

# HANDBOOK FOR SCHOOLS

PROMOTING ENTREPRENEURSHIP  
THROUGH ICT FOR GIRLS

MARÍA J. RODRÍGUEZ MALMIERCA  
BOZICA ILIJIC  
CARMEN FERNÁNDEZ MORANTE  
BEATRIZ CEBREIRO LÓPEZ  
BIRGIT WOLF



WWW.ICTGOGIRLS.EU

# HANDBOOK FOR SCHOOLS

## PROMOTING ENTREPRENEURSHIP THROUGH ICT FOR GIRLS

### Authors:

María J. Rodríguez Malmierca

Bozica Ilijic

Carmen Fernández Morante

Beatriz Cebreiro López

Birgit Wolf

**Editor:** Bozica Ilijic and Jennifer Ziegler

**Production:** wordup Werbeagentur

### License



This handbook is licenced under Creative Commons Attribution – Share Alike

“This license lets others remix, tweak, and build upon your work even for commercial purposes, as long as they credit you and licence their new creations under the identical terms. This licence is often compared to “copyleft” free and open source software licences. All new works based on yours will carry the same licence, so any derivatives will also allow commercial use. This is the license used by Wikipedia, and is recommended for materials that would benefit from incorporating content from Wikipedia and similarly licensed projects <http://creativecommons.org/about/license/>”

We would like to acknowledge the work of the ICT-Go-Girls! partners who have coordinated national networks of stakeholders to disseminate information regarding the development and testing of the ICT-Go-Girls! methodology.

## PROJECT COORDINATOR



CESGA (Galicia Supercomputing Center)  
Spain

[www.cesga.es/](http://www.cesga.es/)

## PROJECT PARTNERS



USC (University of Santiago de Compostela)  
Educational Technology Research Group  
Spain

[www.usc.es/tecnoeduc](http://www.usc.es/tecnoeduc)



die Berater®

Austria

[www.dieberater.com](http://www.dieberater.com)



SAN (University of Social Sciences,  
Academy of Management)  
Poland

[www.san.edu.pl](http://www.san.edu.pl)



Universität Stuttgart

Institut für Arbeitswissenschaft und  
Technologiemanagement IAT

University of Stuttgart  
in cooperation with Fraunhofer IAO  
Germany

[www.iao.fraunhofer.de](http://www.iao.fraunhofer.de)



CVO Antwerpen  
centrum voor volwassenenonderwijs

CVO Antwerpen

Belgium

[www.cvoantwerpen.be](http://www.cvoantwerpen.be)

Danube University Krems.  
The University for Continuing Education



Danube University Krems – The University  
for Continuing Education  
Austria

[www.donau-uni.ac.at/imb](http://www.donau-uni.ac.at/imb)

# HANDBOOK FOR SCHOOLS

## PROMOTING ENTREPRENEURSHIP THROUGH ICT FOR GIRLS

1. Introduction .....	2
2. About this handbook.....	4
2.1 Who is this handbook for? .....	4
2.2 Who will benefit from this handbook? .....	5
3. Starting point: Women and ICT .....	6
3.1 Current situation in Europe .....	6
3.2 Contribution to the EU policies and framework.....	7
4. Gender issues: Reasons for girls to opt or not to opt for ICT .....	8
5. ICT-Go-Girls! project approach .....	10
6. ICT-Go-Girls! methodology.....	12
7. ICT-Go-Girls! products .....	14
8. Supporting ICT materials .....	15
9. Using the model in European schools .....	18
10. Social learning for 21 <sup>st</sup> century students.....	21
11. Activities for the promotion of entrepreneurship in the classroom .....	23
12. Female role models .....	34
13. Conclusions and lessons learned .....	35
14. Sources.....	40

# 1. INTRODUCTION

This handbook aims at encouraging the participation of young girls in the ICT world with an entrepreneurial spirit and considers teachers, parents, schools and communities as their key influencers when choosing a profession. It highlights the challenges and key themes in the ICT-sector for young girls and presents lessons learned from the piloting stage of the project ICT-Go-Girls! in the partner countries. The handbook describes how ICT-Go-Girls! designed, carried out and evaluated a pilot programme for secondary schools to enhance entrepreneurship skills among secondary school girls, using ICT as a key element in terms of resources and tools.

The main aim of this handbook is to show in practical terms how young girls in lower secondary schools in Europe can become engaged with ICT-related subjects and entrepreneurship, with the final goal of opening their eyes to the many possibilities that ICT related professions can offer them in the future. Identifying best practice examples from the piloting carried out in partners' countries outlines what needs to be done and how to approach the subject young girls and ICT from different perspectives and in different regions.

Girls can learn very early how to assess their strength and abilities and seek information, communicate and negotiate with people in leadership positions. They need to acquire leadership skills and face possible obstacles without losing sight of their goals. Even in

the case of marginalised girls who are more seriously challenged, with some effort, they can access business networks and be successful in ICT.

The ICT-Go-Girls! project has reached a wide audience at local, regional, national and European level and has been reinforced by the dissemination and exploitation of good practices achieved at European level. The ICT workforce is a dedicated goal of the Europe 2020 Strategy. Therefore, raising awareness about ICT-related professions and entrepreneurial activities is a fundamental step to promote female employment. Digital jobs will be more and more important in the future. Individual needs of young girls, in particular marginalised young girls, must be taken into consideration. What is required is not just career counselling and mentoring but also the opportunity to experience hands on ICT-related subjects within the curriculum. But why not also incorporate the opportunity to establish contact with women who have themselves built a career in the "ICT-sector"? This emerged during the project as a highly successful practice in helping students obtain a true picture of what it really means to have a job in the ICT field.

This project represents a mere drop in the ocean. Therefore, planning for sustainability of the ICT initiative is of vital importance. Young girls who participated in the piloting know well the advantages and disadvantages to be expected in the ICT-sector. This informa-

tion needs to be spread over the coming years. Initial high enthusiasm needs to be maintained to ensure that these best practices and ideas don't disappear. Possible transfer projects will be taken into consideration to be able to reach a wider public and implement the methodology. Local, national and European authorities need to be included for the improved sustainability of this initiative.

Further initiatives are needed in order to reach a wider public and influence European schools to integrate

ICT more in the curriculum and facilitate the decision making process of young girls to boost their self-esteem, to believe in themselves and to develop essential competences early in their lives that can help them to choose professions they wish to be involved in to become competent and able to work as a professional workforce.

The ICT-Go-Girls! project contributed its drop into the 2020 ocean to ensure that we see more and more female entrepreneurs in the ICT industry in the future.

## 2. ABOUT THIS HANDBOOK

The ICT-go-Girls! project is a European Lifelong Learning Programme project funded by the European Commission with a partnership made up of a total of seven partners from Austria, Belgium, Germany, Poland and Spain. These partners have pooled their expertise to exploit synergies to meet the challenge of under-representation of young girls in ICT-related subjects and entrepreneurship in this field, thus bridging a digital divide. This goal was achieved through the development of innovative products and programmes for promoting Entrepreneurship in ICT among secondary school girls.

Since most young girls tend to choose their future career early in life without clear planning or strategy, they need more support in these early stages to make better decisions. Schools and teachers need to do preliminary work to make young girls aware of ICT related employment and careers and the entrepreneurial skills needed to be successful in this and other fields. Today it is unthinkable to undertake any profession without ICT literacy and young girls aged 10 to 14 years must have contact with communication technologies as early as possible if the gender gap in ICT-related professions and entrepreneurship is to be closed.



The handbook reflects both teachers' and students' points of view and their inputs during the piloting. It concludes with the interpretation of obstacles that educational institutes are likely to face. This handbook brings together in one place a variety of strategies aimed at improving young girls participation in ICT and entrepreneurship, in a context of mixed gender classrooms. Attached is a DVD with a sample of products, activities, methodology, tools and useful links. In doing so, it highlights the difficulty of a one-size-fits-all approach and underlines the importance of front and back-end processes in the delivery of successful programmes for teachers, schools, trainers, youth organisations, employment agencies, students, especially European girls at lower secondary level.

The handbook is available in English, Flemish, German, Spanish and Polish and can be used throughout Europe. More information about the project can be found at [www.ictgogirls.eu](http://www.ictgogirls.eu)

### 2.1 WHO IS THIS HANDBOOK FOR?

The handbook is aimed at:

- Lower secondary schools and teachers
- School principals
- Teachers' organisations
- Teacher training centres

- Decision makers (Educational authorities, policy makers)
- Initial teacher training providers
- Careers Advisors
- Youth Workers
- Other Vocational Employment and Training Practitioners

The handbook explores the changes the partnership believe necessary in the field of ICT and entrepreneurship in order to encourage greater participation from girls. It demonstrates the research and piloting carried out and includes testimonies from the young girls and teachers involved, highlighting their change of attitude from the initial contact with the project to the end of the piloting phase.

It is of high relevance to discuss with young people what they want to become and give them guidelines and instructions at the right time. Within this project the methodology used in the piloting phase was developed in order to make young girls think more carefully about their professional future and choose professions which bring satisfaction and good prospects for the future.

