforated aeroplane": created in the 20th century we are looking for a graphing calculator (invention) and an ENIGMA code decipherment (result) so that we can separate ourselves and be useful elsewhere.*	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Jamboard "*Team Labelling*" Post-it blocks	20 minutes

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 2hs in total
5. Adding people to the team	11.3. In addition, it will be pointed out that while they are working or at the end of their review, each team can read the information board of the other teams and decide which teams they want to meet with, noting it down on their note sheet. The teacher will suggest that their decisions can be based on similarities, the relationship between teams, or the same historical context. 11.4. While the class is working, the teacher will hand out post-it notes for the students to write their team's name. The students should put the post-it on their T-shirts. This is so that the rest of the class can identify them. Each person in each team must carry their cards (yellow or blue) with them to show them on request of other students. 12. When the teams are ready to meet up, the teacher will indicate to the class that they have 15 minutes to talk to other teams. 12.1. The teacher will tell them to get up and look for those teams with whom they want to talk to. The teacher must explain that the intention is to find resources and tools that can be grouped together.	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Jamboard "*Team Labelling*" Post-it blocks	

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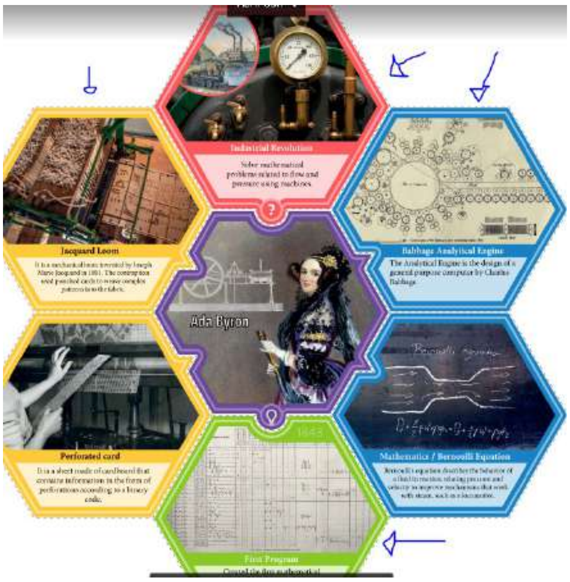
Activity Title & number	Short description of the activity	Resources needed	Time 2hs in total
6. Meeting other teams	12.2. At the end of the time, each team will have to decide with whom they want to regroup, either with one person from a team (who has a pair of yellow/blue cards) or with the whole team. This decision shall be written on their record sheet (Annex 1). *Note:* *(The teams will not actually regroup). It is possible that in a team each set of cards(yellow/blue) pertain to a different invention. Therefore, this team would have to work with two inventions.* 12.3. The decision to be taken by the students will be: two people with a yellow card, two people with a blue card must decide to join together because they belong to the same historical context and the same result/invent.  12.4. This decision will be indicated, per team, on Jamboard "Women Scientists Puzzle".  	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Jamboard "*Team Labelling*" Annex 1. Jamboard "Women Scientists Puzzles"	10 minutes

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Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 2hs in total
	There is one sheet per scientist: on each scientist those teams who think that the card combination they have created belong to this scientist will write them on this page. This document will be public. 12.5. Each team could make two proposals. These proposals will contain the combination of the yellow cards, the blue cards, the historical context and the result/invention they consider correct. They could be on the same or different scientist page.		

Activity Title & number	Short description of the activity	Resources needed	Time 2hs in total
7. Meeting the scientists	13. While the students interact, the teacher will prepare the projection of the biographies of the women scientists (Scientists Biographies.pdf). After 10 minutes, the teacher will tell the class that she/he will show the biographies of the scientists who have created or devised the inventions/results they have learned about. 13.1. The class will be told that while the biographies are being shown, each team should take notes so that at the end of the screening they can review their decisions about which of the scientists invented the inventions they have chosen and written on the worksheet. 13.2. After the screening the teacher will point out that there can only be one inventor per invention or result. 13.3. The teacher will then allow about 5 minutes for each team to discuss and decide about what they have decided and written on the Jamboard "Women Scientists Puzzles". 13.4. The teacher will explain that, after the time given to answer, (s)he will remove the editing permissions from the Jamboard and that the answers given by the teams are final. 13.5. They will have 10 minutes to work.	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Annex 1. Scientists Biographies.pdf Jamboard "Women Scientists Puzzles"	10 minutes

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 2hs in total
8. Matching the scientists with the teams	14. After the time has elapsed, the teacher will remove the editing permissions from the Jamboard. 15. The teacher will then explain the correct answers 16. This activity brings the lesson to a close.	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Jamboard "Women Scientists Puzzles"	10 minutes

References:

1. Programa Diana. Instituto de las Mujeres. Ministerio de Igualdad. Madrid
2. https://en.wikipedia.org/wiki/Ada_Lovelace
3. https://en.wikipedia.org/wiki/Edith_Clarke
4. https://en.wikipedia.org/wiki/Ruth_Teitelbaum
5. http://edition.cnn.com/2011/TECH/innovation/02/08/women.rosies.math/
6. https://en.wikipedia.org/wiki/Betty_Holberton
7. https://en.wikipedia.org/wiki/Marlyn_Meltzer
8. https://en.wikipedia.org/wiki/Frances_Spence
9. https://en.wikipedia.org/wiki/Kathleen_Antonelli
10. https://en.wikipedia.org/wiki/Joan_Clarke
11. https://en.wikipedia.org/wiki/%C3%81ngela_Ruiz_Robles
12. https://en.wikipedia.org/wiki/R%C3%B3zsa_P%C3%A9ter
13. https://en.wikipedia.org/wiki/Ida_Rhodes
14. https://en.wikipedia.org/wiki/Grace_Hopper
15. https://en.wikipedia.org/wiki/Margaret_Hamilton_(software_engineer)
16. https://en.wikipedia.org/wiki/Carol_Shaw
17. https://en.wikipedia.org/wiki/Susan_Kare
18. https://en.wikipedia.org/wiki/Katie_Bouman

Annexes:

ANNEX 1 – Suggested content for the Answer sheet

Team member 1 (Name and Surname)		Team member 2 (Name and Surname)	
	Name	Possible historical context	Possible result/invention
Yellow card 1			
Yellow card 2			
Blue card 1			
Blue card 2			
Is there a clear relation between the teams’ cards	• Yes • No		
If so, which is it?			
If not, what could be the possible relation between them?			
Team’s main characteristics			
Team’s Name:			
	With whom do you want to regroup		
Team member 1			
Team member 2			

Documents needed for this lesson plan:

1. Jamboard "Team Labelling" (https://jamboard.google.com/d/1ApdkMRh22TRnMakaJg6m7gKgkFZufu0CfT8ISFRdgnM/edit?usp=sharing).
2. Jamboard "Women Scientists Puzzles" (https://jamboard.google.com/d/1m5ME0cDYpsx_VwAsM_O92okT6TVf7tSZToLgDbVHcv0/edit?usp=sharing)
3. Mentimeter survey with the names of each inventor (see model Mentimeter https://www.menti.com/alsbx8mxzcvm).

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1. Annex Material complete version.pdf

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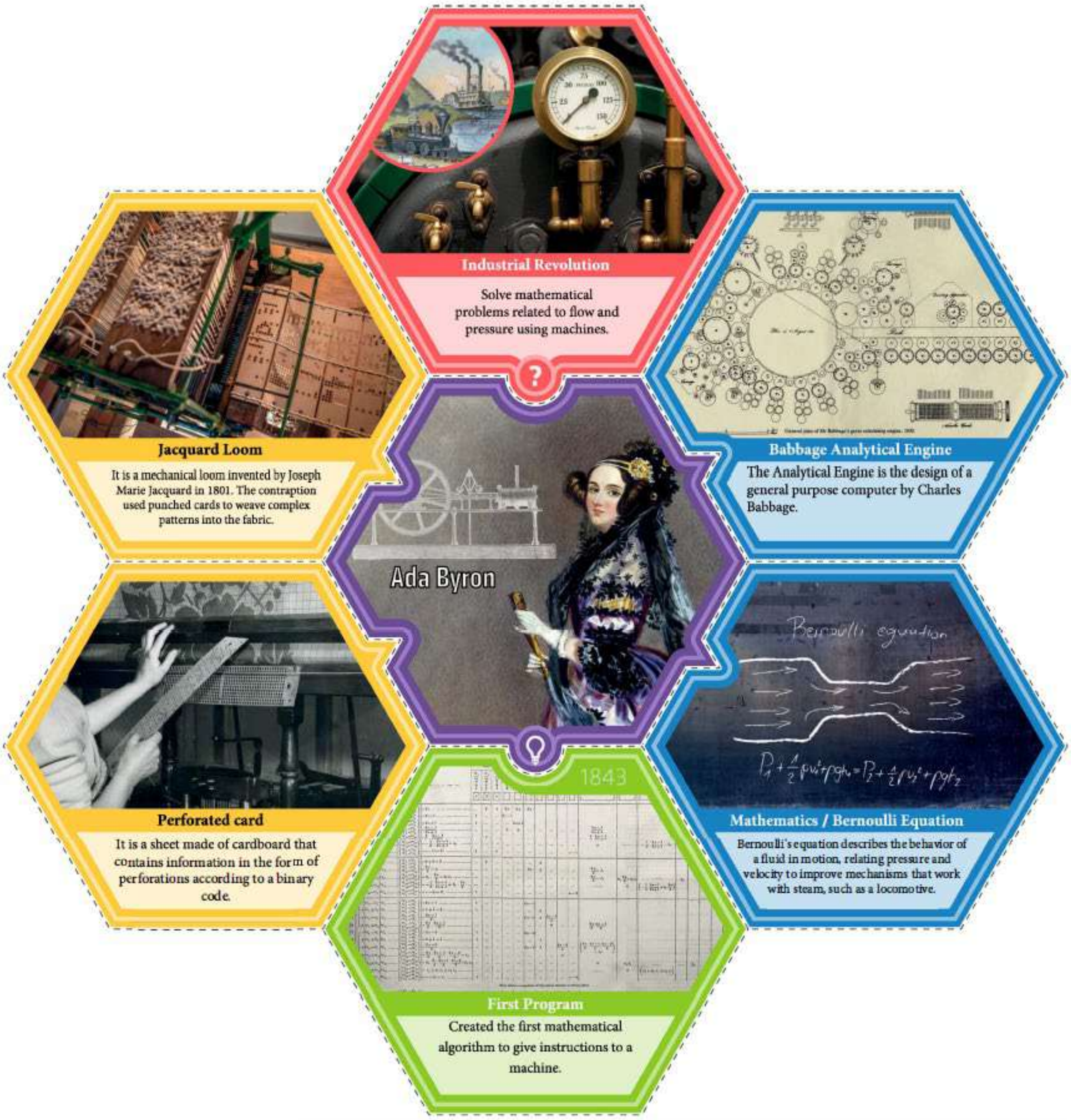

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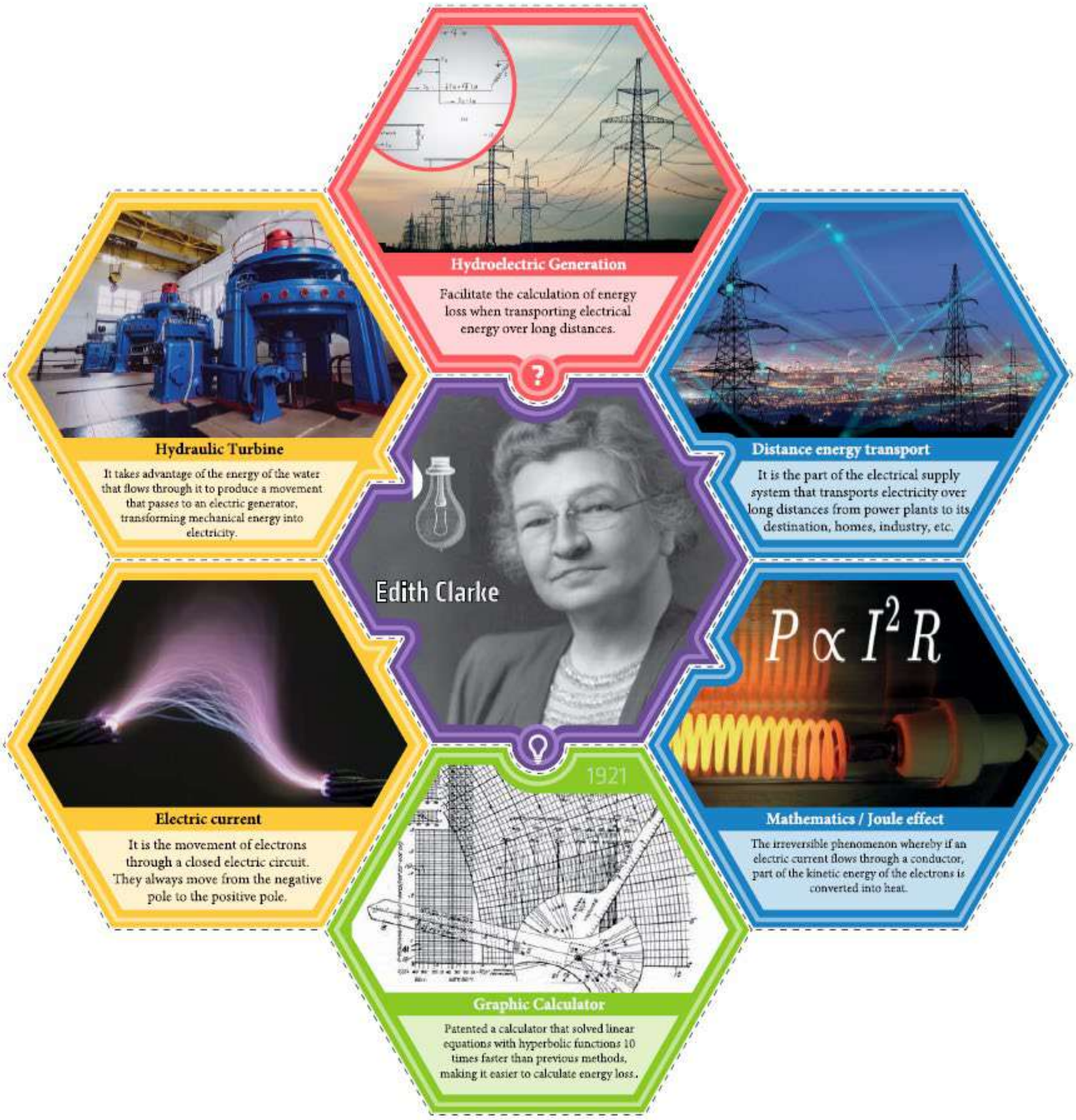

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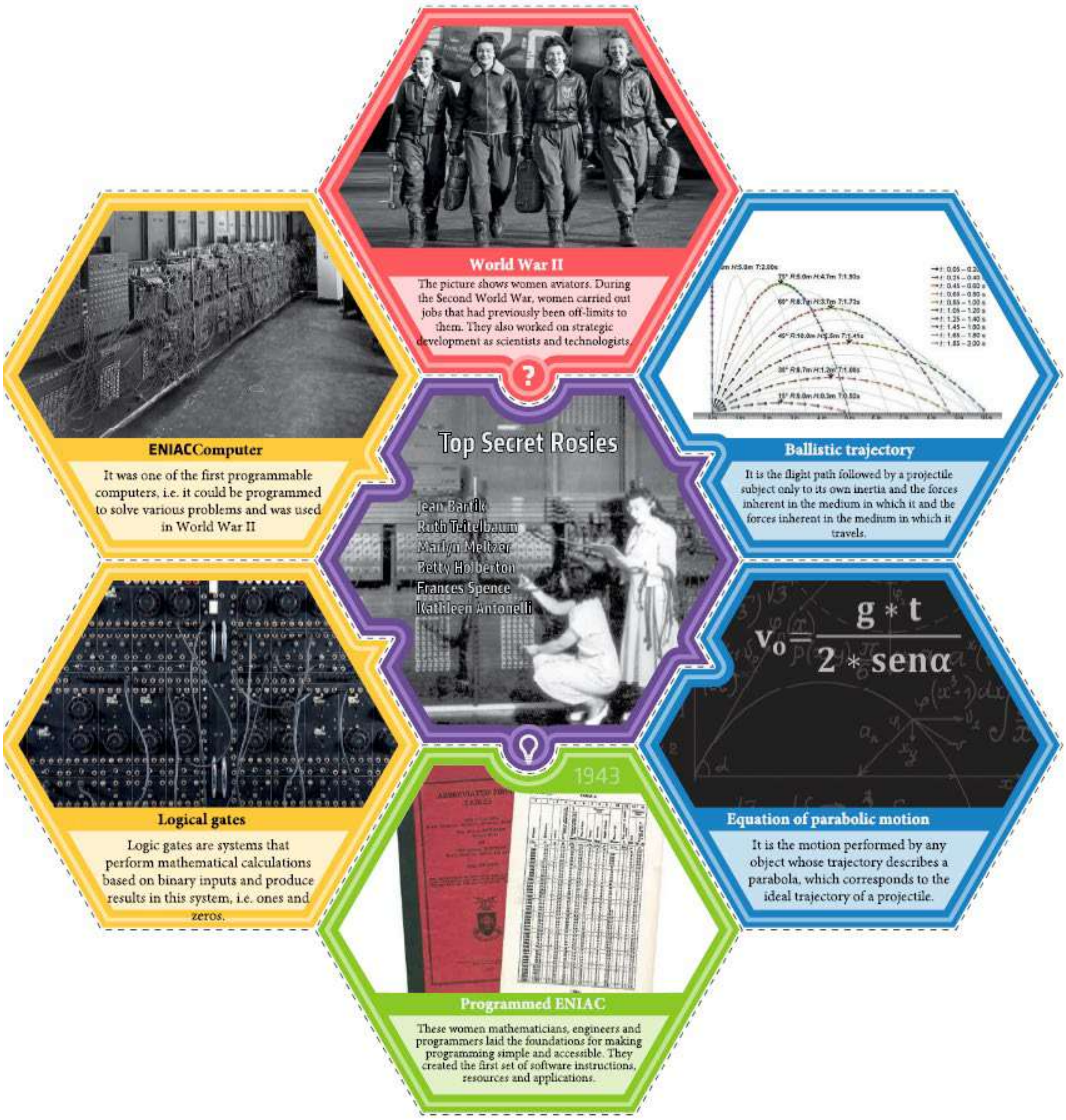

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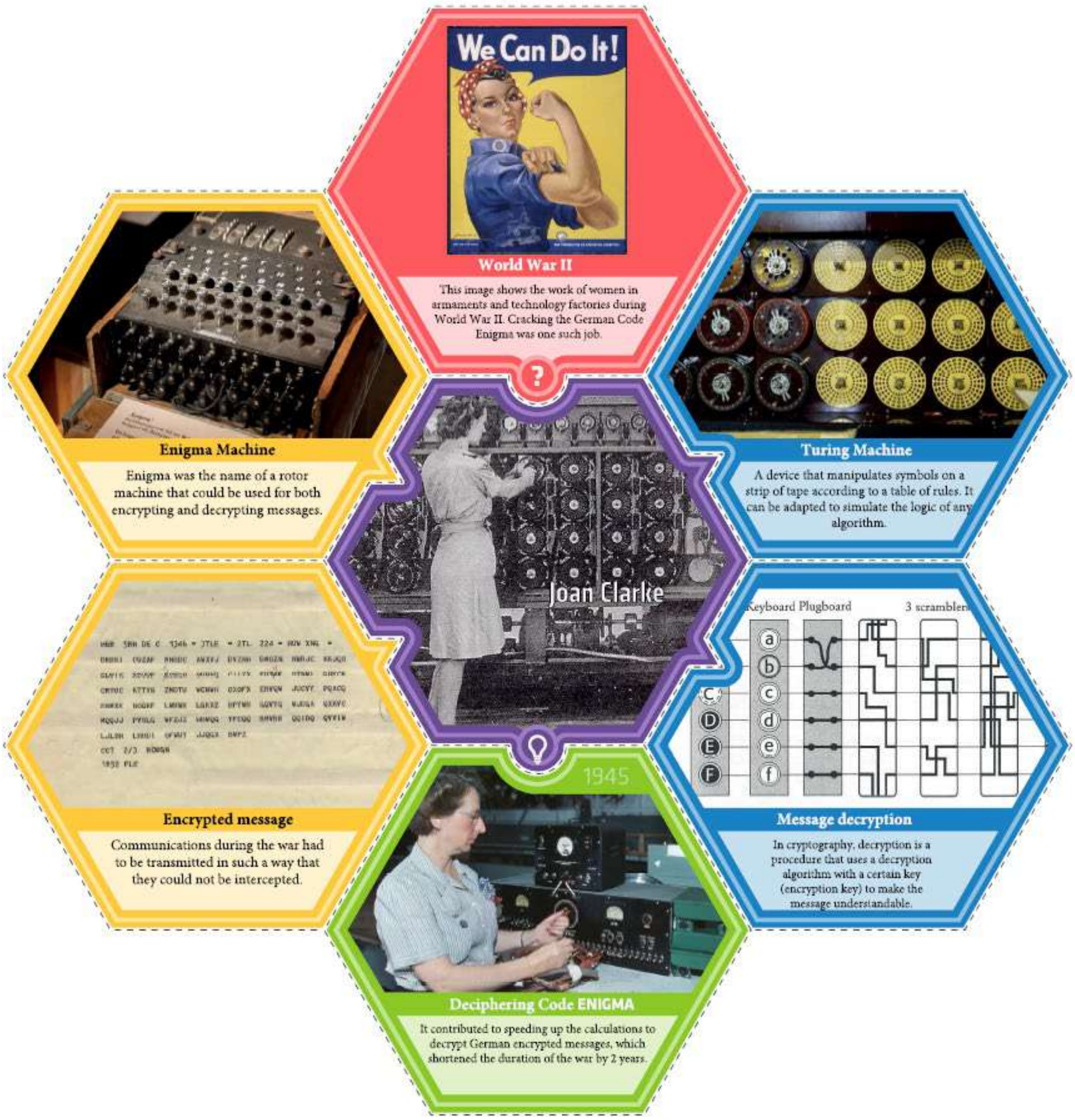

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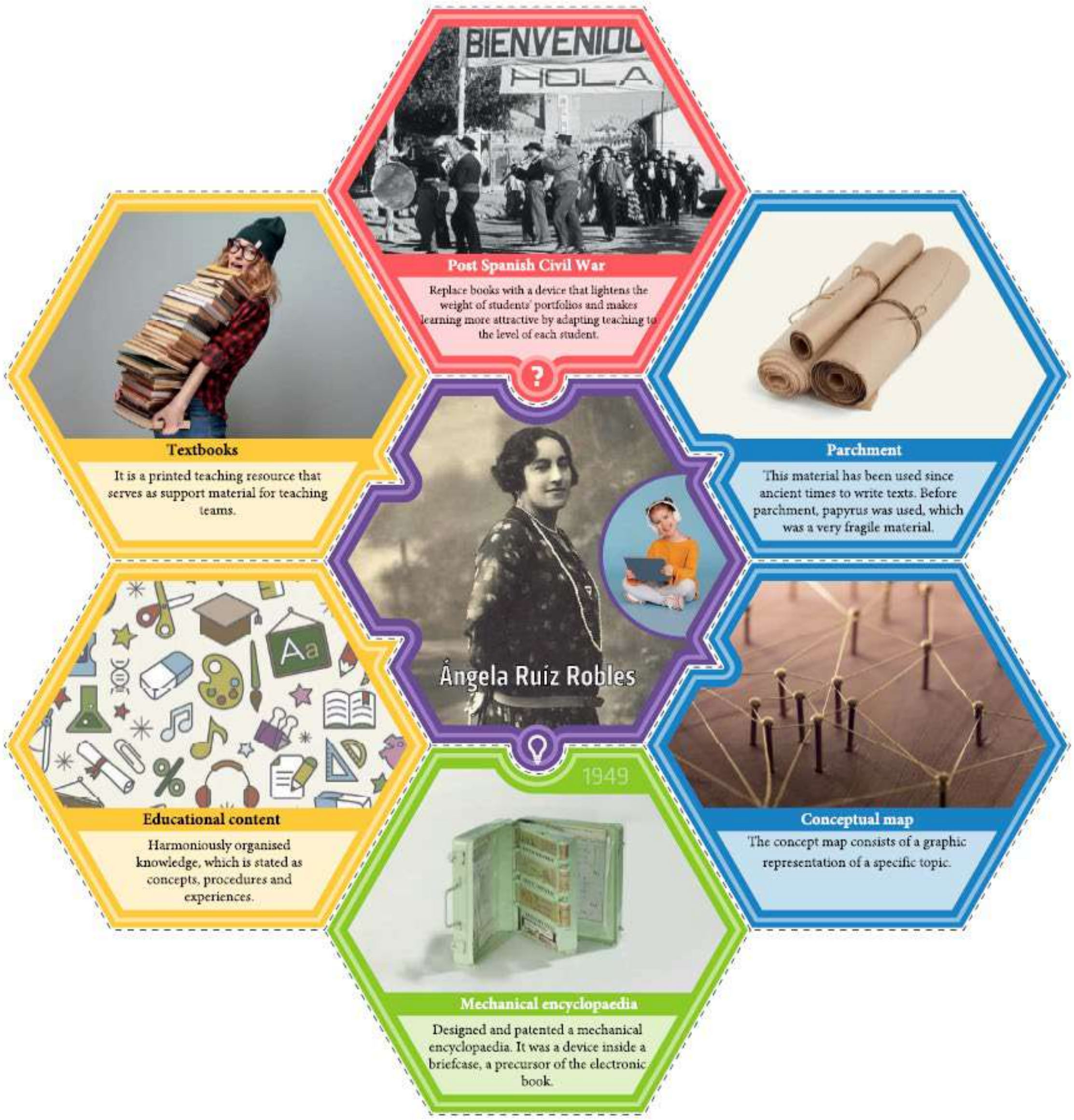

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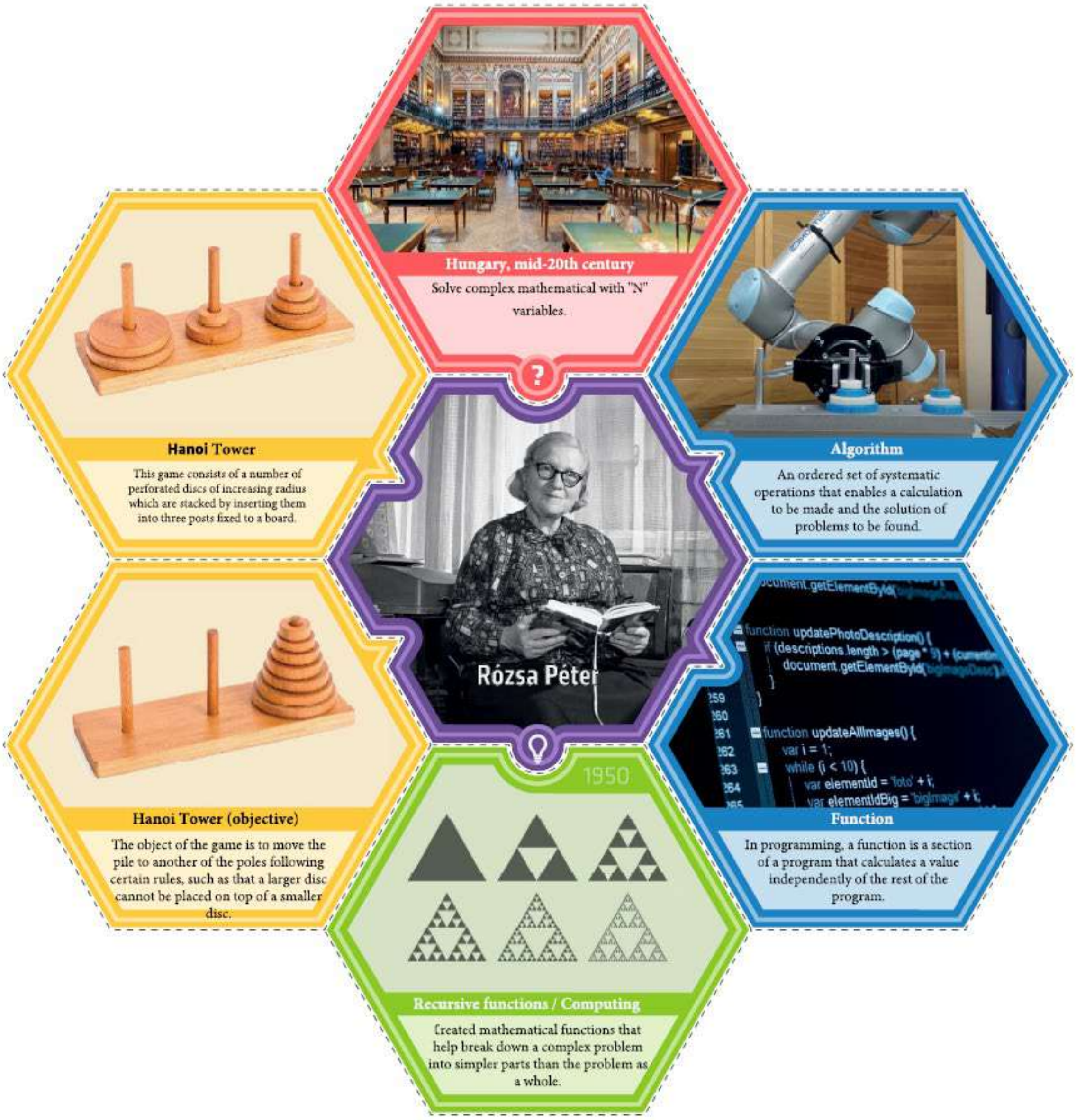

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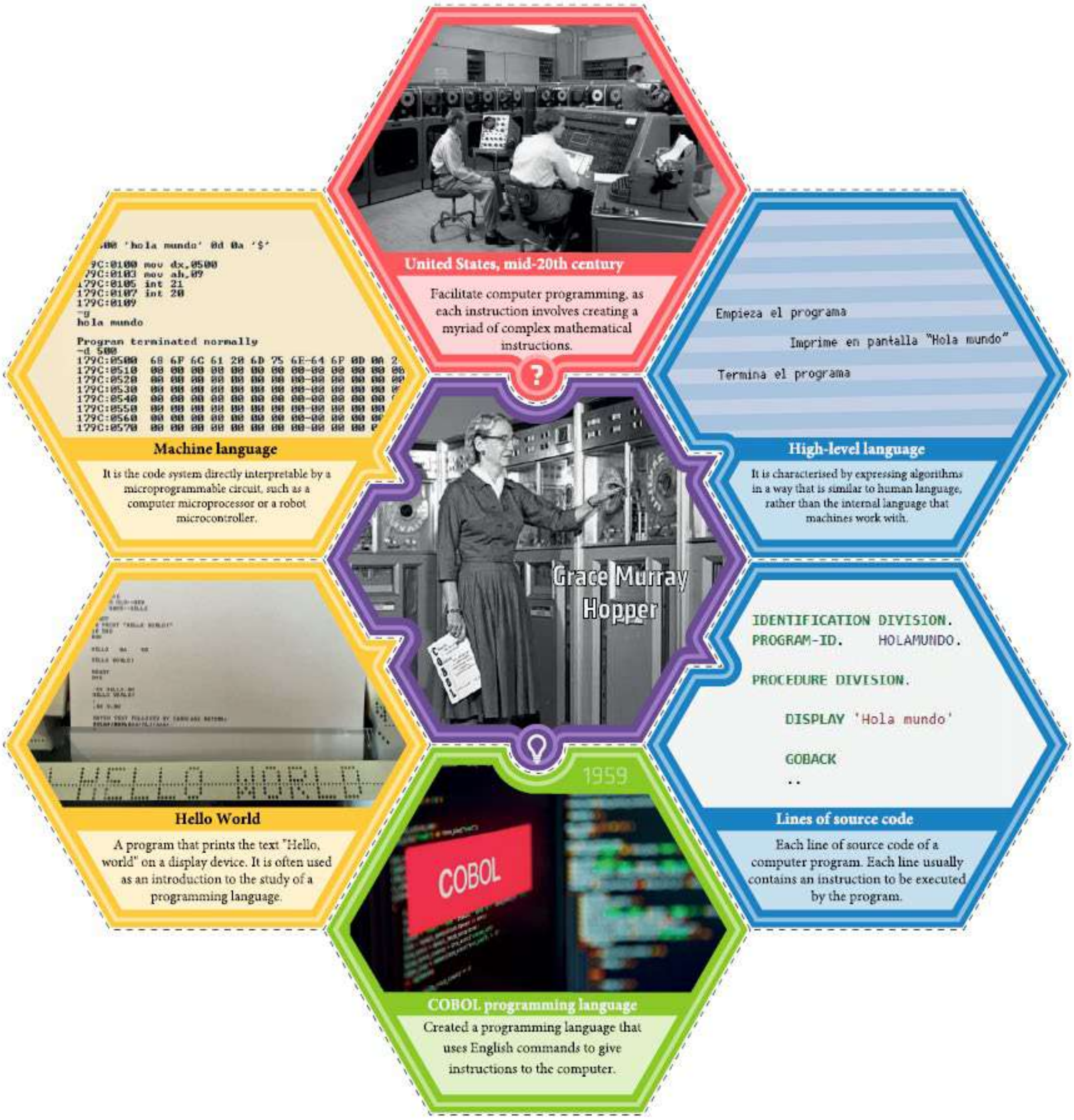

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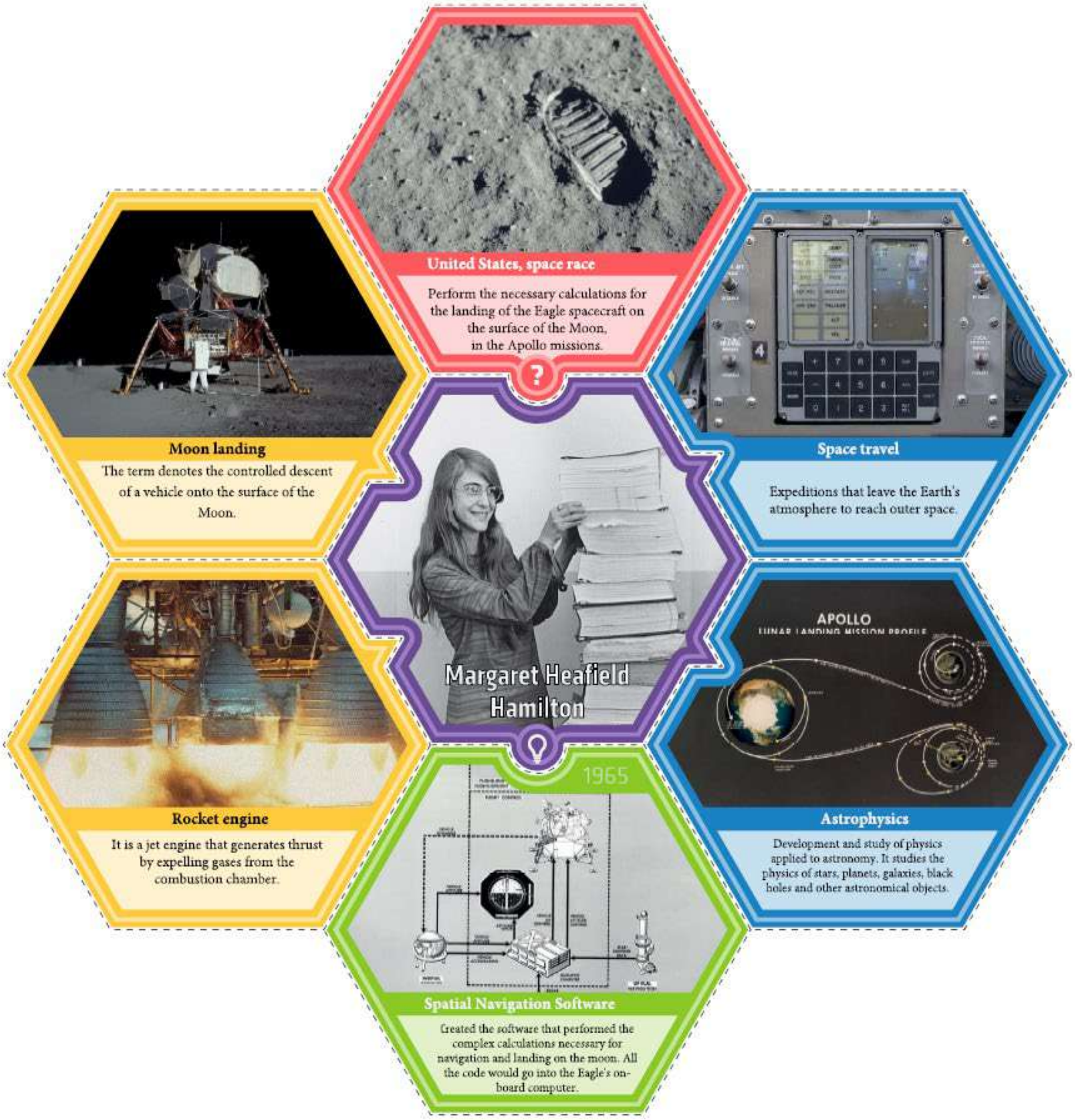

