

Girls, ICT and Entrepreneurship

Learning from existing initiatives



Lifelong
Learning
Programme

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The „ICT-Go-Girls!“ project

Overview

The „ICT-Go-Girls!“ project intends to design, carry out and evaluate a pilot program to enhance technical and entrepreneurship skills among secondary school girls, by using ICT as the key element.

This initiative is aimed at empowering girls with the knowledge, skills and values to help them be able to create future opportunities for innovation and ICT related employment. It aims to provide useful methodologies, and a complete toolkit (containing support materials, methodologies and software) for schools and educational communities to be able to replicate this initiative in other regions in Europe.

Project Facts

Contracting Organisation:

- » Education, Audiovisual and Culture Executive Agency, LLP: Comenius, ICT, Languages and Programme

Project Number:

- » 526590-LLP-1-2012-1-ES-COMENIUS-CMP

Duration:

- » 1.11.2012 - 31.10.2014

Project Coordinator:

- » CESGA (Galicia Supercomputing Center) Spain

Project Partners:

- » USC (University of Santiago de Compostela) Spain. | Die Berater. Austria. | SAN (Academy of Management). Poland. | Stuttgart Uni - Fraunhofer IAO. Germany. | CVO Antwerpen-Zuid. Belgium | Danube University Krems. Austria.

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Summary

This report presents the main findings of an analysis conducted 2013 in the framework of the project „ICT-Go-Girls! Promoting Entrepreneurship among Secondary School Girls through ICT“. The objective was to review existing projects and initiatives relevant to the objectives of ICT-Go-Girls! and to summarise reflections and experiences from Europe and abroad that can be applied for the development of the project.

This report bases both on literature review and analytical review of examples of best practice. The best practice initiatives are both part of the core analysis and listed in an annex. The conclusion gives an insight about lessons learned for the project development of ICT-Go-Girls!

In the beginning, the two key competences “entrepreneurship” and “ICT skills”, both central to the project ICT-Go-Girls!, are defined. National strategies of the project partner countries concerning entrepreneurship education and ICT in secondary schools are described. The question what could make girls interested in or shying away from the ICT-sector leads to another one: Why do women leave the ICT sector? The reason for both problems lies in a lack of knowledge of the manifold job profiles in the sector on the one hand and in the workload connected to a range of ICT professions on the other. Many women do not want to handle the working hours that are not easily compatible with family life, and many girls are afraid of this incompatibility.

One central finding is that gender sensitive didactics and career counselling are often overlooked in practice, even though well known for their importance. This is especially relevant as gender sensitive didactics highlights the role of teachers, the way teaching material is set up including the language and pictures used, to mention a few.

In successful approaches, female role models were invited to attract girls to ICT-related jobs or activities. However, many projects tend to focus on information about the educational pathway of role models, whereas it would be equally or even more important to provide opportunities for the girls to learn about these women’s everyday life. Another aspect highlighted is to show the many facets of jobs requiring a high level of ICT knowledge.

The review also shows that the design of tools for promoting girls’ entrepreneurship and interest in ICT should be participatory. The viewpoint of the girls as the target group is important, furthermore an involvement of the teachers into the design process is also desirable. Web 2.0 tools provide many opportunities here, as they are attractive and adaptable, making the switch from user to designer easy.

Internet security is another issue in ICT-related projects. As teachers and schools are responsible for their students during school activities, a closed and secure environment for every internet project is necessary. Besides this, students should have the possibility to keep school activities apart from activities they do in their free time, in private, which has to be especially kept in mind when planning the use of social media in projects. Last, but not least, our review showed also the high relevance to support teachers in such projects, being it in terms of technical support, but as well for training activities.



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Introduction

Context of this report

This report presents the main findings of an analysis conducted for the project „ICT-Go-Girls! Promoting Entrepreneurship among Secondary School Girls through ICT“. The project ICT-Go-Girls! proposes to design, carry out and evaluate a pilot program to enhance entrepreneurship skills among secondary school girls, using ICT as a key element both in terms of resources developed as in content. It is aimed at empowering girls with the knowledge, skills and values to help them to be able to create future opportunities for innovation and quality ICT related employment. For this purpose, useful interactive activities, proposals and open source / free digital tools were identified and adapted for the development of a learning methodology and a complete toolkit, containing support materials, methodologies and software for schools and educational communities.