With this in mind, the aim of the ICT-go-Girls! handbook is to:

- Support teachers to explore methods and tools that will motivate young girls to choose professions in ICT and entrepreneurship
- Support practitioners to understand the impact that the wrong career decision can have on young people and their future employment prospects
- Communicate positive aspects of ICT and entrepreneurship
- Raise awareness of tried and tested tools and methodologies

## 2.2 WHO WILL BENEFIT FROM THIS HANDBOOK?

The direct beneficiaries of this initiative are lower secondary school girls between 10 and 14 years old. However, boys or older girls can also benefit from the project since it is designed to encourage young people in decision-making processes and help them recognise their strengths and weaknesses for their professional future, as well as highlighting the importance of ICT. The methodology is particularly effective when dealing with young people who have not made any clear decisions about their future career path. This approach is very important in order to help marginalised young girls who tend not to think at all about their future, or at best insufficiently, and as a result often end up as members of a workforce with lower prospects and career opportunities.

# 3. STARTING POINT: WOMEN AND ICT

Finding an effective way to provoke interest among girls towards ICT related careers and jobs seems to be one of the most difficult challenges in this field. There are numerous initiatives aimed at young girls to raise awareness of the many options that ICT careers offer, as well as practical hands-on workshops, clubs, contests, etc. being promoted by governments, educational institutions, civil society and ICT companies. Examples of these can be found in our report “Girls, ICT and entrepreneurship. Learning from existing initiatives” (available on the DVD). In the following section we give an overview about the starting point and context of the project, including facts and figures about the ICT sector and related policy frameworks.

## 3.1 CURRENT SITUATION IN EUROPE

In European countries we still find gender segregation in the labour market. Entrepreneurship among European women shows significant inequality when referring to the ICT sector. Statistics show that while women constitute almost 54% of all entrepreneurs (in sectors other than ICT), they count for just 19.2% of all ICT entrepreneurs in Europe (EU 2013). According to the 2013 EU report *Women active in ICT Sector*, only 29 out of 1.000 female graduates in Europe have a degree related to ICT, as opposed to 95 male graduates. Even though women hold more than 60 per cent of ICT-related jobs in OECD countries, only 10 to 20 per cent are

computer programmers, engineers, systems analysts or designers. The majority of women in this sector work in secretarial, word processing or data-entry positions, requiring low-level skills or limited technical training. *“In recent years, girls in many countries have caught up with or even surpassed boys in science proficiency. Better performance in science or mathematics among girls, however, does not necessarily mean that girls want to pursue all types of science-related careers. In fact, careers in ‘engineering and computing still attract relatively few girls”* (OECD 2012). Consequently, if career pathways continue to follow traditional, outdated gender roles, the problem will only grow worse.

We need to take into account the words of UN Secretary General Ban Ki-moon (2012): *“Equality for women and girls is not only a basic human right it is a social and economic imperative. Where women are educated and empowered, economies are more productive and strong. Where women are fully represented, societies are more peaceful and stable.”* Similarly, Klaus Schwab, Founder and Executive Chairman of the World Economic Forum stated, *“The key for the future of any country and any institution is the capability to attract the best talent.”* (World Economic Forum 2012) Thus, following the principles of equality and an inclusive society, the productiveness and wealth of the EU member states also depends on overcoming gender segregation and establishing equal opportunities for women in all sectors in addition to many other valid reasons for encouraging the empowerment of girls.



It is worthy of note that only 5% of girls, but 18% of boys expect a career in engineering and computing (OECD 2012). Over 95% of all jobs now have a digital component and in many jobs the importance of digital tools will increase in the future, so young people need to acquire appropriate digital skills to ensure successful futures. Despite this, experts are warning about the “large and growing skills shortage in the ICT sector itself, as well as in other fields where technology plays an ever more important role, from law and medicine, to being an airline pilot or a research scientist”.

## 3.2 CONTRIBUTION TO THE EU POLICIES AND FRAMEWORK

The above situation is not unique to Europe – governments and IT companies worldwide acknowledge the problem and the challenges to actively revert the situation. Very recently, even a company such as Google stated the number of female employees in the company was less than 30%, and that they struggled to recruit and retain women in the business. The European Commission acknowledges this problem in its Europe 2020 Strategy aimed at achieving “Smart Growth” (pillar VI, action 60), where there is an explicit action to undertake initiatives to increase the participation of women in ICT.

Entrepreneurship is pointed out as one of the crucial skills in today’s world, and defined as the 21st century key competence 7 by the European Commission (2006). The Eurydice report, “Developing Key Competences at School in Europe: Challenges and Opportunities for Policy (2012), pays special attention to the question on how to further enhance transversal competences such as “digital competences and entrepreneurship”, which

are both addressed by the innovative approach of the ICT-Go-Girls! Project. The goal of entrepreneurship education is “to give students the attitudes, knowledge and skills to act in an entrepreneurial way.” (EACEA Eurydice 2012) Key competencies include an individual’s ability to turn ideas into actions, manage creativity, innovation and risk taking, as well as the ability to plan and deliver projects in order to achieve objectives.

“Developing mindsets, transversal attributes and skills that are the foundations of entrepreneurship can be complemented by imparting more specific knowledge about business according to the level and type of education.” (EACEA Eurydice 2012) At the same time, ICT is a growing and diverse market for quality jobs and enterprises and there are very few women specialized in ICT careers and jobs in Europe (and Worldwide). Moreover, ICT skills in Europe are defined as the key competence 4 as set out in the document Key Competences for Lifelong Learning, which defines that “digital competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and communication. It is underpinned by basic skills in ICT: the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet.” (European Commission 2006). By fostering 21st century key competences among secondary school girls, we do not only support the lifelong learning strategy as stated in the European Framework, but also contribute to the European principle of equal opportunities and the building of strong, productive and stable societies.

# 4. GENDER ISSUES: REASONS FOR GIRLS TO OPT OR NOT TO OPT FOR ICT

In a qualitative study carried out with girls and young women from seven European countries, Zauchner et al. (2007) assume a set of criteria (Reif 2013) on the question why girls would opt (or do not opt) for a career path in the field of ICT, scientific or engineering professions and made the following findings:

- Lack of information about existing ICT, engineering and scientific professions as well as educational pathways. Here, it should be underlined that especially younger age groups knew about only very typical jobs in the field such as web designer and could not imagine a realistic working day in one of these jobs. Among the women interviewed, the lack of job information was mentioned as a major factor impeding the pursuit of careers in ICT.
- The relevance of context-practical applicability in these fields was questioned and here, the importance of integrating theoretical concepts with applicability is an important factor. Other issues were raised such as, “doing good for society” and doing something “meaningful” and being “creative” such as developing new ideas or products which could be beneficial for society or at least have a practical impact for other people. These link to the theoretical orientation of education with not enough hands-on activities in workshops being cited by girls as an impeding factor.
- The decisive role of family, teachers and peer groups was stated by the women interviewed as a further factor.
- Early playful experiences with computers was stated as a decisive factor for the women, often depending on family and school environment
- Girls mention long training periods as impeding factors which are often perceived as difficult and requiring a high degree of intellectual abilities. In this respect, women, especially young girls, appeared less confident about their abilities to pursue such a career.
- The balance between work and family life is considered a risk of such professions.
- Additionally, both girls and women stated that they may/do encounter gender-based discrimination in such professions.

These factors give insights about the many different reasons for opting or not towards a career seen as non-traditional for girls or in „male-dominated areas“. In their model on factors affecting decision-making about careers in ICT, Miliszewska and Moore 2010 give a detailed overview, covering as main factors:

- School / college influence,
- Family influence,
- Peer group influence,



- Influences of Higher Education (subject status, market value of IT qualifications)
- Images and uses of IT in popular culture and the media

This last point touches on the images of “nerds” and working in the ICT as being unsocial by nature, as well as the wider question of how girls and women are depicted in media.

In conclusion the following factors play a key role for social change concerning this particular gender gap:

- Encouragement for the development of ICT and entrepreneurship skills
- Early access (first stage of secondary schools, before taking career decisions) to formal training with an emphasis on experiential activities
- Practical knowledge about the host of professional opportunities available within ICT and entrepreneurship
- Experiences and tools to maintain contact with the field

## 5. ICT-GO-GIRLS! PROJECT APPROACH

Taking into account the experiences and initiatives of our associate partners, IBM and Queensland Government (Australia), together with the experiences of project partners, the partnership decided that the project would follow a new approach and it was therefore agreed to propose, test and evaluate an educational methodology focused on promoting entrepreneurship through the use of ICT resources and technologies *within the curriculum*, **not** as an extracurricular activity. There are, and have been, a number of very interesting examples of extracurricular activities to promote ICT among girls, many linked to girl computer clubs, coding camps etc. However, the partnership wanted to test how this kind of approach could be taken directly into the classroom.

### INSIDE OR OUTSIDE THE CLASS?

From the project it emerged that success here depends very much on the situation of each school and the degree of flexibility allowed regarding the curriculum. In this project, it was a successful approach in schools where a critical mass of teachers from different areas were supported and influenced by an enthusiastic principal. However, in other schools this approach proved very difficult to implement. The causes were varied, but lack of time and the high pressure felt by many teachers in order to meet curriculum goals made it very difficult to introduce ICT-Go-Girls! methodology in full. In such

cases the proposal and its activities were adapted to meet the specific needs and conditions of these teachers and schools. In all partner countries, Spain, Austria, Poland, Germany and Belgium, two secondary schools piloted the methodology.