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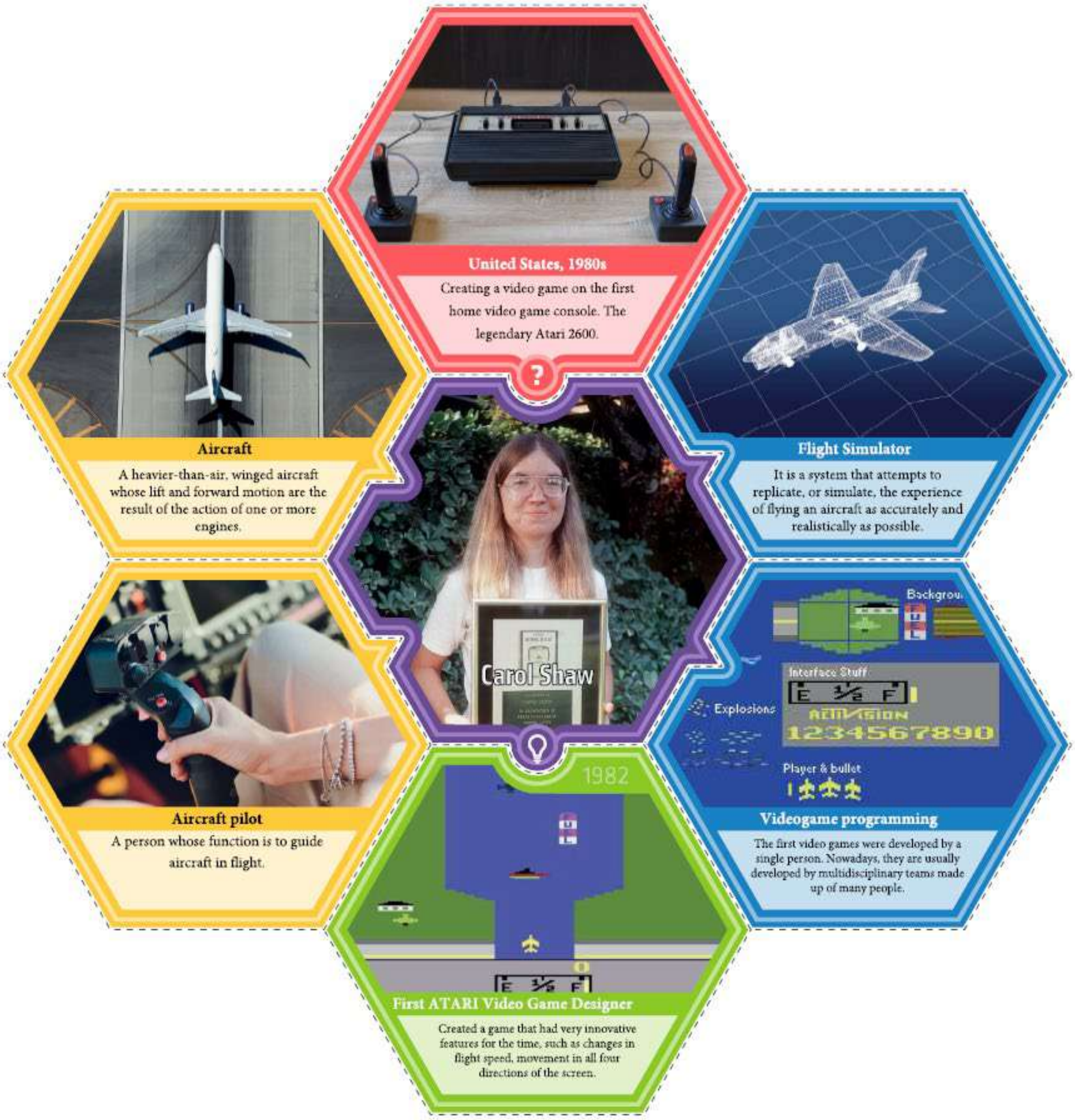

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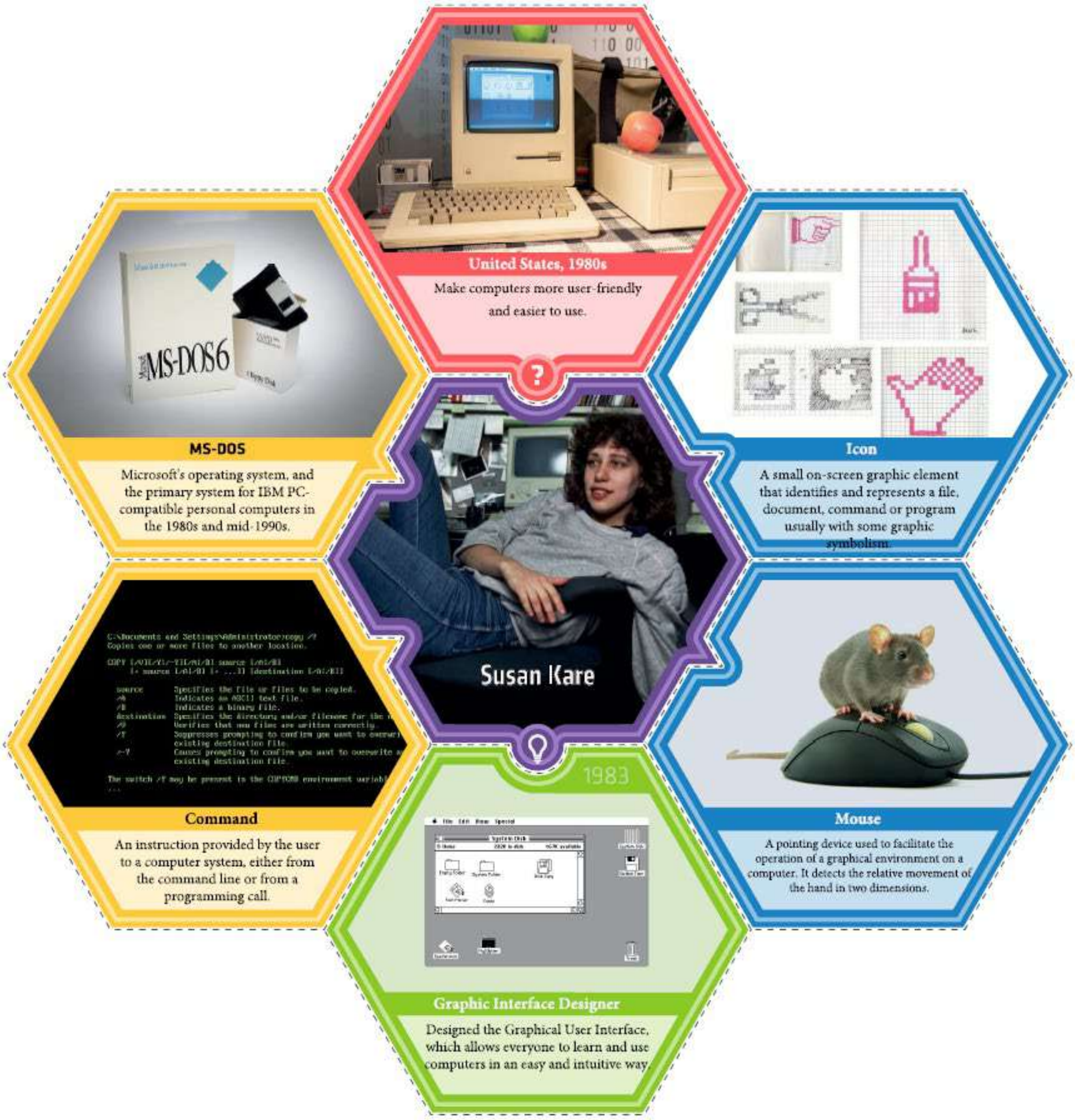

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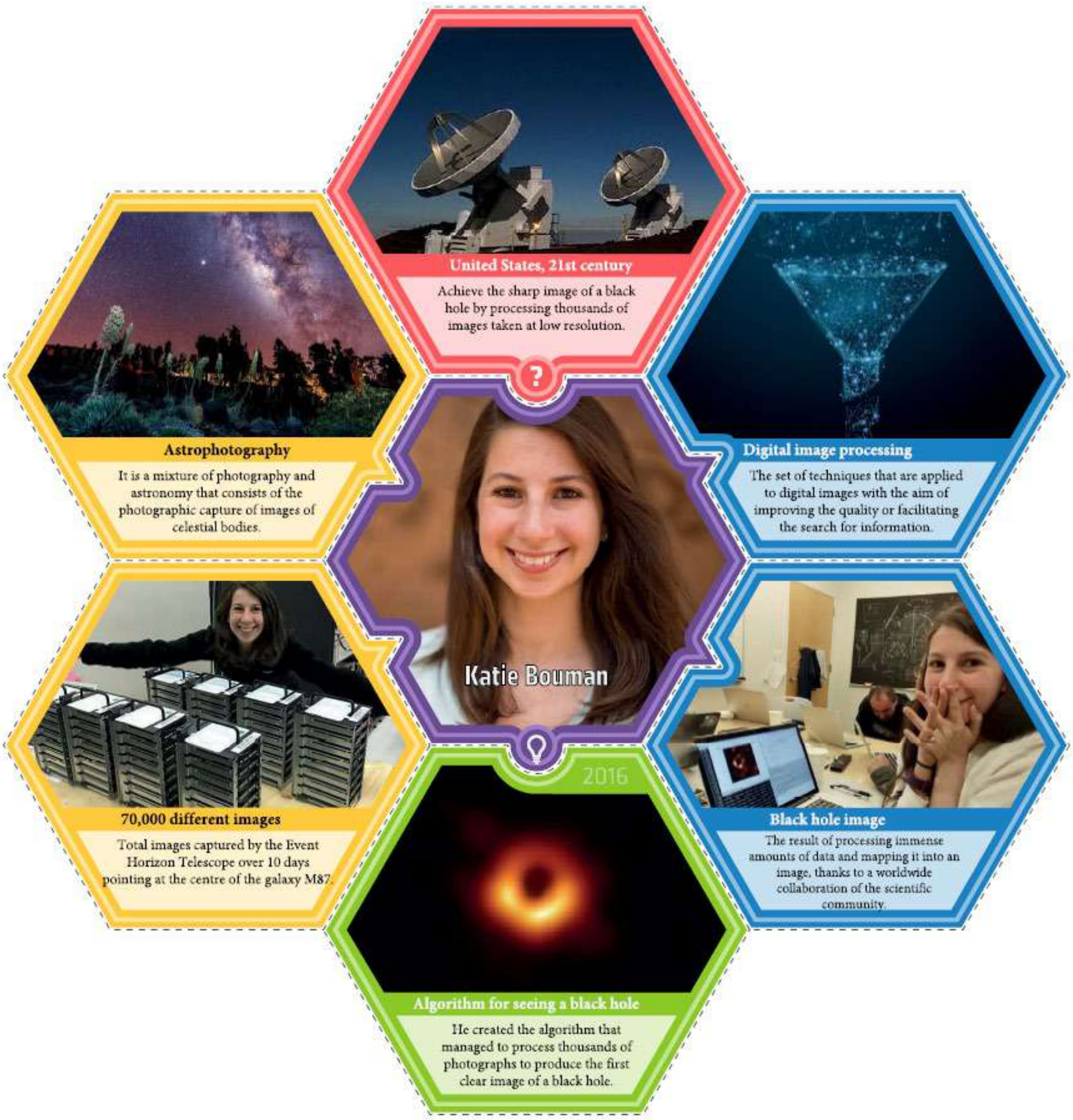

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2. Annex Scientists Biographies.pdf.

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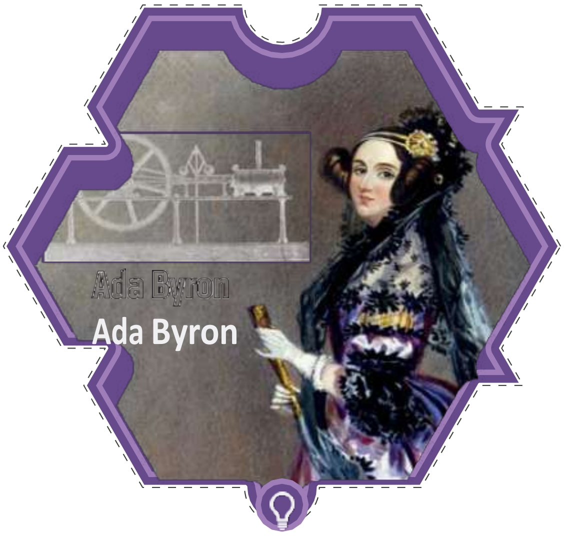

Augusta Ada King, Countess of Lovelace (née Byron; 10 December 1815 – 27 November 1852) was an English mathematician and writer.
She was the first to recognise that the machine had applications beyond pure calculation, and to have published the first algorithm intended to be carried out by such a machine.
Her mother promoted Ada's interest in mathematics and logic
Her educational and social exploits brought her into contact with scientists and the author Charles Dickens, contacts which she used to further her education.
https://en.wikipedia.org/wiki/Ada_Lovelace

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Edith Clarke (February 10, 1883 – October 29, 1959) was the first woman to be professionally employed as an electrical engineer in the United States, and the first female professor of electrical engineering in the country.
Her parents died when she was 12, being raised by an older sister. She used her inheritance to study mathematics and astronomy at Vassar College, where she graduated in 1908.
After college, she started working at AT&T in 1912. While at AT&T, she studied electrical engineering at Columbia University by night. In 1918, Clarke enrolled at the Massachusetts Institute of Technology, and the following year she became the first woman to earn an Master degree in electrical engineering .
https://en.wikipedia.org/wiki/Edith_Clarke

Reference:
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Instituto de las Mujeres. Ministerio de Igualdad. Madrid

They were women recruited from high schools and colleges to work at the University of Pennsylvania in the 1940s. They moved into dorms and apartments and went through a rigorous introduction to ballistics calculations in order to do the job. It paid well, and the women were close.
Jean Jennings Bartik was one of the women computers. In 1945, she was a recent graduate of Northwest Missouri State Teachers College, the school's one math major. She lived on her parents' farm, refusing the teaching jobs her father suggested, avoiding talk of marrying a farmer and having babies.
Kathleen McNulty Mauchly Antonelli (2 February 1921 – 20 April 2006), an Irish-born American computer programmer. The family emigrated to the United States in October 1924. In high school, she studied algebra, geometry, and trigonometry. She enrolled in Chestnut Hill College for Women and took every mathematics course offered, including spherical trigonometry, differential calculus, projective geometry, partial differential equations, and statistics. [She graduated with a degree in mathematics in June 1942.
Frances (Betty) Snyder Holberton (March 7, 1917 – December 8, 2001) was an American computer scientist. She invented breakpoints in computer debugging. She studied journalism.
Marlyn Wescoff Meltzer she was born in Philadelphia in 1922 – December 7, 2008) she was an American mathematician and computer programmer. She graduated from Temple University in 1942. She was hired by the Moore School of Engineering after graduating to perform weather calculations, mainly because she knew how to operate an adding machine.
Frances Bilas Spence (March 2, 1922 – July 18, 2012. Her father as an engineer for the Philadelphia Public School System and her mother as a teacher. She attended Chestnut Hill College after being awarded a scholarship. She majored in mathematics with a minor in physics and graduated in 1942.
Ruth Lichterman Teitelbaum (February 1, 1924 – August 9, 1986) was one of the first computer programmers in the world. She was the elder of two children, and the only daughter, of Sarah and

Simon Lichterman, a teacher. Her parents were Jewish immigrants from Russia. She graduated from Hunter College with a Bachelor degree in Science in Mathematics. She was hired by the Moore School of Electrical Engineering at the University of Pennsylvania to compute ballistics trajectories.

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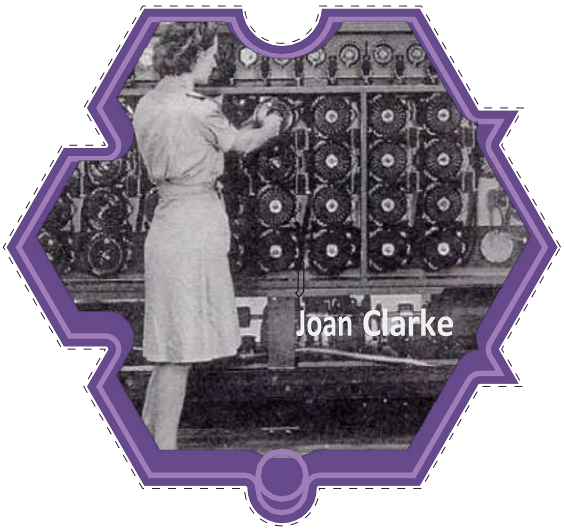

Joan Elisabeth Lowther Murray, MBE (born Clarke; 24 June 1917 – 4 September 1996) was an English cryptanalyst and numismatist best known for her work as a code-breaker at Bletchley Park .
Clarke attended Dulwich High School for Girls in south London and won a scholarship in 1936, to attend Newnham College, Cambridge, where she gained a double first degree in mathematics and gained first-class honours in the final year of the university's degree in mathematics. She was denied a full degree, as until 1948 Cambridge awarded these only to males.

Reference:
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Ángela Ruiz Robles (March 28, 1895 Villamanín, León - October 27, 1975, Ferrol, A Coruña) was a Spanish teacher, writer, pioneer and inventor. She received two patents related to her inventions. Her inventions were solutions found by her to help people. Her device was never put into production but a prototype is in display at the National Museum of Science and Technology in A Coruña.
Her father was a pharmacist and her mother a housewife. She studied to become a teacher and started her professional career in the capital of the province as an instructor of stenography, typing and commercial accounting between 1915 and 1916.
https://en.wikipedia.org/wiki/%C3%81ngela_Ruiz_Robles

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Rózsa Péter, born Rózsa Politzer, (17 February 1905 – 16 February 1977) was a Hungarian mathematician and logician.
She attended Pázmány Péter University originally studying chemistry but later switching to mathematics. After graduating in 1927, Péter could not find a permanent teaching position although she had passed her exams to qualify as a mathematics teacher https://en.wikipedia.org/wiki/R%C3%B3zsa_P%C3%A9ter

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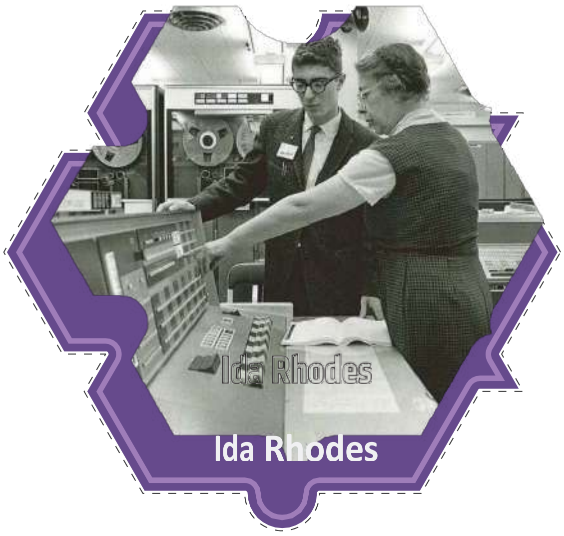

Ida Rhodes (born Hadassah Itzkowitz; May 15, 1900 – February 1, 1986) was an American mathematician who was as influential women of early computer development in the United States. Hadassah Itzkowitz was born in a Jewish village Kamianets-Podilskyi between Nemyriv and Tulchyn in Ukraine on May 15, 1900. When she was 13 years old her parents brought her to the United States. Her name was changed upon entering the country to Ida Itzkowitz. Rhodes
She was awarded the New York State Cash Scholarship and a Cornell University Tuition Scholarship and began studying mathematics at Cornell University only six years after coming to the United States, from 1919–1923.
She held numerous positions involving mathematical computations before she joined the Mathematical Tables Project in 1940.
https://en.wikipedia.org/wiki/Ida_Rhodes

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Grace Brewster Hopper (born Murray; December 9, 1906 – January 1, 1992) was an American computer scientist, mathematician, and United States Navy rear admiral.
She was a pioneer of computer programming and is the first to devise the theory of machine-independent programming languages, and the FLOW-MATIC programming language she created using this theory.
Grace was very curious as a child; this was a lifelong trait. Grace was initially rejected for early admission to Vassar College at age 16 (because her test scores in Latin were too low), but she was admitted the following year. She graduated in 1928 with a bachelor's degree in mathematics and physics and earned her master's degree at Yale University in 1930.
Prior to joining the Navy, Hopper earned a Ph.D. in mathematics from Yale University and was a professor of mathematics at Vassar College. She began her computing career in 1944.
https://en.wikipedia.org/wiki/Grace_Hopper

Reference:
Programa Diana
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Margaret Heafield Hamilton (born August 17, 1936) is an American computer scientist, systems engineer, and business owner. She was director of the Software Engineering Division of the MIT Instrumentation Laboratory. She later founded two software companies—Higher Order Software in 1976 and Hamilton Technologies in 1986, both in Cambridge, Massachusetts.
Hamilton has published more than 130 papers, proceedings, and reports, about sixty projects, and six major programs. She is one of the people credited with coining the term "software engineering". On November 22, 2016, Hamilton received the Presidential Medal of Freedom from president Barack Obama for her work.
https://en.wikipedia.org/wiki/Margaret_Hamilton_(software_engineer)

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Carol Shaw (born 1955 in Palo Alto, California), her father was a mechanical engineer. In a 2011 interview, she said she did not like playing with dolls as a child, but learned about model railroading from playing with her brother's set, a hobby she continued until college.
Shaw first used a computer in high school and discovered she could play text-based games on the system. Shaw attended the University of California, Berkeley and graduated with a Bachelor Science degree in Electrical Engineering and Computer Science in 1977. She went on to complete a master's degree in Computer Science at Berkeley.
She is one of the first female game designers and programmers in the video game industry. She left game development in 1984 and retired in 1990.
https://en.wikipedia.org/wiki/Carol_Shaw

Reference:
Programa Diana
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Susan Kare (born February 5, 1954) born in Ithaca, New York is an artist and graphic designer. Her father was a professor at the University of and her mother taught her counted-thread embroidery as she immersed herself in drawings, paintings, and crafts.
She graduated summa cum laude with a Bachelor degree in Art from Mount Holyoke College in 1975, with an undergraduate honors thesis on sculpture. She received a M.A. and a Ph.D. in fine arts from New York University in 1978. Her goal was "to be either a fine artist or teacher". As an early pioneer of pixel art and of the graphical computer interface, she has been celebrated as one of the most significant technologists of the modern world. https://en.wikipedia.org/wiki/Susan_Kare

Reference:
Programa Diana
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Katie Bouman

Katherine Louise Bouman (born 1989) is an American engineer and computer scientist working in the field of computer imagery.
Bouman grew up in West Lafayette, Indiana. Bouman studied electrical engineering at the University of Michigan and graduated summa cum laude in 2011. She earned her master's degree (2013) and doctoral degree (2017) in electrical engineering and computer science from the Massachusetts Institute of Technology (MIT).]
The California Institute of Technology, which hired Bouman as an assistant professor in June 2019, awarded her a named professorship in 2020.[In 2021, asteroid 291387 Katiebouman was named after her.
https://en.wikipedia.org/wiki/Katie_Bouman

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3. Annex Scientific Inventions_results.pdf.

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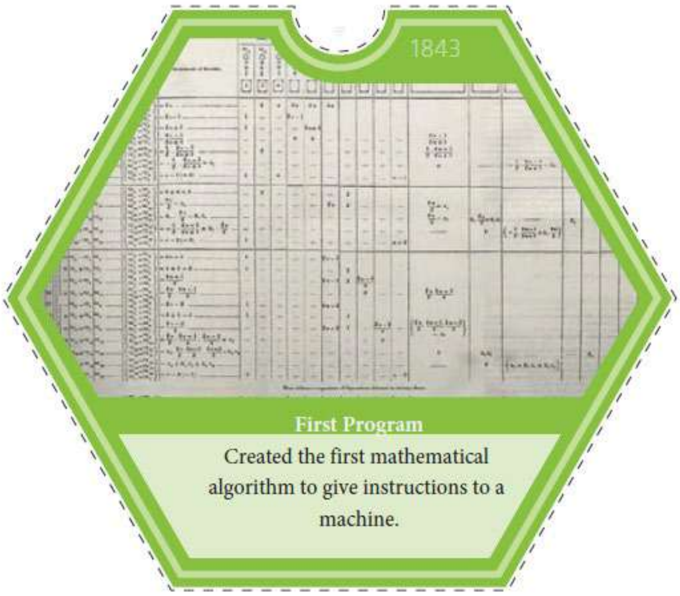

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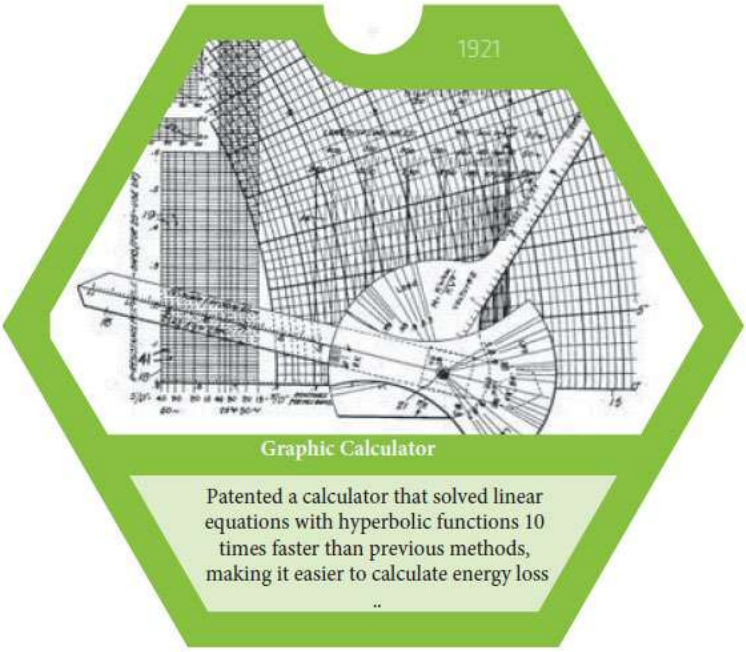

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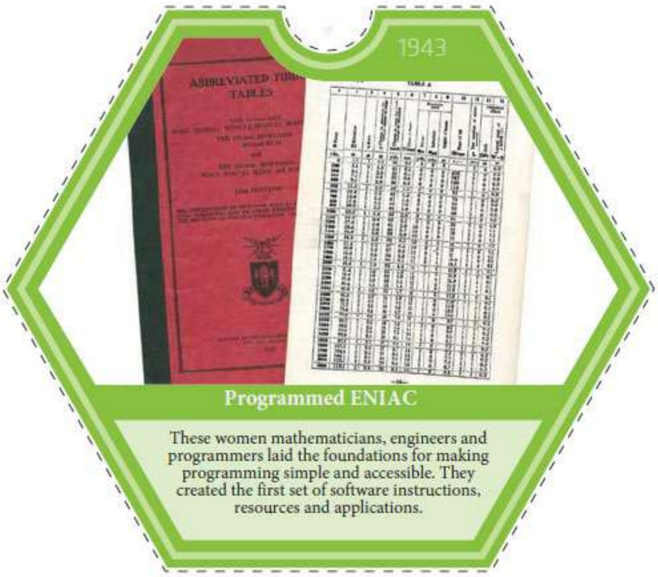

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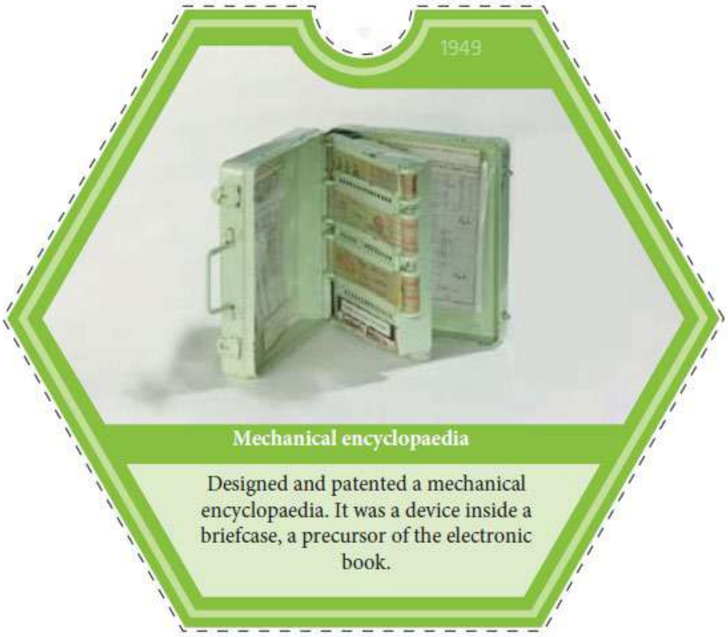

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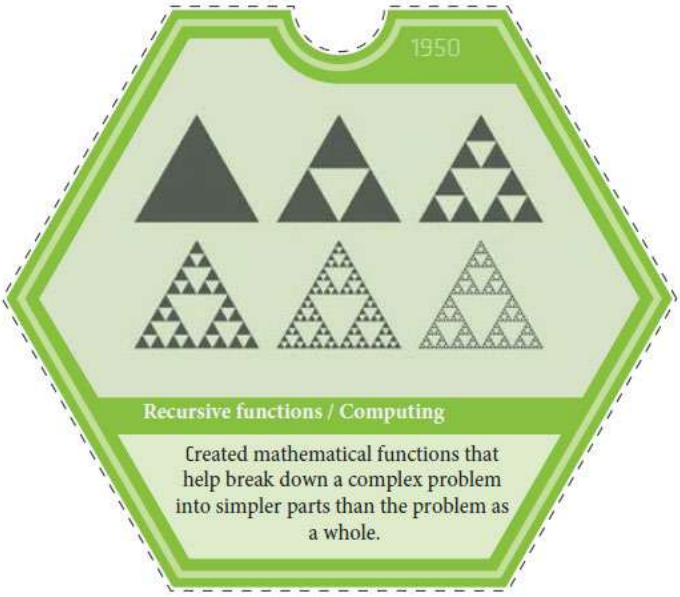

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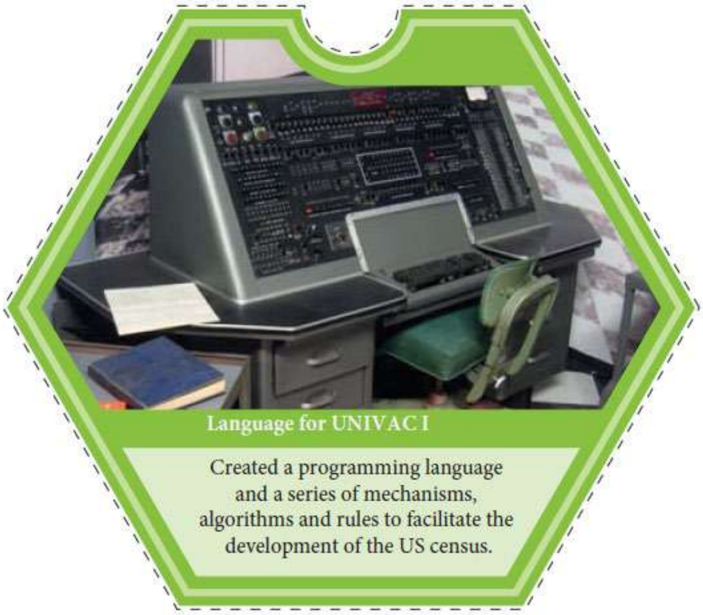

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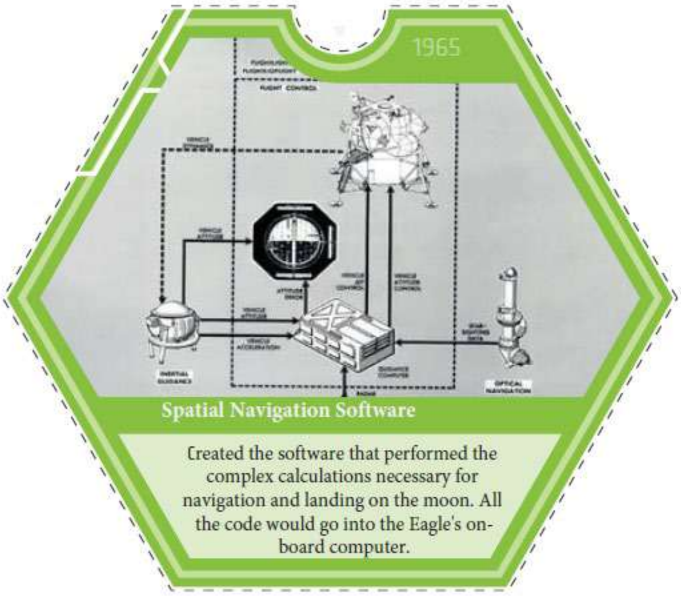

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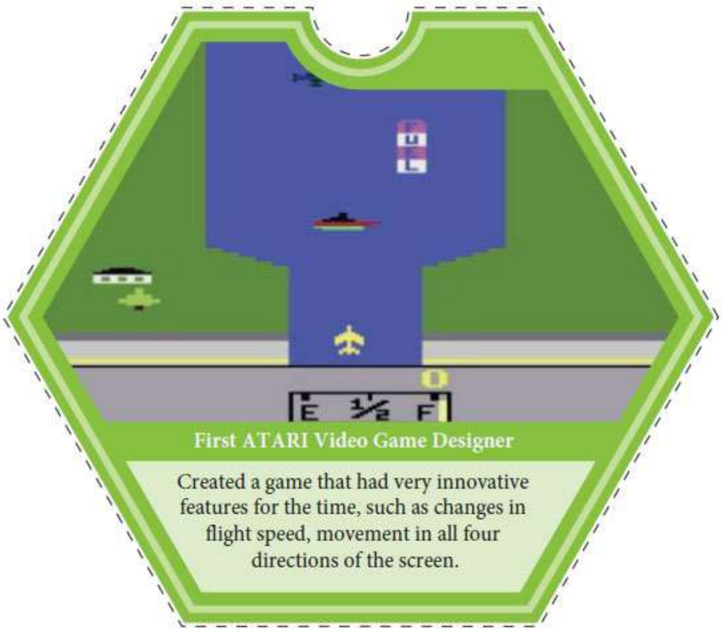

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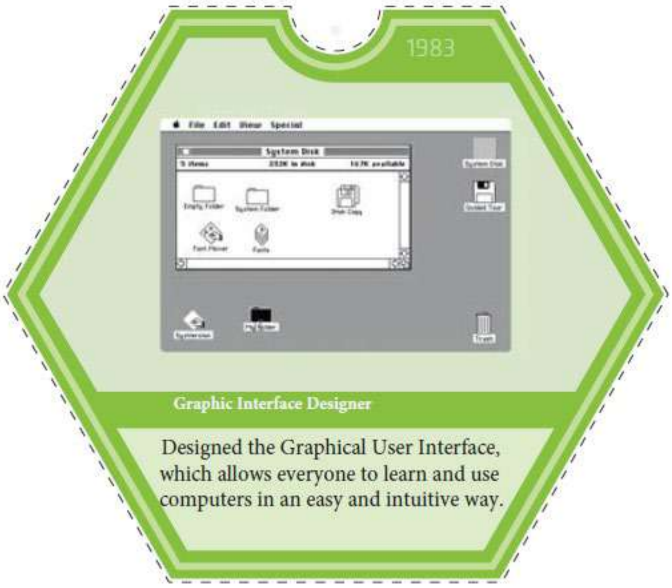