The objective of work package 2 “Analysis of previous studies / initiatives” was to review existing projects and initiatives relevant to the objectives of the project ICT-Go-Girls! and to summarise learnings from Europe and abroad. Thus, we wish to provide the knowledge basis for the project ICT-Go-Girls!, thus setting the scene for next steps of the project, being it the design of the methodology, the development of learning materials and the outline of the school pilots.

Methodology

During the first project meeting in November 2012, we decided to review primarily:

- » projects / initiatives aiming at the promotion of entrepreneurship training in secondary system in the partner countries (generally speaking)
- » projects / initiatives aiming at the promotion of girls in ICT – ICT in the sense of professions with a high use (or even with the central topic) of ICT, approach of job profiles related to ICT industry.

Based on the partner’s network and experiences, we collected information on approximately 40 projects and initiatives in Europe and overseas and reviewed their objectives, design of actions, methodological approaches, materials developed, outcomes achieved and factors leading to or impeding success. In order to assure a common approach, a framework for the analysis has been developed and was used by all partners for the descriptions and analysis of the projects and initiatives, which is provided in Annex III of this report. The review itself was mainly based on desk top research, where we reviewed project documentations (websites, reports, evaluations etc.) as well as resources developed, if available. In addition, partners of the consortium have contacted project coordinators in order to clarify questions which could not be answered from material mentioned above. On this basis, main findings for successful approaches were extracted and integrated with research results from gender studies, closing with recommendations for the design of actions.



Report structure

The report is structured in three parts:

Part I aims to give first orientation in developing a common understanding of the terms entrepreneurship, entrepreneurship education, ICT competencies and ICT related professions, as the use of these may vary from one context to another. Furthermore, it provides a snapshot on where the development of skills related to entrepreneurship and ICT are embedded in secondary school education in Spain, Poland, Germany, Austria and Belgium. Beside these, part I summarizes main reasons given for the low participation rate of girls (and women) in ICT related subjects and professions, based on research results from Gender Studies and evaluations of interventions in the field of promoting girls in STEM from recent years.

Part II presents the main findings on successful design of activities in the field of supporting girls in ICT as well as in entrepreneurship education, thus giving grounds to the development of the learning methodology for ICT-Go-Girls!. Furthermore, this part outlines for each of the key topics discussed useful resources for the development of the learning material and the development of the project ICT-Go-Girls in general.

Based on the main findings from this review, the *final chapter* provides recommendations for the development of the learning methodology to be applied in the for the pilots carried out in the framework of ICT-Go-Girls! as well as for other activities within the project.

Even though this review was conducted primarily for the project ICT-Go-Girls!, we think that it can be also helpful for anyone interested in the topic in general or, more specifically, with interest to develop similar initiatives.



Part I Contextualization

The aim of this chapter is twofold: It recalls basic concepts of central terms used in this project: entrepreneurship, entrepreneurial education and ICT, ICT-related jobs. Beside these terms, two of the eight key competences defined at European level are directly related to our project: digital competence and sense of initiative and entrepreneurship.

Furthermore, the chapter will provide a snapshot on how ICT and entrepreneurship are addressed in secondary education in the countries involved in our project and where the piloting will take place: DE, AT, ES, BE, PL. Here, we will address the following questions: Are there national strategies or action plans, how are they addressed in national educational steering documents? What can be said about the specific learning outcomes defined at national level?¹ This is important to acknowledge, as the several definitions/understandings translate directly to educational policies and the related legal frameworks and framework conditions of the countries where the project ICT-Go-Girls! is supposed to be embedded primarily.