### FOR GIRLS ONLY?

The partnership decided to work with mixed-sex groups of students taking into account that this is often the case in schools and that future work in the ICT sector will involve men and women working together collaboratively. Furthermore, not only girls would benefit from this experience and reflection. In fact, boys had the opportunity to reconsider their stereotypes and gender issues concerned with working in technologies, leadership and cooperation.

### THE YOUNGER THE BETTER!

Statistics shows that there is no significant difference between boys and girls regarding their interest in computers when they are in primary school. However, when lower secondary school education starts, girls become increasingly disinterested in computer classes, beginning a process which distances girls from ICT. The partnership decided that this was the key stage at which to act – still interested in computers and ICT but undecided about their future studies. Therefore, the partnership focused the piloting experiences towards the first

and second years of lower secondary education (ages between 10-14 years old).

## ENTREPRENEURSHIP AND ICT?

The project identified a number of very relevant experiences in promoting ICT among girls, and some others, aiming to encourage young people to become entrepreneurs. However, there were no programmes to promote girls engaging into ICT careers as leaders. ICT-Go-Girls! linked these two concepts, by promoting *entrepreneurship among girls through ICT*. The project took the concept that an entrepreneur works creatively to generate and transform innovations into economically viable goods and services to a school level. This implied the need to develop children's enthusiasm

and teach them how to develop their critical thinking together with their imagination. The main goal was to raise awareness and develop new ideas that would lead to the development of entrepreneurial competences needed in every area of life.

## REFLECTING ON THE FUTURE.

Most young students are not used to reflecting on their professional future. The methodology developed by the ICT-Go-Girls! project was built around a key concept – “What do I want to become in the future?”. This became the basis for the first and last activity for all participant students in the pilot, encouraging them to individually reflect on their professional future.

## 6. ICT-GO-GIRLS! METHODOLOGY

The project offers advice on resources and methodologies for implementing lessons to link the beliefs of young girls regarding their professional future and the real work environment. It is based on role models and exercises that encourage young girls to work in the ICT-sector or to become entrepreneurs. The activities provide teachers with a wide range of ideas for implementation that can be tailored to suit different classroom settings. The methodology was developed by a European team via the application of interdisciplinary know-how in order to meet the ever-changing needs of young girls and encourage them to shift paradigms, change traditional ways of thinking and lifestyle. It builds upon the skills of young girls while allowing more in-depth thought about professional options. It is based upon their psychological and physical needs including performance indicators within the classroom. The methodology does not only allow young girls to reflect on their professional future but also promotes deeper thought and the development of essential skills, attitudes and knowledge concerning decision-making processes with regard to professional choices.

The ICT-Go-Girls! steers a career plan that would assist young girls in the transition from school to entry into a career option in the ICT-sector or to become entrepreneurs.

Key elements of the methodology also include self awareness of young girls and indirect answers to questions such as:

- Who am I?
- Where am I going?
- How do I get there?
- What are my interests and abilities?
- What are my strengths?
- How do I perceive different professions and why?
- Why do I opt for one particular profession and not another?
- Why do I need a career plan?
- Why is self-reflection so important?
- Which skills do I need if I want to work in the ICT-sector?
- What is the relationship between my education and future career?
- Which abilities relate to ICT career clusters?

Furthermore, the methodology exposes young people to:

- Entrepreneurial options and possibilities
- Roles in a company and job descriptions
- Strategies for career options
- Employment information
- Awareness of the educational offer in high schools or vocational schools

Finally, the methodology raises awareness related to:

- Assessment of personal strengths and weaknesses
- Research of ICT careers that complement personal and professional strengths

- Development of personal skills concerning ICT career
- Understanding of what being successfully employed means
- Differentiation between home, education and profession
- Understanding of the value of work and personal success
- Development of appropriate skills for the desired workplace
- Self-improvement
- Development of decision-making techniques
- Understanding self and public perception
- Understanding lifestyle preferences and future career paths
- Understanding the impact of ICT career selections
- Understanding values in different work environments
- Understanding influence of current choices on future professions
- Understanding career obstacles
- Understanding positive and negative impacts of career choices
- Development of an action plan to reach personal goals

The methodology was implemented during the piloting activities where the participants were allowed to select and communicate information, oral, graphic, multimedia etc. using computers and new technologies. They could develop skills in converting information into a variety of formats and develop effective presentations thus raising awareness of the importance of such methods and the technology needed to support them in the workplace. The young people could express

their ideas or incorporate ideas in groups. All these skills are necessary to reach goals and to develop the confidence to aim for higher career opportunities in the ICT-sector as well as viewing complexity in an optimistic way and being accountable for the accomplishment of tasks. During the piloting activities, it was possible for students to go beyond the ICT-Go-Girls! methodology and use the project work as a springboard for further creativity and imagination. They could recognise what existing knowledge was necessary in order to work in the ICT-sector as well as developing advocacy, debating, negotiating, and feedback skills.

Young marginalised girls could learn in the project who they were as citizens and how their school experiences are connected to their future success. They were able to elaborate the way in which their traditions and cultural backgrounds influenced their beliefs and determined who they are. They could work on questions such as why work is important to them and which role it ought to play in their life or why their current choices influence their future. They also learned how to communicate at home possible reasons for opting for ICT and the advantages that becoming an entrepreneur had compared to other career paths. Many teachers involved observed enormous progress, even from young marginalised girls, who showed that they could learn a lot during the piloting activities.

As stated earlier, the methodology is a guideline for teachers and they should feel free to adapt it to their own particular needs in the classroom.

# 7. ICT-GO-GIRLS! PRODUCTS

This initiative has produced a number of practical products for schools in Europe to help their staff reflect, apply and adapt to individual needs. All of these products are available on the attached DVD, as well as being downloadable from: <http://ictgogirls.eu/>.

## THE ICT-GO-GIRLS! PRODUCTS:

- Research Study on previous European initiatives and recommendations.
- Step by step methodology for promoting ICT and entrepreneurship in European schools.
- Social web-based software platform for interactive communication and networking among schools

and pupils in European countries, based on Elgg and SocialWire (<http://social.ictgogirls.eu>).

- This Handbook, specifically developed for schools and teachers in Europe, to be able to encourage ICT and stimulate entrepreneurial mindsets in young girls with the main objective of encouraging young generations to be more open and flexible when making career choices.

The ICT-Go-Girls! partnership does not claim to have produced a complete answer to the issue – this initiative is a starting point to changing the current gender imbalance in ICT and entrepreneurship. Teachers are encouraged to implement other initiatives as well at their schools in order to encourage girls to work on their competences and be able to take ICT and entrepreneurship into consideration as their chosen professions.



## 8. SUPPORTING ICT MATERIALS

ICT is a highly diverse, rapidly changing and attractive environment which many adults find difficult to keep pace with. On the other hand, digital natives are used to being in contact with technology from the day they are born and interact naturally with mobiles, tablets, computers, etc and are perfectly at home when using them in a variety of contexts. However, school is an environment where the use of technology tends to be restricted to using computers to carry out activities which are often highly teacher-centred and rarely creative. In order to help teachers make ICT based lessons more meaningful for their students, we have prepared a list of software which can help improve the creative aspects of the computer lab.

FLOSS (Free/Libre and Open Source Software) refers to software that anyone can freely use, redistribute, create derived works from and have access to the source code. FLOSS allows educational institutions to benefit from the use of free software to create, learn, share and exploit ICT in teaching and learning, without licensing fees or restrictions stated by software creators and adapt it to their needs. The types of FLOSS in education are very broad, and they go from office or productivity suites to graphic and multimedia management and editing, desktop publishing, multimedia learning content creation, or even complete management of e-learning environments. More recently, a new concept, Cloud Computing, and more precisely cloud based tools, have succeeded in providing educators and stu-

dents with a wide range of tools which do not need to be installed, but are accessed through a web browser, providing more flexibility, cross-platform access and possibilities than traditional software. Some engaging tools to consider when planning a motivating activity for the use of technologies in class or at home are:

### TO CREATE INTERACTIVE VISUALS:

- **Glogster**, ([www.glogster.com](http://www.glogster.com)) a great tool to create interactive posters with all kinds of multimedia, using a lot of templates, attachments, links, etc.
- **Piktochart**, ([www.piktochart.com](http://www.piktochart.com)) which supports the easy creation of infographics, interactive visuals, etc. with a lot of templates and graphs to use.
- **Thinglink**, ([www.thinglink.com](http://www.thinglink.com)) which allows you to create interactive pictures by adding links, videos, music, and text to them.

### TO CREATE WEB-BASED TIMELINES

Very useful for sharing a story, for example a portrait of a career of a female role model is the following web-based software:

- **Tiki-Toki** ([www.tiki-toki.com](http://www.tiki-toki.com)) or **timeglider** ([www.timeglider.com](http://www.timeglider.com)) both provide a free online resource with support to include multimedia resources.

## MIND MAPPING TOOLS

They support the creation of visual diagrams to show the relationships between ideas or information. They are great tools to collect and organize thoughts, aid brainstorming and can even act as presentations — all in order to help solve problems, map out resources and uncover new ideas. Some of the best available free online are:

- **Popplet** ([www.popplet.com](http://www.popplet.com)) allows us to create beautiful diagrams, adding texts, your own drawings and external multimedia (images, videos, etc.)
- **Coggle** ([www.coggle.it](http://www.coggle.it)) allows beautiful and easy collaborative maps that can contain text, hypertexts and images.