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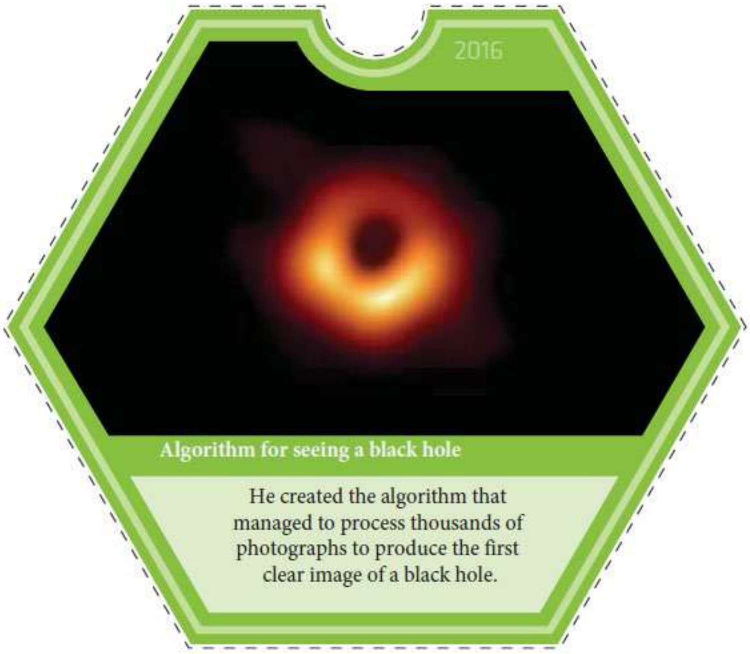

4. Annex Historical Contexts.pdf.

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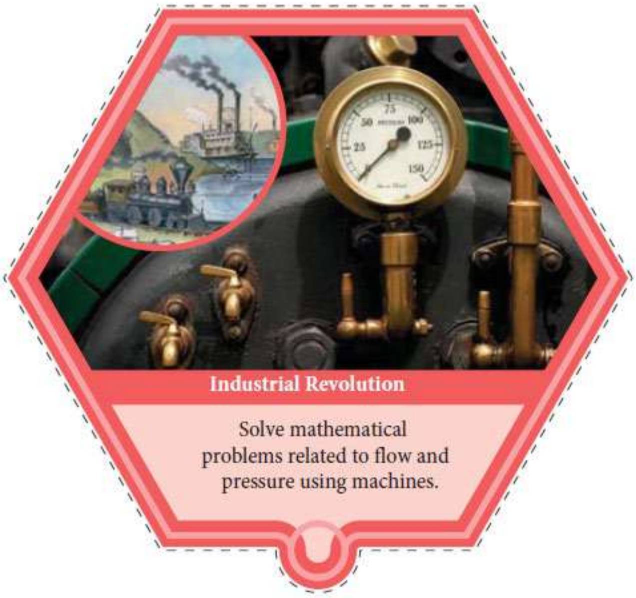

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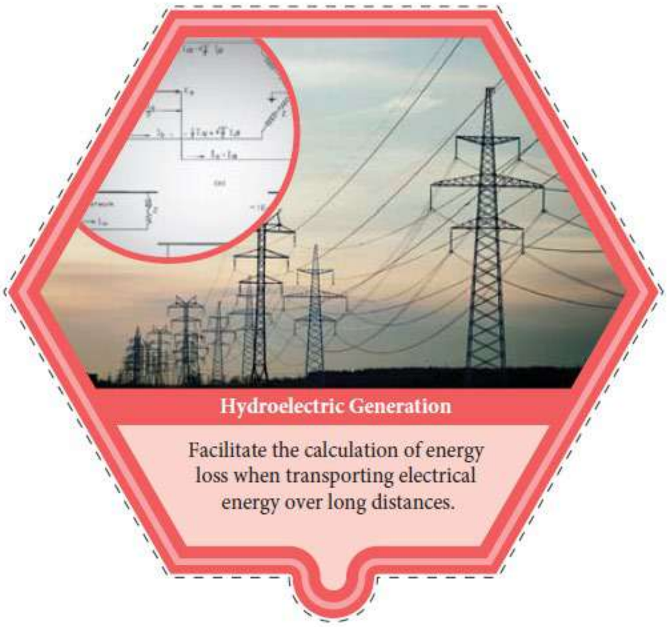

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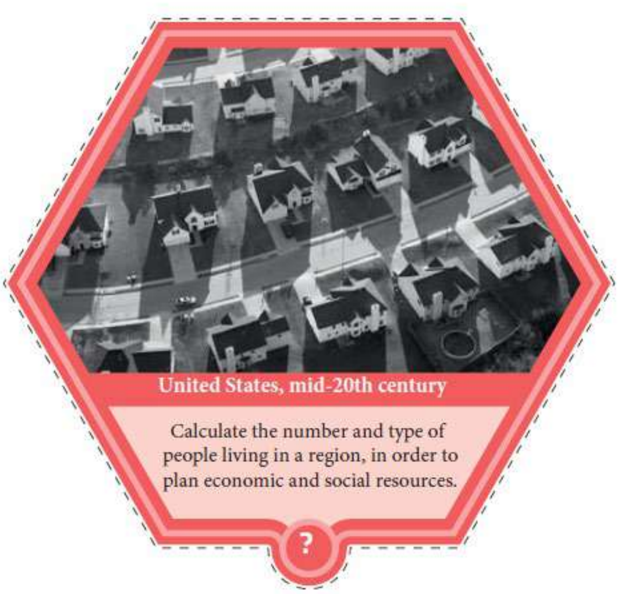

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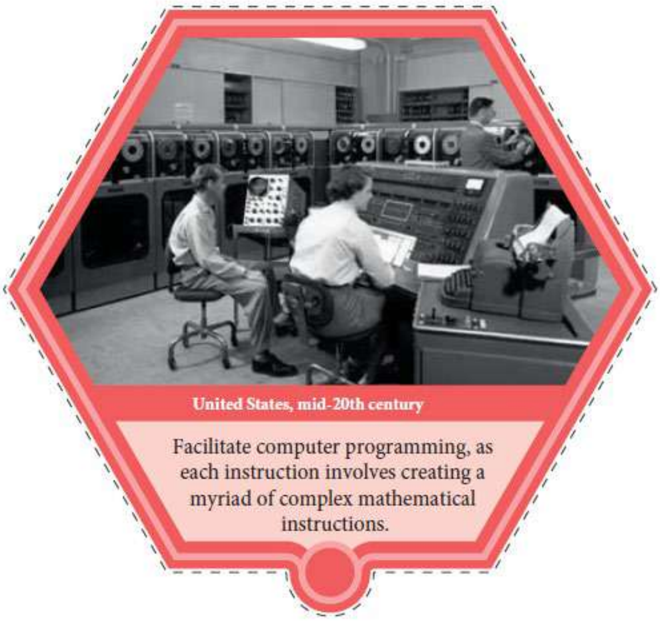

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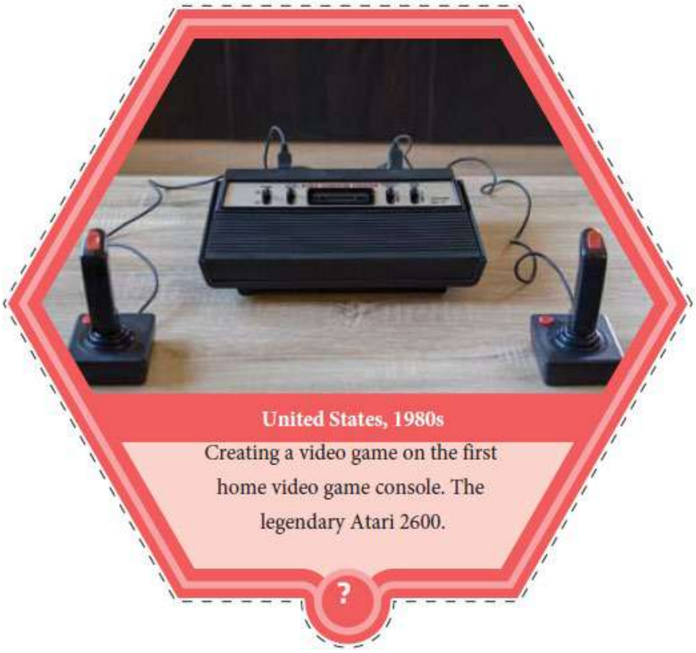

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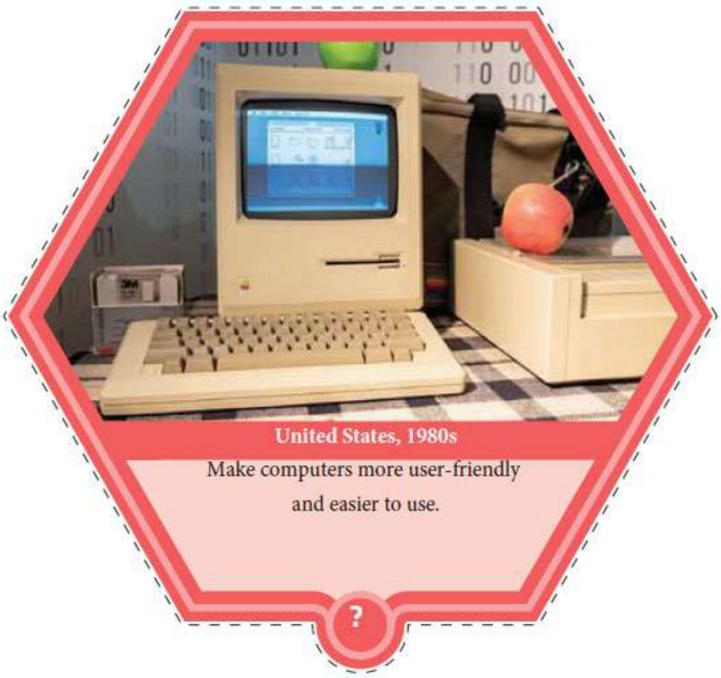

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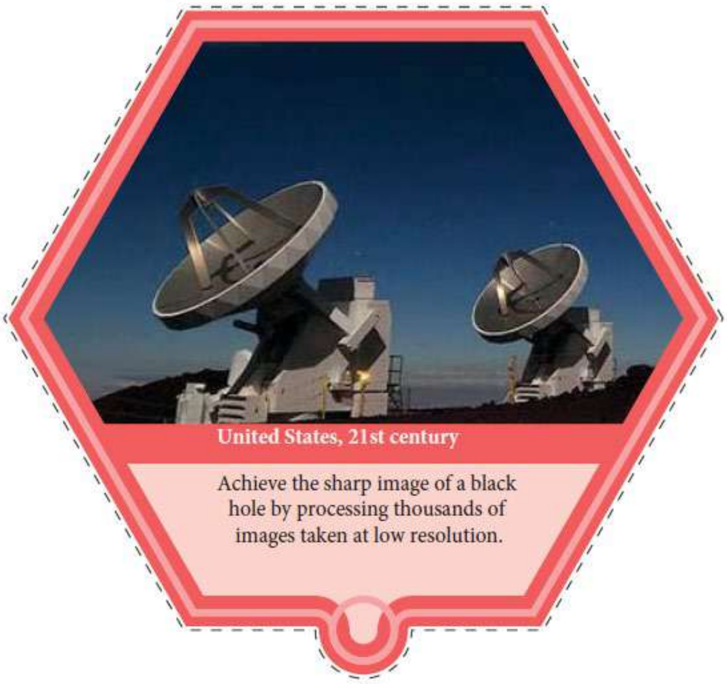

LESSON 3.

E-SOC Lesson Plan

Learning Objectives:	To describe the basics of programming process and the people who carry it on. To demonstrate that abilities in Programming, do no depend on gender and this process can be playful and fun. To apply the digital methodology used to teach the lesson content in the classroom.
Learning outcomes:	By concluding this session/class participant will have: **Knowledge:** To demonstrate to girls the ways to study STEAM subjects and careers specifically those related to programming. **Skills:** To apply blended teaching methodology to attract girls to STEAM subjects **Attitudes:** To integrate blended teaching strategies to enhance a gender-inclusive STEAM class.
Stereotype and counter arguments	S1 Girls are less interested in STEAM subjects. CA1 STEAM abilities are not male qualities. CA2 There are girls with higher results in STEAM than boys
Target group:	**Upper - Secondary School Teachers** **School students (choose from 15-18+)**
	Lesson periods: 1. Lesson planning 30 minutes 2. 2 periods x 45 min. = 90 minutes

Activity Title & number	Short description of the activity	Resources needed	Time
1. Lesson preparation	1. Before starting, the teacher should take the following into consideration: 1.1. Must have completed a survey with the questions indicated for discussion in an application such as Mentimeter. 1.2. Have the video open to present in the classroom. 1.3. To divide into teams of two people. You should ensure that the groups are mixed or only girls. 1.4. Have the statistics about the number of women enrolled in engineering and architecture in the country where the class is being held.	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable In case of not having access to technological devices the teacher can elaborate all the digital documents on paper.	30 minutes
2. Getting started	2. To start the lesson, the video "What is computers Science - unplugged activity " from the organization Code.org (https://youtu.be/HsXaVV6fFDY duration 2 min) Through the mentimeter application or something similar, the teacher will ask the following questions for each team to answer: • What does a programmer do? • Places where there is programming? • How much fun do you think programming is? Would you like to program? • What do you think the people who program are like? Are there more girls, boys or is it the same for both sexes? • Do you think that in the future many people will be needed to program?	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable	15 minutes.

Activity Title & number	Short description of the activity	Resources needed	Time
	• Have you recognized anyone in the video?		
3. Applications design and programming	3. Once the previous debate comes to an end, the following video will be shown: Madewithcode video, a Google initiative (https://youtu.be/aFF8PYDU0D8 duration 1 min 30 s). Through the mentimeter application or similar, the teacher will ask the following questions for each team to answer: • What applications do you use frequently? • How would you like to improve those applications you use? • What things would you like to program? What applications would you like to invent? • Think of things that have no programming. Which ones would you program to do different things? Teachers can use the following approaches to reinforce the discussion that arises in class: •When a person chooses their professional career, they are influenced by different situations such as family, the school environment, the ideas they have about what the field of work is, personal motivations, the belief they have about personal abilities in relation to certain subjects. • Both girls and boys have the same capacity and potential for social skills and math-related skills. Therefore, being educated and socializing in a family and school space free of sexist beliefs and prejudices allows girls to choose scientific or technical careers. If the girls do not have the same opportunities as their brothers, even in the design of the rooms, there may be circumstances that discourage them. An example of	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable	15 minu tes.

Activity Title & number	Short description of the activity	Resources needed	Time
	them is that the computer is in the brother's room or not in hers or in a space for common use. • In sectors related to engineering and programming, jobs are carried out in predominantly male environments. For many of the young girls, this situation can be unattractive to develop their professional career. • Main keys to motivate the participation of girls and boys in programming: 1. Focus on cooperation: Learn to program through team activities. 2. Telling stories: including characters with whom students of both sexes feel identified helps to generate interest and to feel like an interpreter of their own story. 3. Use of creativity: programming can make what we imagine come true.		
4. Giving a Historical context to programming	To carry out this activity, the teacher will distribute the photographs among the groups already formed (See Annex 3). The teacher will explain to the students that they will have to draw up a chronological line with the given cards. To this end, they will have to talk and interact with the other groups in the class, so that together they can build the timeline. The teacher will indicate that each photograph contains information that will help them locate each milestone in time. As they progress, they can locate the photographs on the sheet that has been provided (see Annex 3). Once they finish, each group will stick their results on the classroom wall that the teacher indicates. The teacher as well as the rest of the class will observe the other people's work, and each group can decide whether or not to change the order of their photos. To do this, they can research on the internet if they have located each milestone correctly. • The teacher will finish the activity explaining the milestones that have not been resolved.	Annex 3.	45 minutes.

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of the European Union

Reference:
Diana Program Institute for Women and for Equal Opportunities Ministry of Health, Social Services and Equality Condesa de Venadito 34 28027-Madrid

Annexes:

Annex 1 (for Activity 2. Getting started)

Teachers can use the following approaches to reinforce the debate that arises in class.

- Programming is defined as the process that through a code called programming language, instructions are generated that will then be interpreted by a machine. Nowadays, programming is closely linked to the creation of applications in various devices and environments, such as web pages, video games, traffic light control, weather forecasting, 3D printing, design of robotic machinery for industry, agriculture, among others. others.
- Although currently the proportion of female students in Engineering and Architecture in universities has been increasing. Of those people who study in universities (indicate the country where the lesson takes place), women represent less than XX% (indicate the statistics of the country where the lesson takes place). This difference is greater in careers such as Computer Engineering, where women represent XX% (indicate the statistics of the country where the lesson takes place).
- women who choose to study programming for various reasons, and these are different depending on the cultural context and the country where they live.

For example, in some Asian countries such as the Philippines, India, Malaysia, and Vietnam, women make up half of the workforce in the Information and Communication Technology sector. This situation does not occur in the European or American context.

- The European Commission has estimated that it is important to attract more women to technology careers because in the near future there will not be people with the necessary ICT skills for the jobs that will be created in this area. For this reason, institutions linked to innovation and technological development are considering reducing this technological skill gap by attracting girls to ICT-related careers.

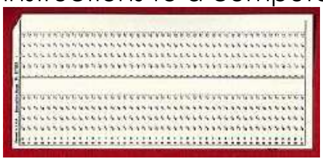
Annex 2 (for Activity 4. Giving a Historical context to programming)

Teachers can use the following approaches to reinforce the debate that arises in class.

Women have been present in the generation of knowledge but their inventions or contributions to science have not been known or have been omitted from the story of the development of science. Only the contributions of men have been highlighted. Therefore, it is important that people know that women have contributed very much to science. With this, they would make visible the scientific work of women, specifically in the area of programming, eliminating sexist beliefs and prejudices that disqualify the capacity of women in the scientific field.
When one thinks that science is neutral and that technology is also neutral, the masculine gaze that exists in the story of scientific achievements is not highlighted. In addition, the idea that women are phobic of technology is perpetuated, while what happens is that women who work in these fields are not talked about. For this reason, it is very important that in the school environment, from when people are very young, girls and boys are equally motivated to be interested in science and technology.
To make the scientific activity more entertaining, you can find some objects that refer to the history of computing. For example, in second-hand markets or asking the families of the educational center for collaboration.
Examples:

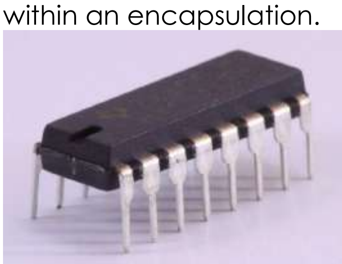
Vacuum valve: It is an electronic component used to amplify, switch, or modify an electrical signal by controlling the movement of electrons.

Perforated card: It is a sheet made of cardboard that contains information in the form of perforations according to a binary code. These were the first means used to input information and instructions to a computer in the 1960s and 1970s.



The transistor: It is a semiconductor electronic device used to deliver an output signal in response to an input signal.

Integrated circuit or microchip: It is a small structure of semiconductor material on which thousands of electronic circuits are manufactured, generally by photolithography and which is protected within an encapsulation.



Annex 3 (for Activity 4. Giving a Historical context to programming)

There is programming in:

Mobile telephone: This device uses programming not only in its Operating System but also in applications developed for these phones.

Fireworks. The sequence of launch of the rockets and firecrackers is done through the programming. It is usual for releases to be synchronized with a music and thus make the spectacle something singular.

Vehicles. The functions of the modern cars are regulated by computers. These functions include those of the mechanic system until the control of lights, communications, security and control panels.

Televisions. Modern TVs are like large tablets since they have Web navigation systems, and programming capable of movies or series recording. Through these televisions you can download applications expanding its functions.

Irrigation systems. Through computerized systems the accurate moment for irrigation is controlled. The irrigation systems are programmed considering several variables that allow an optimum irrigation as well as saving water.

Rockets. Launching a rocket into space requires sophisticated systems for control so they can enter the suitable orbit. In this way satellites can be deployed and astronauts can be put into space.

Automated Sewing Machines. Through the use of programming processes, industrial automated systems relieve people of doing repetitive jobs, optimizing the process and safeguarding the health of those who work operating these machines.

Video game consoles. Playing a video game is possible as many hours of programming and development have been invested, not only in the video game itself but also in the console that allows us to access them.

There is no programming in

Antique Radios. These devices do not process information despite the fact that they have electronics systems. They operate by receiving an electromagnetic sign and converting it in a audible sound. This type of electronic technology that does not process digital information receives the name of analog technology.

Antique Microscopes: The mechanical microscopes have optical systems to enlarge the sample being observed up to several thousands of times.

Mechanical toys. These toys have mechanic systems that store energy in a spring for after releasing it in form of movement. Therefore, these toys move like robots but its' movement are very limited.

Bicycles. They are devices that convert the movement of the legs in a rotation movement of the wheels, optimizing the effort done by the person.

Electrical Guitar. Although these guitars appear to be digital, they cannot de programmed. Despite operating with pushbuttons and regulators these work through analog electronic systems. These systems deform, equalize and harmonize the electrical waves with analogic electronics.


Astronomical Clock. These clocks predict the position of the Moon, the sun and some planets, and they do it without computing programming. These devices reproduce with the movement of their pinions and gears the regular and cyclical movement of the stars.


Pinball games. These interactive games work with mechanic and electronics devices, but without computer programming. Their pushbuttons, switches and mechanisms give to those who use it the experience of an interactive game. Actually, these types of games operate with programmed electronic systems.


Movie Projector. The movies in photographic rolls are projected through analog devices, so the image and the sound are reproduced by mechanic, optic and electrical methods. Currently, movies are made with digital systems, which is why systems that project them are also digital.


Ladbrokes
the Bar & Lounge

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SONY
SELECT
START


PENSONIC

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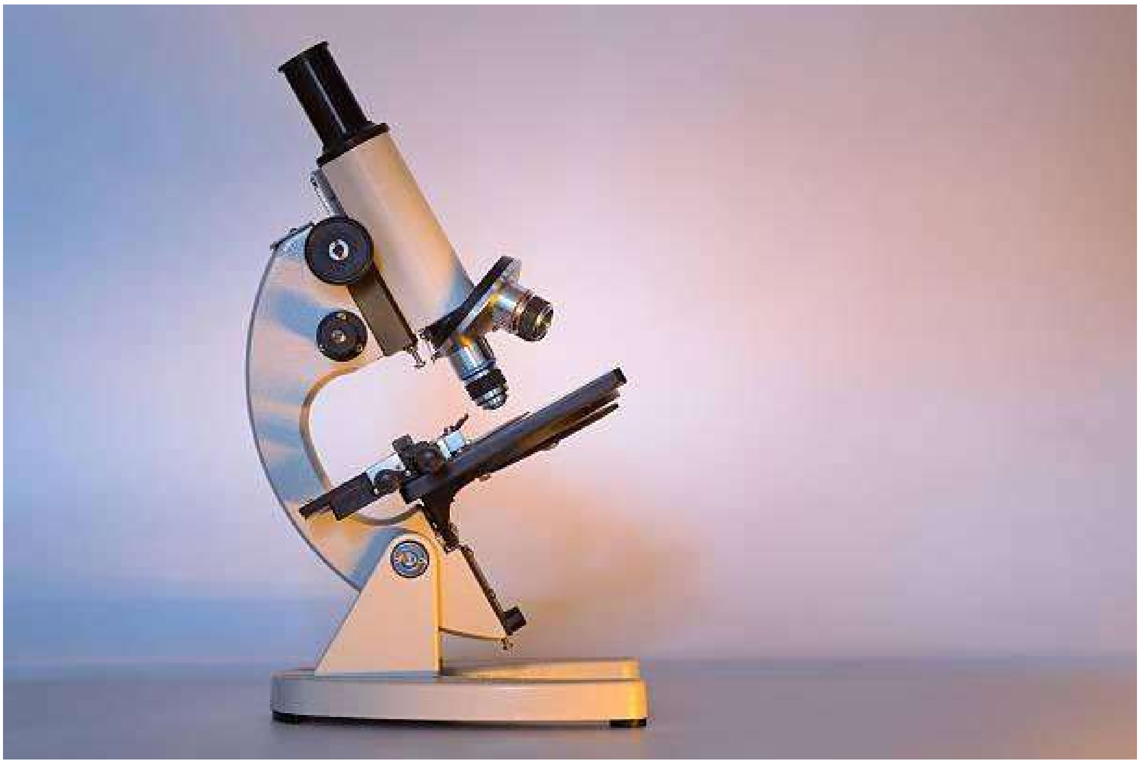


COFFEE


9,000
7,000
5,000
3,000
1,000
4,000
2,000
SAME PLAYER
SHOOTS AGAIN

LESSON 4.

E-SOC Lesson Plan

Learning Objectives:	To stimulate creative writing to make known the biography and work of women scientists. To apply the digital methodology used to teach the lesson content in the classroom.
Learning outcomes:	By concluding this session/class participants will have: **Knowledge:** To identify women scientists as relatable to girls to address gender stereotypes that turn girls away from STEAM careers. **Skills:** To illustrate the stereotype of "geek", that withdraws girls from STEAM studies by using cross-subject teaching strategy. **Attitudes:** To value cross-subject and blended teaching strategies to enhance a gender inclusive STEAM class.
Stereotype and counter arguments	**S1 Girls are less interested in STEAM subjects**. CA1 There are girls who participate willingly and actively in Olympiad Contests in Mathematics, Physics, Chemistry, Biology, and ICT. CA2 Certain statistics prove that STEAM abilities are not male qualities.
Target group:	**Upper - Secondary School Teachers** **School students (choose from 15-18+)**

Lesson periods:
1. Lesson preparation 15 minutes
2. 2 periods x 45 min. = 90 min.

Activity Title & number	Short description of the activity	Resources needed	Time
1. Lesson preparation	1. Before starting, the teacher should take the following into consideration: 1.1. Before beginning the lesson, the teacher must share the following list (Annex 1 – Lesson plan 4) with the students. 1.2. Have prepared three blank paper sheets for each class team and tape. 1.3. To divide into teams of two people. You should ensure that the groups are mixed or only girls. The teacher will assign each group a number starting from 1 to 15, and if there are more than 16 teams, the remaining ones will be numbered from 1 to 15. If this is so, there would be three people in each team. 1.4. Prepare a survey on Mentimeter o a similar platform with the following question: Who is the scientist that has most caught your attention?	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Paper sheets Adhesive tape In case of not having access to technological devices the teacher can elaborate all the digital documents on paper.	15 minutes
2. Getting to know some women scientists	2.The lesson begins by telling the class that they have a shared document in which they will find a list of women scientists who have worked in programming (Annex 1 – Lesson plan 4a). Then the teacher will tell the class that next, they will have to search the Internet for the Wikipedia page of the woman scientist whose number is the same as that of their team. That is, team 1 has to search about scientist 1 (Ada Lovelace), team 2 about scientist 2 (Adele Goldberg), team 2 about scientist 3 (Ángela Ruiz Robles) and so on. 2.1. The activity to be carried out will be the following:	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable	25 minutes.

Activity Title & number	Short description of the activity	Resources needed	Time
	Each team will read the biography of the scientist. After reading it, they will take note of the following information (if any): What did the scientist like to do when she was little? -Those who supported her in her professional/family life How did she become a scientist? This information will be written by each person on the team in their notebook.		
3. Writing letters	3. Once the class finish the previous activity, they must decide the following: 3.1. A person from the team will write a letter of at least three paragraphs, as if it were written by the scientist. This letter will be for a girl who wants to study a technological career related to programming and has doubts about it. This letter will be to motivate her to study the technological career and the scientist should explain why, from her personal opinion, this girl should study that career. 3.2. The other person on the team will write a letter of at least three paragraphs, as if she was a girl who wants to study a technological career related to programming and who feels inspired by the scientist. This letter will be to explain to the scientist why the personal/professional path of the scientist has inspired this girl to pursue that career. 3.3. When both members of the team have finished, the letters will be exchanged to see if they are related, to make suggestions to the other person, etc. 3.4. Once they are satisfied with the content of both letters, each team will make a poster with the name of the scientist whose biography they have read. 3.5. Then, they will paste the poster and the letters on the wall of the classroom. When each team has all their letters posted together, they will be able to read the other people's letters.	Paper sheets Adhesive tape	30 minutes.

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Activity Title & number	Short description of the activity	Resources needed	Time
4. Giving feedback	4. The teacher will suggest to the class that while they read the other teams' letters, they must take notes of those that have caught their attention the most. 4.1. The teacher will project a survey on the blackboard asking: Who is the scientist that has most caught your attention? 4.2. And the five most voted will be the letters that will be read aloud to the rest of the class by the teams who wrote them.	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable	25 minutes.

Annex:

Material for activity 2. Getting to know some women scientists

1. Ada Lovelace

British 1815-1852
She wrote a paper on "Charles Babbage's General-Purpose Mechanical Calculating Machine" which contains what is recognized today as the first algorithm intended to be processed by a machine. As a consequence, she is considered as the first computer programmer.
https://en.wikipedia.org/wiki/Ada_Lovelace

2. Ángela Ruiz Robles

1895-1975 Spanish
Forerunner of the electronic book. She obtained her Mechanical Encyclopedia patent No. 190,698 for a mechanical, electrical, and air-pressure process for reading books.
https://en.wikipedia.org/wiki/%C3%81ngela_Ruiz_Robles

3. Grace Murray Hopper

She was one of the three people who designed a program for the first electromagnetic computer, the Mark I. She participated in the creation of the first commercial computers, Binac and UNIVAC I. She supervised the department that developed the first compiler and the first programming language of high level management oriented, which would be inspired by COBOL.
https://en.wikipedia.org/wiki/Grace_Hopper

4. Hedy Lamarr

1914-200 Austria, Hungary, American She Developed a secret communications system that was used to build undetectable guided missiles during World War II.
https://en.wikipedia.org/wiki/Hedy_Lamarr

5. Evelyn Berezin

1925 american
Designer of the first word processor.
https://en.wikipedia.org/wiki/Evelyn_Berezin

6. María Wonenburger

1927-2014 Spanish
Her research focused on group theory and Lie algebra theory. She graduated in the first class of mathematics from the Central University of Madrid in 1950. She was the first woman to receive a Fulbright scholarship from the United States, which allowed her to study in New York and receive a PhD from Yale. In 2010, she was the first scientist to be awarded an honorary doctorate by the University of A Coruña.
https://en.wikipedia.org/wiki/Maria_Wonenburger

7. Frances E. Allen

1932
Pioneer in the field of optimizing compilers. Her accomplishments include work on compilers, code optimization, and parallel computing. In 2007, she was the first woman to receive the Turing Prize, equivalent to the Nobel Prize in Computer Science.
https://en.wikipedia.org/wiki/Frances_Allen

8. Lynn Conway

1938 american

Pioneer in the field of computer architecture and microelectronics. Much of the evolution in silicon chip design is based on her work. In 1965 she participated in the first superscalar computer.
https://en.wikipedia.org/wiki/Lynn_Conway

9. Jude Milhon

1939-2003 American
Founder of the cypherpunk movement; programmer and activist for rights in the network.
https://en.wikipedia.org/wiki/Jude_Milhon

10. Adele Goldberg

1945-american
She participated in the development of the Smalltalk-80 programming language and was a pioneer in the creation of new concepts related to object-oriented programming.
https://en.wikipedia.org/wiki/Adele_Goldberg_(computer_scientist)

11. ENIAC

1946
Considered the first electronic computer. Six women programmed this computer: Betty Snyder, Holberton, Jean Jennings Bartik, Kathleen McNulty Mauchly Antonelli, Marlyn Wescoff Meltzer, Ruth Lichterman Teitelbaum, and Frances Bilas Spence.
https://en.wikipedia.org/wiki/ENIAC

12. Anita Borg

1949-2003 American
Creator of the Systers mailing list, the first email network for women in technology. She is the founder of the Grace Hopper Celebration of Women in Computing, and the Anita Borg Institute for Women and Technology.
https://en.wikipedia.org/wiki/Anita_Borg

13. Limor Fried

American
Forerunner of the maker movement, "do it yourself". MIT (Massachusetts Institute of Technology) student, her favorite hobby, according to her, has always been "playing with technology". She has become one of the most important figures in the technological revolution that free hardware represents.
https://es.wikipedia.org/wiki/Limor_Fried

14. Radia Perlman

1951 american
Software creator and network engineer, security expert. She created the Spanning Tree Protocol (STP). Known for being "the mother of the Internet"
https://en.wikipedia.org/wiki/Radia_Perlman

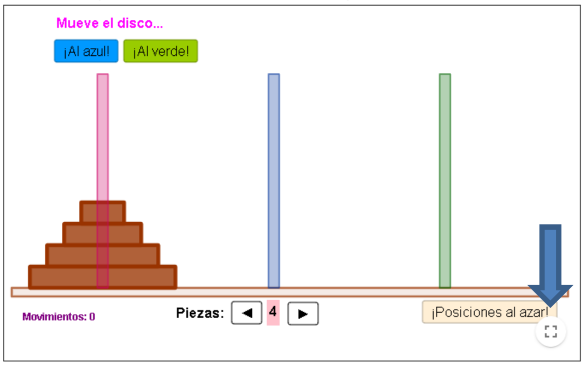
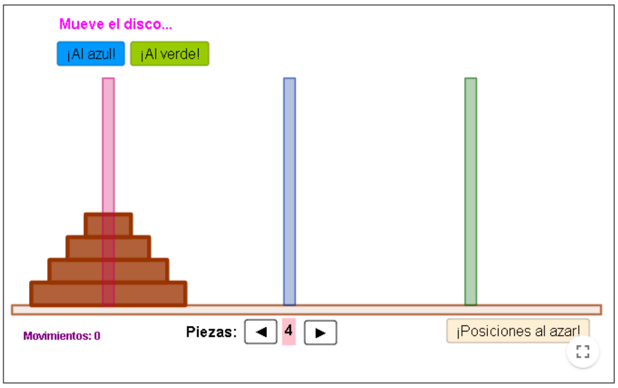
15. Susan Kare

1954 american
Artist and graphic designer. In the 1980s she designed many of the interface elements for the Apple Macintosh.
https://en.wikipedia.org/wiki/Radia_Perlman

LESSON 5.

E-SOC Lesson Plan

Learning Objectives:	To demonstrate the basics of the programming process. To demonstrate that abilities in Programming, do not depend on gender and this process can be playful and fun. To apply the digital methodology used to teach the lesson content in the classroom.
Learning outcomes:	By concluding this session / class participants will have: **Knowledge:** To motivate girls to study STEAM subjects and careers specifically those related to programming. **Skills:** To identify the stereotype of "geek", that withdraws girls from STEAM studies by using blended teaching strategy. **Attitudes:** To practise blended teaching strategies to enhance a gender inclusive STEAM class.
Stereotype and Counter arguments	**S4** *Boys' results in STEAM are due to their quick minds, while girls have to put in constant engagement and effort.* CA1 The idea that talent is innate influences learning. It is important to consider gaining new knowledge and putting oneself in challenging situations instead of thinking that "it's not for me".
Target group:	**Upper - Secondary School Teachers** **School students (choose from 15-18+)** Lesson periods: 1. Lesson planning 10 min. 2. 2 periods x 45 min. = 90 min.

Activity Title & number	Short description of the activity	Resources needed	Time
1. Lesson preparation	1. Before starting, the teacher should take the following into consideration: 1.1. Before beginning the lesson, the teacher enters the link: https://www.geogebra.org/m/ShhEGWAH. The teacher will project the game The Towers of Hanoi on the board/screen in full screen, clicking the gray box in the white circle in the lower right corner of the game  To teach this lesson in English or another language, you must click the right mouse button and translate the page with Google translator into English or the desired language. The game will not be translated, so the teacher can use the following legend:  **Mueve el disco** means move the disc ¡Al azul! means to the blue ¡Al verde! means to the green **Movimientos** means movements **Piezas** means pieces	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable In case of not having access to technological devices the teacher can elaborate all the digital documents on paper.	10 minutes

Activity Title & number	Short description of the activity	Resources needed	Time
	¡Posiciones al azar! means Random pieces 1.2. Have prepared three blank paper sheets for each class team. 1.3. To divide into teams of two people. You should ensure that the groups are mixed or only girls.		
2. Knowing the Legend	2. The lesson begins by telling the class there is a game that arose according to a legend, and she/he will share it with them. 2.1. The teacher will read the following text: *Legend says that, when the world was created, three diamond rods and sixty-four gold discs were placed on Earth.* *The discs are all of different sizes and were initially placed in decreasing order of diameter on the first of the rods.* *A monastery was also created whose monks have the task of transferring all the discs from the first rod to the third.* *The only operation allowed is to move a disc from one rod to any other, but with the condition that another disc with a larger diameter cannot be placed on top of a disc.* 2.2. The teacher will state *"Now that you know the legend you must continue that work of the monks".* 2.3. The teacher will explain that the game consists of three vertical posts and four cylindrical discs of different sizes. The disks are in one of the posts ordered by their size in a decreasing order from bottom to top, the other two posts being empty. The aim of the game is to pass all the discs from the pink post, that is, the one with the tower of discs, to the third green post (which is empty).	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Access to Internet	5 minutes .