The information provided given in this chapter draws on the following, recently published reports:

- » The Eurydice report “Entrepreneurship Education at School in Europe. National Strategies, Curricula and Learning Outcomes”, published in 2012 and referring to information as for the school year 2011/2012. Also, it focuses on primary (ISCED level 1) and general secondary education (ISCED levels 2 and 3); it does not include information on curricula for vocational, technical or commercial schools at secondary level. Furthermore, it takes into account the public education sector except for a few countries including Belgium, as the private school sector accounts for the majority of enrolments in this country.
- » The Eurydice report “Developing Key Competences at School in Europe: Challenges and Opportunities or Policy”, published in 2012 and based on data from the school year 2011/2012. Here, special attention is given to the question on how to further enhance transversal competences as “digital competences and entrepreneurship” compared to traditional subject-based competences and the question to encourage more young people to pursue studies and careers in mathematics, science and technology.
- » The Eurydice report “Key Data on Learning and innovation through ICT at School in Europe”, published by Eurydice in 2011.
- » The report “Women and ICT. Status Report 2009”, issued by the European Commission.
- » Key Competences for Lifelong Learning – A European Framework, published 2006.
- » The OECD Guide to Measuring the Information Society 2011.
- » The CEN Workshop Agreement European ICT Professional Profiles, published by the European Committee for Standardization 2012.

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¹ Note: When it comes to organizing educational activities, it is discussed whether the format of student companies (also „mini companies“) narrows down „entrepreneurship“ towards „running a company“. See for example the discussion in the context of the evaluation of the project ECE by Bries-sinck 2010.



Defining Entrepreneurship and Entrepreneurship Education

Entrepreneurship, Entrepreneurship Education, sense of initiative and entrepreneurship

A broad definition on entrepreneurship is given in the Eurydice report on Entrepreneurship Education at School in Europe (2012), drawing on the European Framework on Key competences: “Entrepreneurship key competence refers to an individual’s ability to turn ideas into action. It includes creativity, innovation and risk taking, as well as the ability to plan and manage projects in order to achieve objectives. Developing mindsets, generic 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.”²

In addition, the report underlines that the goal of entrepreneurship education is “to give students the attitudes, knowledge and skills to act in an entrepreneurial way.”³ According to the Framework on Key competences, entrepreneurship competences include the ability to identify available opportunities for personal, professional and/or business activities, including ‘bigger picture’ issues that provide the context in which people live and work, such as a broad understanding of the workings of the economy, as well as the opportunities and challenges employers or organizations are facing. Also, individuals should be aware of the ethical position of enterprises, and how they can be a force for good, for example through fair trade or through social enterprise. Examples for skills given in the framework are proactive project management. This involves for example the ability to plan, organize, manage, lead and delegate, analyze, communicate, de-brief, evaluate and record. Furthermore, effective representation and negotiation, the ability to work both as an individual and collaboratively in a team are mentioned. Last but not least, this covers the ability to judge and identify one’s strengths and weaknesses, and to assess and take risks as and when warranted.⁴

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² EACEA/Eurydice 2012 b, p. 5

³ EACEA/Eurydice 2012 b, p. 19

⁴ Framework on Key competences, 2006, p. 11



Defining ICT skills and related professional profiles

ICT, ICT skills and ICT related professions appear as a broad field when it comes to defining both the ICT sector and related professional profiles. The EC status report „Women and ICT“, published 2009, mentions for example that there is no clear definition of the term „ICT sector“, which leads to different interpretations. The report combines different approaches to describe (and measure) the ICT sector, one of them being the OECD definition distinguishing the ICT sector between ICT manufacturing and ICT services. Others are the eight groups of ICT professions provided by Eurostat and the categories on Science and Technology given by the International Standard Classification of Education ISCED-97.⁵ However, in recent years, different attempts have been made in order to get a more specific picture on the ICT sector and related professional profiles. The most relevant in the context of ICT-Go-Girls! are the following:

ICT sector

The above mentioned OECD definition of the ICT sector (based on manufacturing and services) has been altered in 2006/2007, mainly in removing the element of manufacturing industries and leading towards a narrower definition of the ICT sector:⁶