## PROGRAMMING AND CREATING APPS

Letting students create their own apps, games and stories is now easy, with tools like these:

- **Scratch** ([scratch.mit.edu/](http://scratch.mit.edu/)) created by MIT Media Lab, is one of the best, and most flexible options to help students begin to understand the basics of programming and allowing them to create games, interactive stories and interact with the “real world” through sensors connected to external devices. The community around it is wide-reaching and the site offers many examples and tutorials to get you started. It is available both as a free online service and as an installable software.
- **Stencyl** ([www.stencyl.com](http://www.stencyl.com)) is specifically designed to create games and can be used to publish them (iOS, Android, Flash, HTML5, Windows, and Mac). Games can be published to the web for free. Extra features

allow these games to be played and sold in the App store and Google play.

## OFFICE AND PRODUCTIVITY SUITES

Some open source software resources can also be very useful for schools to use in their class projects, as they are available for free for most Operative Systems (Windows, Mac, Linux) such as:

- **LibreOffice** ([www.libreoffice.org/](http://www.libreoffice.org/)) is a complete office suite that embeds several applications: Writer, the word processor; Calc, the spreadsheet application; Impress, to create multimedia presentations; Draw, a drawing and flowcharting application; Base, a database and database frontend; and Math for editing mathematics.
- **Gimp** ([www.gimp.org](http://www.gimp.org)) is a very complete raster image editor, which allows the creation and manipulation of bitmap images (photos, etc) such as resizing, cropping, layering, etc.
- **Inkscape** ([www.inkscape.org](http://www.inkscape.org)) is a vector graphics editor, which is a great tool to create logos and any other resizable images for the web.
- **Audacity** ([audacity.sourceforge.net](http://audacity.sourceforge.net)) is a sound recording software, great to create audio pieces, for podcasts or to use them as multimedia files in larger projects.
- **Avidemux** ([avidemux.sourceforge.net](http://avidemux.sourceforge.net)) is a video editing program designed for video editing and video processing.
- **Scribus** ([www.scribus.net](http://www.scribus.net)) is a complete desktop publishing tool, making it easy to create magazines, leaflets, posters and such documents, which can be professionally printed or exported for the web.

## WEB PLATFORMS

Traditional online campuses (such as Chamilo, Moodle, etc.) can provide a safe, interactive and active platform for students, teachers, families and mentors to engage in discussion, share resources, show their own creations, etc.

For the ICT-Go-Girls! we developed our own private social platform, mostly based on Elgg ([elgg.org](http://elgg.org)). Elgg provides a modular online social environment, with features such as blogging, microblogging, file sharing, net-

working, groups among others. However, we wanted to add some extra features to provide teachers with some group work control and these were provided to the project by the SocialWire team ([www.socialwirelabs.com](http://www.socialwirelabs.com)) together with some original coding.

The platform ([social.ictgogirls.eu](http://social.ictgogirls.eu)) offered a safe introduction to a social learning and communication environment, allowing students and teachers to share their experiences, resources, provide feedback, publish their classwork in different workspaces with different privacy levels, as well as allowing interaction among students and teachers from different schools and nationalities.



Picture 1 and 2: Girls using ICT in one of Spanish pilot schools: CPI O Cruce

# 9. USING THE MODEL IN EUROPEAN SCHOOLS

The ICT-Go-Girls! project has identified the need to implement ICT in a new way in the classrooms of lower secondary schools in Europe in order to encourage young students to become entrepreneurs or choose a profession in the ICT sector.

A critical approach to lower secondary schools was achieved in the piloting phase and teachers contributed to the activities and motivated young girls to participate in the project and think about their professional future. Teachers were committed to incorporate ICT subjects into the everyday classroom practice even though some recognized time constraints as the main drawback to succeed in implementing the initiative fully.



Picture 3: Session with ICT role models with Spanish pilot students

The question of how to integrate ICT and influence young girls to consider ICT careers or acquire entrepreneurship skills will probably be a gradual process in the future. It is evident that most young girls still tend to choose very traditional professions for many reasons.

Motivating young girls to be more open-minded towards ICT helps them to carry out many daily activities more quickly, productively and interactively. Within this context of influencing young girls regarding ICT, we observed that all young girls that participated in the piloting are in general interested in ICT. However, using ICT more intensively and creatively in the classroom could encourage future ICT use or even choosing a profession in this field.

## MORE COLLABORATION BETWEEN TEACHERS, STUDENTS AND DECISION MAKERS

Teachers are convinced that they can influence young girls to become entrepreneurs or work in the ICT sector. However, educational policy and curricula are defined by school authorities and teachers can only partly influence the curriculum. Many questions were raised during the piloting phase such as: "How long do we need

to implement the piloting activities?”. Many teachers suffered from severe time constraints and felt a significant overload during the project lifetime. This means that they either need to go the extra mile considering time constraints or receive support from decision makers and school principals.

Often change needs to start from the bottom and at times decision makers need to see positive results before introducing significant changes to the way in which their institution works. Institutional and individual initiatives are necessary in order to make a positive change in the future. School principals have been informed in those partner countries where piloting was carried out about the positive effects of the project, but additional initiatives and follow-up are necessary to reach and convince a wider audience.

Decision-makers and school authorities must recognise the need for the use of ICT by all, but in particular by young girls, in order to influence them to choose professions in the ICT sector. This is of particular importance for vulnerable target groups such as marginalised girls and improving their employment opportunities.

The question arises as to how to reach more teachers, schools and decision makers to continue promoting ICT and positively influencing young girls to choose the ICT sector or entrepreneurship as a career option. This question goes beyond the scope of the current project, but needs to be considered by the education community.

## REGIONAL DIFFERENCES

Before implementing the material of this handbook teachers need to reflect carefully about how the activities can be applied to their local circumstances. ICT-Go-Girls! provided many activities to reach vulnerable target groups and to involve them in the ICT-related

activities with the focus on job opportunities in the ICT sector. It should be noted that the level of understanding and background of the subject ICT itself varied among partner countries. Austrian groups were up to 75% marginalised girls and more effort was required regarding information transfer and the clarification of the activities. In comparison, Spanish pupils were able to develop more advanced video materials and ICT-related activities and could imagine themselves more clearly in the ICT environment in the future.

## LOOK FOR OPPORTUNITIES

Teachers are generally confident with the tools they use to teach. There is, however, a big challenge for teachers who teach for instance languages, history etc. when dealing with ICT. The ICT-Go-Girls! project provided tools and methodologies for collaborative learning and independent studying. It could help teachers and students in collaboration. During the piloting phase it was evident that teachers from subjects other than ICT needed assistance with certain technological aspects in order to implement project activities. Effective use of ICT in the curriculum is an essential part of education. Simple ICT literacy helps students in the classrooms to become familiar with more complex ICT applications in the long run. These initial difficulties need to be viewed by teachers as an opportunity. For example, collaborative platforms are perfect for developing communication skills in native or foreign languages.

## INVOLVE OTHER STAKEHOLDERS

Educational activities are not only a matter for schools but also concern parents and society. Involving role models seems to be a very successful initiative that

many girls liked during the project implementation. Making sure that parents are aware of the initiative and the reasons behind it will help to change their perceptions as well and allow them to be more accommodating to the new mental models their children are developing.

## SWITCHING FROM USER TO DESIGNER

Experience shows that girls need to create things themselves and to be active designers, for instance web 2.0 technologies, which offer a wide range of possibilities and are easy to use. In this sense, using a secure social platform, fun software and tools to carry out the project activities was a success.

## ANCHOR PROJECT INTO EXISTING ACTIVITIES AND SEEK PARTNERSHIPS

Cooperating with public and private ICT initiatives such as “Girls in ICT Day”, is extremely important in giving greater meaning to any single school initiative and helps students to get a broader view of the ICT.

## POSITIVE FINDINGS

In a nutshell, using ICT as a means to promote entrepreneurship among secondary school girls provided some highly positive findings.

### For schools:

- Students were highly motivated to reflect about their future and express it graphically to others by using

fun ICT tools (such as interactive infographics, digital posters, videos, programming, etc.).

- Using open source software and free cloud services meant no need to spend money on software licenses for schools.
- Detailed methodology and step by step guidance and support were highly valued in order to support teachers implement activities in the classroom.
- Providing guidelines and methodology to support young girls in professional choices
- Encourage using safe social platforms and creative ICT more in day to day class activities
- Possibility to further develop the methodology or adapt it for individual needs
- The methodology has an interactive nature and contributes to better teamwork and common-understanding in the classroom.
- It opens new perspectives for innovative teaching etc.

### For students:

- Provides clear information on the relationship between ICT and today's world of work
- Use of different ICT tools and platforms in the classroom similar to those in the workplace
- Use of new technologies for studying and including them in the everyday life
- Acquire practical ICT skills
- Improve attitudes, knowledge and skills in different working environments
- Increase communication skills, teamwork, flexibility and entrepreneurial mindset and competences
- Learn to take initiative and responsibility in mixed gender teams
- Stimulate entrepreneurial thinking
- Learn to work in projects and be proactive
- Learn to manage time etc.