Activity Title & number	Short description of the activity	Resources needed	Time
	To solve this challenge, it is necessary to comply with two simple rules: 1) In each move, only the top disc of a tower can be moved. 2) We cannot put a large disk on top of a smaller one.		
3. Building towers to deconstruct gender stereotypes	3. The teacher will explain to the class that the task of each team will be to program the movements of the discs to the posts, so that all the discs move to the green post in the least number of steps possible. 3.1. They will do this programming in their notebooks, and they will have 5 minutes to solve it. 3.2. Once the five minutes are over, the teacher will ask two teams to come together and share their programming, and take out the best one to get the discs moving. They will have 5 minutes to do this. 3.3. Once the time is up, the teacher will ask each team to choose a person to act as spokesperson, handing them the notes of the team with the programming. 3.3.1. All the spokespersons will come forward and they will test their programming one at a time with the teacher. The class will observe how many steps were taken in each programming. 3.4. Once the activity is finished (approximately 30 minutes), the spokespersons will join their teams. 3.5. The teacher will suggest to the class to discuss within their teams (now of 4 people) the following: a) How do you think it can be solved with the least number of moves possible?	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Access to Internet	50 minutes.

Activity Title & number	Short description of the activity	Resources needed	Time
4. Solving the game on more time	4. The teacher will explain to the entire class that this game will be solved this time with 5 pieces. 4.1. The teacher will change the number of pieces in the game from 4 to 5. 4.2. The teacher will explain to the class that the teams of 4 that they had formed before must solve this game on paper. For this, it is important that they exchange opinions and share solutions with other teams in order to achieve the common goal. Each group will come up with a solution (being the same or different from the other groups). The final idea is that all the teams come up with a solution with the least number of moves possible, that is, for 5 blocks, 31 moves are required. 4.3. The teacher will tell the class that they have 10 minutes to do this. 4.4. Once the ten minutes have elapsed, the teacher will randomly choose participants from each team to decide the movement to be carried out in each step. Each person will choose a disk and where it should be moved to. For this, the teacher must always keep in mind that she/he must promote the balanced participation of girls and boys. 4.5. The teacher will open a debate to the whole class by asking them: a) Which pattern did you find in the movements to solve the challenge? The teacher will try to help the class deepen the idea that all people, regardless of gender, can have maths and programming skills. **Suggestions for the teachers** To the question, which pattern did you find in the movements to solve the challenge?	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Access to Internet	35 minutes .

Activity Title & number	Short description of the activity	Resources needed	Time
	Since it is possible that, in the given time, the students have not discovered the patterns or rules that must be fulfilled in each step, the debate can be encouraged by asking: could the problem be solved with simple rules? (see https://es.wikipedia.org/wiki/Torres_de_Han%C3%B3i - to know the basic rules for solving problems). Teachers can also encourage the discussion by exploring the rules the class has found. To ensure that there is a balanced participation, the intervention of a girl and a boy should be encouraged alternately. This in order to encourage girls to have an active role in the development of the activity.		

Reference:

Programación creativa en igualdad. Guía para el profesorado de educación secundaria adaptada a la situación de pandemia. Instituto de las Mujeres. Ministerio de Igualdad. Madrid

LESSON 6.

E-SOC Lesson Plan

Learning Objectives:	To use playful activities to make known the work of women scientists. To apply the digital methodology used to teach the lesson content in the classroom.
Learning outcomes:	By concluding this session/class participants will have: **Knowledge:** To visualize women in different scientific fields to address gender stereotypes that turn girls away from STEAM careers. **Skills:** To address the stereotype of "Hard science is still profoundly associated with masculinity" that withdraws girls from STEAM studies by using a blended teaching strategy. **Attitudes:** To practice blended teaching strategies to enhance a gender-inclusive STEAM class.
Stereotype and counter arguments	**S3 Hard science is still profoundly associated with masculinity.** CA1 Girls have the potential to excel in STEAM subjects. **S4. There are not enough successful examples of females in STEAM careers.** CA2 There is a need to focus on career awareness and planning in order to empower girls to pursue a STEAM profession
Target group:	**Upper - Secondary School Teachers** **School students (choose from 15-18+)**

Activity Title & number	Short description of the activity	Resources needed	Time 1 h 45 min total
1. Lesson preparation	1. Before starting, the teacher should take the following into consideration: 1.1. Download the file from https://www.luanagames.com/en.pdf and prepare the cards 1.2. Have 1 deck of cards for every 8 people. The number of teams will depend on the total number of people in the class. The teams will be of 2-3 people; they will be mixed or only girls. For example: in a class of 32 people there will be 4 decks of cards. 1.3. Have prepared three blank paper sheets for each class team. 1.4. Prepare a slide or file with the instructions of the game to be able to project it on the board. It can also be handed out on paper, one per table, or per team. 1.5. Prepare a slide or file with the instructions for the second part of the activity to be able to project it on the board. 1.6. Prepare a survey on Mentimeter o a similar platform: Which scientist lab surprised you the most? Three things you learned today about women scientists?	Computers Tablets Smartphone Printer Video projector TV 32' screen or above HDMI cable Paper sheets Adhesive tape Access to internet In case of not having access to technological devices the teacher can elaborate all the digital documents on paper.	45 minutes

Activity Title & number	Short description of the activity	Resources needed	Time 1 h 45 min total
2. Let's talk about science labs	2.The lesson begins by telling the class that they should divide into teams of two people. The teacher should ensure that the teams are mixed or girls-only. Then the teacher will tell the class that next, they will have to search the Internet for the Wikipedia page of the woman scientist whose number is the same as that of their team. 2.1. The activity to be carried out will be the following: The teacher will organize a "game table" for every four teams. In each table the eight people that make up the teams should be able to play the card game. 2.2. The teacher will ask the teams to sit on the tables, that is, four teams per table. 2.3. When each table is ready, the teacher will distribute a deck of cards for each table, and project the instructions for the game on the blackboard. 2.4. Then, the teacher will indicate that the aim of the game is to become familiar with the scientists on the cards and their contributions to the world of science. 2.5. The teacher will ask the class if they have any questions about how to play the card game. Once all doubts have been resolved, the teacher will start the card game. The class will be told that they have 20 minutes to develop the game.	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Card game Paper sheets Instructions of the card game	20minutes.
3. Building Labs with women scientists	3. Once the game of cards ends, each team must have at least one laboratory. If not, the teams that do not have any laboratory are asked to assemble one at that moment with the cards that are left over on the table. 3.1. Then, the teacher will indicate the following instructions: a) Each team will choose one of the laboratories they have set up.	Paper sheets Adhesive tape	25 minutes.

Activity Title & number	Short description of the activity	Resources needed	Time 1 h 45 min total
	b) They must indicate which scientific branch it belongs to. If they have any doubts they can consult the instructions or the teacher. c) Once teams choose the laboratory, they must search the names of each of the scientists on the internet in order to find their biography, or a review of the scientific work carried out by each scientist. d) On the white sheets that have been distributed, the teams will write: -the name of each scientist, her profession and a summary of two, maximum three paragraphs about the main achievements/works/inventions of this scientist. e) On a separate sheet the teams will write: -the name they will give to the laboratory, the scientific field to which it belongs and the importance, in the opinion of the team, of the work of the women who make up that laboratory. 3.2. Once teams finish, they will place, on a classroom wall, the sheet with the name of the laboratory together with the sheets with the names of the scientists on the wall of the classroom that is indicated.		

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 1 h 45 min total
4. Giving feedback	4. The teacher will suggest to the class that after they "post" their labs on the classroom wall, they should read the other teams' laboratories. They must take notes of those that have caught their attention the most. 4.1. The teacher will project a survey on the blackboard asking: Which scientist lab surprised you the most? Three things you learned today about women scientists? 4.2. The five most voted labs will be read aloud to the rest of the class by the teams who wrote them. 4.3. The teacher will orientate the debate highlighting that: -Both girls and boys have the same capacity and potential for social skills and math/science/technology -related skills. -When a person chooses their professional career, they are influenced by different situations such as family, the school environment, the ideas they have about what the field of work is, personal motivations, the belief they have about personal abilities in relation to certain subjects. Hence, all careers are suitable for girls and boys.	Computers Tablets Smartphone Video projector TV 32' screen or above HDMI cable Online survey Access to internet	15 minutes.

LESSON 7.

E-SOC Lesson Plan

Learning Objectives:

To raise awareness of teachers about their gender conscious and unconscious biases in educational activities

To counter gender stereotypes in STEAM education and give girls more interest in STEAM orientations

Learning outcomes:

By concluding this session participants will have:

Knowledge:

- To compare and contrast teachers' behaviour concerning gender bias in STEAM class

Skills :

- To illustrate skills which will engage more girls in STEAM

Attitudes:

- To value changing in approaching gender bias in STEAM class

Activities :

1) Lead In: Time:15'

   (see the Description of the Activity & Handout 1)

2) Guidelines for teachers:
3) Project Based Learning (Handout 4) T:30' (f2f or online)
4) Questionnaire for students
5) PBL put into practice: 60' f2f (Ts will play the role of ss)
   - 1st Session – 2h20' (when piloted)
   - Inter-session workload – 3hs (when piloted)
   - 2nd session – 1h40' (when piloted)
6) Reflection Grid T:15'
7) Free Feedback T:10'

Stereotypes & Counter Arguments

S1 Girls are less interested in STEAM subjects.

CA 1. STEAM abilities are not male qualities.

CA 2. There are girls with higher results in STEAM than boys

Description of the activities:

1)Suitcases
Participants are asked to write their: Expectations/ Feelings /Contribution on the handout "suitcases". Using blue tack they will be displayed around the classroom and each participant will take a look at the others' suitcases. (relaxing music).It is a good way to know each other. At the end of the course they will receive their suitcases back and they will have to write again, this time after completing the training. The suitcases remain with the trainer.

GUIDELINES FOR TEACHERS (online or face-to-face)

2)Constructivist Theory – Video film Q&A

https://www.youtube.com/watch?v=MBMawqyW2sc&t=50s

- Discuss the usability of the CT in STEAM

- Discuss the usability of the CT in STEAM

To look from a different perspective at our training and avoid the traditional class E-STEAM's didactical approach for TP is using **the Constructivist Learning Theory** with everything which it consists of.

Here we have designed a YouTube video which explains in short this theory. Let's watch it:

https://www.youtube.com/watch?v=69jV1ggHdPw&rel=0 (3'.56")

Discussion: f2f/online
Time:15'

Q**. What are the characteristics of a constructivist class/training?**

A. (ideally)

- the learners are actively involved
- the environment is democratic
- the activities are interactive and student-centred
- the trainer facilitates a process of learning in which trainees are encouraged to be responsible and autonomous

Q. **Furthermore, in the constructivist learning, how learners work primarily?**

A. In **groups** and learning and knowledge are **interactive and dynamic**.

Q. **How can you explain the focus on social and communication skills, as well as collaboration and exchange of ideas?**

A. This is contrary to the traditional classroom in which students work primarily alone, learning is achieved through repetition, and the subjects are strictly adhered to and are guided by a textbook.

Some activities encouraged in constructivist classrooms which you could noticed so far are: (these definitions are hanged around the classroom in big capital letters and they will read them in turn or are projected by a video projector on a screen)

- **Situated learning:** In contrast with most classroom learning activities that involve abstract knowledge which is and out of context, Lave argues that learning is situated; that is, as it normally occurs, learning is embedded within activity, context and culture. It is also usually unintentional rather than deliberate. Lave and Wenger call this a process of "legitimate peripheral participation"

- **Problem-based learning** (**PBL**) is a student-centred pedagogy in which students learn about a subject through the experience of solving an open-ended problem found in trigger material Learners individually perform an experiment and then come together as a class to discuss the results.

- **Discovery learning/Explorative learning:** This allows learners put the concepts and ideas discussed in class in a real-world context by observing, discussing, trying out and reflecting on them. The self-developed experience strengthens self-confidence and arouses curiosity about further experiences.

- **Films and Inquiry learning** are about finding appropriate resolutions and thus questions and issues. Films provide visual context and thus bring another sense into the learning experience. Inquiry can be a complex undertaking and it therefore requires dedicated instructional design. Carefully designed inquiry learning environments can assist learners in the process of transforming information and data into useful knowledge. This technique is used in all of the methods described above. It is one of the most distinctions of Constructivist Teaching methods.

3)Project Based Learning Guidelines

See the video: https://youtu.be/LMCZvGesRz8 https://www.youtube.com/watch?v=LMCZvGesRz8&feature=youtu.be
Discuss the usability of the PBL in STEAM. Skills developed in girls due to this approach: 4Cs Communication/Collaboration/Creativity/Critical thinking. Finding out about Ts experience in PBL.(Questions and answers/good practice) It is important to use PBL approach in STEAM with STEM strategies. Talking about the steps to follow for a well planned PBL.

Conclusion: Examples of the steps for a well designed PBL:

https://www.youtube.com/watch?v=_3yAODXnAsg&t=13s
Time: 10' 48''

I. Involve your students from the beginning (Brainstorming)
II. Break down the intro well defined tasks (Inquiry Based Learning)
III. Plan well, set goals, define outcomes (encourage Ss to ask questions IBL)
IV. Divide your class into working groups with well defined tasks V. Create a tangible artifact as an outcome
VI. Arrive at a conclusion
VII. Document and present to a public audience
Starting the PBL by brainstorming and mind mapping with real life experiences/ local societal causes. Following the mentioned steps teachers will try to simulate PBL.

GUDELINES FOR TEACHER'S PILOTING ON STUDENTS

Student Impact Assessment Questionnaire

(see Handout

PBL applied in the class:

1st Session
Ss are divided in five groups or how many are necessary. They receive a flipchart paper, felt pens, markers etc. Each group will choose a topic which is something they/their community/young people are very interested in. They will choose a name for the group:

E.g.

The Environmentalists – Cleaner Air in Our Community

The Social Workers – Food4All

The Artists – We bring Art in the Community – ART HOBBY

The Innovators – Innovation and Technology

The members of the groups which consist of both girls and boys will receive "tasks"(according to their skills and talents) which they will be happy to fulfill. They will follow the steps mentioned in the PBL Guidelines. The tangible artifact will be a Poster/a Video which will be advertised and campaigned on Face Book. (The class will initiate a FB page)

2nd Session
They will start the campaign in their school, networking, parents, friends on line. The more convincing project and the way of advertising will be classified First Prize. The more likes they will receive, the better place they will get.
The time for this PBL will last for two weeks and will be monitored by the teacher who will play the role of a facilitator. It will involve work at home and recruiting volunteers and campaigning.
The results and the proposed projects will be presented as an "event" where school mates, head-teachers, decision-makers, mass media and parents will participate. An assigned Event Committee will write the invitations, deliver them and prepare the ceremony. Certificates and "prizes" will be prepared. A "jury" consisting of teachers and students will evaluate the "projects" according to an 'Assessment Sheet' where clear descriptors are devised by the Event Committee.
Each team will present their project, its development and the results, in a way which they will consider most successful as presentation will be assessed as well. After the teams project presentations the public will vote online and a team responsible for the public evaluation will communicate the result which will count for half of the entire result.
The 'president' of the Jury will announce the winners (first, second etc)
handing in the certificates and congratulating all the participants. According to each organiser's creativity other "entertaining" events can be added during the brake needed for the calculation of the results.

5)Reflection Grid: It is a process of systematic review. Time is allowed at the end of every session for participants to think over the activities they have just experienced and make notes under various headings: For us as a group/For us as teachers/For our work with students.

6) Free Feedback: Teachers will like to know how information on the content, process and atmosphere as well as how and what students feel they are learning. Five minutes before the end of the lesson students are given a small 10x10cm piece of paper on which they(teachers and later students) are asked to give their feedback on the lesson. This kind of feedback will be used with the participants as well. At the end of each session they will receive such pieces of paper on which to write their feedback. The slips will be redistributed at the beginning of the next session, asking participants to ensure that they do not receive their own and then in a seated circle they are invited to read out the slip they have. Others with slips containing a similar theme or comment will read theirs. It serves as a link, reminding the group what happened during the last session.

Recommended duration:	➲ This activity is f2f and online. Together will last for about 7hs ➲ It will be distributed on a two weeks 'time.
Assessment/ Evaluation:	➲ Self-evaluation ➲ Ss evaluation
Materials, equipment:	Internet connection/BYOD Flip chart paper Post its Markers Handouts 1, 2,3,4
Resources:	Author's own experience.

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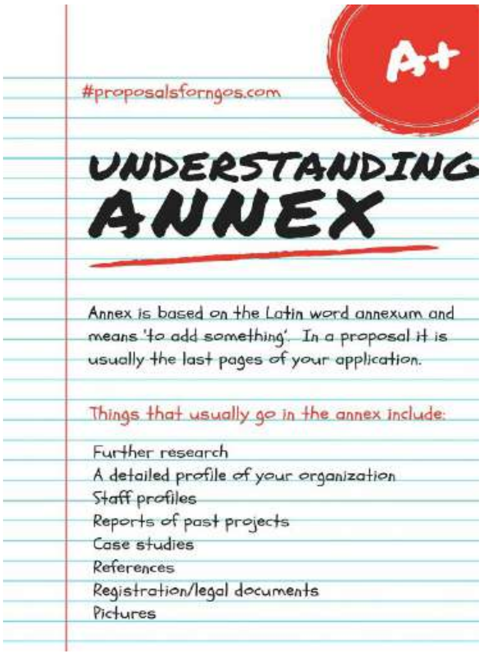
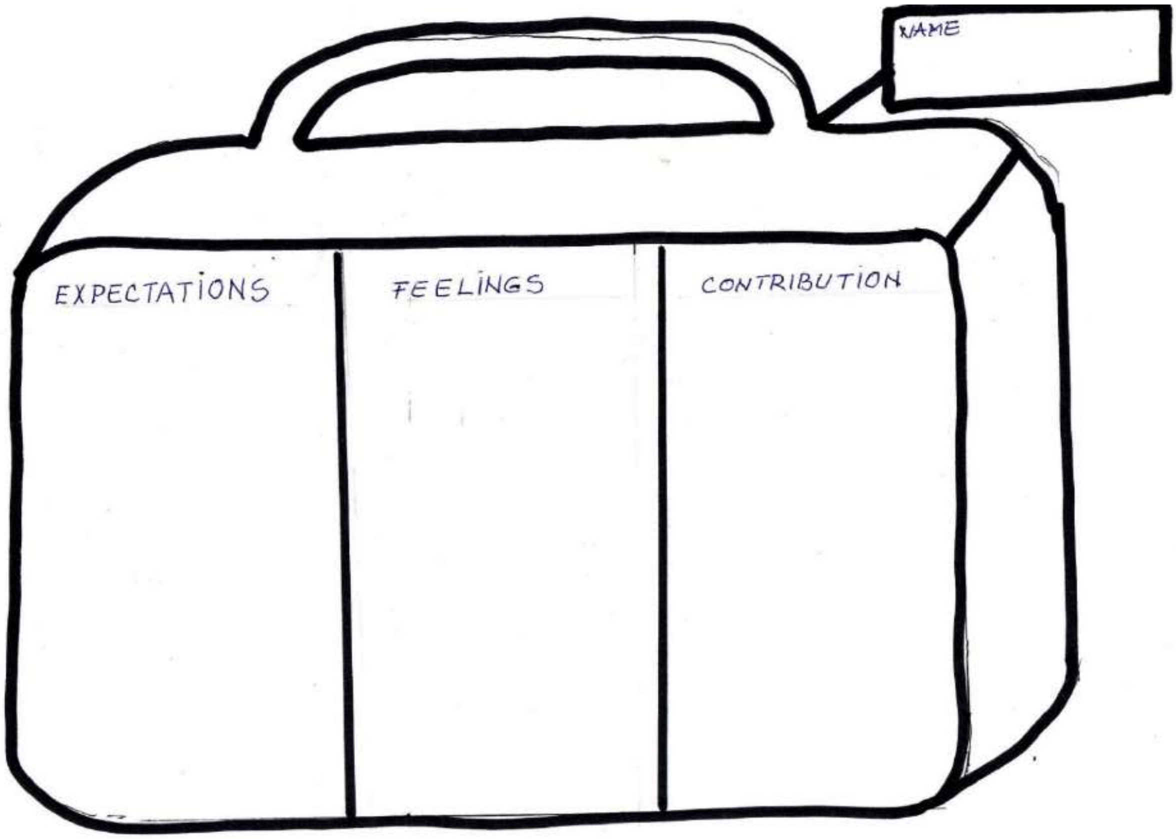
Annexes:



Worksheet 1



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Worksheet 2

Student Impact Assessment Questionnaire

(before and after the piloting)

Your pseudonym/nickname: ______________________________

(don't forget your pseudonym. You will use it for the second questionnaire)

Your age: ________________________________

Your gender: ____________________________ **We would be happy to learn your feelings and opinion about STEAM[1]!**

Try to answer the questions as spontaneously as possible. In most cases, the first answer that comes to mind is the best! Please circle your answer.Only one answer per question.

1. Boys are interested into STEAM.

Strongly Disagree • Disagree • Slightly Disagree • Slightly Agree • Agree • Strongly Agree •

2. Girls are interested into STEAM.

Strongly Disagree • Disagree • Slightly Disagree • Slightly Agree • Agree • Strongly Agree •

3. Boys have talent for STEAM.

[1] What is STEAM? STEAM is the acronym for 'Science, Technology, Engineering, Art and Mathematics'.

Strongly Disagree • Disagree • Slightly Disagree • Slightly Agree • Agree • Strongly Agree •

4. Girls have talent for STEAM.

Strongly Disagree • Disagree • Slightly Disagree • Slightly Agree • Agree • Strongly Agree •

5. STEAM is nerdy.

Strongly Disagree • Disagree • Slightly Disagree • Slightly Agree • Agree • Strongly Agree •

6. STEAM is boring.

Strongly Disagree • Disagree • Slightly Disagree • Slightly Agree • Agree • Strongly Agree •

7. STEAM is dirty.

Strongly Disagree • Disagree • Slightly Disagree • Slightly Agree • Agree • Strongly Agree •

8. STEAM is not interesting

Strongly Disagree • Disagree • Slightly Disagree • Slightly Agree • Agree • Strongly Agree •

9. I plan to pursue STEAM studies later.

Strongly Disagree • Disagree • Slightly Disagree • Slightly Agree • Agree • Strongly Agree •

Thank you for your participation!

Handout 3

What is PBL methodology?

Project-based learning (PBL) is a student-centered pedagogy that involves a dynamic classroom approach in which it is believed that students acquire a deeper knowledge through active exploration of real-world challenges and problems. Students learn about a subject by working for an extended period of time to investigate and respond to a complex question, challenge, or problem. It is a style of active learning and inquiry-based learning. PBL contrasts with paper-based, rote memorization, or teacher-led instruction that presents established facts or portrays a smooth path to knowledge by instead posing questions, problems or scenarios (Source: Wikipedia). Learn more about PBL with this video: https://youtu.be/LMCZvGesRz8 and see Handout 2

Why do we use PBL methodology?

Project Based Learning in Blended Learning training for teachers/trainees

Why Project-based learning, complemented with blended learning? (*Blended learning* generally refers to incorporating online*learning* into training to create *hybrid-learning* experiences for learners).

Detailed procedures. It could be an effective method to achieve better teachers' (pupils) engagement, by transferring the focus on the learner, thus creating learner-centered activities, where core 21st century skills, like communication, collaboration, critical thinking and creativity are addressed. The use of platform will allow the trainees to discover methods and teaching material ready to be used in class with their pupils.

Raise awareness of teachers on PBL (Optional)

- Discuss the usability of PBL in STEAM. Engaging girls in hands on activities. Skills developed in girls due to this approach: 4Cs: Communication/Collaboration/Creativity/Critical thinking.
- Finding out about Teachers' experience in PBL. (Questions and answers/good practice)
- Eliciting from teachers/trainees is important. E.g.

Q: Have you used PBL in your teaching? A: Yes/No

Q: Which are the advantages? Are there disadvantages?

Q: Can you adjust it to your teaching? Can you give us an example?

Q: Which has been your latest topic taught in your subject (STEM) which you think will be appropriate for using PBL which involves pupils in all stages?

Q: How can we plan this topic according to what you saw in the video?

Q: Can you involve both girls and boys in teams? (Quantity is important but also responsibilities have to be divided equally).

- Detailed procedures

  Hands on activity: talking about the steps to follow for a well-planned PBL.

  NB. It is important to use PBL approach in STEAM with Inquiry Based Learning (IBL) in STEAM, strategies taking into account **gender sensitive language** and **gender equality and equity**. (Use the Flipchart):

  Q: Which are the steps you should use in a PBL approach? (Brainstorming). Trainer writes down on the flipchart sheet as the teachers come up with ideas. Then these ideas are selected, teachers put numbers in front of the most relevant tips, thinking of a logical order.

- Conclusion: examples of the steps for a well-designed PBL

  I. Involve your trainees/pupils boys and girls respecting equal numbers but also equal involvement from the beginning (Brainstorming)

  II. Break down the topic into well-defined tasks - Inquiry Based Learning https://www.youtube.com/watch?v=XbxDHqf883g

  III. Plan well, set goals, define outcomes (encourage participants to ask questions IBL)

  IV. Divide your class into working groups with well-defined tasks

  V. Create a tangible artifact as an output (something like an object, a poster, a map, a video, a robot, an IT application)

  VI. Arrive at a conclusion

  VII. Document and present to a public audience (school, local community)

Handout 4: Project Based Learning methodology

At the heart of any STEAM class is the one in which students create products, not just take tests. Those products should be exhibited to their peers, teachers, parents, and adult experts. This step requires smart scheduling, presentation space, invitations, practice time for public speaking, and -- more than anything -- attention to the design process. Using **inquiry-based learning through real-life experiences** and socially relevant challenges will result in continual reflection and refinement of the product.

Allow for creativity. STEAM education is equated with innovation. But what really works? Incorporate a creativity rubric into your project. Use a rubric that has a 'breakthrough' category. This category is open-ended and encourages students to think outside the box.

Make teamwork central. Scientists and engineers work in teams, so emphasizing teams -- and training teachers and students in how to make teams successful in the classroom -- is essential to great STEAM education. To move from old notions of group work or cooperative learning into real teams, use a team collaboration and work ethic to help students identify the exact tasks associated with 21st century teamwork.

Start with questions. Any important endeavor in science, engineering, art or technology starts with a question. How do we create this product? What are the best design specs? What does the consumer want? An engaging, rigorous STEAM curriculum emphasizes questions, not rote learning, lectures, or regurgitating known information. A STEAM program can teach facts and information -- these are essential to young people. But make sure that students are constantly challenged by interesting, meaningful questions - with potential answers that matter to the world.

"The 21st century skills and competencies" are a combination of cognitive, interpersonal and intrapersonal characteristics that support deeper learning and knowledge transfers. Cognitive competencies and skills include critical, innovative and creative thinking. Interpersonal characteristics encompass communication, collaboration and responsibility. Intrapersonal characteristics include flexibility, initiative and metacognition “. (Honey et al., 2014)

Handout 5: Reflection Grid

Reflection Grid: After each session a round-up discussion will be “unpacked” under three major headings:

For us as a group	
For us as a teacher/person	
For our work with students/pupils	

LESSON 8.

E-SOC Lesson Plan

Learning Objectives:	➲ To identify gender-based stereotypes and how they affect women/man or girls/boys choices, attitudes and behaviours; ➲ To develop empathy;
Learning outcomes: **(Use Bloom's taxonomy action verbs)**	By concluding this session/class participants will have: **Knowledge:** ➲ to explain the consequences of being stereotyped; (thus they will increase their ability to empathize with others). **Skills:** ➲ to identify what it means to label students/people ➲ to distinguish how stereotypes and prejudices affect social models and behaviours **Attitudes:** ➲ to value the emotions and feelings they experience. ➲ to develop a change in approaching gender bias in STEAM class

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Stereotype and counter arguments: Labelling students theory

Target group: Secondary School Teachers
School students (choose from 12-18+)

Activity Title & number	Short description of the activity	Resources needed	Time
Lead In: **Activity 1. Watching a video** 	**The Power of Words** https://www.youtube.com/watch?v=Hzgzim5m7oU 1'47'' Discussion on the video: Q: Do words have power? A: Words have energy and power with the ability to help, to heal, to hinder, to hurt, to harm, to humiliate and to humble." Q:Do words create reality? A:Everything begins with a word. **Words** consist of vibration and sound. It is these vibrations that **create** the very reality that surrounds us. **Words** are the creator; the creator of our universe, our lives, our **reality**. Q: How do words inspire change? A: A **word** has the power to **change** your life. Think about that for a moment because it is literally an Earth-moving statement – to **change** your life. ... **Words can** influence us, **inspire** us or just as easily bring us to tears. **Words change** our relationships, our demeanour, our entire system of beliefs.	Internet Laptop/smart Phones Video projector	10'
Activity 2 Labelling	**Labelling** • 5 min. Introducing shortly the activity steps	Sheets of paper	50'

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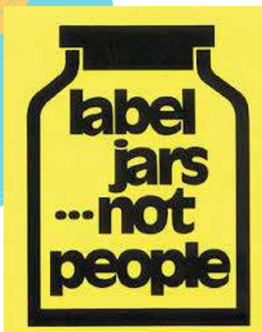 **Assessment/ Evaluation**	• 20 min. Participants talk to each other, treating and behaving according to their interlocutor's label. • 10 min. Participants share their feeling with their labels on. • 15 min. Debriefing Developing of the activity: 1.Attach a label on each participant's forehead (or back) so that the label is not visible to the wearer. Make clear that these labels are being assigned randomly and have nothing to do with students' actual attributes. 2. Choose labels/features that are culturally attributed to males or females (like, overemotional, fragile, aggressive, strong, comprehensive, etc.) 3. Then ask participants to spend 15 minutes talking with each other about "future career in STEAM" (another general topic can be chosen but this one works well in eliciting responses to the labels). Tell participants that they should circulate in order to talk with several different people, and that they should treat one another according to the other person's labelled attribute. For example, someone labelled "forgetful" might be repeatedly reminded of the instructions. 4. After 20 minutes, reconvene the group and ask participants to leave their labels on for a little while longer. Then ask participants to share how they felt during the exercise, how they were treated by others, and how this treatment affected them. Participants will often mention their discomfort not only with being stereotyped but with treating others stereotypically. Debriefing: see evaluation Debriefing (Q&A) When you finish the activity, use the questions below to start a discussion in plenary: • *Was the label what you guessed, or were you surprised by it?* • *When people stereotyped you, were you able to disregard it?* • *Did you try to disapprove the stereotype? If so, did it work?*	Coloured pencils/markers WiFi, smartphones, laptop, videoprojector/TV	1h

	• *How did you feel toward the person who was stereotyping you?* • *If your attribute was positive (e.g., "good at math"), how did you feel?* • *When stereotyping others, how easy was it to find confirming evidence?* • *When stereotyping others, how did you react to disconfirming evidence?* • *Do you think some of the labels are commonly associated with one gender (typically female or male)? Which ones? Why?* • *As a girl or boy, how do you feel about being associated with this label because of your gender?*		
References and other useful sources:	Activity available on Blog "*Stereotypes: labelling activity and cultural pursuit*" https://my.vanderbilt.edu/vucept/modules-open-sessions/stereotypes-in-my-community/ Adapted from Goldstein, S. B. (1997). "The power of stereotypes: A labelling exercise".		
Worksheet 1	See below.		

ANNEXES : Worksheet 1

WORKSHEET 1

The labels which teachers give to students can influence the construction and development of students' identities or self-concepts: how they see and define themselves and how they interact with others. This in turn can affect their attitudes towards school, their behaviour, and ultimately their level of achievement in education.

Labelling refers to the process of defining a person or group in a simplified way – narrowing down the complexity of the whole person and fitting them into broad categories. At the simplest level labelling involves that first judgement you make about someone, often based on first-impressions – are they 'worth making the effort to get to know more', are you 'indifferent to them', or are they to 'be avoided'.

According to labelling theory, teachers actively judge their students over a period of time, making judgments based on their behaviour in class, attitude to learning, previous school reports and interactions with them and their parents, and they eventually classify their students according to whether they are 'high' or 'low' ability, 'hard working' or 'lazy', 'naughty' or 'well-behaved', 'in need of support' or 'capable of just getting on with it' (to give just a few possible categories, there are others!).

Annex 2. Questionnaire

1. Do I enjoy creating (making) something more than reading a book?
2. Do I like to solve and find solutions to the problems that I am having a hard time?
3. Do I like to help others when they need it?
4. For me, the most important way to learn new things is to read something about that subject?
5. Do I like manual labour?
6. Do I like being a boss?
7. Do I prefer to know all the data of a problem before I start solving it?
8. Do I like to take care of others?
9. Do I like to design, to invent new things?
10. Do I like to express myself through art?
11. Would I like a job where I could be in touch with others all day?
12. Do I enjoy working with materials and equipment?
13. Do I enjoy finding new things and ideas?
14. Does cooperation with others seem to me a natural state?
15. Do I look to find out how things work by disassembling them?
16. Would I choose to work with machines rather than people?
17. Do I usually succeed in influencing people to do things my way?
18. Do I like to build and repair objects?
19. Do I like the research I need to carry out my projects?
20. Do I enjoy getting in touch with people?
21. Do I look to find new ideas and ways of doing things?
22. Do I seek the opinion of others?
23. Do I like to learn how to use various tools / equipment?

Interpretation of the questionnaire:

If you have circled the statements 1, 5, 9, 12, 15, 16, 18, 23 - you like the world of objects you have knowledge about it, in it, you can handle it. Mechanical construction, repair and maintenance, transport, crafts and technology attract you.

If you have circled 3, 6, 8, 11, 14, 17, 20, 22 - for you the area of interest is people. You like to care for or help others, convince or interview people, work as a team, and lead or respond to others. The occupations that characterize you are from the following fields: medical, education and training, assistance and counselling, religion.

If you have circled the statements 2, 4, 7, 10, 13, 19, 21, 24 - you are concerned about the written information. You like to express yourself in writing, music or art, do experiments or research on a topic, find solutions or answers to puzzles, study or read. You will find jobs in the following fields: business and finance, scientific research, and sales. and services, tourism, and law.

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Annex 2. Questionnaire

SCHOOL DISCIPLINE	YOU CAN BECOME
Language and Literature	foreign languages: Teacher, linguistics researcher, teacher, librarian, educator, guide, translator, journalist, etc.
Mathematics/computer science	Teacher, economist-accountant, engineer, bank official, astronomer, computer scientist, etc.
Physics, Chemistry, Biology	teacher, researcher, doctor, pharmacist, biological etc.
History	Teacher, writer, musicologist, policeman, etc.
Physical education	Sports teacher, coach, army officer etc..
Arts and Technologies	Teacher, painter, designer, modeller, designer, architect, musician, actor, popular folk etc.

CHAPTER SIX – SECONDARY LEVEL

LESSON 9.

E-SOC Lesson Plan

.