„The production (goods and services) of a candidate industry must primarily be intended to fulfil or enable the function of information processing and communication by electronic means, including transmission and display.“

In this context, the OECD report also refers to the relevance of ICT goods and services outside the ICT sector, for example in other sectors as general government, business outside the ICT sector. Here, output may be ICT products produced for sale or for own use. In addition, software development work done by entities for their own use („own account software“) may also be significant for some businesses outside the ICT sector and for general government organizations.⁷ The EC report on Women in ICT mentions education, employment, health, environment, government, business and entertainment as main areas, in which ICT are considered to be changing agents, with the sub-areas of higher education, convergence, practices and organizations, cyber-sciences, computer assisted learning, privacy and security, biomedicine, biometrics, enabler of socio-economic development, innovation, healthcare, communication environment and the latest on crisis response.⁸ This shows the broad relevance or even ubiquity of ICT nowadays, its manifold areas of use.

ICT related professional profiles and skills

As mentioned above, there is a broad spectrum of professional profiles in the field of ICT, many of which have developed in recent years. In this respect, the CEN Workshop Agreement on European ICT Professional Profiles published 2012 gives valuable insights. This document is the result of a Workshop on ICT Skills realized by the European committee for Standardization (CEN) upon proposal of the Council of European Professional Informatics Societies (CEPIS), the European Centre for the Development of Vocational Training (Cedefop) and the ICT industry. Even though the Agreement is not an official standard developed by CEN and its members, it serves as reference document for national bodies and gives a good, easy to understand and up-to-date insight into job profiles in the field of ICT and related skills.

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⁵ European Commission 2010, p. 12

⁶ OECD 2011, p. 59

⁷ OECD 2011, p. 60

⁸ European Commission 2010, p. 15

It includes 23 professional profiles in ICT along six families, covering business management, technical management, design, development, service and operation and support, which are structured along the full ICT business process as shown below:

- » MANAGE: business management, technical management
- » PLAN: design
- » BUILD: development
- » RUN: services and operation
- » ENABLE: support.⁹