# 10. SOCIAL LEARNING FOR 21<sup>ST</sup> CENTURY STUDENTS

Over the last five to six years there has been a substantial increase in internet usage by teens (9–12 year olds). Their usage patterns now resemble those of teenagers five to six years ago, and younger school-aged children's usage is increasing to the equivalent of tweens' previous use. Schools and families mustn't view this situation only as a threat, but consider it an opportunity to engage children in creative activities, while interacting and encouraging positive behaviour towards learning and building their own personality. Websites are banned by law from collecting personal information without their parents' permission from children who are under the age of 13. However, it is well known that many children bypass this law, by simply lying about their age. Several studies point out that 75% of 7<sup>th</sup> through to 12<sup>th</sup> graders use social media sites. ICT-Go-Girls! used a social learning approach to engage girls to reflect and share their work, making connections and learning from their peers as well as from any other members of the same educational social network. To do so, we implemented an adapted version of Elgg, where students could safely interact and carry out the activities proposed in our project methodology.

Traditional e-learning platforms (Moodle, Blackboard, etc.) do not have the features needed to provide a good support to informal learning as they are more focused on providing tools for formal learning proposals with

a clear unbalanced access to resources and rights. A social online environment (such as Facebook, Twitter, etc.) provides easy and powerful communication and resource sharing, but has the drawback of having little control over privacy issues and there is the risk of minors being contacted by strangers. Open Source solutions offer the possibility of adapting the platform to your needs, given you have the technical means to work on the code or engage external services if necessary.

## HOW TO USE A KIDSAFE SOCIAL NETWORK

If your school wants its own social network service, the easiest option is to set up some groups and activities around it to keep your initiative running.

If this is not the case, you can opt to create your own community on a social learning site, such as Edmodo ([www.edmodo.com](http://www.edmodo.com)), which offers the possibility of creating basic free access for both teachers and students, and also paying for a school or district subdomain so that teachers can partition their students' access to Edmodo and more easily administer their learning experience. Parents can participate by creating their own Edmodo accounts, and teachers can use Edmodo

to connect with colleagues in other parts of the country to share ideas and offer support.

Apart from this example, there are some interesting social networks aimed exclusively at young girls (and their parents) such as:

[www.itwixie.com/](http://www.itwixie.com/) Designed for girls under 15, it is a safe place, where all content is screened before being published, with moderated chats, all in a network

where girls are encouraged to express their real selves, share their ideas, and achieve their goals.

[www.sweettyhigh.com](http://www.sweettyhigh.com) Provides young females with a safe, creative introduction to digital media and the performing arts. It offers girls an extremely engaging, age-appropriate platform, while giving parents the transparency and editing controls they need to help oversee and guide the process.



# 11. ACTIVITIES FOR THE PROMOTION OF ENTREPRENEURSHIP IN THE CLASSROOM

The following activities were carried out in the ICT-Go-Girls! project and tested in the pilot schools with some schools implementing all of the described activities, whilst others only used selected activities.



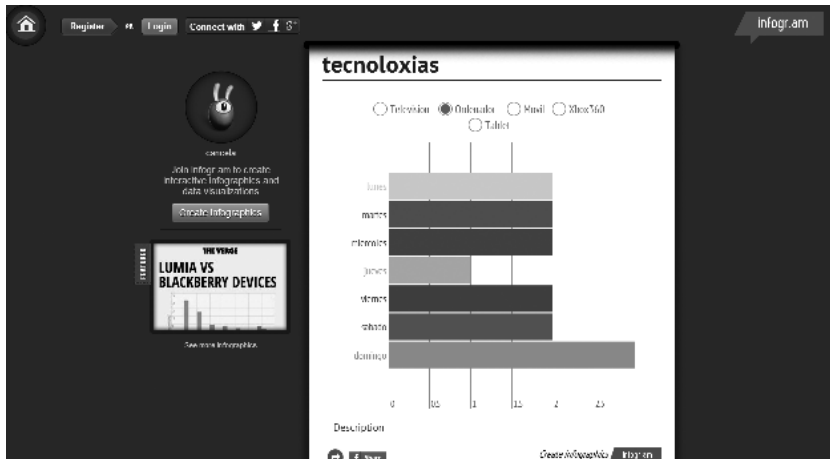
Picture 4: Girl is preparing for the piloting


Activity n. 0	Thinking about my professional future
Introduction and Aims	<p>Each student writes a description about her/his vocational preferences individually. For this reason an online tool is used. The tool consists of a series of focused questions orientated towards promoting individual reflection. The answers are open. To collect the students' reflections a template should be used (i.e. online questionnaire). It should be saved until the end of the programme, and be private and not visible to the rest of the group.</p> <p><b>The aims of the activity:</b></p> <ul style="list-style-type: none"> <li>■ To identify the professional fields that most attract students.</li> <li>■ To reflect on the vocational preferences of students.</li> </ul>
Class dynamics	<p>The activity should take place in one session guided by the teacher, according to the following phases:</p> <ul style="list-style-type: none"> <li>■ <b>Phase 1:</b> Presentation to students of the aim of the activity by the teacher. Students' spontaneity will be promoted without any previous conditioning nor guidance to professions related to technology (students should express their expectations and preferences about their concerns and professional aspirations freely).</li> <li>■ <b>Phase 2:</b> Presentation of the tool and the questions to guarantee that all the students understand correctly how to complete their reflection and that their responses must be spontaneous.</li> <li>■ <b>Phase 3:</b> Check that the task is undertaken in a personal and individual manner.</li> </ul>

Activity n. 0	<b>Thinking about my professional future</b>
Class dynamics	<p><b>Teacher's role:</b></p> <p>To introduce the task and to manage the class dynamics so that the task is undertaken by students in an individual and independent way and so that students have the freedom to write down whatever they wish without consulting their schoolmates.</p> <p>To check the contributions of each student and to prepare a report on the students' work. This report will have two sections:</p> <ol style="list-style-type: none"> <li>1. A table with professions or professional activities that appear in the students' work and another column with the number of girls/boys that chose them.</li> <li>2. If in the contributions of the students any reference is made to technologies, teachers must copy the sentence and include it in the report.</li> </ol>
Suggested ICT tools	Online questionnaire tool such as SurveyMonkey, Google Forms, or SurveyGizmo.
Experience from pilots:	<p>This activity encouraged girls and boys to think about their professional future. Most students had not previously thought in depth about this and there were some unrealistic ideas and many doubts about what to write.</p> <p>Discussions after the activity were found to be very fruitful in all cases, and helped teachers to understand better their students' expectations, dreams or job interests.</p>

Activity n. 1	<b>Initiative and tools presentation</b>
Introduction and Aims	<p>This activity focuses on explaining the approach of the initiative in class, the technological support and the roles of each participant. The environment and tools to be used should be presented to all the participants of the school. It can be undertaken in a class session (class group) or in a joint session in each centre.</p> <p><b>The aims of the activity:</b></p> <ul style="list-style-type: none"> <li>■ To introduce the initiative to participating students</li> <li>■ To introduce the different technological tools that will be used during the development of the educational experience (i.e. social platform, individual e-portfolio, specific tools and purposes)</li> <li>■ To introduce the different players who will accompany students throughout the process and the roles that they will play (partner/contact person, teaching staff, counsellors, leading women in technology, entrepreneurship or experts)</li> </ul>

Activity n. 1	<b>Initiative and tools presentation</b>
Class dynamics	<p>The activity will take place in one session guided by the coordinator with the help of the teacher, according to the following phases:</p> <ul style="list-style-type: none"> <li>■ <b>Phase 1:</b> Presentation of the aims of the initiative: What is it about? How long will it last? How will it take place in schools/lessons?</li> <li>■ <b>Phase 2:</b> Presentation of the ICT tools to be used, emphasizing the different set ups and their functions and possible uses. It is important in this phase to motivate students to be proactive and interact with the other participants throughout the process.</li> <li>■ <b>Phase 3:</b> Presentation of e-portfolio. What is it and how to complete it? The e-portfolio developed will be a tool to promote self-reflection about the construction of professional identity and the possibilities of ICT in the job market.</li> </ul> <p><b>Teacher's role:</b></p> <p>It should be taken into account that to promote active involvement of students in their e-portfolio, teachers should give them feedback. For this reason, one of the roles of participant teachers, tutors or counsellors is to follow up the public sections of the students' e-portfolio and the stimulation of their participation in the different interactive tools of the Social Platform. Who and how she/he will undertake this follow up (one or more teachers) must be agreed upon from the beginning of the pilot.</p>
Suggested ICT tools	Social platform (such as ICT-Go-Girls! platform), e-portfolio (useful list here: <a href="http://electronic-portfolios.com/eportfolios/tools.html">http://electronic-portfolios.com/eportfolios/tools.html</a> ), blog (Wordpress, Blogger...)
Experience from pilots	<p>The project social platform was initially difficult for teachers to understand, as it is a different concept from a virtual campus, but once the structure and functionalities were clarified, most teachers felt at ease with it, although some still regarded it as challenging.</p> <p>Students seemed to like the platform and used it well from the very beginning to communicate with their peers. In some cases, like in Polish schools, what students missed the most was the lack of interaction with students from other European country – they were trying to establish contact but without much effect. Most of the communication happened on a national level.</p>
Activity n. 2	<b>How and why do we use technologies?</b>
Introduction and Aims	<p>The activity consists in the development of a digital infographic in groups about ICT tools that they usually use and why they use them, with a special stress on the gender differences.</p> <p><b>The aims of the activities:</b></p> <ul style="list-style-type: none"> <li>■ To raise awareness in students of the variety of uses of ICT in all areas of daily life and to promote a diversified use of them</li> <li>■ To identify possible gender stereotypes</li> </ul>