Learning Objectives: **(SMART)**	To promote reflection and debate about why girls might appear to be less interested in STEM. To explore how the advertising endorses this stereotype.
Learning outcomes: **(Use Bloom's taxonomy** **action verbs)**	By concluding this session/class participants will have: **Knowledge:** To recognise, define and understand the meaning of stereotyping. To analyse and reflect on gender bios affects them To recognise the influence of the perception **Skills:** To critically evaluate and appraise some ways in which girls are encouraged away from STEAM **Attitudes:** To build and demonstrate resilience to stereotypical messages.
Stereotype and **counter** **arguments**	**S 1** *Girls are less interested in STEAM subjects.* CA1 There are girls who participate willingly and actively in Olympiad Contests in Mathematics, Physics, Chemistry, Biology, and ICT. CA2 Certain statistics prove that STEAM abilities are not male qualities

Target group: Secondary School Teachers,
School students (12-15)

Activity Title & number	Short description of the activity	Resources needed	Time 90 min. in total
Description	There is a PPT slide show lesson which includes different advertisements in video and poster form. The lesson is very open and non-prescriptive. It should generate reflection, thought, debate and ideas. It does not tell the pupils what to think. Depending on the class, it may take less or more time than allocated. **EEB4- E-SOC Lesson plan - Stereotype 1 - materials.pptx**	**PPT**	90 min.
1. Introduction Prior knowledge	Assessing prior knowledge and understanding **Show PPT slides 1-5** Ask open questions to assess prior knowledge and current thinking. Ask them to reflect and write their thoughts in their notebooks. Discuss and take feedback as you wish • What is STEAM? • 'Like a Girl/Boy' What comes into your head? • What does this mean? • Pupils list words in their notebooks • Compare and contrast. Discuss. Return to this later if you wish	**PPT Slides 1-9** Notebooks and pens Whiteboard	20'

Activity Title & number	Short description of the activity	Resources needed	Time 90 min. in total
	Slide 6 Show the graphic. Allow sufficient time to think and analyse. No comment here unless students offer comment **Slide 7** Ask: • What messages are being communicated here? • What do you notice? • What do you think about this? • What do you agree/disagree with? Allow some discussion here. **Slides 8-9** What is stereotyping? Use Think-Pair-Share to discuss. The previous slides should have elicited some debate. This will lead to more of an understanding of how to define stereotyping. Class collaborates in whichever way you feel is most cooperative and creates a definition of stereotyping. Write it on the board.		
2. Think and discuss	**Slide 10** Watch the video **Slide 11** On a blank page, each student considers and writes: 1. What this made you feel?	**PPT Slides** Notebooks and pens	20’

Activity Title & number	Short description of the activity	Resources needed	Time 90 min. in total
3. Evaluation	2. What affects girls' attitudes towards themselves? **Slides 12-14** Use the slides to generate discussion. Draw specific attention to stereotyping. Include various topics: sexism, feminine, colour-use **Slides 15-17** Ask: Watch the video and consider its merit as breaking stereotypes In which ways does it break stereotypes? **What would you change to make it even better? This is an important part of the lesson. It focuses the pupils on how we can change attitudes and the power of influence.** You decide how you would like to organize this last part. Groups? Pairs? Suggestion cards? Make notes in their notebooks? **Slides 18-19** Tell the students that the following ad was banned in the UK. Show the ad – you may need to show it twice. Ask why they think it was banned. This will help to assess whether they have understood the purpose of the lesson		
4. Task	**Slide 20**		40'

Activity Title & number	Short description of the activity	Resources needed	Time 90 min. in total
	Make a poster Discuss criteria if you wish to set some. Ask the students to make an advertising poster for a toy which is usually marketed to one gender. Make the ad non-stereotypical.		
5. Conclusion	Discuss and evaluate the posters students have made. Display in an appropriate setting**.**		5'
6. Follow-up	**Slide 21** **Organise a debate** The motion: Boys are more interested in STEM than girls		5'

Annexes: PPT : EEB4- E-SOC Lesson plan - Stereotype 1 - materials.pptx

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Stereotypes

WALT consider stereotyping in STEAM education

What is STEAM?

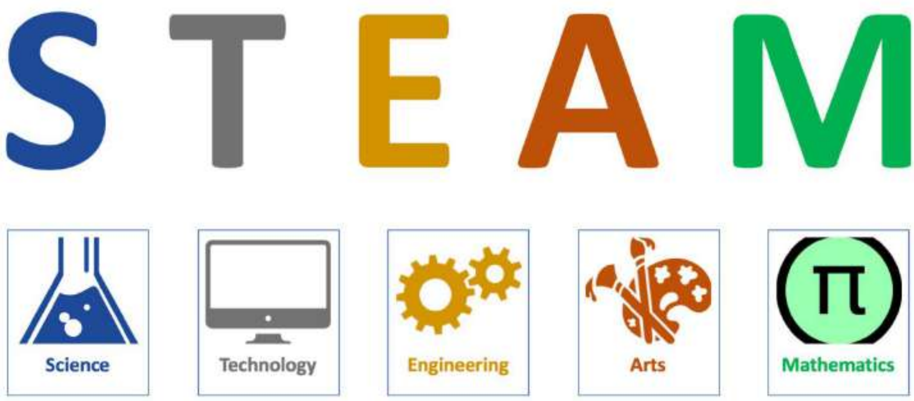
Science

Technology

Engineering

Arts

Maths



'Like a Girl'

What comes into your head?
What does this mean?
Reflect for a few seconds ...

Now, you have 2 minutes to write down some words you associate with being like a girl.

'Like a Boy'

What does this mean?
Reflect for a few seconds ...

Now, you have 2 minutes to write down some words you associate with being like a boy.

Compare and contrast your two lists

Which words appeared on both lists?

Discuss with those around you

Look at the following graphic

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What messages are being communicated here?

What is stereotyping?

Think – Pair – Share

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On a blank page consider and write:

1. What this made you feel.

2. What affects girls' attitudes towards themselves.

Lego ad

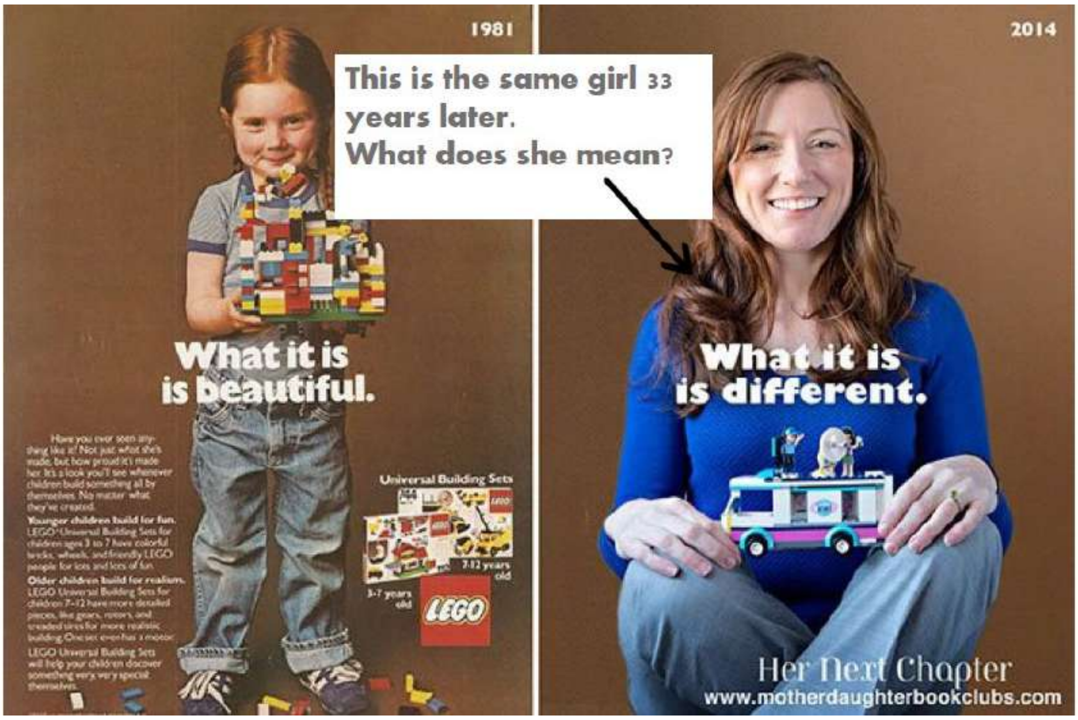
What year?

1981

Lego ad

What year?

1981



Watch the next advertisement

Consider its merit as breaking stereotypes

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In which ways does it break stereotypes?

What would you change to make it even better?

The following ad was banned in the UK

WHY?

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Task

Make an advertising poster for a toy which is usually marketed to one gender.

Make the ad non-stereotypical.

Follow-up

Organise a debate.

The motion:

Boys are more interested in STEM than girls

LESSON 10.

E-SOC Lesson Plan Two

Learning Objectives: (SMART)	To develop an understanding and to realize that women and girls can make significant contributions to the world of STEAM.
Learning outcomes: (Bloom's taxonomy action verbs)	By concluding this session/class participants will have: **Knowledge:** To present and defend a thesis always demands a level of preparation and knowledge on the topic **Skills:** To present an opinion using the proper arguments To organise a role-play **Attitudes:** To demonstrate a change in gender bios and prejudices in themselves, even if it's not easy To value them.
Stereotype and counter arguments	**S2** *Boys' results in STEAM are due to their quick minds, while girls have to put in constant engagement and effort.* CA1 The idea that talent is innate influences learning. It is important to consider gaining new knowledge and putting oneself in challenging situations instead of thinking that "it's not for me". CA2 A person's interests are independent of gender. Occupational choices are based on interests, education, and opportunities and not on gender.
Target group:	Secondary School Teachers, School students (choose from 12-15)

Activity Title & number	Short description of the activity	Resources needed	Time 90 min. in total
Lead In: **1. Providing the information about the roles of the role-play**	**A role - play** Dividing the class in 4-5 groups. The roles are presented to the participants: i. A young girl who wants to be an engineer. ii. The girl's father who wants his daughter to become a teacher iii. The girl's best friend who wants to become a painter iv. The girl's mother who is wondering about her daughter's family life in the future. v. The girl's uncle who supports totally the free choice of a woman to work in STEM areas. Use the method of 6 thinking hats in each group. Give a short explanation of the method. It is not necessary to use all colours of hats. It depends on how many students form a group. Each person in a group plays a different role of a colour hat. Give some time so, each student choses its colour of hat and build their own thesis to defend/present.	The roles printed on papers The chart with the 6 thinking hats is printed too	15'

Activity Title & number	Short description of the activity	Resources needed	Time 90 min. in total
2. Distribution of roles and preparation	The groups adopt a role-play and they have a short time to organize the discussion (after drawing lots). 15 minutes are given to a group to prepare their arguments and then the presentation begins.	Draft paper to take notes	15'
3. Role-play	The presentation begins, starting from the girl...(i) Each group has 10 minutes to present their role-play and their colour hat's think of.		50'
4. Comments - Evaluation	After the role-play, all the participants make their comments. Specific issues can be discussed as: i. Was the girl sure for her choice? Did she also have some bias even if she wasn't able to recognise them? ii. Which were the main arguments against the girl's choice? Were they fully reconstructed during the discussion? etc.		10'

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Annexes:

Roles

i. A young girl who wants to be an engineer.

ii. the girl's father who wants his daughter to become a teacher

iii. The girl's best friend who wants to become a painter

iv. The girl's mother who is wondering about her daughter's family life in the future.

v. The girl's uncle who supports totally the free choice of a woman to work in STEM areas.

COLOURED HAT	THINK OF	DETAILED DESCRIPTION
	***White paper***	The white hat is about data and information. It is used to record information that is currently available and to identify further information that may be needed.
	***Fire and warmth***	The red hat is associated with feelings, intuition, and emotion. The red hat allows people to put forward feelings without justification or prejudice.
	***Sunshine***	The yellow hat is for a positive view of things. It looks for benefits in a situation. This hat encourages a positive view even in people who are always critical.
	***A stern judge***	The black hat relates to caution. It is used for critical judgement. Sometimes it is easy to overuse the black hat.
	***Vegetation and rich growth***	The green hat is for creative thinking and generating new ideas. This is your creative thinking cap.
	***The sky and overview***	The blue hat is about process control. It is used for thinking about thinking. The blue hat asks for summaries, conclusions and decisions.

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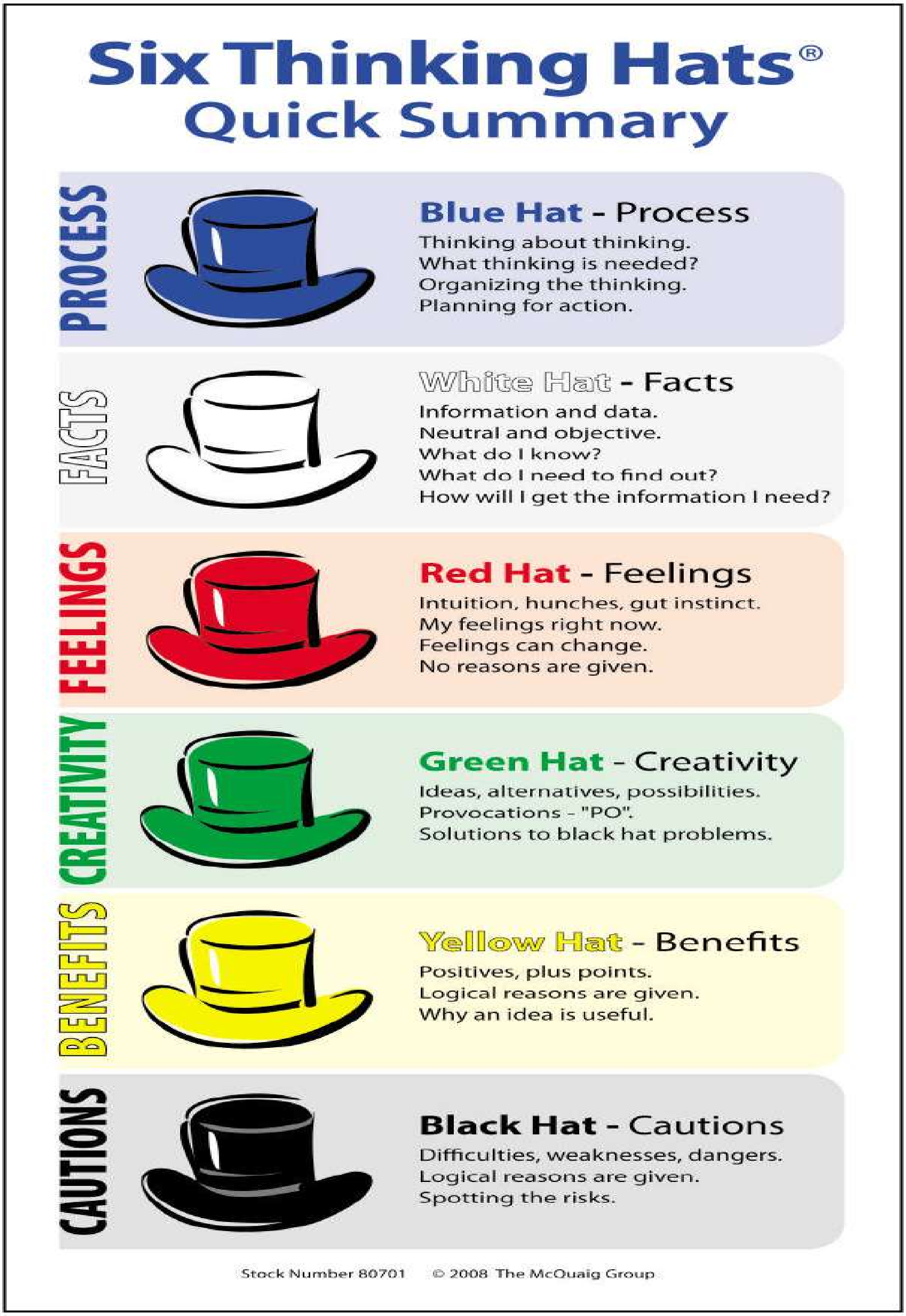

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LESSON 11.

E-SOC Lesson Plan

Learning Objectives:	To recognize and deepen their understanding of women's participation in STEAM field To apply the new knowledge in possible careers in relation to the job market To analyse and reflect on their own interests in academic subjects in STEAM To create their own future career plan
Learning outcomes:	By concluding this session/class participants will have: **Knowledge:** To form attitudes corresponding to the subject discussed in the lesson-there are plenty of opportunities for women in the STEAM field **Skills:** To identify skills that will engage more girls in STEAM, to understand what skills are needed in STEAM professions **Attitudes:** To demonstrate a change in approaching gender bias in STEAM class, to create their own dream about STEAM opportunities
Stereotype and counter arguments	**S3 Hard science is still profoundly associated with masculinity.** CA1 Girls have the potential to excel in STEAM subjects. CA2 There is a new (somehow imposed) attitude towards girls and women in STEAM career paths.

Target group: Secondary School Teachers,
School students (choose from 12-16)

Activity Title & number	Short description of the activity	Resources needed	Time
			90 min. in total
Lead In: **1. Team builder activity**	Puzzles game/ the four portraits of famous women are made in pieces of a puzzle and are mixed and each student takes a single piece and tries to find the other students who have parts of the same picture. After forming the face, they make a group with these classmates. Each group has to read the material corresponding to the picture and present it in front of the class. The students will create posters with the important information.	Worksheet1 Portraits of the scientists – cut in the number of pieces- related to the expected group	40'
2. STEAM CAREER WORD SEARCH	https://www.dreambigaustralia.org/articles/2020/5/17/identifying-your-personal-steam-skills The students receive a chart with hidden words and try to discover the different professions in the STEAM field. In Group work, every group explains what these professions mean. **A brief presentation of the job market** will be done by the teacher. **You see the promise in STEM jobs by the numbers:** • Average salary for engineering majors: $73,700		20'

Activity Title & number	Short description of the activity	Resources needed	Time 90 min. in total
	• Average salary for non-STEM majors: $49,500 • Unemployment rate for engineers: 1.3% • Unemployment rate for all occupations: 5.1% • Projected percentage increase in Biomedical engineering jobs 2010-2020: 62% • Projected percentage increase in all occupations 2010-2020: 14% • There are 26 million STEM jobs in the U.S. – 20% of all U.S. jobs • ½ of all STEM jobs don't require a four year degree and pay an average of $53,000, which is 10% higher than non-STEM jobs with similar education requirements		
3. Presenting different STEAM professions	Think about these four professions: a graphic designer, an architect, a video game designer, an app developer. Each group has to make a choice of one of them and write down what do they know about it- what education do they need, what skills, etc. After that, to find the description, read it and discuss what are the new things they have learnt. They can build **mind maps** presenting the 5th professions.	Worksheet2	30'
4. Discussion or post it wall	Travel in the future - Self reflection What are the possibilities for students in the STEAM field?	post - it in different colours	10'

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Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 90 min. in total
	The pupils should write 3 possibilities in future in a different post-it that to stick them on the wall or the white board. Read them and have a discussion.		

Annexes:

WORKSHEET 1

STEAM CAREER WORD SEARCH
https://www.dreambigaustralia.org/articles/2020/5/17/identifying-your-personal-steam-skills

Team builder activity:

Shirley Jackson, physicist and inventor

What you can tell your children about her: She invented technology for the telephone, and she is a leader of important science groups.

Why we're celebrating her: *Time* magazine called Shirley Jackson (born 1946) "perhaps the ultimate role model for women in science," and we couldn't agree more.

She has been interested in science since childhood. Her mother read her books about scientists, and her father helped her with projects at school. She earned her Ph.D. degree in physics at Massachusetts Institute of Technology — the first African American woman to do so. At AT&T Bell Laboratories, her research in optical physics led to the invention of the touch-tone telephone, fibrotic cables, caller ID and call waiting.

Jackson has counselled presidents about public health and nuclear energy, and about how science and technology policies can help the economy. President

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Barack Obama awarded her the National Medal of Science for her distinguished career in research and development.

Katherine Johnson, mathematician and aerospace pioneer

What you can tell your children about her: She was a maths expert who helped astronauts go into space and land on the moon.

Why we're celebrating her: Before there can be astronauts who fly in rockets and go to space, there must be people like Katherine Johnson (1918-2020) who help them get there. Johnson made critically important contributions to the country's most historical achievements in spaceflight.

Growing up, Johnson had parents who encouraged her abilities in maths and sent her to a school where she could excel. She graduated from college at age 18 with the highest honors. When the U.S. entered the space race in the 1950s, NASA hired Johnson and other maths experts to make complex calculations. She calculated the path for the ship that would take the first U.S. astronauts to space and was part of the team that sent the first people to the moon.

For her extraordinary contributions to our country, President Barack Obama presented Johnson with the Presidential Medal of Freedom, the nation's highest civilian honor. She is one of the characters portrayed in the 2016 movie "Hidden Figures."

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Marie Curie, discoverer of radioactive elements

What you can tell your children about her: She was a scientist who figured out radioactivity, which is used to make X-rays, kill germs and create electricity.

Why we're celebrating her: Marie Curie (1867-1934) followed her curiosity into unknown territories of science, which led to foundational discoveries for modern medicine and industry.

Both of Curie's parents were educators who made sure their four daughters had the same access to learning as their son. She excelled in physics and maths. Through her work with uranium, she coined the term "radioactivity" and helped create the field of atomic physics. She and her husband, Pierre, also discovered the radioactive elements polonium and radium.

In 1903, Curie shared the Nobel Prize in physics with Pierre and another scientist for their work in radioactivity. She became the first woman to win a Nobel, the highest honor in her field. Continuing her work with radium, she alone earned the Nobel Prize in chemistry, in 1911.

What you can tell your children about her: She was a scientist and writer who helped save birds from bad chemicals.

Why we're celebrating her: Rachel Carson (1907-1964) was one of the premier nature writers of the 20th century. Her poetic style compelled people to call for change, igniting an environmental movement that led to the prohibition of the pesticide DDT.

Her life's work began as a child. Carson's mother loved nature, and she passed along that passion to her daughter. Carson created pamphlets and articles for the government to educate people about nature and conservation.

In Carson's personal time, she wrote articles and books — such as her 1962 book "Silent Spring" — in which she questioned the damaging role of humans in the ecosystem. DDT was banned in 1972.

Worksheet 2

3 job presentation

App Development

It's hard to ignore the fact that we are growing more reliant on mobile computing applications. Whether it's your phone or tablet, you most likely arrived at this article via an app, while on a break from surfing through other apps. With the emergence of more and more apps for more and more devices, it is no surprise that there is a higher demand for app developers in many different industries. An app developer must comfortably draw from all the STEAM pillars to succeed in their career.

App development consists of designing functional, user-friendly, engaging, creative digital platforms that address a need, solve a problem or satisfy a want. Consequently, programming, design and math skills are some of the highest learning priorities for app developers. To create a fully-functional platform, they need to understand coding in various languages, as well as understand user experience design. In this context, a high level of creativity, iterative testing and problem-solving skills are needed to ensure that users interact positively with the app and continue to use it on a regular basis.

Median 2018 Salary: $103,805 USD per year[6]
Project Employment Growth Rate (2019-2029): 30.7%

Similar Careers That Use STEAM Skills:

- Web Designer
- Product Designer
- Creative Technologist

Graphic Design

Careers in graphic design continue to be in high demand. These designers are responsible for the striking, inspiring, persuasive visuals that populate the digital and physical spaces we see every day. Graphic designers must be competent with visual art to create unique and visually appealing designs. However, math is also an important component used every day throughout the design process.

For a design to look complete on a page, the designer must understand math concepts like symmetry, patterns, positive/negative space and sequencing. These concepts allow graphic designers to create optimal designs, as they have the ability to compare ratios and scale images up or down for different mediums.[4] To succeed in a graphic design career, students must develop solid problem-solving skills, adaptive creativity, spatial awareness and technical literacy to design compelling work in various formats, often for a variety of different stakeholders.

Median 2018 Salary: $45,703 USD per year[5]
Projected Employment Growth Rate (2016-2016): 4.2%

Similar Careers That Use STEAM Skills:

- Web developers
- Fashion Designers

Architecture

Whether the space is public or private, indoors out outdoors, single-use or multi-use, architects are key contributors to the development of cities, towns and individual structures. They are licensed professionals trained in the science and art of building design who influence how individuals will engage with the space. Effective architecture determines much more than just about how a building looks — it also determines its structural stability, safety and overall functionality.

Architects conceive and help create structures by combining maths, physics, engineering and art into their work. They use creative problem-solving skills to come up with designs that meet the needs of those who use the building every day. Architects incorporate STEAM skills into their work, constantly thinking of how design affects function, so they can respond to logistical and aesthetic challenges. They would not be able to design a building properly without considering the technical, artistic and mathematical implications of every decision they make. In many ways, architecture is one of the clearest examples of how STEAM learning can come together in a single profession.

Median 2018 Salary: $79,380 USD per year[1]
Projected Employment Growth Rate (2018-2028): 8%

Similar Careers That Use STEAM Skills:

- Civil Engineer
- Industrial Designer
- Interior Designer

Video Game Design

These designers, coders and 3D modellers are the masterminds behind the addictive, innovative video games that captivate billions of gamers worldwide. No matter the title, there is a team of individuals who spend hours coding, designing and creating the storylines, characters and environments that gamers everywhere come to love. In many cases, the goal is to create storylines filled with unsolved problems and tensions that the protagonist can solve in various ways. This is especially true when you consider the very recent developments in open-world gaming. The architects of these massive environments use a combination of STEAM skills to successfully bring them to life. The expectations and the demand for highly immersive gaming experiences have never been higher. It's all about bigger worlds, higher stakes, better graphics and more responsive gameplay.

Coding and mathematics are essential to every video game designer's skill set. However, to come up with the proper coding sequence, they first need to conceptualize and design the visual aspects of the game. Understanding how design affects function, and exhaustive iterative testing are essential during this process. From the colour of the character's hair and their facial expressions to their ultimate objectives and emotions, bringing these variables to life within the game would not be possible without a solid grasp of fundamental STEAM skills. In a rapidly-growing industry that's undergoing an incredible transformation, video game design is an enticing, exciting future career option for young STEAM students.

Median 2018 Salary: $90,270 per year[2]
Projected Employment Growth Rate (2016-2026): 9.3%

Similar Careers That Use STEAM Skills:

- Computer Programmer
- Art Director
- Animator

LESSON 12.

E-SOC Lesson Plan

Learning Objectives:	• To deconstruct stereotyped thinking • To share opinions and work as a team to create new thinking and bring out new ideas • To have new perspectives • To think about the career prospects of the future of female students
Learning outcomes:	At the end of the lesson, the participant will have: **Knowledge:** To identify concepts like "stereotypes" "prejudice" and "emotional intelligence" in order to apply these concepts in daily life. **Skills:** To analyse how stereotypes affect everyone's life and career choices from a young age. **Attitudes:** To value a critical sense in life.
Stereotype and counter arguments:	**S1** Girls are less interested in STEAM subjects. **CA1** There are girls who participate willingly and actively in Olympiad Contests in Mathematics, Physics, Chemistry, Biology, and ICT. **CA2** Certain statistics prove that STEAM abilities are not male qualities.

Target group: Secondary School Teachers

School students (choose from 12-18+)

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 2:50hs in total
Lead In: **1. Icebreaker**	The trainer invites the participants to introduce themselves, saying their name and how they feel using the metaphor of an atmospheric element.		15'
2. Introduction: Prejudice and stereotypes	Pre-test administration on previous skills: Attachment 1 SOLUTIONS: 1a; 2b; 3b; 4a; 5a; 6b; 7a; 8b • Print the test in a sufficient number of copies for the training components. • Distribute the TEST to each participant, inviting them to complete it independently. • At the end of the compilation, collect the answers and proceed by comparing what emerged with the correct solutions reported on the board. • Start a debate using the question related to the test.	Worksheet Flipchart Pens	30'
3 Activity: Inside matter	Couples activities • Distribute, to each pair of participants, a copy of the instructions in Attachment 2 • Read the situation presented • invite each group to answer the questions and write the email • invite each group to explain what emerged from the work.	Flipchart Worksheet Markers	50'

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 2:50hs in total
	• Write down the answers provided on the board. • Following the questions, start a discussion by asking for opinions and personal experiences.		
4 Activity: **Common thought**	Individual Activity: • Distribute, to each participant, a copy of Attachment 3 • Read the instructions to the participants: indicate, next to each trade, if, in your opinion, it is more male (M) or female (F). For each answer given, in the yellow column, indicate whether, in your assessment, you followed the common thought (=) or gave an answer that fights it (+). • Read "gender gap" and after compare the answers and start a short concluding debate.	Flipchart Worksheet Markers	60'
5	Conclusions and collection of feedback	Flipchart Markers	15'

Annexes:

WORKSHEET 1

1. **In your opinion, what is the most correct definition of prejudice?**
   a. Inaccurate judgments about situations or preconstituted opinions towards people.
   b. Voluntary negative assessments of certain groups of people.

2. **How are prejudices formed?**
   a. From our direct experience of some people or situations.
   b. They are formed in our thoughts by common opinions without direct experience.

3. **How does our brain make decisions in a short time?**
   a. It used to reflect carefully but quickly.
   b. Activates mental patterns that sacrifice decision quality for speed.

4. **What do you think "thinking by stereotypes" means?**
   a. Assign preconstituted characteristics to situations or people.
   b. Jump to conclusions in a reasoning.

5. **Which of the following statements seems most correct to you?**
   a. Emotions are unconscious and do not depend on our will. That is why it is important to become aware.
   b. Emotions derive from our will and are a consequence of our choices.

6. **Let's talk about Scientific Subjects: what do you think they are useful for?**
   a. Scientific subjects help in mathematical processes and are the basis of technological innovations.
   b.They are the basis of everything around us: from recipes to animal care. They are in every aspect of our modern life.

7. **What do you think "emotional intelligence" is?**
   a. Understand our and their emotions and know how to put yourself in other people's shoes.
   b. Have a good affinity for human sciences.

8. **The reason why it is more boys than girls who follow scientific subjects is:**
   a. girls are less able in scientific subjects.
   b.Girls and boys have the same skills but the external conditions and the examples make them think the opposite.

E-SOC E-STEAM ON THE CLOUD
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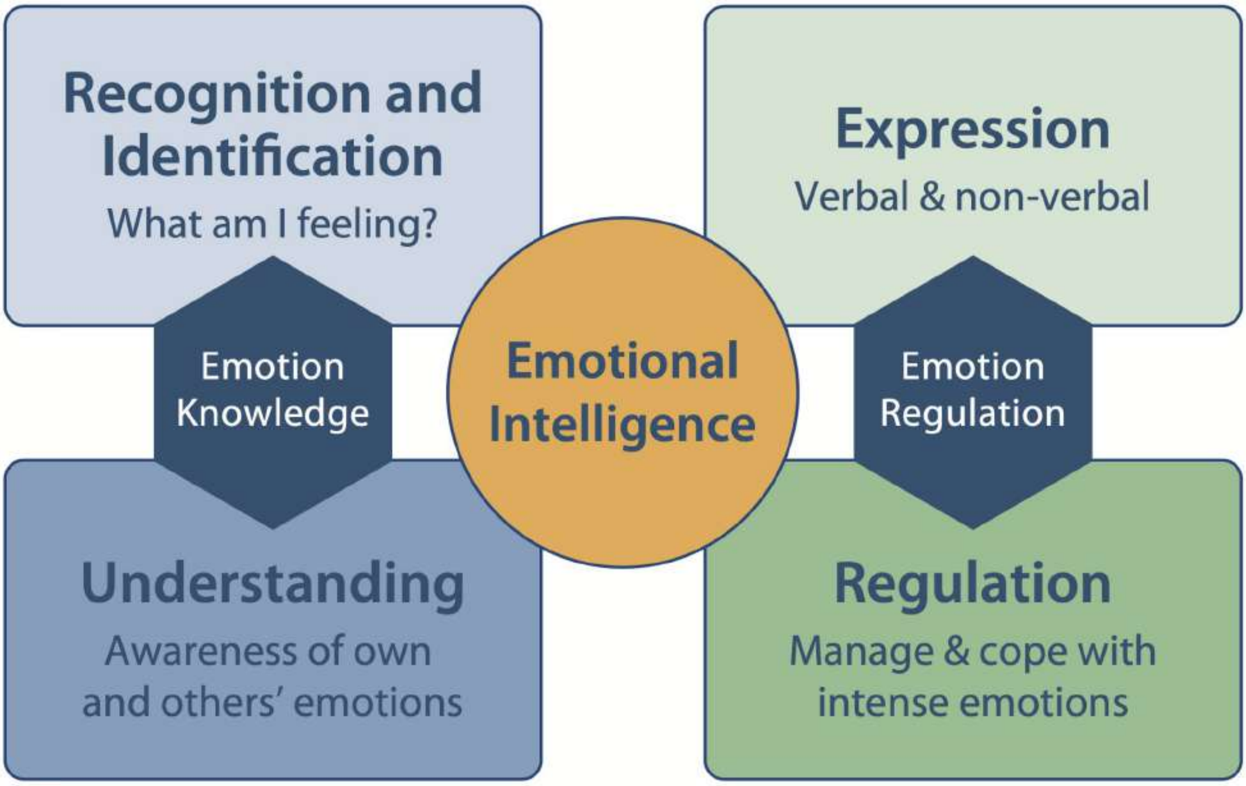
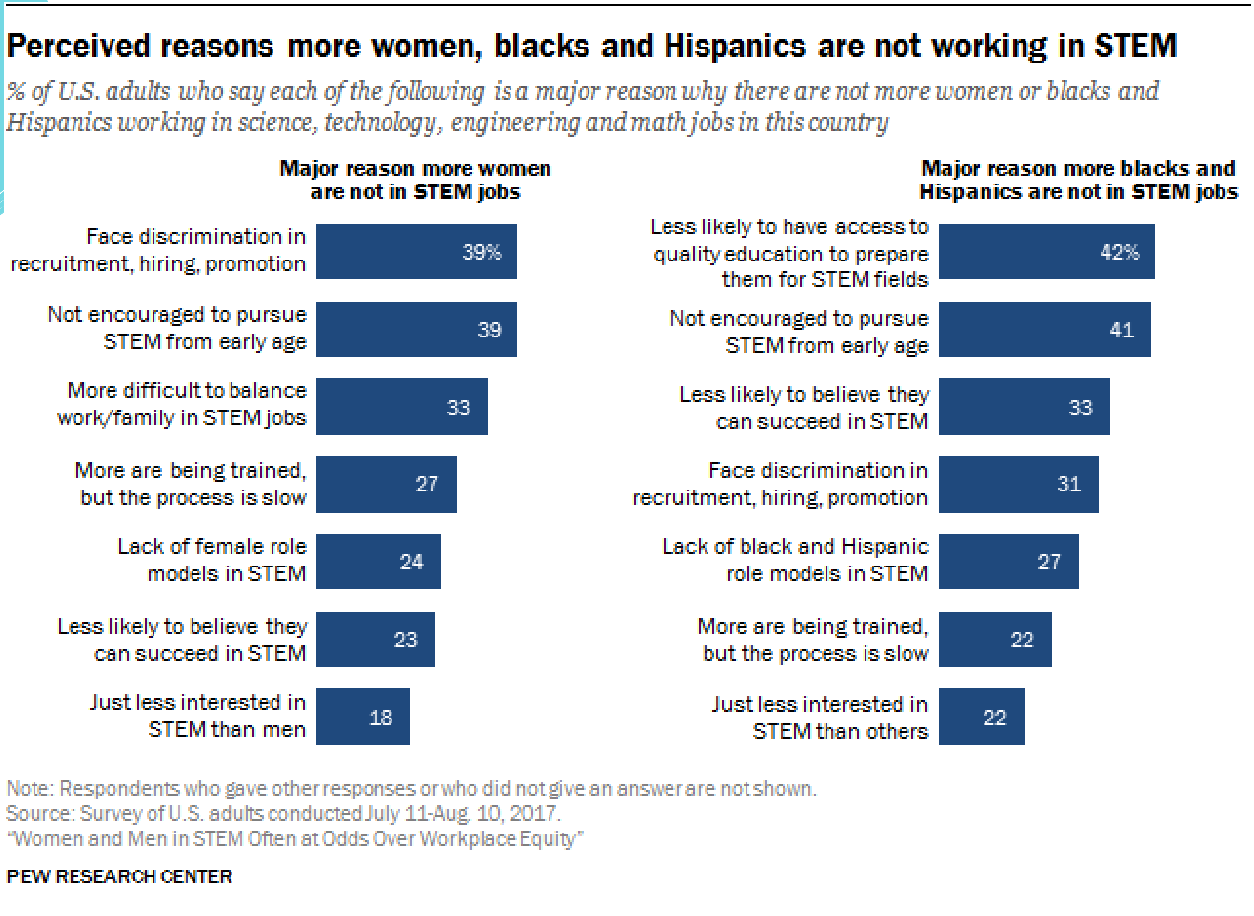
What Is Prejudice?

Prejudice can be conscious or unconscious and involves stereotypes, prejudgments, and beliefs (which are usually negative) about a group of people. These beliefs can be based on: race, sex, gender, religion, culture, disability, sexuality, etc.





DISCUSSION ABOUT THE PRE-TEST.

-Have you ever found the definition of "prejudice" during your school activities? In which subject?

-Have you ever felt that you were prejudiced against someone? How did this make you feel?

-Do you think some kind of prejudice can have a positive connotation?

-What do you think about the sentence "girls are less able in scientific subjects"? In your experience, is it a correct sentence?

-Have you ever found the definition of “emotive intelligence” during your school activities? In which subject?

-What do you think about “emotional intelligence”? Do you think the answer “a” is correct or do you have another opinion?