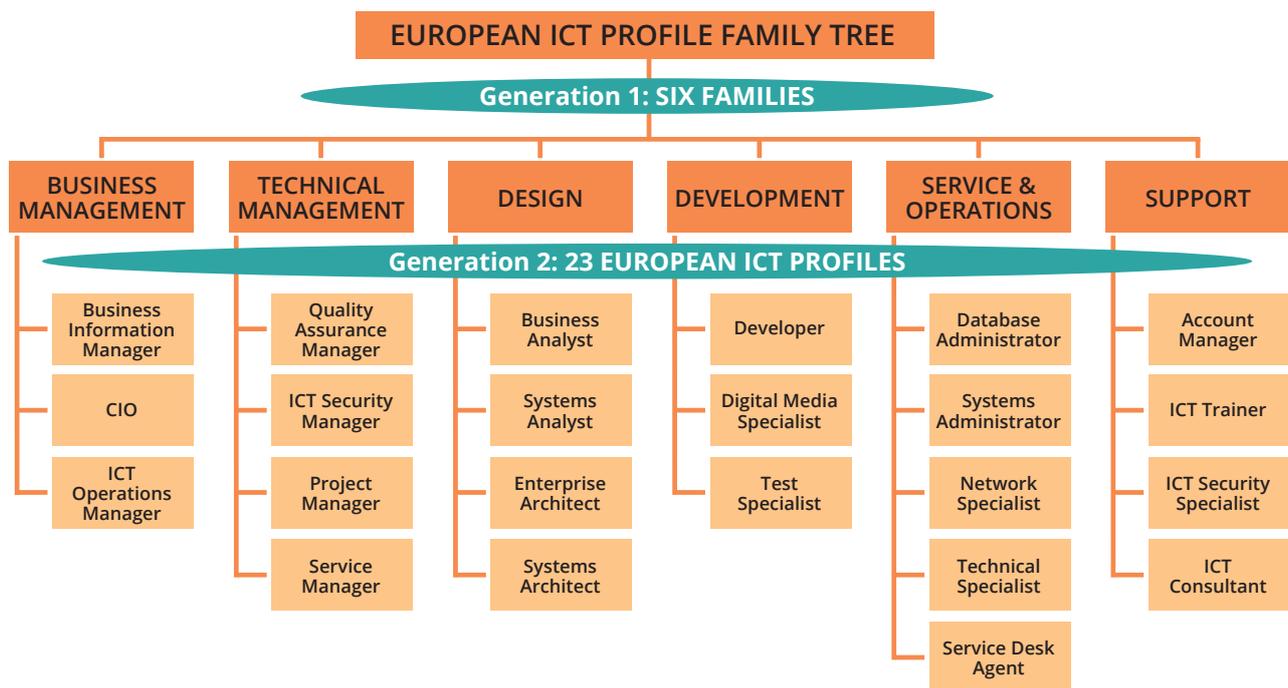


Figure 1: European ICT Profile Family Tree.

Source: CEN Workshop Agreement „European ICT Professional Profiles“ (May 2012)

Another important result of the Workshop on ICT Skills is the eCompetence Framework (e-CF), a reference framework of 36 ICT competences that can be used and understood by ICT user and supply companies, the public sector, educational and social partners across Europe. It is intended to support the definition of jobs, training courses, qualifications, career paths, formal and non-formal learning paths, certifications etc. in the ICT sector and serves as shared reference for national, European and global ICT vendor and user companies as well as qualification and certification providers.¹⁰

EU key competences for lifelong learning: „digital competence“

Another point of reference related to ICT skills in Europe is the key competence number 4 as set out in the document Key Competences for Lifelong Learning, published in 2006. According to it, „digital competence involves the confident and critical use of Information Society Technology (IST) for work, leisure and commu-

⁹ CEN 2012, p. 4-5

¹⁰ CEN 2012, p. 6-7. See for further information www.ecompetences.eu



nication. 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.” Sound understanding and knowledge of the nature, role and opportunities of Information Society Technology (IST) in everyday contexts (personal, social life and at work), including main computer applications such as word processing, spreadsheets, databases, information storage and management are mentioned as essential knowledge. Further skills mentioned are to have an understanding of the opportunities and potential risks of the Internet and communication via electronic media (email, network tools) for work, leisure, information sharing and collaborative networking, learning and research. Also, individuals should understand how IST can support creativity and innovation, and be aware of issues around the validity and reliability of information available and of the legal and ethical principles involved in the interactive use of IST.¹¹

As to the skills needed, digital competence includes the ability to search, collect and process information and use it in a critical and systematic way, assessing relevance and distinguishing the real from the virtual while recognizing the links. Individuals should have skills to use tools to produce, present and understand complex information and the ability to access, search and use Internet-based services. Individuals should also be able use IST to support critical thinking, creativity, and innovation. Use of IST requires a critical and reflective attitude towards available information and a responsible use of the interactive media. An interest in engaging in communities and networks for cultural, social and/or professional purposes also supports this competence.¹²

Summing up this chapter, it should be stressed that the key competence “digital competence” is rather orienting towards the ability to use ICT, whereas from the perspective of professional profiles in the ICT sector, ICT related skills and competencies are going far beyond „using technology“ towards the design and develop of technology itself. This differentiation turns to be of central relevance when designing projects or initiatives developing or supporting girls’ interest in ICT: According to findings from research conducted in the project „PREDIL Promoting Equality in Digital Literacy“, there are no differences as to the extend girls and boys are nowadays using ICT in school or leisure. The gap appears when it comes to the question of who is creating, who is developing technology used in society, where highly specialized knowledge on technology is needed. In this respect, the term of “ICT practitioners”¹³ might be worth to explore further, as opposed to “user”.

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11 Key Competences for Lifelong Learning – A European Framework, 2006, p.7

12 Key Competences for Lifelong Learning – A European Framework, 2006, p.7

13 Used for example in the Eurydice report 2011 on Key Data on Learning and Innovation through ICT at School in Europe 2011, page 26.