Activity n. 2	<b>How and why do we use technologies?</b>
Class dynamics	<p>The activity will take place in a session guided by teachers and individual work by students, according to the following phases:</p> <ul style="list-style-type: none"> <li>■ <b>Phase 1:</b> Presentation of the activity and explanation of what an infographic is, showing some examples. Introduction of some tool/s to make an infographic and the tutorials for the use of this tool. Large group work session.</li> <li>■ <b>Phase 2:</b> Group brainstorming to share their experiences. For what and in which daily fields do you use technologies? Which technologies do you usually use? Teamwork.</li> <li>■ <b>Phase 3:</b> Each group develops their infographic that should answer the questions raised in phase 2. Teamwork.</li> <li>■ <b>Phase 4:</b> Presentation and debate about the infographics of each of the groups. (Work session with the whole class or on-line debate).</li> </ul> <p><b>Teacher's role:</b></p> <p>To introduce the task and to manage the classroom dynamics (brainstorming and final debate) promoting students' involvement in the group work and encouraging the making of interesting and non-repetitive contributions on the use of ICT.</p> <p>To check the contributions of each group and to verify that all the infographics have been published on the Social Platform.</p> <p>Teachers should have manuals or tutorials for the use of the tool to develop the infographics that can be examined by students or teachers which briefly explain the functioning of the tool so that students can develop their infographics independently.</p>
Suggested ICT tools	<p>Tools to create infographic, i.e. Visual Ly, infogr.am, Picktochar, etc. Other alternatives can be proposed, even students or schools can suggest other possibilities.</p> 

Activity n. 2	<b>How and why do we use technologies?</b>
Experience from pilots	<p>Students from pilot schools loved to work with interactive infographics to express their ideas, and reported this as one of the most satisfying activities. Both teachers and students were not familiar with this type of tool and regarded this part of the training as the most 'cool and funny' (quote from pilot in Poland).</p> <p>The results from this activity were very enlightening, as it showed that even those students who would initially opt for stereotypical female professions (hairdresser, sales person etc.), such as marginalised young girls from one Austrian school, used internet and new technologies in schools and their private lives daily. They used internet for exchanging information with other students, research activities and preparation of homework or exercises, not to mention that all of them used social media such as Facebook daily.</p> <p>The results of this activity showed that most students are interested in ICT, but they perceive it more like a "playground" than a tool to aid their education and future career opportunities. This led to interesting discussions on how students can learn to use ICT better for more important issues rather than just for private issues.</p>  <p>Picture 5: Girls preparing interactive infographics during the pilot course in Austria</p>

Activity n. 3	<b>Professionals and companies that use ICT in our community</b>
Introduction and Aims	<p>This activity consists in researching, by means of an information search and direct contact, ICT professionals and companies in the local neighbourhood. Also, the gender perspective in relation to women and men and the roles they have in these jobs are analysed. The task should be undertaken in mixed work groups that will design a multimedia poster (i.e. using Glogster or similar tool) of one of the cases to show it to the rest of their classmates and to reflect on all the cases.</p> <p><b>The aim of the activity:</b></p> <ul style="list-style-type: none"> <li>■ To explore the labour market in the student's community to identify gender stereotypes and ICT in relation to different professions</li> </ul>

Activity n. 3	<b>Professionals and companies that use ICT in our community</b>
Class dynamics	<p>The case description should be done by means of the design of an online multimedia poster:</p> <ul style="list-style-type: none"> <li>■ <b>Phase 1:</b> Presentation of the activity (including the selected examples by partners and their distribution between the work groups) and the explanation of the selected tool (tutorials and examples). Work session in large group (classroom).</li> <li>■ <b>Phase 2:</b> Development of a multimedia poster by each team that describes the selected case. Teamwork. Example: <a href="http://antoncofe.edu.glogster.com/gato-salvaje">http://antoncofe.edu.glogster.com/gato-salvaje</a></li> <li>■ <b>Phase 3:</b> Presentation and debate about the multimedia posters designed by students. Work session in large group or on-line debate</li> </ul> <p><b>Teacher's role:</b></p> <p>To introduce the task and to manage the classroom dynamics (information search and presentation of examples) promoting the activity of students during teamwork. The teacher will stimulate reflection on stereotypes in gender and ICT.</p> <p>The teacher should help the different groups to identify examples in order to complete a short research activity. She/he helps them find information on the internet and how to establish personal contact. She/he will advise students on how to address these professionals and companies. She/he should supervise the files completed by students. It is advisable that teachers help students in the in-depth analysis of professional roles and tasks of the companies associated with gender stereotypes with the aim of allowing students the chance to reach conclusions about stereotypes and responsibilities in jobs by themselves.</p>
Suggested ICT tools	<p>Tool for the design of the multimedia poster (Glogster), or <a href="http://poster.4teachers.org">http://poster.4teachers.org</a>. Other alternatives can be proposed.</p>
Experience from piloting	<p>Teachers and students loved this activity, as it allowed students to express their work in a very creative and enjoyable way. Teamwork was also good to start assigning leadership roles to the girls in the groups.</p> <p>In some cases a lack of computers made it necessary to adopt pen and paper activities.</p>



Picture 6: Girls preparing posters during the pilot course in Austria

Activity n. 4	<b>Professional models: Case Studies of female role models in ICT</b>
Introduction and Aims	<p>The activity consists of analysing and debating in the classroom one or more case studies of women that stand out because of their successful professional career in ICT.</p> <p>This activity offers students a direct contact with female experts in ICT, entrepreneurs, students of ICT careers and find out about their daily activities and interests, ask them questions and also, if possible, develop a video report to show to the rest of their classmates.</p> <p><b>The aims of the activity:</b></p> <ul style="list-style-type: none"> <li>■ To present examples of women who stand out for their successful professional career in ICT to be able to analyse the presence of women in this sector and professions within ICT.</li> <li>■ To promote breaking stereotypes related to professional activities in ICT and gender.</li> </ul>
Class dynamics	<p>The activity should take place in a session guided by teachers according to the following phases:</p> <ul style="list-style-type: none"> <li>■ <b>Phase 1:</b> Presentation of the activity (including the selected cases and their distribution between the work groups). Work session in large group (classroom).</li> <li>■ <b>Phase 2:</b> Analysis of the assigned case in small groups with the guidance of the teacher. In this phase, the curiosity of the students for the case as well as their assessment about the professional career path analysed should be promoted.</li> <li>■ <b>Phase 3:</b> Design of the presentation of the case by each group. In this phase, the possibility that students contact the women chosen directly (interview, videoconference, email contact, etc.) should be taken into account. Direct contact will help the creation of multimedia elements (photos, short video clips, podcasts, data collection the role models are willing to share, etc.) to be included in the presentation. Optionally, students could do the activity 'Reporters: a day in the life of...' to accompany a professional and, thus, gather direct information to contribute to the presentation of the case. This could be done by a small group.</li> <li>■ <b>Phase 4:</b> Presentation of the cases in the classroom and debate (large group). The aim of this session is that all students get to know the professional career paths selected and exchange opinions and reflections about them.</li> </ul>
Suggested ICT tools	Social Platform / communication platform. Media for video-reports or podcasts. Youtube or VIMEO for publishing interviews.
Extra resources	<p>Template for the description of the case.</p> <p>An example of an interview to an ICT female entrepreneur in school:</p> <p><a href="http://centros.edu.xunta.es/cpiocruce/entrevistaemprendedora/131/entrevista/index.htm">http://centros.edu.xunta.es/cpiocruce/entrevistaemprendedora/131/entrevista/index.htm</a></p>



Activity n. 4	<b>Professional models: Case Studies of female role models in ICT</b>
Experiences from pilots	<p>Students enjoyed activity 4 and spent quite a lot of time researching and analysing successful professional women in the ICT sector. Girls studied duties, biographies, reasons why successful women have chosen their careers in the ICT sector, their educational background and challenges they needed to face to climb the ladder. Direct contacts with successful women were made via the school and some managers gave their feedback to the girls. More information can be found on produced posters and qualitative reports. Changes to their previous perceptions were discussed and analysed.</p> <p>In some pilots, the fact that the pupils were able to meet these women in person or through videoconference, asking them questions, from a personal perspective, made it a really fruitful and thought provoking activity. Role models invited also reported their satisfaction with these contacts, and their availability for further support (via social website, emails, etc.). From our experience, female professionals contacted are very aware of the lack of females in this sector and are very willing to help schools out.</p> 