-In your opinion, how can “emotional intelligence” help you in your real life?

WORKSHEET 2

You need to write an email to a friend, who you care about.
This person wants to undertake a sport that is not appropriate, according to the common stereotype of what is considered "a purely male sport or a purely female sport". His/Her group of friends does not seem to support him/her, except for you, who must encourage him to continue his/her efforts.
Draw up the short email, but answer the questions on this page before writing it.

- Who are you writing to? (imagined name, age)
- What type of sport would you like to pursue?
- What counter-motivations could friends have?

What is "gender roles"?

Gender roles in society means how we're expected to act, speak, dress, groom, and conduct ourselves based upon our assigned sex. For example, women are generally expected to dress in typically feminine ways and to be polite, accommodating, and nurturing. Men are generally expected to be strong, aggressive and bold.

Every society, ethnic group, and culture has gender role expectations, but they can be very different from group to group. They can also change in the same society over time. For example, pink used to be considered a masculine color while blue was considered feminine. Another example is sport: football is for boys and dance is for girls.

Reading the e-mails try to start a debate using these questions:

-Do they write to a girl or a boy? Why?

-How old is the person in the e-mail?

-How did they feel writing the e-mail?

-What do they think of people who want to hinder their friend?

-How old are the people who want to hinder their friend?

-Do you think there are sports for men and sports for women? Why?

-Has this ever happened to you? And what did you do?

-Do you think there are gender roles in our society?

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WORKSHEET 3

Profession	Sex (F or M)	Common Thought (+ o =)
Doctor		
Bus Driver		
Babysitting		
Dogsitting		
Police		
Nurse		
Dancer		
Professor		
Psychologist		
Lawyer		
Scientist		
Chef		
Engineer		

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TOTAL		

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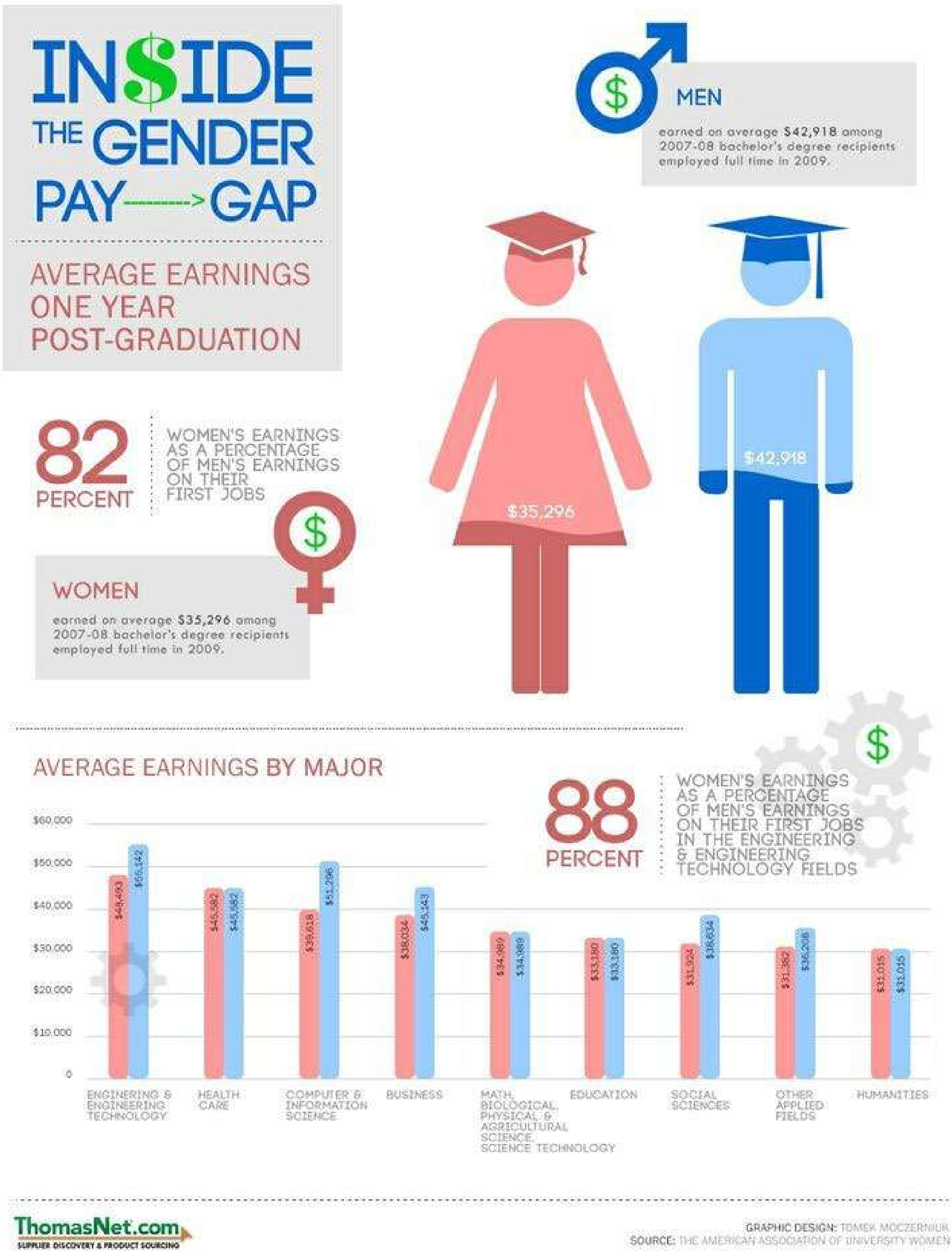
What is “GENDER GAP” and why does it exist ?



The gender gap is the difference between women and men as reflected in social, political, intellectual, cultural, or economic attainments or attitudes.

This can suggest that unequal access to opportunities is what maintains inequality between the genders. When we think about the gender gap, one of the things that immediately comes to mind is the pay gap, which refers to the difference in wages and salaries between men and women. On average, women make about 80% of what men do. There are also racial disparities; white women and Asian American women, on average, make more than Hispanic, African American, or Native American women.

It's not just pay that's unequal, though. It's also the type of jobs that women do. According to researchers at Stanford, only about 8% of executives at major corporations are women as of 2020. Regardless of why this is, this does indeed show a major gap between the genders.

Since the 1970s women have made significant inroads into higher-paying professions that were traditionally male dominated: Women have branched out from teaching or nursing and become more prevalent in traditionally male-dominated law, medicine and engineering. However, reductions in occupational segregation by sex seem to have plateaued or slowed since the 1990s. And, the differences in employment among the genders across occupations and industries remain significant. Moreover, while women have ascended managerial ranks, they remain underrepresented at the very top tier of the management hierarchy.

Economists have found evidence of men being favored over equally qualified women in specific instances: a study found that when symphony orchestras began to adopt "blind" auditions for musicians — in which a screen is used to conceal the identity of the candidate — it substantially increased the probability that women would advance out of preliminary rounds and be winners in the final round.

Gender roles and the gender division of labor within the family continue to impact women's work. Research continues to indicate a negative relationship between children and women's wages, commonly known as the motherhood wage penalty. This penalty could be attributed to the firm's anticipating that motherhood may cause a woman to leave her employer or alter her productivity. Evidence also indicates that women are more likely to quit their jobs or to exit the labor market for family-related reasons.

Women who broke the role

Ellen Ochoa

In 1993, Dr. Ellen Ochoa became the first Hispanic woman to go to space when she served on a nine-day mission aboard the space shuttle Discovery. She has flown in space four times, logging nearly 1,000 hours in orbit. Prior to her astronaut career, she was a research engineer and inventor, with three patents for optical systems. Ochoa is also the first Hispanic (and second female) to be named director of NASA's Johnson Space Center.

Katherine Johnson

Katherine Johnson, an African-American space scientist and mathematician, is a leading figure in American space history and has made enormous contributions to America's aeronautics and space programs by her incorporation of computing tools. She played a huge role in calculating key trajectories in the Space Race -- calculating the trajectory for Alan Shepard, the first American in space, as well as for the 1969 Apollo 11 flight to the moon. Johnson is now retired, and continues to encourage students to pursue careers in science and technology fields.

Mollie Orshansky

Mollie Orshansky was a food economist and statistician whose work on poverty thresholds pioneered the way the U.S. Government defines poverty. By using the cost of the cheapest nutritionally adequate diet to calculate a cost of living expense for families of various sizes, Orshansky developed guidelines which eventually became the federal government's official statistical definition of poverty. Her work provided a way to assess the impact of new policies on poor populations, which to this day remains a standard measure of new policies, demonstrating the enduring impact of her work on American public policy.

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LESSON 13.

E-SOC Lesson Plan

Learning Objectives: **(SMART)**	• To deconstruct stereotyped thinking • To share opinions and work as a team • To create new thinking and bring out new ideas • To have new perspectives • To think about the career prospects of the future of female students
Learning outcomes:	**Knowledge:** To compare notions about women's role in history and about the differences between women and men. Understanding women and men's position in the labor market. **Skills:** To illustrate how society represents women and women's roles in society. To discover how this affects self-perception. To devise a constructing discussion about the subject using the notions just learned. **Attitudes:** To appraise self-reflection, reflection on one's gender identity and about one's aspirations.

Stereotype and counter arguments

S2 Boys' results in STEAM are due to their quick minds, while girls have to put in constant engagement and effort

CA1 The idea that talent is innate influences learning. It is important to consider gaining new knowledge and putting oneself in challenging situations instead of thinking that "it's not for me".

CA2 A person's interests are independent of gender. Occupational choices are based on interests, education, and opportunities and not on gender.

Target group:

Secondary School Teachers
School students (choose from 12-18+)

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 2 hs in total
Lead In: **1.** Post-it notes Brainstorming	• Brainstorming, using post-its notes. • Write 3 keywords regarding his expectations about the lesson. • Then write the name, the profession they aspire to. • the students have to read what they wrote.	Post-it notes Pens	15'

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 2 hs in total
2. Nurse and Physicist Group activity (Understand)	• Internet search about two different jobs: Nurse and Physicist. • The task will be to find out how many pictures are there of women or men in both professions. • Find pictures on internet. Use inspiration by Attachment Lesson 2 - Slide 1. • The groups will introduce the character to the class and a debate will start from there.	tablet or pc	30'
3. Women in history and biological differences (knowledge and analyze)	• Show slides and watch videos (Attachment 2 - slides 2 - 4) • Debate	Computer Projector	25'
4. A new generation of scientist (Apply and Evaluation)	• A new generation of scientist • work on groups	pc, tablet or sheet paper	20'
5. Our proposal (Creation)	• create a concrete proposal and choose the recipients	pc, tablet or sheet paper	20'

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WORKSHEET 1

Post-it notes. Brainstorming

This activity will work as an opener / icebreaker for all the lesson.

1. Every participant will find a post-it on top of their chair. this is a brainstorming, using post-it notes;
2. The trainer will ask each participant to write 3 keywords regarding his expectations about the lesson;
3. When the activity will be completed, the trainer will invite the students to introduce themselves by saying their name, profession they aspire to;
4. Sharing the activity by reading the post-its notes.

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WORKSHEET 2

Nurse and Physicist - Group activity. (Understand)

1. The trainer has to split the participants in smaller groups;
2. Each group needs to do an internet research about two different jobs: Nurse and Physicist;
3. The task will be to find out how many pictures are there of women or men, establishing the percentage of male and female represented in both professions;
4. Find pictures in internet (Attachment Lesson 2 - Slide 1);
5. Build an identikit of the two professions starting from the photos found on the internet;
6. Each group will introduce the character to the class and discuss it.

WORKSHEET 3

Women in history and biological differences (knowledge and analyze)

The purpose of this activity is to acquire more knowledge about how in history women have been protagonists of scientific discoveries, and understanding why women have never been encouraged to study STEAM subjects.

1. To facilitate this knowledge, a slide and two videos are proposed (Attachment 2 - slides 2 - 4);
2. After watching the videos the trainer asks the students the following questions:
   a. Do you think this will affect the interest of girls in these academic subjects?
   b. Why?
   c. Why do you think women have been excluded from these subjects?
   d. Why aren't their achievements in science told?

3. Students reflect and discuss the questions posed by the trainer

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WORKSHEET 4

A new generation of scientist (Apply and Evaluation)

The class is divided into small groups or pairs.
The purpose of this activity is to plan, if the groups or pairs think it is appropriate, how to change the scenario that exists nowadays.
The trainer introduces some ideas for thought such as:

1. What are the areas in which there is the greatest influence on the development of children's personalities?
2. What are the things that influence children the most and their perception of male and female attitudes (e.g. family, school, advertising, friends, etc.)

WORKSHEET 5
Our proposal (Create)

1. All the ideas proposed in the previous activity are collected and selected, deciding which ones can be achievable easily, those which concern the public and social sphere, which instead are personal.
2. All the students create a feasible proposal together, also writing who they think should be the recipients of this proposal (for example, national or European institutions, groups of people, influencers, the school, etc.)

LESSON 14.

E-SOC Lesson Plan

Learning Objectives: (SMART)	● To recognize unconscious gender prejudices ● To inform how gender stereotype affects women's study and work choices in Italy ● To reflect on the personal changes needed for a new gender narrative ● To rebuild a new image of personal opportunities, beyond gender prejudices
Learning outcomes: (Use Bloom's taxonomy action verbs)	By concluding this session/class participants will have: **Knowledge:** To develop tools to deconstruct the stereotype To acquire the ability to organize concepts To identify the incongruencies in their thinking process through questions and observations. **Skills:** To discover higher self-esteem in girls by aiming to increase self-confidence To connect to their strengths and decreasing the comparison with others; **Attitudes:** To reframe on what is positive and what can be done; To judge one's limitations and step out of the comfort zone that precludes new possibilities;

To value a more critical approach to the cultural truths which they are being taught.

Stereotype and counter arguments:

S2 Boys' results in STEAM are due to their quick minds, while girls have to put in constant engagement and effort.

CA1 The idea that talent is innate influences learning. It is important to consider gaining new knowledge and putting oneself in challenging situations instead of thinking that "it's not for me".

CA2 A person's interests are independent of gender. Occupational choices are based on interests, education, and opportunities, not gender.

Target group:

Secondary School Teachers
School students (choose from 12-18+)

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 2 hs in total
Lead In: **1.** Icebreaker (remember)	Trainers invite participants to introduce themselves, by saying their name, their favorite activities and talking about their favorite toys when they were kids.	sheets of paper to fill out	10'

Activity Title & number	Short description of the activity	Resources needed	Time 2 hs in total
2. Recall Facts and basic concepts (knowledge)	Data, statistics and common sense on STEAM in Italy, (Attachment 1 - slides 1-2-3): • STEAM Degree Data in Italy • Common sense • Academic performance is not everything	Computer Projector	10'
3. What an advertisement! (Understand)	• Students find adverts in magazines and newspapers, they are divided into groups. They can search and cut out advertising photos where there is a clear gender bias, especially as regards STEAM issues. The same work can be produced using the internet and online advertisements, the students will produce a video by inserting the various pieces of advertising. • Students are encouraged by teachers to focus their attention on toy advertisements that discriminate toys according to gender	magazines, advertising, scissors, glue, tablet or pc, internet video	20'
4 Wow, it's my life! Explain Ideas and use informations (Analyze)	• The trainers ask the participants to visualize themselves during a moment in which, in their life, they have felt an emotion, negative or positive, towards scientific subjects. • Participants are asked to share the memory and to visualize the process that would have led them to a different outcome of that moment. • The trainers will then guide the discussion on how the stereotype has	Sheet papers, pens	20'

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 2 hs in total
	influenced the personal experience of the participants.		
5 Rooms (Evaluation)	• Showing the slide "Try to imagine" (Attachment 1 - slide 4) • Rooms' pictures sharing (Attachment 1 -slide 5-8) • Class discussion	Computer Projector	20'
6 A new way of thinking! Creativity	• Students think about how to change one of the advertisements found so that it no longer appears to be gender biased. They write their ideas in short paragraphs, or visualize them, narrating them, in a short video.	magazines, sheet papers, video	20'
7 Conclusion	• conclusion and final discussions (Attachment 1 - slide 9) • critical thinking about how one grows up when surrounded by a culture where gender bias is inherent, especially regarding STEAM • problem solving	Computer Projector	10'

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WORKSHEET 1

Ice breaker (remember)

1. This activity will work as an opener / icebreaker for all the lesson.
2. The trainer explains to the students that a particular lesson, a laboratory, will be held today, but does not immediately want to reveal what it is about.
3. Trainers invite participants to introduce themselves, filling a sheet of paper in which the following information is requested:
   a. name
   b. favorite activities
   c. favorite toys when they were kids.
4. Each student reads what he/she wrote.
5. The trainer introduces the topic of the lesson: Gender stereotypes and bias in STEAM training and work

WORKSHEET 2

Recall facts and basic concept (knowledge)

The trainer will explain with the help of slides, the current situation in Italy for those who study and work in STEAM

Data, statistics and common sense on STEAM in Italy, (slides 1-2-3):
- STEAM Degree Data in Italy (slide 1)
- Common sense (slide 2)
- Academic performance is not everything (slide 3)

This activity shows students how in Italy there is a strong gender disparity with regard to STEAM, based on both statistical data, common feeling and cultural heritage.

WORKSHEET 3

What an advertisement! (Understand)

The focus of this activity is that the students experience first-hand how advertising both on paper and on the internet represents a model in which women suffer gender discrimination with regard to access to training and work in the STEAM field.

The activity develops as follows:

1. The trainer before the day of the lesson have to collect different magazines;
2. the students are divided into small groups, some work on the magazines while others work online;
3. The same work can be produced using the internet and online advertisements, the students will produce a video by inserting the various pieces of advertising;
4. Students are encouraged by trainers to focus their attention on toys advertisements that discriminate toys according to gender;
5. The goal of the activity is to search and cut out advertising photos where there is a clear gender bias, especially as regards STEAM issues.

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WORKSHEET 4

Wow, it's my life!

Explain Ideas and use informations (Analyze)

In this activity the trainer wants to focus attention and analyze progress so far, emphasizing both personal elements and those of the cultural society where we grew up.

The activity develops in this way:

1. The trainers ask the participants to visualize themselves during a moment in which, in their life, they have felt an emotion, negative or positive, towards scientific subjects. (personal element)
2. if possible the trainer try to contextualize the moment in the public sphere and what were the stereotypes of that period (public element)
3. Participants are asked to share the memory and to visualize the process that would have led them to a different outcome of that moment (analyze)
4. The trainers will then guide the discussion on how the stereotype has influenced the personal experience of the participants.

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WORKSHEET 5
Rooms (Analyze and Evaluation)

In this activity we try to understand what happens in our brain which is not empty but is filled with information since birth, conditioning due to family, school, books, the society in which we live and is continuously influenced by them.

1. Try to imagine if our brain is a room. Showing the slide "Try to imagine" (Attachment 1 - slide 4),
2. But what if the information we have is partial or misleading have we ever wondered about it? Rooms' pictures sharing (Attachment 1 - slides 5-8)
3. Class discussion

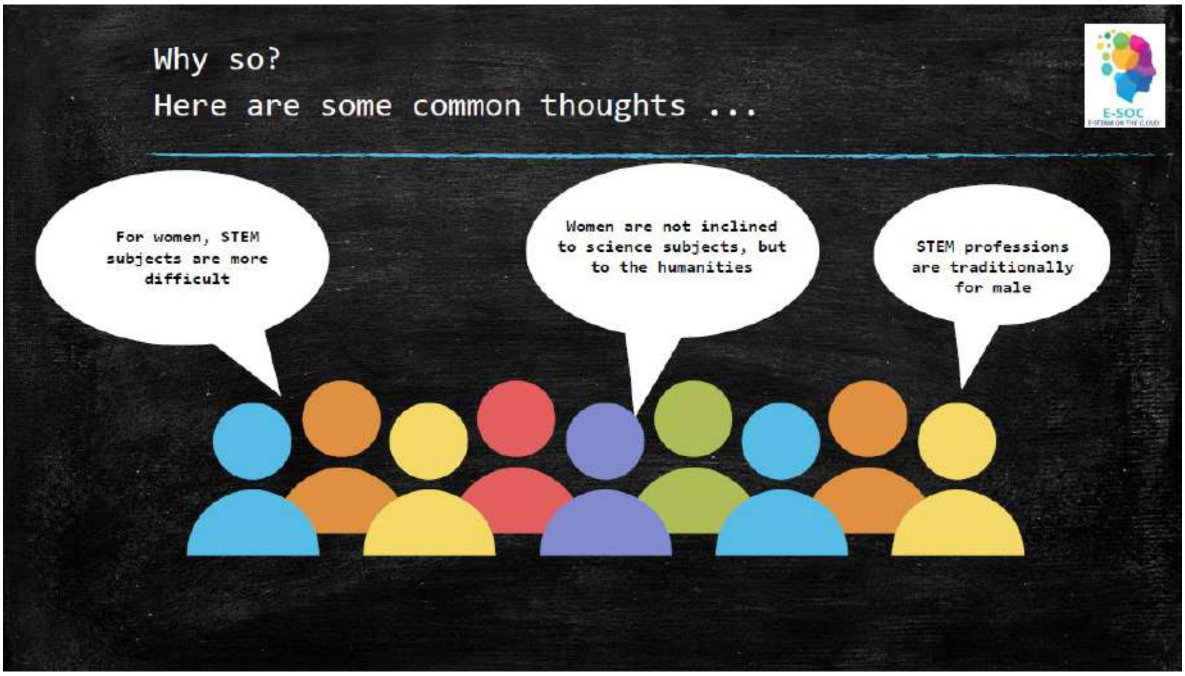
WORKSHEET 6
A new way of thinking! (Creativity)

It's time to change things!
Students at the end of this lesson have acquired new knowledge, understood and analyzed it. Now is the time to propose new methods in the advertising field finding new slogans or ways to advertise the same products without incurring gender bias related to the STEAM area
Students think about how to change one of the advertisements found in the previous worksheet number 3, so that it no longer appears to be gender biased. They write their ideas in short paragraphs, or visualize them, narrating them, in a short video.

WORKSHEET 7
Conclusion

Conclusion and final discussions (Attachment 1 - slide 9)
Critical thinking about how one grows up when surrounded by a culture where gender bias is inherent, especially regarding STEAM.
Problem solving

Annexes - Attachment 1



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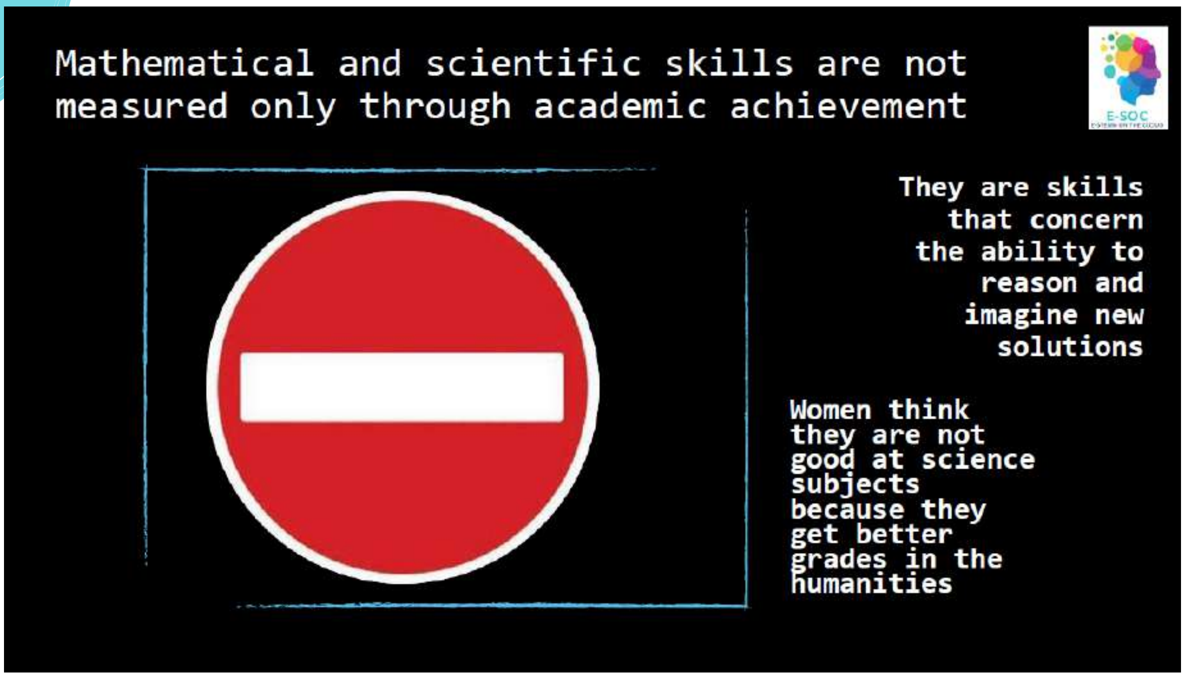

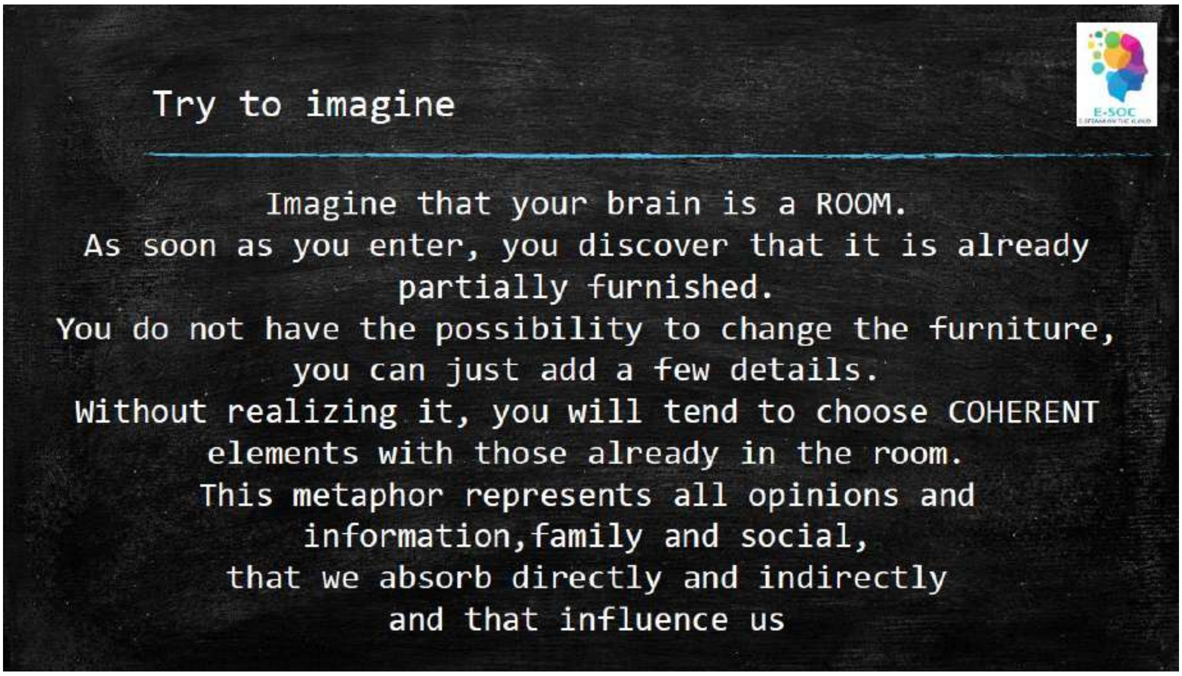


Look at these bedrooms ...


Look at these bedrooms ...

E-SOC
E-STEAM ON THE CLOUD
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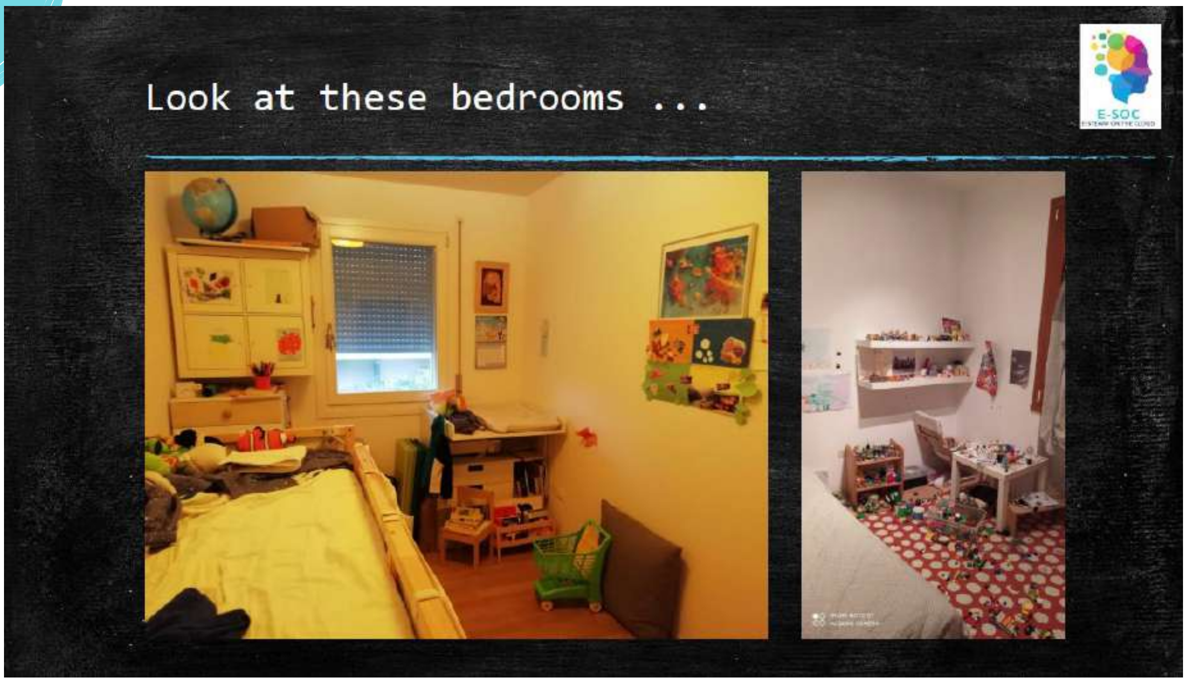

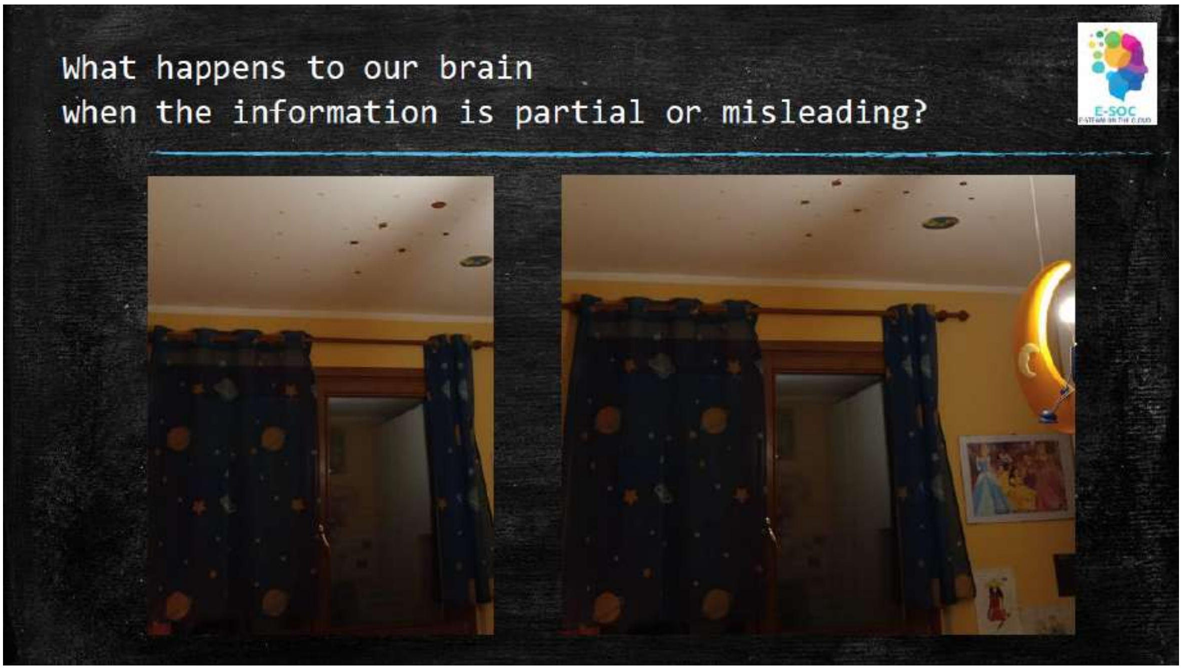

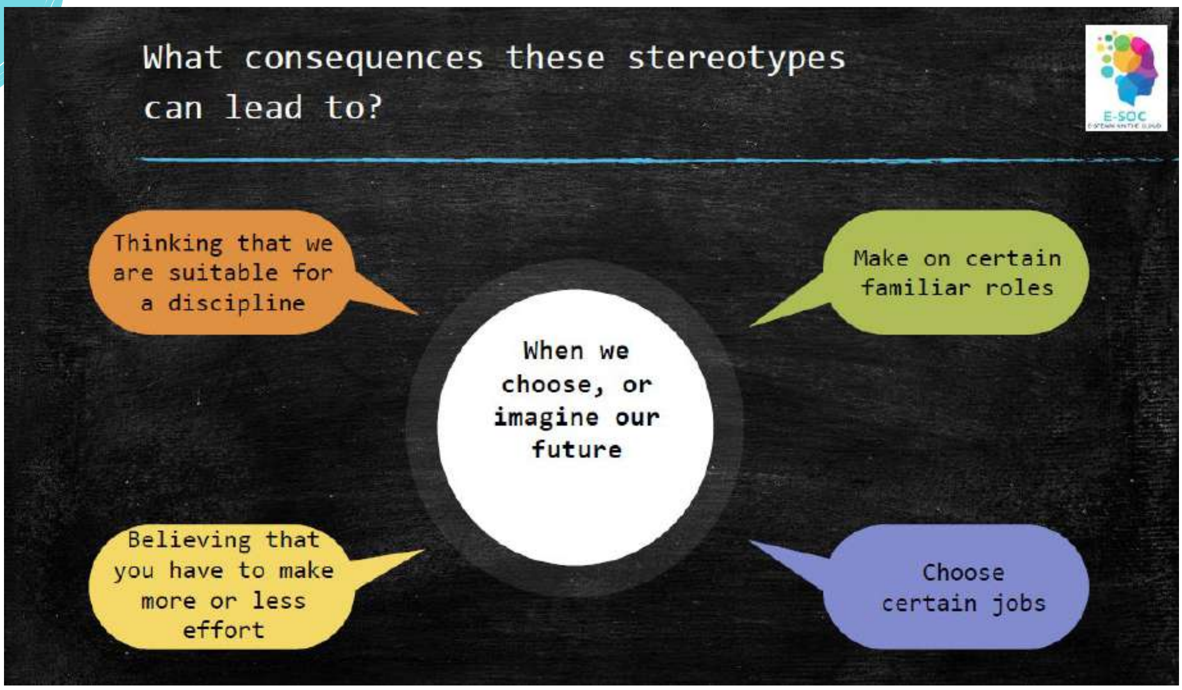
What consequences these stereotypes can lead to?
Thinking that we are suitable for a discipline
Make on certain familiar roles
When we choose, or imagine our future
Believing that you have to make more or less effort
Choose certain jobs

LESSON 15.

E-SOC Lesson Plan

Learning Objectives:	1. To identify which human brain part is responsible for what. 2. To discover how the difference between male and female brains are being created. 3. To name at least three topics or fields of their own interest.
Learning outcomes:	By concluding this session/class participants will have: **Knowledge:** To demonstrate the knowledge about the human brain from biological approach. To support the idea that biologically brain does not have a gender. To realize that every person trains their own brain while playing, working, reading, and participating in other activities. **Skills:** To design their own brain map. To criticize the stereotypically gendered spheres of activities. To compare their unique experience to the others. **Attitudes:** To value every person's possibility to fulfil their unique potential. To develop a more sensitive approach to their own strengths. To examine their own gender biases.
Stereotype and counter arguments:	S2 Boys 'results in STEAM are due to their quick minds, while girls have to put in constant engagement and effort. CA1 Results and occupational choices are based on interest and not on gender. CA2 To strive for new knowledge and put yourself in difficult situations have nothing to do with gender.