Picture 7: Session with role models in Germany



Activity n. 5	<b>Business Project: creating a virtual company</b>
Introduction and Aims	<p>The activity consists of the development of a small ICT business project in mixed teams (6-8 students). If possible a competition or a showcase among the different proposals could be organised to motivate the students, or even among different schools. This competition would consist in a role-play between the schools of each country directed to the selection of the best business project of the ICT-Go-Girls! project.</p> <p><b>The aims of the activity:</b></p> <ul style="list-style-type: none"> <li>■ To promote leadership and entrepreneurship skills related to ICT</li> <li>■ To practice attitudes and skills in ICT use and improve knowledge of its potentials addressed throughout the training activities during the pilot in a real context</li> <li>■ To give visibility to the most innovative ideas of the use of ICT proposed by the different pilot schools and the ability of female students to lead them</li> </ul>
Class dynamics	<p>The activity will take place in sessions guided by teachers according to the following phases:</p> <ul style="list-style-type: none"> <li>■ <b>Phase 1:</b> Presentation of the activity, including the setting-up of work groups and the assignment of roles within these teams. Each business project will be led by a female member of the team who will be the business manager (Chief Executive Officer: CEO). Work session in large group.</li> <li>■ <b>Phase 2:</b> Business idea proposal session. A tutor for each idea will be assigned and will be responsible for helping students obtain all the basic information about products, marketing, prices, etc. needed to develop the idea. Teachers, experts from activities 3 and 4, school counsellors, local female role models can all be tutors. Work session in teams.</li> <li>■ <b>Phase 3:</b> Development of the business project (classroom and free time). Throughout this phase the role of the tutor is essential. The work teams will rely on this figure to obtain advice and feedback.</li> <li>■ <b>Phase 4:</b> Selection of the best business project according to the assessment proposal. The business proposals will also be disseminated through the social platform and online tools selected. The selection of the best idea in each school could be done by means of electronic voting, for example, by using Doodle or similar tools, or by means of a negotiation process undertaken in the schools.</li> <li>■ <b>Phase 5:</b> Competition among different schools (optional). This consists of the selected projects of each school being presented and promoted by their leaders in front of the other schools. The evaluators of the ideas (the other schools) will carry out the role of financing body and will choose by vote the best proposal.</li> </ul>
Suggested ICT tools	Social platform and online tools selected (website, blog, wiki). Videoconference (Bigbluebutton, Vyew, etc.) or video recording for online presentation. Voting tool (Doodle, Tricider, etc.)

Activity n. 5	<b>Business Project: creating a virtual company</b>
Extra resources	Examples of business projects undertaken by schools. Guidelines for evaluation of the Business Plans. Items to be considered in the business project competition (virtual role play)
Experiences from pilots	<p>This was one of the most challenging activities from the methodology, and most schools reported that they didn't have the time to complete it fully. In some cases, the "companies" were just designed, in others, there were real "products" from student created companies (game design company, web development, etc.).</p> <p>Teachers visualised with the girls having a company and discussed roles, tasks and responsibilities. Girls could broaden their horizons and tried to recognise the advantages and disadvantages of being self-employed or working in the ICT-sector.</p> <p>Most teachers who did this activity obtained a positive reaction from their students who were interested and committed to the work produced by their "companies". On the negative side, most of them reported that it was very time consuming, and sometimes, they didn't have the resources (computer rooms) or time to do it properly.</p>
Activity n.6	<b>Rethinking my professional future. "Professional profiles and my professional career preferences"</b>
Introduction and Aims	<p>After all previous activities, each student should write a description about her/his vocational preferences individually, to sum up the process. An online tool is used to collect their responses, with open questions oriented towards promoting individual reflection (i.e. online questionnaire).</p> <p>This activity is directly related to the initial activity. At this point in time, the process will be repeated so that students can compare their initial spontaneous opinion (Activity 0) with their final perspective following the implementation of ICT-go-Girls! methodology. This helps them to be conscious of their first expectations and to what extent they have changed.</p> <p><b>The aims of the activity:</b></p> <ul style="list-style-type: none"> <li>■ To identify the change in perceptions related to professions and ICT</li> <li>■ To assess if we have changed the expectations of students in relation to the possibilities ICT offers to their professional future</li> <li>■ To analyse job preferences in relation to gender</li> </ul>

Activity n.6	<b>Rethinking my professional future. “Professional profiles and my professional career preferences”</b>
Class dynamics	<p>The activity takes place in one session guided by the teacher following the below phases:</p> <ul style="list-style-type: none"> <li>■ <b>Phase 1:</b> Presentation to students of the aim of the activity. Students’ honest thought will be promoted. Again students need to express themselves freely, but they have obviously just taken part an ICT initiative.</li> <li>■ <b>Phase 2:</b> Presentation of the tool and the questions it includes to ensure that all the students understand correctly how to complete their reflection and that their responses must be spontaneous.</li> <li>■ <b>Phase 3:</b> Check that the task is undertaken in a personal and individual manner.</li> <li>■ <b>Phase 4:</b> The starting point activity will be handed out to each student so that she/he can analyse her/his change of perspective of professions and gender roles in the vocational choice.</li> </ul> <p><b>Teacher’s role:</b></p> <p>To introduce the task and to manage the class dynamics so that the task is undertaken by students in an individual and independent way and so that students have the freedom to write down whatever they wish and without consulting their schoolmates.</p> <p>To check the contributions of each student and return to the initial reflections of the starting point so that students can review them.</p>
Suggested ICT tools	Online questionnaire tool such as SurveyMonkey, Google Forms, or SurveyGizmo.
Experiences from pilots	Teachers’ impressions were that the piloting was very interesting and a perspective changing process for the girls was achieved.

# 12. FEMALE ROLE MODELS

Women who participated in the piloting project as role models:

<p><b>Luz Castro</b> Age: 41 Studies: Computer engineering Skills: e-learning, programming, multimedia, serious gaming. Position: Founder &amp; CEO of imaxin software. www.imaxin.com, Spain</p>		<p><b>Cristina Gamallo</b> Age: 32 Studies: Computer engineer, Doctor in ICT Skills: robotics, security, indoor localization systems. Position: Founder and CEO of Situm Technologies. www.situm.es, Spain</p>	
<p><b>Kathleen Fritzsche</b> Age: 31 Studies: Linguistics Skills: Social Media, Marketing, ICT, Software Skills OS Position: Co-Founder of Accelerate Stuttgart and StartUp Stuttgart, Germany</p>		<p><b>Anna Hoberg</b> Age: 32 Studies: Logistics Skills: ICT, Collaboration Performance Position: Project Manager at Fraunhofer Institute, Stuttgart, Germany</p>	
<p><b>Claudia Garád</b> Age: 34 Studies: Communication Science Skills: Social Media, Marketing, ICT, Software Skills OS Position: Executive Director, Wikimedia Österreich, Vienna, Austria</p>		<p><b>Mar Pereira</b> Age: 46 Studies: Degree in Physics (electronics) Skills: ICT, management, health, computing Position: Director of Agency for Galicia Technological Modernization (AMTEGA), Spain</p>	

Table 2: Female Role Models, who participated in the project

# 13. CONCLUSIONS AND LESSONS LEARNED

Stand-alone efforts by teachers are by their very nature limited if they are not supported by school authorities, school principals and decision-makers. Supportive public policy and the development of adequate skills in ICT-related subjects are necessary in the early years and girls need to implement basic skills in ICT gradually. Supporting strategies are essential for both teachers and young girls in order to make the most effective use of ICT.

Focusing on better collaboration between school authorities, school principals, teachers, parents and pupils can be highly relevant to the introduction of new ways of working in order to help young girls pursue a career in the digital field. Lower secondary schools in Europe can contribute a great deal when it comes to influencing and strengthening the positions of young girls and their confidence in using ICT and a change in attitude when it comes to choosing the right profession for them.

## SECONDARY SCHOOL GIRLS NEED TO BE AWARE OF THEIR POTENTIAL

One of the ICT-Go-Girls! objectives was to find possible answers to the under-representation of women in the ICT-sector. The project contributed to the motivation of young girls to be more open-minded when consider-

ing different professions as possible careers, especially the ICT-sector. Young girls in lower secondary schools in Europe could learn to unlock their potential and opt for ICT-professions or leadership roles and ICT entrepreneurship. Schools, teachers and parents as main educators, should help young girls to improve their leadership potential and encourage them to opt for more responsibility in the ICT-sector or in general to aim to achieve more in their future. During the piloting phase girls from partner countries developed significant competences while carrying out the project activities.

*"I was pleased and surprised at the same time as the pilot let me get to know my students better and let me help integrate them."*

Teacher from Polish school

The project helped girls between 10 and 14 years to develop skills desired for the ICT-sector and to assume leadership and entrepreneurship roles. Even marginalised young girls with lower possibilities were encouraged to discuss their future expectations. In doing this, they recognised their potential, even though they had a different vision at the beginning of the project. Old mental models were discussed, in particular, misbeliefs that many women are not able to combine family and work or that they are not able to think outside the box and imagine themselves as managers or engineers in a company. Young girls were made aware of their poten-

tial and their former beliefs concerning family-friendly policies were positively influenced.

## HIGHER EXPECTATION AND EFFORT = BETTER CHANCE FOR A GOOD JOB

It was observed during the piloting that young girls thought less well-qualified jobs would be easier for them. Teachers worked intensively to work on mental models that could stop many girls from having successful careers in different sectors, especially ICT. The background of The Europe 2020 strategy was presented at schools with the message that women need to pursue senior positions in order to remove the gender disparity at management levels. Women need an equal and fair chance for career opportunities. The ICT-Go-Girls! initiative also takes this strategy into account by encouraging girls to take the lead in the group activities proposed.

It was stated during the piloting that proactive policies in schools supported by decision-makers and principals are highly significant in achieving results. Girls need both, theoretical and practical approaches and the ICT-Go-Girls! empowers girls with tools and methodologies that pave the way for them making more aware choices concerning their professional future.

Once girls have made the decision to work in the ICT-sector they can climb the ladder and reach the managerial level too. ICT-Go-Girls! Has a long term vision as it is sure that we will see more women-run companies in the future and they will be more likely to support women in their additional responsibilities and combination of family and work.

Girls understood during the piloting that qualified and trained women can only be an asset to the companies. This kind of awareness raising contributes to more girls

getting involved with competence development and training, in addition to improvements in the decision-making processes. Given that currently only a small percentage of women opt for ICT and are rarely represented at the managerial level, the initiative is a great way of contributing to the change process.

## TEACHERS NEED SUPPORT AND FLEXIBILITY TO MAKE CHANGES HAPPEN

Support to those responsible for leading and facilitating such initiatives (teachers, youth workers etc) is extremely important. This includes technical support and maintenance as well as training on how to use materials such as toolboxes, training kits, platforms, Web 2.0 technologies etc. In this respect, but also to ensure transfer of knowledge among teachers and to gain a multiplying effect, it is helpful to include activities for teachers to reflect on their own learning and experiences, for example, how to build up an online community. Supporting teachers also raises the question of just how much time and effort goes into gaining a new skills set and how this should be recognised officially. One way is to ensure that training activities are part of the framework of obligatory teacher ongoing education. In addition, the training could be integrated into school activities like project weeks, school clubs or, if possible, into the curriculum.

ICT-Go-Girls! activities were initially planned to be performed during class time, as a cross-curricular initiative that could be worked on in different subject lessons. However, reality showed that in some pilot schools this was very difficult to achieve as some teachers had very demanding curriculums and little time and flexibility to allow them to implement the full set of activities as they

were envisaged. Therefore, it was necessary to be flexible with the proposal, adjusting times and options to the reality of the participant schools. However, despite these limitations, teachers observed that piloting in partner countries contributed to attitude change, competence development and the improvement of girls' self-esteem.

*"The methodology was very good and creative. I would have included a business plan creation activity, but we dedicated about 30 h. to do the rest and didn't have the time."*

Spanish teacher

There's evidence from the piloting that using computers in a less traditional way during the class practice can increase the general motivation for ICT and influence girls to take it into consideration when deciding which career path to choose.

## **DIRECT INVOLVEMENT OF GIRLS IN THE PROCESS IS CRUCIAL**

The involvement of young girls in the piloting was a major contributor to the success of the ICT-Go-Girls! project. As well as being of great practical use it has also proven to be critical in improving the decision-making process and development of necessary competences. It could be observed that the project was considered as a powerful tool for young girls to support them and provide the right professional information at the right age and time. The social-platform developed during the project was used as an interactive tool for information exchange and the uploading files and outputs and was viewed as a pre-stage tool from the ICT work environment. It was necessary to involve girls in technical tasks

to deal with tools naturally and overcome initial fears – there is no other way of developing confidence.

Young girls could voice their opinions in classrooms and discuss with teachers on a level playing field. This boosted the self-esteem of many, in particular, marginalised young girls. Another important result was the amount of creative work completed and the positive effect of teamwork which carried on outside of the piloting phase.

## **YOUNG SECONDARY EDUCATION GIRLS HAVE TRUE INTEREST IN ICT**

Comparing piloting results from the partner countries, it can be confirmed that at the beginning of secondary school most girls and boys are generally interested in ICT. Around this age (12) they still cannot see its potential for their education and future careers, but enjoy using technologies both at home and, if given the chance, at school. The fact that they were given the option of using computers and other equipment "in a different way" in a school environment was highly appreciated as it was perceived as "fun to do".

*"I found very enlightening that students were disappointed if their ICT-Go-Girls! session had to be rescheduled, as they truly enjoyed working on their own ICT projects."*

Milagros Trigo, headmaster of CPI O Cruce,  
pilot school in Spain





Picture 8: Getting active – Piloting in Spain

## USING ENGAGING ICT TOOLS MAKES A DIFFERENCE

One of the elements that was most appreciated in the piloting was the use of creative, fun tools to work on the different activities. Both teachers and students reported that tools used to create infographics and multimedia posters or programming with Scratch, as well as some fun devices, such as Makey Makey or Lego WeDo were very engaging for girls and boys. Furthermore, the interaction with schools and pupils from other European countries was motivating. However, in order to make the most of this opportunity linguistic skills need to be improved and this in turn creates opportunity for cross-curricular collaboration. Some pupils were shy and did not have courage to talk to others at the beginning of the piloting. Particularly young marginalised girls were reluctant to exploit ICT and the social platform at the beginning. However, a noticeable change in these attitudes was observed over the course of the piloting.

## CLOSE CONTACT WITH FEMALE ROLE MODELS IS VERY POSITIVE

Pilots showed that girls appreciated the possibility of having a direct contact with role models, in particular, those that they could talk to, or communicate with, either in person or by e-mail or videoconference. Role models are real examples that they can relate to and exchange opinions with as well as help them clarify doubts. The project showed that girls could learn both from women who are successful and have already climbed the career ladder, as well as from younger women who have started working in ICT field as entrepreneurs and can share their worries, passions and their personal life with the students. Future family life, motherhood and how to combine this with work, particularly in a male dominated sector, is of high relevance for the girls and their future choice of career and personal contact with female managers living these experiences was seen to be highly effective in positively influencing the girls.

## INTEGRATE A GENDER PERSPECTIVE IN MATERIALS AND TRAINING DESIGN FOR TEACHERS

A gender sensitive language should be used and stereotypes in pictures, storyboards etc. should be avoided when dealing with gender and professional sectors with deeply rooted stereotypes. Teachers need to reflect very carefully on the messages being delivered and how to promote gender-sensitive co-education.



## TAKE CARE OF SECURITY ISSUES

Internet security plays an important role and parents, teachers and pupils need to be informed on all aspects, especially security of personal data and correct use of social media.

## MARGINALISED YOUNG GIRLS INITIALLY REQUIRE MORE EMPOWERMENT BY TEACHERS

Marginalised young girls face more challenges than their counterparts. They need more clarification and

with teachers required to make a greater effort in order to work with them and to bring them to an appropriate level. Teachers were called upon to analyse and discuss the realistic and unrealistic wishes of the girls. The beginning of the piloting revealed that some of these girls opted more for typical female professions (hairdresser, chef, etc.) but by its end had a broader outlook regarding possible future jobs. Some girls could not initially see the advantages and disadvantages of different professions in the ICT-sector but following practical applications in the classroom these became much clearer and it can be said that positive influence was achieved regarding the choice of profession.



Picture 9: Alba Souto, Yolanda González (CEOs Bampifu), Susana Ladra (Researcher and Vice dean of Computer Science Faculty UDC), Cristina Gamallo (Founder Member of SITUM) and Ángeles Pariente (founder of A2, Laboratorio de Ideas), ICT role models invited in our Girls in ICT celebration 2014

# 14. SOURCES

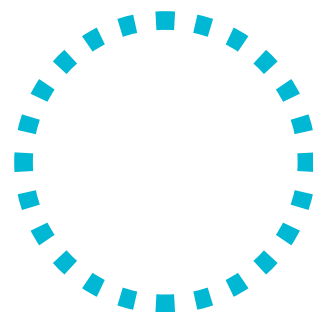
- EACEA/Eurydice, 2012. *Entrepreneurship Education at School in Europe. National Strategies, Curricula and Learning Outcomes*. Brussels: Eurydice.
- EU Kids Online Foundation 2013, Kaiser Foundation 2013.
- European Commission, 2013. *Women active in the ICT sector*. Madrid: European Commission. [Available at: [ec.europa.eu//digital-agenda/en/news/women-active-ict-sector](http://ec.europa.eu/digital-agenda/en/news/women-active-ict-sector)]
- European Commission, 2006. Key Competences for Lifelong Learning – A European Framework. Brussels: European Commission.
- European Commission: Action 60: Increase participation of women in the ICT workforce. [Available at: <http://ec.europa.eu/digital-agenda/en/pillar-vi-enhancing-digital-literacy-skills-and-inclusion/action-60-increase-participation-women-ict>]
- Miliszewska, Iwona and Moore, Aidan, 2010. *Encouraging Girls to Consider a Career in ICT: A Review of Strategies*. Journal of Information Technology Education: Innovations in Practice, 9. pp. 143-166. ISSN 2165-3151 (print) 2165-316X [online].
- OECD, 2012. What kinds of careers do boys and girls expect for themselves? PISA in Focus 03 (March).
- Reif, Lil (ed.), 2013. *Girls, ICT and entrepreneurship. Learning from existing initiatives*. ICT-Go-Girls! project consortium, Danube University Krems – University for Continuing Education, June. [Available at: <http://ictgogirls.eu/?q=en/products>]
- UN Secretary General, 2012. More than a basic human right, it is a social and economic imperative. SG/SM/12991GA/10961 WOM/1807, New York: United Nations, July. [Available at: <http://www.un.org/News/Press/docs/2010/sgsm12991.doc.htm>]
- World Economic Forum: The Global Gender Gap Report 2012. [Available at: <http://www.weforum.org/reports/global-gender-gap-report-2012>]
- Zauchner, S., Zens, B., 2007. Gender Sensitive Media Composition through Participatory Design: Evaluation Concept for the Development of an Online Role-Play Game for Girls. In: Richards, G. (Ed.). Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2007. Chesapeake, VA: AACE, pp. 556-561.





This project has been funded with support from the European Commission (Reference: 526590-LLP-1-2012-1-ES-COMENIUS-CMP)

This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



[WWW.ICTGOGIRLS.EU](http://WWW.ICTGOGIRLS.EU)