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Target group: Secondary School Teachers teaching arts
School students 12-15 years old

Activity Title & number	Short description of the activity	Resources needed	Time
Lead In: **1.** Icebreaker "Change the place, if…"	All the participants are standing in the circle. One person goes to the middle and says a fact about themselves using the formulation of the sentences starting with the words "Change the place, if…". Everyone who relates with the statement – changes their place. The last person in the middle stays and says another statement.	Worksheet 1, Open working space.	5'
2. Brainstorm	Participants in groups of 3-5 brainstorms about stereotypically feminine and masculine activities / hobbies / science fields / etc. After that all the ideas are being transferred to the maps of stereotypically female and male brains.	Worksheet 2 Annex 1 Flipcharts Markers / pens	10'
3. The Brain Map	The teacher reminds the participants how human brain works. Each participant creates their own brain map. The unique map could be based on the biologically defined spheres or could be artistically interpreted. Participants create an exhibition of their brain maps.	Worksheet 3 Annex 1 Annex 2 Markers / pens / pencils / etc. Paper sheet or a printed brain form for every participant	20'
4. Reflection	While sitting in the circle everyone gets the opportunity to share about their unique experience, the teacher highlights the most important parts.	Worksheet 4 Chairs in the circle	10'

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WORKSHEET 1

Icebreaker "Change the place, if…"

This game works as an icebreaker to get the participants to feel cozy and open the topic.

1. The teacher greets all the participants and explains them that today they will be talking about their similarities and differences (not highlighting the gender sphere).
2. The teacher asks everyone to make a circle and stays in the middle of it.
3. The teacher explains that they will play a short game "Change the place, if…" where the person, standing in the middle, says a statement about themselves and everyone else will have to change a place if relating to the statement.
4. The teacher starts the game with a simple statement (for example "Change a place if the color of your eyes is blue".
5. The game can be played in as many rounds as the group wants.
6. If the group is more bonded, it is possible to play the game in "levels". Where the statements have the rules: the first level should be only about the appearance / physicality, the second level should be about the hobbies / leisure activities, the third level – about character traits and so on.
7. The teacher has the right to end the game when they want to.

WORKSHEET 2

Brainstorm

This part of the lesson will help the participants to dig into content of the topic. It helps to create the right mindset for further activities.

1. The teacher tells the students that even though all the people have a lot of similarities and differences, there are a lot of prejudices (stereotypes) about the gender which are not based on any scientific evidence. He or she explains that now they will try to brainstorm in the groups of 3-5 about those prejudices.
2. The teacher splits the class into the groups. He or she could use any method to do that, but it is important that the groups wouldn't be homogenous based on gender of the students.
3. Every group gets a flipchart and a marker.
4. The teacher says that now they have 3-5 minutes to write as many character traits, activities, etc., which are stereotypically masculine or feminine.
5. While students are brainstorming in the groups, the teacher prepares two Brain Forms (Annex 1) and names it "Masculine brain" and "Feminine brain". It could be printed / painted / showed on the screen with the possibility to write on it.
6. After the brainstorm in the groups, students are presenting their work and filling the brain forms with gendered the traits.
7. After all the groups are finished, the teacher says that now they can see two different brain maps, which shows the difference between the brain of a woman and a man.
8. Teacher asks the students "Do the brain of man and woman really differ?" (The right answer is – biologically no.) It sets the scene for the next activity.

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WORKSHEET 3

The Brain Map

This activity helps the students to identify their own spheres of interest, strengths, and possible career paths. Also, it gives the opportunity to remember / learn about the biological way of seeing the brain.

1. Firstly, the teacher shows the students the biological structure of the brain (Annex 2) and explains that everyone has the same logic of biological structure. While talking about the brain, biologically men and women are totally the same, but it could differ based on the activities which the person is doing (for example – if one person spends a lot of time constructing Lego – their spatial thinking will be more advanced than the persons who was reading a lot of books).
2. The teacher gives every participant a sheet of paper and some drawing tools (also, it could be a printed brain form from Annex 1) and asks them to paint their own unique brain map. He or she explains that while drawing students can rely on the biological structure of the brain or can easily interpret the task as they want to. It should take about 10 minutes.
3. The teacher could decide to show the participants some artistical interpretations of the brain map (see Annex 3).
4. When all the participants are finished with the drawing, the teacher asks to make a small exhibition of the brain maps. It can be anonymous; participants are not required to write their names on it.
5. The students get some time to view all the drawings.

WORKSHEET 4

Reflection

It is the most important part of the lesson – here the teacher can highlight the most important bits of information, the students get some time to reflect on their experience and absorb all the information.

1. The teacher asks everyone to sit down to the circle.
2. At first the teacher asks the students do they have any questions. If there is a bit more time left, the teacher could give everyone a sticky note to write a question down.
3. After the questions session, the teacher creates a safe space and lets the participants freely share their experience. The reflection could be led by those questions:
    a. How do you feel now?
    b. What was the most important part for you?
    c. What new things did you learned / understood today?
    d. How could you use these new realizations in your daily life? In your school life? In your future career path?
4. It is very important to let everyone share. If there are students who are not very talkative, it is possible to use a “talking thing” (a small thing which is being held while speaking and being forwarded to another person).
5. At the end, the teacher summarizes all the experiences, reminds the students about the most important parts of the lesson (the brain does not have a gender, we have a possibility to “train” our brain all the time, jobs, hobbies, other activities, and spheres does not have a gender.) and closes the lesson.

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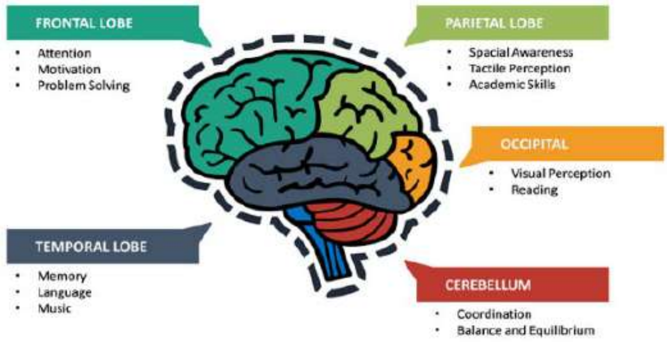
Annex 1

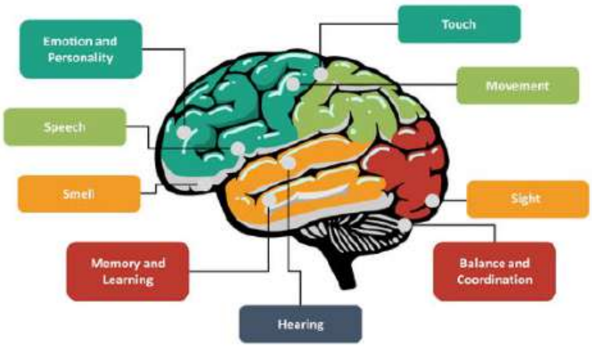
The Brain Form

Source: Favpng.com

Annex 2

The Biological Structure Of The Brain





Source: Sketchbubble.com

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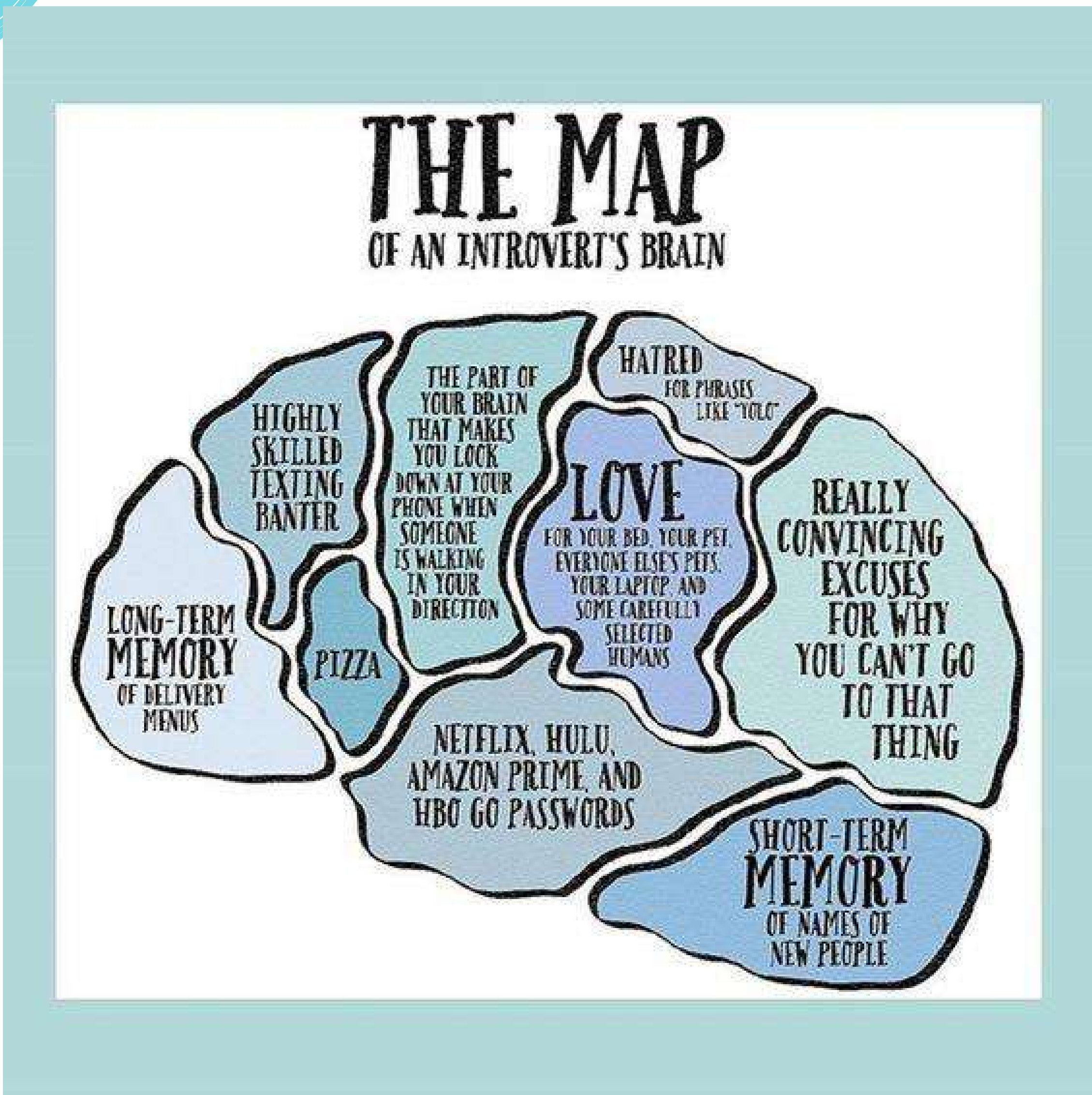
Annex 3

Artistical Interpretation of The Brain Map



LESSON 16.

E-SOC Lesson Plan

Learning Objectives: (SMART)	1. To tackle personal gender prejudices in the sphere of science. 2. To identify what kind of gender stereotypes are widespread in their culture. 3. To identify how the narratives about gender can be changed.
Learning outcomes:	By concluding this session/class participants will have: **Knowledge:** - To identify the concept of gender stereotypes in general and in the science field. - To define how the gender stereotypes affect people. - To recognize the most widespread gender stereotypes in their cultural background. **Skills:** To develop a fictional scenario how the existing narratives of gender prejudices can be tackled. To question the gender-biased cultural messages. To compare their unique experience to the others. **Attitudes:** To value every person's possibility to fulfil their unique potential. To develop a more critical approach to the culture in which they live. To examine their own gender biases.
Stereotype and counter arguments:	**S4** *There are not enough successful examples of females in STEAM careers* **CA1** Mostly men's achievements are popularized in media, posters, and invitations to school lectures **CA2** There is a need to focus on career awareness and planning in order to empower girls to pursue a STEAM profession

Target group: Secondary School Teachers teaching arts
School students 12-15 years old

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time**
1. World cafe	All the participants will be split in five mix-gendered groups. On 5 tables will be left 5 flipcharts with 5 different questions. Every group will have 90 seconds on one sheet of paper to answer the question. After 90 seconds they will rotate until they will get to the question they started with. At the end they will present what was written on the flipcharts.	Worksheet 1, 5 flipcharts, Markers.	15’
2. Creative writing	The students personally or in the groups will have to write a creative story in which they will try to deconstruct a stereotype that only men can be scientists (or another chosen stereotype). Few volunteers will be asked to read out loud their pieces.	Worksheet 3 Paper sheets Pens	15’
3. Poster workshop	The students personally or in the groups will have to create a poster which promotes women in science. They can work on a paper or digitally. The posters should be exhibited at the school. The debates or other further activities could be organized.	Worksheet 3 Paper sheets Markers, pens, pencils, scissors, magazines Or Computers with internet connection	20’
4. Reflection	While sitting in the circle everyone gets the opportunity to share about their unique experience, the teacher highlights the most important parts.	Worksheet 4 Chairs in the circle	10’

WORKSHEET 1

World Cafe

This activity will work as an opener / icebreaker for all the lesson.

1. The teacher greets all the participants and explains them that today they will be talking about gender prejudices in the field of science.
2. The teacher forms 5 groups and explains that now the students will have to answer 5 different questions while rotating every 90 seconds. The questions:
    a. What are gender stereotypes?
    b. What gender stereotypes in science field do you know?
    c. How can gender stereotypes affect peoples' choices?
    d. How can gender stereotypes affect peoples' emotional wellbeing?
    e. Name all the scientists who you know.
3. Groups chooses their starting question, and the world coffee begins. Every 90 seconds the teacher asks students to go to another flipchart.
4. After all the questions answered by all the groups, the teacher asks everyone to come and sit in the circle.
5. The teacher asks every group to present the questions. While students are presenting, teacher writes the most important thoughts on the board / a flipchart.
6. When all the groups finish their presentations, the teacher summarizes the results.

WORKSHEET 2

Poster workshop

This activity will let students to express their creativity while tackling the problem of representation.

1. The teacher tells students that know they will have an opportunity to tackle one of the most important social problems – the lack of representation of women in STEAM careers.
2. For the task students can either work personally or in small groups (of 2-4). Students can choose the way of working, but it is important to have homogenous groups.
3. The task for students is to create a poster which represents women in STEAM. It can be either a real or fictional scientist.
4. Also, the students can choose in which format they would like to work (teacher can decide it before the lesson having in mind the equipment needed): digitally or on the paper. If the class will work on the paper, it is important to provide kids with all materials needed – paper, pens, pencils, markers, magazines, scissors, and glue could be included (they could make a collage).
5. Teacher highlights that their posters will be exhibited at the school.
6. Students gets at least 15 minutes to work on the posters. If possible – give them more time.
7. After the workshop, they will present their works for others.

WORKSHEET 3

Creative writing

This activity will encourage students to reflect deeper on their personal gender prejudices and to try to flip their understanding.

1. The teacher tells that now he/she dares the students to flip all their personal gender prejudices by writing a creative piece in which everyone will have to deconstruct the stereotype that only men (mostly white, from suburbs) can become a scientist. For this task they will have 8-10 minutes.
2. The students can work in groups, in pairs or alone. The teacher can either choose the way of working or to propose the students to decide.
3. The students can write a piece on a scientist who they represented in a poster created previously.
4. When the short stories are completed, the teacher asks if there is a volunteer to read their story. If there is none – the teacher can randomly pick few people to do so. If a teacher is deciding who will read, it is recommended to ask a girl and a boy read the writings.

After the readings, the teacher encourages and other students to read

WORKSHEET 4

Reflection

It is the most important part of the lesson – here the teacher can highlight the most important bits of information, the students get some time to reflect on their experience and absorb all the information.

1. The teacher asks everyone to sit down to the circle.
2. At first the teacher asks the students do they have any questions. If there is a bit more time left, the teacher could give everyone a sticky note to write a question down.
3. After the questions session, the teacher creates a safe space and lets the participants freely share their experience. The reflection could be led by those questions:
    a. How do you feel now?
    b. What was the most important part for you?
    c. What new things did you learned / understood today?
    d. How could you use these new realizations in your daily life? In your school life? In your future career path?
4. It is very important to let everyone share. If there are students who are not very talkative, it is possible to use a "talking thing" (a small thing which is being held while speaking and being forwarded to another person).
5. At the end, the teacher summarizes all the experiences, reminds the students about the most important parts of the lesson (everyone has some gender prejudices, but it can be changed, everyone has the opportunity and possibility to choose their own unique path, professions should not be gendered, by formatting new narratives (for example – writing a stories) we can change the rooted prejudices) and closes the lesson.

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LESSON 17.

E-SOC Lesson Plan

Learning Objectives: (SMART)	1. To tackle personal gender prejudices in the field of STEAM 2. To realize the different position of women and men in the society. 3. To identify how the narratives about gender can be changed. 4. To learn how to create a mindful digital content.
Learning outcomes:	By concluding this session/class participants will have: **Knowledge:** To classify the concept of gender stereotypes in general and in the field of STEAM To define how the gender stereotypes affect different people. To recognize the ways how to use different digital tools to tackle social problems. **Skills:** To develop unique digital content which will advocate for gender equality in the field of STEAM. To learn how to talk about gender related topics in a sensitive way. To compare their unique experience to the others. **Attitudes:** To value every person's possibility to fulfil their unique potential. To develop a more critical approach to the cultural truths which they are being taught. To formulate a respectful attitude towards gender matter.
Stereotype and counter arguments:	**S1** *Girls are less interested in STEAM subjects.* **CA1** STEAM abilities are not male qualities. **CA2** There are girls with higher results in STEAM than boys

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Target group: Secondary School Teachers teaching arts
School students 15-18 years old

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time**
1. Discussion	All the participants will be participating in a discussion about gender stereotypes in a field of STEAM lead by a teacher.	Worksheet 1 Chairs in a circle.	10'
2. Let's create some content!	Participants in the groups of 4-5 will create a chosen digital content which will tackle the problems created by gender prejudices in a field of STEAM.	Worksheet 2 Laptops / smartphones Multimedia Internet connection	40'
3. Reflection	While sitting in the circle everyone gets the opportunity to share about their unique experience, the teacher highlights the most important parts.	Worksheet 3 Chairs in the circle	10'

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WORKSHEET 1

Discussion

This activity will help the students to understand the topic deeper so it will be easier for them to accomplish next task.

1. The teacher greets all the participants and explains them that today they will be talking about gender prejudices in the field of STEAM.
2. The lesson will be starting by an open discussion about the stereotypes. A teacher can either create the slides / kahoot / wordcloud with the questions or just ask the students. The questions for the opening discussions:
   a. How do you understand the concept of gender stereotypes?
   b. What role does gender stereotypes play in our life?
   c. Do gender stereotypes affect the field of STEAM? If yes, how?
   d. Why is it important to question the gender stereotypes? What can it do for the community?
   e. In which ways can we tackle those prejudices?
3. The role of the teacher in this activity is to lead the students to the deeper understanding of the ways how gender stereotypes affect people (especially – women) in a field of STEAM.

WORKSHEET 2

Let's create some content!

This part of the lesson will encourage students to become the leaders in a changing society.

1. The teacher explains that now the students will have 30 minutes to work on a digital content which tackle the problems created by gender prejudices in a field of STEAM.
2. The students should work in the groups of 4-5. The groups can be created either by students picking freely or being assigned. In the tasks which ask for creativity, it could be easier to work with chosen, not prescribed groups.
3. The teacher elaborates that the content can vary they can draw comics, create social media content (for example – Instagram or TikTok account), create a website, a quiz, create a series of memes and so on. The form of the content is their own choice.
4. The only restrictions for the task are the topic and the fact, that it must be digital.
5. The teacher could also encourage the students to create the content in English, so that it could be understood by a wider auditory.
6. The work can be done either in a classroom, or any other space. It depends on the teacher.
7. After half an hour, the students are being asked to present their content.

WORKSHEET 3

Reflection

It is the most important part of the lesson – here the teacher can highlight the most important bits of information, the students get some time to reflect on their experience and absorb all the information.

1. The teacher asks everyone to sit down to the circle.
2. At first the teacher asks the students do they have any questions. If there is a bit more time left, the teacher could give everyone a sticky note to write a question down.
3. After the questions session, the teacher creates a safe space and lets the participants freely share their experience. The reflection could be led by those questions:
   a. How do you feel now?
   b. What was the most important part for you?
   c. What new things did you learned / understood today?
   d. How could you use these new realizations in your daily life? In your school life? In your future career path?
4. It is very important to let everyone share. If there are students who are not very talkative, it is possible to use a “talking thing” (a small thing which is being held while speaking and being forwarded to another person).
5. At the end, the teacher summarizes all the experiences, reminds the students about the most important parts of the lesson (gender prejudices affect every sphere of peoples’ life, in the field of STEAM women are facing a lot more pressure than men, every person can become an advocate who helps to recreate a rooted norms in our society) and closes the lesson.

LESSON 18.

E-SOC Lesson Plan

Learning objectives:

This training/lesson aims to:

1. raise participants' awareness of gender stereotypes regarding the representation of girls/ women in STEAM, particularly in the arts
2. identify gender stereotypes in STEAM education, especially in the arts, by identifying counterarguments to the debated stereotype

Learning outcomes:

By concluding this session/class participants will have:

Knowledge:

1. to recognize the stereotypical character of a statement

2. to identify counterarguments

for the discussed stereotype

Skills:

1. to demonstrate a change in approaching gender bias in STEAM class
2. to use the information gained to increase girls' interest in the STEAM field

Attitudes:

1. to evaluate their own behaviour regarding gender representation in STEAM domains

2. to value a change in approaching gender bias in STEAM

Stereotypes and Counterarguments:	**S4** 'There are not enough successful examples of females in careers like engineering, science research, and STEAM professions'' **CA1** There are plenty of examples of successful STEAM women role models but mostly men's achievements are popularized in the media. **CA2** Most women in the STEAM field have excellent skills in observation, revision, creativity, innovation
Target group:	Secondary School Teachers School students (choose from 12-18+)

Activity Title	**Short description of the activity**	**Resources needed**	**Time** 2hs
Lead In: **1. Icebreaker** **Read my thoughts!**	Each student is asked to say two qualities that characterize them and one quality that they would like to have from the opposite sex. The rest of the participants will guess which is the opposite. After that, students are asked to explain their choice.	N/A	15'
2. Guess who's coming to dinner?	**Part 1.** The participants will be divided into teams of 4-5 students. Participants will receive a generic list of 10 professions in the artistic field: ACTOR, SINGER, ARCHITECT, COMPOSER, PAINTER, WRITER, SCULPTOR, TATOO ARTIST, PHOTOGRAPHER, and FASHION DESIGNER. Each team will host a dinner where they will invite 5 people, depending on the choice of a profession. After the students present their choices, the guest list is revealed. (Annex) **Part 2.**	A guest list Flipchart Markers	30'

	The teacher divides the flipchart in two, a part for female personalities and the second part for male personalities. Students are asked to answer the following question: -Apart from the invitations from the list, what personalities from the artistic field would you like to invite to dinner? The students are invited to write in the appropriate field the name of the chosen personality. In the end, the number of women and the number of men is centralized.		
3. Brainstorming	Write for two minutes everything that comes to mind when you hear the words prejudice and stereotype. Fill in the circles.	Worksheet1	5'
4. Identifying the debated stereotype	Students are asked to answer the following questions: -What conclusion can be formulated starting from the given result? (possible answers: there are few examples of successful women/ the number of successful men is higher) -Do you agree that there are no enough successful women in art? Can you argument why?		30'
5. Finding counterarguments to the debated stereotype	Individually, the participants formulate points of view for and against the debated stereotype. For one minute, each must state, in a convincing way, both arguments/counterarguments. The public or a designated judge decides on the most relevant arguments and counterarguments. The presentation of pros and cons can be organized in pairs: one participant presents the arguments and the other the counterarguments.		30'

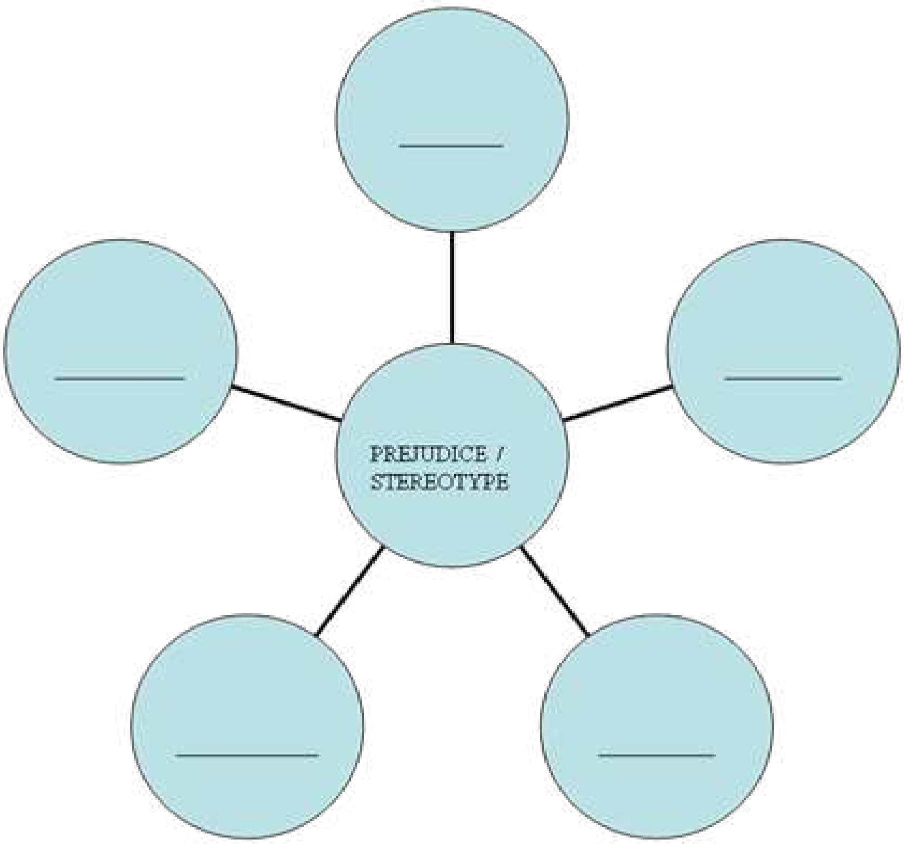
6. Evaluation of the activity	Students receive a worksheet to complete, in order to investigate the satisfaction of the participants. 1. I liked…. 2. One interesting thing I found out is…. 3. I would have liked to……. 4. I will…..	Worksheet 2	10'

ANNEXES:

1. The guest list

ACTOR	Jonny Depp, an American actor
SINGER	Madonna, an American singer and artist
ARCHITECT	Ieoh Ming Pei, a Chinese-American architect, who designed The Louvre Pyramid
COMPOSER	Antonio Lucio Vivaldi, Italian composer, virtuoso violinist and impresario of Baroque music
PAINTER	Frida Kahlo, a surrealist Mexican painter
WRITER	Jules Verne's, a French writer
SCULPTOR	Constantin Brancusi, Romanian sculptor, painter, and photographer
TATTOO ARTIST	Curt Montgomery is famous across the world for his stylish and elegant tattoo designs
PHOTOGRAPHER	Robert Doisneau, a French photographer, a master of humanist photography
FASHION DESIGNER	Coco Chanel, French fashion designer, and businesswoman

2. Worksheet 1



1. **Worksheet 2**
Suggestions for teachers:

Successful women in art:

1. **Coco Chanel**, French fashion designer and businesswoman https://en.wikipedia.org/wiki/Coco_Chanel
2. **Adeline Virginia Woolf**, an English writer, is considered one of the most important modernist 20th-century authors and a pioneer in the use of stream of consciousness as a narrative device. https://en.wikipedia.org/wiki/Virginia_Woolf
3. **Oprah Gail Winfrey**, an American talk show host, television producer, actress, author, and philanthropist. She was the richest African-American of the 20th century, was once the world's only black billionaire and the greatest black philanthropist in U.S. history. By 2007, she was sometimes ranked as the most influential woman in the world. https://en.wikipedia.org/wiki/Oprah_Winfrey
4. **Marilyn Monroe**, an American actress, an emblem of the era's sexual revolution. Long after her death, Monroe remains a major icon of pop culture. https://en.wikipedia.org/wiki/Marilyn_Monroe
5. **Frida Kahlo**, surrealist Mexican painter, a recognized figure in art history, but also regarded as an icon for Chicanos, the feminism movement, and the LGBTQ+ community. https://en.wikipedia.org/wiki/Frida_Kahlo
6. **Zaha Hadid**, an Iraqi-British architect, artist, and designer, is recognised as a major figure in architecture of the late 20th and early 21st centuries. Hadid was the first woman to receive the Pritzker Architecture Prize, in 2004. She received the UK's most prestigious architectural award. https://en.wikipedia.org/wiki/Zaha_Hadid

7. **Who are the ones in the picture famous for?** Search and give details:


MAE JEMISON
ROSALIND FRANKLIN
DR.HAYAT SINDI
CYNTHIA BREAZEAL
MARIA DA PENHA
Stop VIOLENCE
JULIANA ROTICH
GLADYS WEST
屠呦呦

LESSON 19.

E-SOC Lesson Plan

Artistic Intervention using IT skills- connection points in gender equity

Learning objectives:

This training aims to:

1. Use of Arts as an agent of transformation of the surrounding environment through AI (artificial intelligence) and VR (virtual reality).
2. Intervene in a social area where inclusion and art become points of connection
3. Describe performances in the artistic fields depending on skills and work done irrespective of gender.
4. Raise participant's awareness of gender stereotypes regarding the representation of women and men in ARTS

Learning outcomes: By concluding this session/class participants will have:

Knowledge:

1. To prove that Art is a useful vehicle for providing an illustration of what means to use Internet-based Virtual Reality
2. To familiarize with the ability to use AI (Artificial intelligence generator programme) and organize work in a mixed girls-boys team and to expand the scope of professionalization of their artistic talents
3. To compose an artwork using Artificial intelligence through which students can use works of important female artists in different fields of expression

Skills:

1. To obtain different social tools that allow a complete development of the person
2. To improve techniques by learning through observation and experimentation, as well as sharing knowledge.

3. To illustrate arts projects which deliver outcomes to initial audiences far beyond those within an immediate community

Attitudes:

Stereotypes and Counterarguments

1. To support *coexistenc* with people from different nationalities, social contexts, situations, cultures, religions.
2. To value the search for useful and interesting IT instruments and topics by carrying out a social intervention
3. To create durability through extension into other media, scaling the project through enabling a much wider participation than in the initial production, or a self-reproducing cycle of performances.

S4 There are not enough successful examples of females in STEAM careers.

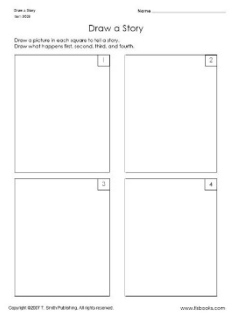
CA1 Mostly men's achievements are popularized in media, posters, and invitations to school lectures.

CA2 There is a need to focus on career awareness and planning in order to empower girls to pursue a STEAM profession.

Target group:

Secondary School Teachers
School students (12-18)

Activity Title & number	**Short description of the activity**	**Resources needed**	**Time** 2hs
Lead In: 1.Icebreaker **Draw the Story**	Because arts fulfill a significant role in terms of telling stories about our past, our present, and our futures, and as such it is crucial that the stories being told are inclusive of the diversity of gendered experiences, each student is asked to say how the place where they imagine themselves in the future looks like using their drawing skills, and others must guess the place.	Draw a Story worksheet/pencils	15'

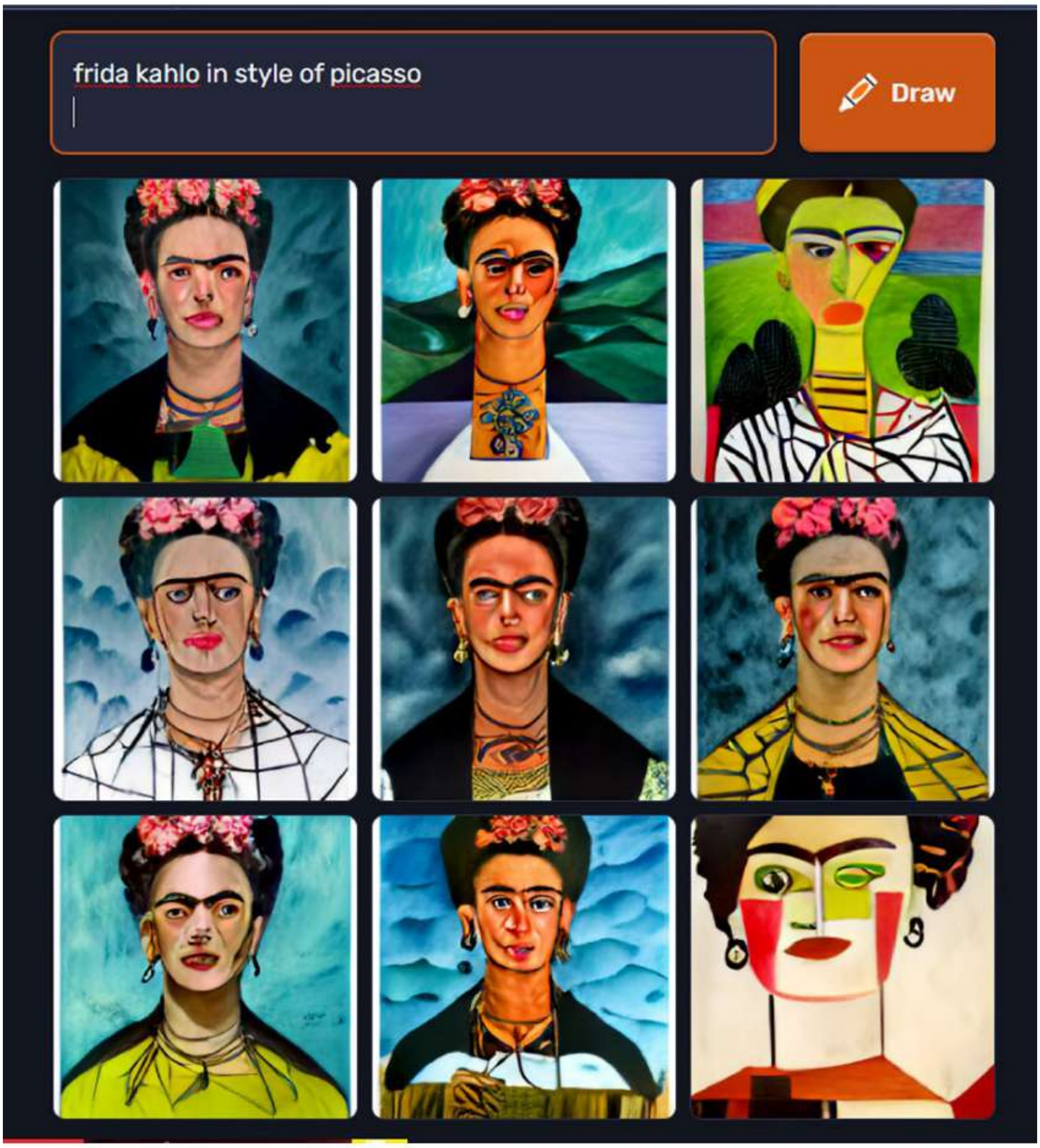
			
2. Activity Equality pursued through the arts	**Part 1.** **Students are grouped in 4-5 members; they need to analize and choose one of the statements indicated on a sheet of paper, then explain, exemplify and develop what they choose, in an interactive communicative playground, using dialogue, brainstorming, drawing and other manual skills and techniques.** I. arts are a crucial mechanism whereby identities are formed and performed, an important vehicle whereby gender stereotyping can be reinforced. (Exploring, different ways of being a man or a woman, or indeed disrupting the notion that one must be either) II. arts revealing aspects of cultures and behaviours that might otherwise be taken for granted (unhealthy and unsafe environments that can be found in exclusively male or highly male dominated sporting clubs, workplaces and environments) III. The arts allow and validate, self and collective expressions through being heard and being visible in public spaces, hence all sections of our communities, identifying in terms of their gender and sexuality, must be seen and heard within our public performance and displays of art **Part 2.**	Paper Board Markers Computer, phone AI generator programme printer	30'

	Each member of group will write down min 4 words that are associated with each number of activities they choose 1,2,3, so they will have written 20 words which they will use in a programme called Artificial Intelligence Generator, and generate a piece of art, based on their words and associated to an art style. *Anexe 1* EX www.craiyon.com *is a free online AI image generator that can draw images from any text prompt (Here are a few keywords that can be interesting to experiment with: "illustration", "photorealistic", "high definition", vintage, futuristic, pointillism, impressionism, futurism, modern, contemporary, renaissance, baroque, etc)* Part 3.- optional Printing on Tshirt/paper.		
3.Identifying the stereotype	Boys perform better in areas such as Technology and Engineering and girls in science and art. -Do you agree with that? Can you argument why? -Identify women well-known visual artists *(Anexe 2)* and their work and combine it with male artists and generate a coworking sheet in AI generator that can be printed.		45'
4.brainstorming on counterarguments	Identify counterarguments like: Female Nobel prize engineers https://www.nobelprize.org/womenwhochangedscience/explore Male artist/ scientist/ musician/singer And search for examples.		10'
5. Feedback about the activity	Students receive a worksheet to complete: 1. I mostly liked …. 2. One interesting thing I found out is…. 3. I would have liked to……. 4. I learn ….		10'

Annexes:

Annex 1.

www.craiyon.com



www.craiyon.com

Annex2

The history of art is littered with the names of great men—Leonardo da Vinci, Vincent Van Gogh, Pablo Picasso, etc. As with many other fields, women were historically discouraged from pursuing a career in the arts, yet there are many incredible females who persevered. These famous female artists have more in common than their gender and career path—they are all trailblazers in their own right, with many breaking barriers in their personal and public life.

Unfortunately, as women continue to fight for equality in all fields, these exceptional artists are often still mentioned in terms of their gender. Luckily, more than ever, these women of distinction are being held up against their male peers and recognized positively for their contributions to art history.

Louise Bourgeois (French, 1911-2010)

Born in Paris to parents who ran a tapestry restoration business, Louise Bourgeois grew up helping them in the workshop, filling in missing parts of the designs depicted on the tapestries. Although she studied mathematics and geometry at the Sorbonne, she eventually returned to art, practicing printmaking, painting, and large-scale sculpting throughout her long and varied career. Although she was not formally affiliated with any specific artistic movement, she exhibited with abstract expressionists and explored themes including loneliness, jealousy, anger, sexuality, and the unconscious in her work.

In 1982, at the age of 70, Bourgeois was finally given her moment to shine when The Museum of Modern Art exhibited a retrospective of her work, which featured contorted human-like figures suspended from wires; fabric creations made from her old clothes; and enormous spider sculptures, which she is best remembered for today.

Pictured: Louise Bourgeois, Maman (1999), photographed in Hamburg, Germany in 2012.

Frida Kahlo (Mexican, 1907-1954) Frida Kahlo's fierce self-portraits featuring her iconic bold unibrow and mustache were once described by André Breton, the founder of Surrealism, as "ribbon[s] around a bomb." Indeed, Kahlo's paintings are simultaneously seductive and confrontational. In "The Two Fridas (Las dos Fridas)" from 1939, completed shortly after Kahlo's divorce from Mexican muralist Diego Rivera, Kahlo depicts her two personalities—one in traditional Tehuana costume with a broken heart, and the other in modern dress, independent, with a full heart. Kahlo's constant remaking and layering of her own identity was an important predecessor to identity politics and continues to inspire artists today.

Pictured: Frida Kahlo, The Two Fridas (Las dos Fridas) (1939), on display in 2007.

Georgia O'Keeffe (American, 1887-1986)

A seminal figure of American Modernism, in 1915 Georgia O'Keeffe was one of the very first American artists to produce a purely abstract work of art, in contrast to the dominant movement of American realism. In Music, Pink and Blue from 1918, O'Keefe abstracts a floral subject with extreme cropping, producing an archway of colorful petals that hum with a musical energy suggested by the title. The theories of Russian artist Wassily Kandinsky in part inspired O'Keeffe to explore "the idea that music could be translated into something for the eye," to achieve pure expression free of other external references.

Pictured: O'Keeffe posing with Pelvis Series Red with Yellow (1945) in Albuquerque, New Mexico, in 1960.

Élisabeth Louise Vigée Le Brun (French, 1755–1842)

Painting, Portrait, Art, Self-portrait, Hat, Costume hat, Costume design,

Completely self-taught, Élisabeth Louise Vigée Le Brun became an artist despite major obstacles (as with any woman in late 18th-century Paris) and was active during some of the most turbulent times in European history. With the intervention of Marie Antoinette, she was admitted into the French Academy at the young age of 28 as one of only four female members. Vigée Le Brun was particularly praised for her sympathetic portraits of aristocratic women, deemed more natural than the works of her contemporaries. Forced to flee Paris during the Revolution, the artist traveled throughout Europe, impressively obtaining commissions in Florence, Naples, Vienna, Saint Petersburg, and Berlin before returning to France after the conflict settled.

Pictured: Élisabeth Louise Vigée Le Brun, Self-Portrait in a Straw Hat (1782).

Hilma af Klint (Swedish, 1862-1944)

It wasn't until the Guggenheim Museum hosted a major survey of her work that Hilma af Klint was finally widely recognized as a preeminent pioneer of abstract art; her earliest abstract compositions were completed years before those of Wassily Kandinsky, Kazimir Malevich, and Piet Mondrian. On view from October 2018 to April 2019, "Hilma af Klint: Paintings for the Future," featured an array of big, bright, somewhat magical-looking abstract works and remains the most-attended Guggenheim exhibition ever.

Born in Stockholm, af Klint attended the city's Royal Academy of Fine Arts, graduating in 1887 and going on to become well known for her figurative work and serve as secretary of the Association of Swedish Women Artists. During this time, spiritualism and Theosophy gained momentum as people, including af Klint, looked for a way to reconcile religion with the many recent scientific advancements. Those belief systems inspired her first major group of nonfigurative, nonobjective work. Called The Paintings for the Temple, the 193 paintings were created between 1906 and 1915 and explored a dualistic perception of creation, evolution, and the universe. Intended to be installed in a spiral temple, af Klint mandated that the works not be shown until 20 years after her death. Those paintings, along with some of her earlier pieces, made up the bulk of the exhibition at the Guggenheim—a spiral sanctuary in its own right.

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Pictured: **Hilma af Klint**, The Ten Largest, No. 7, Adulthood (1907).

LESSON 20.

E-SOC Lesson Plan

Learning objectives:

This training/lesson aims:

- To identify gender-based stereotypes and how they affect women/men or girls/boys' choices, attitudes and behaviours;
- To develop empathy.

Learning outcomes:

By concluding this session/class participants will have:

Knowledge:

- to explain the consequences of being stereotyped; (thus they will increase their ability to empathize with others).

Skills:

- to distinguish how stereotypes and prejudices affect social models and behaviours

Attitudes:

- to value the emotions and feelings they experience.
- to develop a change in approaching gender bias in STEAM class

Stereotypes and Counterarguments:

S3 "Hard science is still profoundly associated with masculinity."
CA1 Most female university graduates join research in laboratories while male students work in companies and get senior positions.

CA2 Social pressure on making a career and establishing oneself professionally is stronger on males than on females.

Target group:

Secondary School Teachers
School students (choose from 12-18+)

Activity Title	**Short description of the activity**	**Resources needed**	**Time** 2hs
1.Lost on a Deserted Island-ICEBREAK	The scenario: everyone is lost and stranded on a deserted island and each person has to describe one object that they would bring to the island and why.	An indoor setting	15’
2. Lost on a Deserted Island-OBSERVE AND DISCOVER!	1. The teacher divides the flipchart in two, one part for the female objects chosen and the second part for the male objects. 2. The students are invited to write in the appropriate field the name of the chosen object. 3. Students are asked to observe the male’s list and the female’s list. (possible lists: the boys gave practical examples: compass, matches, tent, flashlight, ropes, knife, ax, and the girls gave as examples books, phone, beach cream, sun hat, paper and pen, and headphones)	Flipchart Markers	15’
3. Brainstorming	Write for two minutes everything that comes to mind when you hear the words prejudice and stereotype. Fill in the circles.	Worksheet 1	5’

4. Identifying the debated stereotype	Students are asked to answer the following questions: -What conclusion can be formulated starting from the given result? Possible answers: 1. Boys are more oriented towards science, and practical activities, while girls are more idealistic. 2. The number of successful men in sciences is higher. -Do you agree that there are not enough successful women in science? Can you give an argument for why?		30'
5. Finding counterarguments to the debated stereotype	Individually, the participants formulate points of view for and against the debated stereotype. For one minute, each must state, in a convincing way, both arguments/counterarguments. The public or a designated judge decides on the most relevant arguments and counterarguments. The presentation of pros and cons can be organized in pairs: one participant presents the arguments and the other the counterarguments.	Papers	30'
6. Individual research	Students are invited to search for examples of successful women in science.	Phones, laptops, computers	10'
7. Evaluation of the activity	Students receive a worksheet to complete, in order to investigate the satisfaction of the participants. 1. I liked…. 2. One interesting thing I found out is…. 3. I would have liked to……. 4. I will…..	Worksheet 2	15'

ANNEXES:

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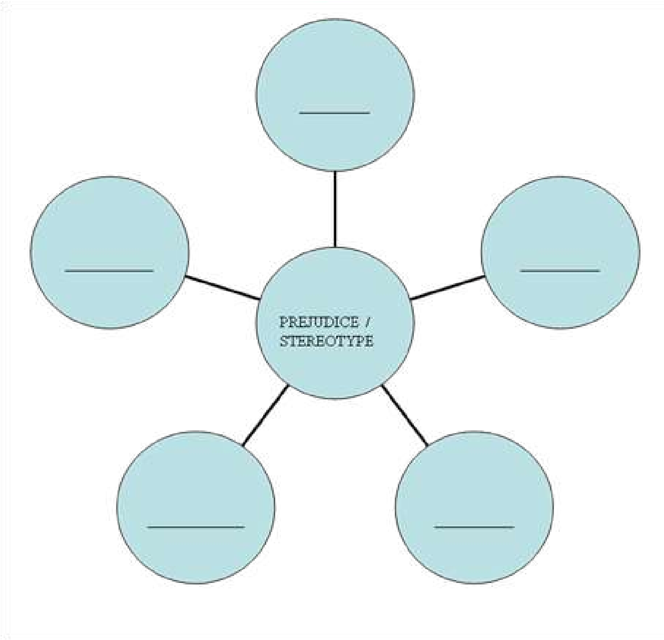
1. Worksheet 1



2. Examples of successful women in science:

https://www.bestcolleges.com/blog/10-women-who-made-scientific-history/

LESSON 21.

E-SOC Lesson Plan

Love for Science

Learning Objectives:	To break with any doubt about the fact that stereotypes are part of the past To recognize and deepen their understanding of women's participation in STEAM field To apply the new knowledge in possible careers in relation STEAM field To raise their own interests in academic subjects in STEAM
Learning outcomes:	By concluding this session/class participants will have: **Knowledge:** To analyze and conclude that women have and will continue to play an integral role in the world of science, technology and the arts. **Skills:** To identify and develop skills that will engage more girls in STEAM **Attitudes:** To demonstrate a change in approaching gender bias in STEAM class To create their own dream about STEAM opportunities
Stereotype and Counter	

arguments	**S4** *There are not enough successful examples of females in careers like engineering, science research, and STEAM professions.* CA1 Since the introduction of ART in STEM many opportunities open for girls. CA2 There are plenty of examples of successful women's role models in the STEAM field worldwide although they are not presented either in Media or in textbooks
Target group	Secondary and primary teacher, School students (11-15)
School subjects:	Discover of the World and Integrated Science Lesson periods: 1. 2 periods x 45 min. = 90 min. 2. 2 periods x 45 min. = 90 min.

Activity Title & number	**Short description of the activity** [Use the PPT - Love for Science]	**Resources needed**	**Time** 180 min.
1. Lead In:	**MY FUTURE PROFESSION** The teacher asks questions about the choice of the dream profession of the students: "What do you want to do?" "You want to become…" Why? "Your dream job will be…" "You want to learn/study (in the university) ..."		5'

	"Which subjects you want to choose in S4/5"		
2. Warm-up activity	**MEN OR WOMEN PROFESSIONS?** Reflect on your real-life experience with the listed professions: Read the following list of professions (choose 10-12) and ask students to stand up if they meet more women in this profession, to stay sit if they meet more men, and hand up if they meet both equally. Suggested list of professions: ● Cooker ● Nurse ● Teacher ● Primary teacher ● Maths teacher ● Science teacher ● School director ● School Deputy director ● Builder ● Policeman ● Firefighter ● Soldier ● Cleaner ● Physician ● IT specialist ● Coach ● Judge ● Lawyer ● Engineer ● Astronaut ● Technician ● Scientist ● Doctor ● Chemist ● Lab technician or assistant		5'

3. Line up activity	**AGREE- DISAGREE** Identify one side of the room as agreeing and one side as disagreeing. Class to stand in the middle with space for them to move along a spectrum from agree to disagree. Read out a few of the statements. Following each statement (choose 4/5) ask the pupils to move to a place on the agree/disagree spectrum that reflects their view and to make a line with a common spot. Suggested list of statements: ● People should go for the jobs they think they would be good at and are interested in. ● Maths is really difficult. ● Your gender should have no impact on your subject choices. ● Males and females are equal. ● Boys are better than girls at Maths. ● Girls do better in school than boys. ● Design Technology is a “boys” subject. ● Nursing is a profession best suited to women. ● Being the only male/female in a class would put me off choosing that subject. ● The best job for you is one that matches your skills, abilities and personal qualities. ● Girls are better at art than boys.		10’

	• Boys are better at STEAM than girls. Facilitate discussion after pupils have positioned themselves, asking them why they have stood there.		
4. Draw a Scientist activity	**DRAW A SCIENTIST** 1. Ask students: What is a scientist? Explain that a scientist is someone who studies or investigates nature and the laws of nature and does scientific work. 2. Distribute paper and drawing supplies. Instruct students to draw a picture of a scientist. Don't give any more instructions than that. Allow students 15 minutes to complete their drawings. 3. Brainstorming - After students have finished their drawings, ask them to write three different statements on a different color post-it related to this profession about: □ qualities □ abilities □ knowledge Ask them to use/to write one/two words only - the first thing coming to their mind. 4. Ask to stick them aside of their drawings and keep them. 5. After students have finished, have them share their pictures and notes with the whole class (in a circle).	White drawing thick paper (one for each student) Drawing supplies such as colored pencils, crayons and magic markers 3 different colors of post-it sticker papers (3 for each student) pen	30'

	6. Instruct them to explain briefly what's going on in their picture. 7. You can display (on walls) the pictures around the room and allow students to do a gallery walk, so they can see all the pictures. (If you like.) 4. Engage students in a discussion by asking the following questions: • What first came into your mind when I asked you to draw a scientist? • How did you come up with an idea for your drawing and notes? • When you see everyone's picture, what did you notice? • What were the similarities among the pictures and the notes? • What differences did you notice? NOTE: If there are clear patterns among the pictures such as mostly male, older, White or some other aspect of identity, point those patterns out if the students do not. • Why do you think those similarities exist among our pictures? • What did you learn by doing this? • What surprises you? • Why do you think stereotypes changed over time?		

Successful examples of females in STEAM field	1. Ask the students to write the name of a scientist that they have learned about, like well-known scientists, engineers, designers, technology leaders that they know. The teacher can write them on the board too. Discuss whether they are - more women or men. Watch the video: https://www.youtube.com/watch?v=LdEAz3mjaSw&ab_channel=AllisonLangland Gender Roles in Society - We are all people 2. Overview of the video - short discussion - (famous man/woman - ppt) 3. Present the objectives and outcomes of the lesson: And the topic: There are many successful examples of females in careers like engineering, inventions, science research, and STEAM professions. There are plenty of successful women's role models in the STEAM field worldwide, although they are not presented either in media or in textbooks.	Post-it Smart board or projector, laptop and Wi-Fi or internet connection to watch the video PPT presentation	10'
Research teamwork	**FAMOUS WOMEN IN STEAM** 1. Make research about women who are not so famous and who are not presented either in media or in textbooks.	**Worksheet 1** A2 white posters paper for 4-5 teams	30'

	2. Give the students a list of women's names in STEAM printed in 5 colours. 3. Build the teams by the printed color lists of women. Teams can be form by 3-4 persons. Each student search information about one scientist. 4. Distribute the 4 (5) posters with image of S T E (A) M to each team and marker for each student. Assure that there are enough iPads or laptops for each team to do the research quickly.  5. Give them 20 min. to do the search and write the visit cards. 6. After finishing their work each team presents their research to the others in 3 minutes = 15 min. for all.	(1 for each group) with an image of S T E A M Laptops/I pads 2 per team (10 in total) Wi-Fi/Internet connecti on Markers for each member team Board and magnets or 4-5 flipcharts	
Interview	**WOMAN SCIENTIST AND RESEARCHER** Presentation: Teams video call, recorded video or guest, presented in the lesson The teacher could choose to invite a scientist – parent or other institution worker and do different workshops with students. ex. Belgium : https://www.greenlightforgirls.org/	**Workshee ts 2**	15'

	ex. Spain – a young woman scientist – Maria Iturralde **See information in Worksheet 2**		
Science workshops-demonstration	**LOVE FOR SCIENCE** The class stays in the same teams as for the research (3-4 students per team). The teacher and the invited scientist will prepare the materials and the needed printed information for the workshop/s. They will distribute the materials to the students and will show a short demonstration or video of the experiments. After that, the students will repeat the experiments in their own and will explore. The teacher can choose to do one or two workshop experiments with the whole class, or with each team to do different workshop experiments. Workshop 1 and Workshop 2 sheets **Demonstration:** **Workshop sheet 1:** Ingredients for each team: a heat-resistant glass container. Bowl with hot water 5 grams of coconut oil 5 grams of another natural oil 5 grams of beeswax	**Workshop 1 sheet** **Workshop 2 sheet** Ingredients materials and containers Described in the sheets	30'

	1 drop vitamin E 5 drops of essential oil (optional) Process: Clean and disinfect your work area and the utensils you are going to use. Weigh all the ingredients and place them in a heat-resistant glass container. Put the container in a saucepan with water and heat it in a water bath. Let the ingredients dissolve and mix.		
Science workshops-experiments	**Workshop 2 - Experiments** ➢ **1st time - They will follow the recipe** ➢ **2nd time - They will change the ingredients or measurements to explore** ➢ **Then they should analyze and write their results in a science booklet.** **Workshop sheet 2:** Ingredients for each team: a plastic container 80 gr Himalayan pink salt 15 gr of orange powder 25 grams sweet almond oil 15 drops of pink Grapefruit aromatic essence Process: 1. We weigh 80 grams of Himalayan pink salt in a container. Add 15 grams		30'

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	of orange powder and mix well to mix. We break the lumps that may exist. 2. In 25 grams of sweet almond oil, we add 15 drops of aromatic essence of pink Grapefruit and stir. 3. Add the mixture of oil and aroma to the salt container. Mix thanks to a spatula until the mixture is integrated. 4. Fill the glass container with the mixture and put the cork stopper. We already have our scrub ready. Once all the ingredients are dissolved and mixed, turn off the heat. Take the jar out and let it cool for 5 minutes. After this time, add the drop of vitamin E. Ready to pack and enjoy.		
Follow-up activity **Homework**	Overview of the lesson – experiments and anaylises The students will put the prepared cream into a Brown Paper Bag like a present and take them to home. **BROWN PAPER BAG** In the paper bags, each student will find information about how the paper bag is produced and a worksheet to find the name of the inventor. It could be used for a follow-up for next lesson topic.	Small brown paper bags for each student with printed **Worksheet 3** materials	15'

Annexes:

WORKSHEET 1

List of Women Inventors

A list of women inventors and the fascinating things they invented.

A partial list of the many ingenious inventions by women.

Invention	Inventor	Year
Battery container	Nancy Perkins	1986
Beehive	Thiphena Hornbrook	1861
Canister vacuum	Nancy Perkins	1987
Car heater	Margaret Wilcox	1893
Circular saw	Tabitha Babbit	1812
Computer program	Augusta Ada Byron	1842
Cooking stove	Elizabeth Hawk	1867
Dam and reservoir construction	Harriet Strong	1887
Direct and return mailing envelope	Beulah Henry	1962
Dishwasher	Josephine Cochran	1872
Drinking fountain device	Laurene O'Donnell	1985
Electric hot water heater	Ida Forbes	1917
Elevated railway	Mary Walton	1881
Engine muffler	El Dorado Jones	1917
Feedback control for data processing	Erna Hoover	1971
Fire escape	Anna Connelly	1887
Globes	Ellen Fitz	1875
Grain storage bin	Lizzie Dickelman	1920
Improved locomotive wheels	Mary Jane Montgomery	1864
Improvement in dredging machines	Emily Tassey	1876
Improvement in stone pavements	Emily Gross	1877
Kevlar, a steel-like fiber used in radial tires, crash helmets, and bulletproof vests	Stephanie Kwolek	1966
Life raft	Maria Beaseley	1882
Liquid Paper correction fluid	Bette Nesmith Graham	1956
Locomotive chimney	Mary Walton	1879
Medical syringe	Letitia Geer	1899
Mop-wringer pail	Eliza Wood	1889
Oil burner	Amanda Jones	1880
Permanent wave for the hair	Marjorie Joyner	1928

Portable screen summer house	Nettie Rood	1882
Refrigerator	Florence Parpart	1914
Rolling pin	Catherine Deiner	1891
Rotary engine	Margaret Knight	1904
Safety device for elevators	Harriet Tracy	1892
Street cleaning machine	Florence Parpart	1900
Submarine lamp and telescope	Sara Mather	1870
Suspenders	Laura Cooney	1896
Washing machine	Margaret Colvin	1871
Windshield wiper	Mary Anderson	1903
Zigzag sewing machine	Helen Blanchard	1873

Women Nobel Prizes

The Nobel Prizes

The Nobel Prizes are awarded under the will of Alfred Bernhard Nobel, Swedish chemist and engineer, who died in 1896. The interest of the fund is divided annually among the persons who have made the most outstanding contributions in the fields of physics, chemistry, and physiology or medicine, who have produced the most distinguished literary work of an idealist tendency, and who have contributed most toward world peace. In 1968, a Nobel Prize of economic sciences was established by Riksbank, the Swedish bank, in celebration of its 300th anniversary. The prize was awarded for the first time in 1969. The prizes for physics and chemistry are awarded by the Swedish Academy of Science in Stockholm, the one for physiology or medicine by the Caroline Medical Institute in Stockholm, that for literature by the Academy in Stockholm, and that for peace by a committee of five elected by the Norwegian Storting.

Women Nobel Prize Winners for Science

Marie Sklodowska Curie (Physics, 1903; and Chemistry, 1911)

Marie Curie is considered the most famous of all women scientists. She was the only person ever to win two Nobel Prizes. By the time she was 16, Marie had already won a gold medal at the Russian lycee in Poland upon the completion of her secondary education. In 1891, almost penniless, she began her education at the Sorbonne in Paris. In 1903, her discovery of radioactivity earned her the Nobel Prize in physics. In 1911, she won it for chemistry.

Irene Curie (Chemistry, 1935)

Irene Curie was the daughter of Marie Curie. She furthered her mother's work in radioactivity and won the Nobel Prize for discovering that radioactivity could be artificially produced.

Gerty Radnitz Cori (Biochemistry, 1947)

Gerty Cori was the first American woman to win a Nobel Prize in science. She studied enzymes and hormones, and her work brought researchers closer to understanding diabetes. She won the Nobel Prize for discovering the enzymes that convert glycogen into sugar and back again to glycogen.

Barbara McClintock (Physiology or Medicine, 1983)

Barbara McClintock studied the chromosomes in corn/maize and her work uncovered antibiotic-resistant bacteria and a possible cure for African sleeping sickness.

Maria Goeppert Mayer (Physics, 1963)

Maria researched the structure of atomic nuclei. During World War II she worked on isotope separation for the atomic bomb project.

Rita Levi-Montalicini (Physiology or Medicine, 1986)

Rita is an Italian neuroembryologist known for her co-discovery in 1954 of nerve growth factor, a previously unknown protein that stimulates the growth of nerve cells and plays a role in degenerative diseases like Alzheimer's disease. She received the Nobel Prize in medicine in 1986.

Dorothy Crowfoot Hodgkin (Chemistry, 1964)

Dorothy discovered the structures of penicillin and vitamin B(12). She won the Nobel Prize for determining the structure of biochemical compounds essential to combating pernicious anemia.

Gertrude Elion (Physiology or Medicine, 1988)

Gertrude Elion is the only woman inventor inducted into the Inventors Hall of Fame. She invented the leukemia-fighting drug 6-mercaptopurine. Her continued research led to Imuran, a derivative of 6-mercaptopurine that blocks the body's rejection of foreign tissues.

Rosalyn Sussman Yalow (Medicine, 1977)

Rosayln Yalow won the Nobel Prize for developing radioimmunoassay, a test of body tissues that uses radioactive isotopes to measure the concentrations of hormones, viruses, vitamins, enzymes, and drugs.

Christiane Nusslein-Volhard (Physiology or Medicine, 1995)

Christiane Nusslein-Volhard won the Nobel Prize using the fruit fly to help explain birth defects in humans.

Linda Buck (Physiology or Medicine, 2004)

She and fellow American Richard Axel discovered how the olfactory system--the sense of smell--works and how people are able to recognize and remember more than 10,000 odors.

Françoise Barrç-Sinoussi (Physiology or Medicine, 2008)

Françoise Barrç-Sinoussi and fellow French virologist Luc Montagnier won the Nobel Prize for their discovery of human immunodeficiency virus. They received the prize jointly with German virologist Harald zur Hausen for his discovery of human papilloma viruses causing cervical cancer.

Elizabeth H. Blackburn and Carol W. Greider (Physiology or Medicine, 2009)

Blackburn, Greider, and fellow American Jack W. Szostak won the Nobel Prize for the discovery of how chromosomes are protected by telomeres and the enzyme telomerase.

Ada E. Yonath (Chemistry, 2009)

Crystallographer Ada E. Yonath, along with Venkatraman Ramakrishnan and Thomas A. Steitz, won the Nobel Prize for studies of the structure and function of the ribosome.

May-Britt Moser (Physiology or Medicine, 2014)

Norwegian neuroscientist May-Britt Moser, along with John O'Keefe and Edvard I. Moser, won the Nobel Prize for their discoveries of cells that constitute a positioning system in the brain.

Tu Youyou (Physiology or Medicine, 2015)

Chinese medical scientist Tu Youyou won the Nobel Prize for her discoveries concerning a novel therapy against Malaria.

WORKSHEET 2

<u>Maria Iturralde</u>

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COSMETIC CHEMIST

MARIA ITURRALDE

I consider myself as a person eager to work and learn new things, very committe to my work and I find easy to communicate with people. With the ability to worl in a team, creative and perfectionist skills in the work that is entrusted to me.

CONTACT

633 88 78 08
mariaitu15@gmail.com
Driving license B and own vehicle

LANGUAGES

Spanish | Native
Catalan | C1 - Advanced
English | C1 - Advanced
French | A2 - Basic

IT

- Computer user level
- Knowledge of mathematical and statistical software (Freemat, Mathematica, R)

OTHER DATA

- Erasmus+ Praga, Rep. Checa 2019-2020
- Summer course in 2014. The Heart of England Study Programmes, Royal Leamington Spa, UK. Living with a native family.
- Private teacher of mathematics, physics, chemistry and english. 2020-2022
- Global winner of the first edition of the Rising Stars Challenge of Provital company. 2022

EDUCATION

2021-2022

MASTER OF COSMETIC INDUSTRY
Universidad Politécnica de Valencia

2016-2021

CHEMISTRY DEGREE
Universidad Jaume I, Castellón

WORK EXPERIENCE

TRAINEE RESEARCHER
University of Chemistry and Technology, Prague 2019

- Pilot study on the effect of post-aeration of digested sludge
- Measurement of physical and chemical properties of wastewater.
- Flocculant tests

INTERNSHIP
FACSA, Castellón 2021

- Spill control
- Wastewater analysis
- Operation of probes in sewage treatment plant

FINAL DEGREE PROJECT
Universidad Jaume I, Castellón 2021

- Quantitative analysis of classical drugs in wastewater
- Semiquantitative analysis of new psycoactive substances
- Solid phase extraction and liquid chromatography

LABORATORY ASSISTANT
Laboratorios Calduch, Castellón 2022

- R&D formulator
- Laboratory assistant in pharmacy compounding formulation
- Manufacturing of cosmetic products

Workshop 1 - demonstration

LABIAL CREAM WITH VITAMIN E

Ingredients:

5 grams of coconut oil

5 grams of another natural oil

5 grams of beeswax

1 drop vitamin E

5 drops of essential oil (optional)

PROCESS:

Clean and disinfect your work area and the utensils you are going to use.

Weigh all the ingredients and place them in a heat-resistant glass container.

Put the container in a saucepan with water and heat it in a water bath.

Let the ingredients dissolve and mix.

Once all the ingredients are dissolved and mixed, turn off the heat.

Take the jar out and let it cool for 5 minutes. After this time, add the drop of vitamin E.

Ready to pack and enjoy

Workshop 2 - experiments

HOME PEELING

The peeling, one of the cares that should not be lacking in our skin to keep it clean and with a healthy appearance.

Peelings prevent us from the dreaded sunspots, mitigate them and help cell regeneration. They are essential in skin care to prevent wrinkles, sagging and act in the formation of collagen.

Do homemade peeling:

This treatment consists of exfoliating the skin to help eliminate cells that regenerate daily. Doing homemade peeling will be so simple that it will not cost you to do it every week. It is not recommended to abuse exfoliations to respect the natural process of cell regeneration.

Apply a homemade peel:

First, we will wash the face well with water and do not dry it in order to better apply the peeling. We apply the peeling all over the face giving soft circular massages if it is a facial peeling and a more intense massage if it is for the rest of the body. Let the peel act for a few minutes before rinsing with plenty of water. The applied peeling has incorporated oils, so the skin will be hydrated. If we have dry skin, we will apply a moisturizer afterwards.

Depending on the type of skin we have, we will use a type of exfoliant and oil. Thus, creating a specific peeling for our skin type. The exfoliating particles should be finer for an exfoliation of the face, while for the rest of the body we can use coarser particles.

When choosing the oil that we will use, we must know its properties, moisturizing, astringent, anti-aging, we will choose the one we need to do homemade peeling.

How to prepare a peeling at home:

To make a homemade scrub or peeling, we only need to choose the exfoliating particles and the oil. If you want, you can add dyes and essences to give it color and aroma.

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Your skin deserves pampering from time to time and with this citrus body scrub you can enjoy a moment of relaxation thanks to the aroma it gives off and the beneficial properties of pink Himalayan salt. You can make homemade scrub as a body treatment and add it to your routine so that your skin regenerates successfully and looks splendid.

https://youtu.be/b6Jt_FN_el8

Homemade peeling recipe

Himalayan pink salt in combination with orange provides extra vitamin C and antioxidants, in addition to the energizing properties associated with this type of salt. Almond oil will pamper your skin by providing maximum hydration.

To do homemade peeling we need:

80 gr Himalayan pink salt
15 gr of orange powder
25 grams sweet almond oil
15 drops of pink Grapefruit aromatic essence

Step by step for homemade peeling:

1.We weigh 80 grams of Himalayan pink salt in a container. Add 15 grams of orange powder and mix well to mix. We break the lumps that may exist.
2.In 25 grams of sweet almond oil, we add 15 drops of aromatic essence of pink Grapefruit and stir.
3.Add the mixture of oil and aroma to the salt container. Mix with the help of a spatula until the mixture is integrated.
4.Fill the glass container with the mixture and put the cork stopper. We already have our scrub ready.

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WORKSHEET 3

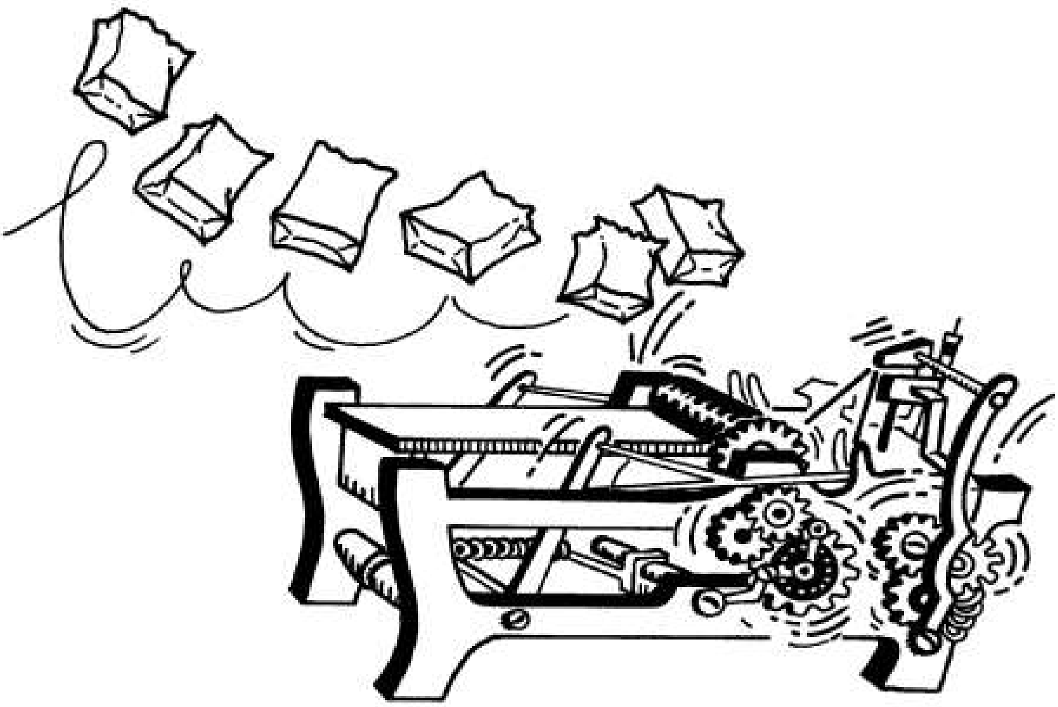
Name________________________________ Date________________

The Big Brown Paper Bag

Every day thousands of brown paper bags are carried home from supermarkets and other stores all over the country. Yet few consumers realize that the machine that cuts, folds, and pastes the square or rectangular bottoms of these bags was invented in the late 1860s by an American woman.

This unusual inventor had little formal education. She built the machine while she was employed in a paper bag company in Massachusetts. There she had observed workers performing the time-consuming task of cutting, folding, and pasting bag bottoms by hand. Later in life, this mechanically oriented woman patented other machines, including a rotary engine and a machine for cutting shoe soles.

The name of this female inventor appears in code on the next page. In this code, each number stands for a different letter of the alphabet, as noted. Write the appropriate letter above each of the numbered spaces.



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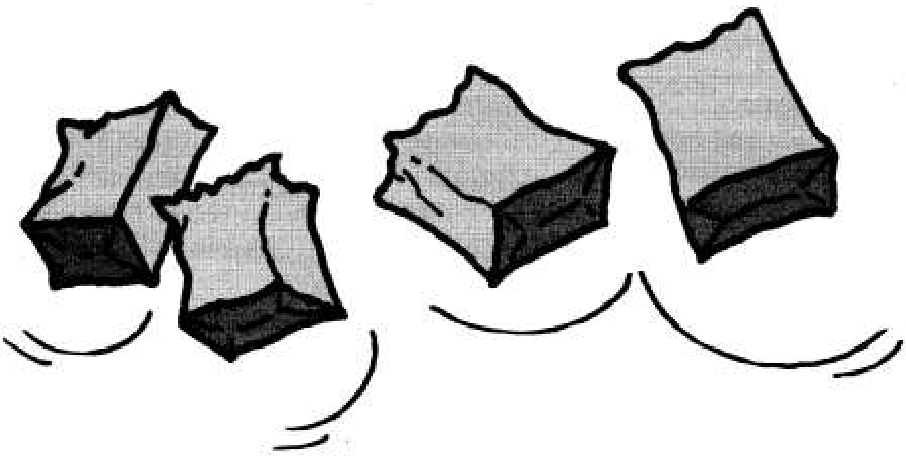
Name________________________________ Date__________________

The Big Brown Paper Bag

_ _ _ _ _ _ _ _   _ _ _ _ _ _
13 1 18 7 1 18 5 20   11 14 9 7 8 20

A = 1	N = 14
B = 2	O = 15
C = 3	P = 16
D = 4	Q = 17
E = 5	R = 18
F = 6	S = 19
G = 7	T = 20
H = 8	U = 21
I = 9	V = 22
J = 10	W = 23
K = 11	X = 24
L = 12	Y = 25
M = 13	Z = 26



More information can be downloaded on the website: esoc.uji.es