National strategies on Entrepreneurship Education and ICT in Secondary School

National strategies or action plans on entrepreneurial skills

According to the EACEA/Eurydice report „Entrepreneurship Education at School in Europe. National Strategies, Curricula and Learning Outcomes“ published in 2012, most of the European countries have only recently launched national strategies promoting entrepreneurship education. For the countries involved in the project ICT-Go-Girls!, the report states, that Poland launched a strategy in 2010, followed by Spain, Austria and the Flemish part of Belgium in 2011. As to 2012, Germany is reported to have no national strategy which explicitly focuses on or includes entrepreneurship education.¹⁴

In the case of the *Flemish Community of Belgium*, the government launched by the end of 2011 the so called Action Plan for Entrepreneurship Education 2011 – 2014. This was based on a shared initiative between the Prime Minister, the Minister for Economy and Agriculture, the Minister for Education and the Minister for Employment, with the objective to prepare students for self-employment as well as providing teacher trainings on creating a positive attitude among students towards entrepreneurship and self-employment.

Austria and Poland refer to the framework of the Recommendation of the European Parliament and Council on Key Competences for Lifelong Learning mentioned in the previous chapter, setting out eight key competences, the 7th being entrepreneurship. Based on this, both countries have created and adopted national strategies for lifelong learning including objectives for the implementation of entrepreneurship education.

In the case of *Spain*, the Ministry of Education and the different Autonomous Communities develop entrepreneurship education by regulations on education including aspects on entrepreneurship education and educational initiatives for its promotion. Also, the 2011 Plan for Entrepreneurial Support established by the Ministry of Industry, Energy and Tourism fosters actions to promote entrepreneurship initiatives. Furthermore, the report mentions local and regional strategies for the promotion of an entrepreneurial culture. These aim at encouraging regional education authorities to carry out a wide range of initiatives, including the sharing of methodologies and educational materials for entrepreneurial education, introducing curricular and extra-curricular activities, collaborating with regional ministries, chambers of commerce, associations and other private bodies, such as Junior Achievement.¹⁵

National strategies or action plans on ICT and related areas

Specifically on ICT, the Eurydice report “Key Data on Learning and Innovation through ICT at School in Europe 2011” shows that all European countries have national strategies in place to foster the use of ICT in different areas. Beside this, 28 countries have adopted an ICT strategy particularly in the field of education, aiming in many cases at providing ICT skills (digital literacy skills) to pupils and training in ICT for teachers. Another important feature of these strategies is the provision of up-to-date technology and infrastructure in schools. Target groups are mainly students and teachers in primary and secondary education, to a lesser extent they target higher education, parents, adults and the general public. As monitoring actions the report mentions that the Flemish Community of Belgium as well as Spain and Poland have developed indica-

¹⁴ EACEA/Eurydice 2012 b, p. 7

¹⁵ EACEA/Eurydice 2012 b, p. 13-14



tors on infrastructure and on the information society in order to measure progress in implementing the ICT strategy; as to Belgium, it also includes stakeholder perceptions about the educational use in ICT. Germany is conducting regular reportings on activities and projects. In the case of Poland, a specific institution responsible for the monitoring of the implementation of the Polish ICT strategy is existing, but with focus more on general ICT and/or broadband strategies rather than on educational aspects. There is no extra information on monitoring activities in Austria, but the general figure on central monitoring mechanisms in the Eurydice report suggests that monitoring mechanisms are in place.¹⁶

Beside the above mentioned “digital competence”, being key competences number 4, another key competence, namely “mathematical competence and basic competences in science and technology” is of high relevance for ICT. Therefore, beside national strategies explicitly referring to ICT, we would like to mention here also national strategies in the fields of mathematics, science and engineering provided in the Eurydice report “Developing Key competences at School in Europe”.

Spain A national strategy to support the development of individual key competences in Science: National Strategy for Science and Technology 2007 – 2015 (Estrategia Española de Ciencia y Tecnología – ENCYT).¹⁷

Austria National strategy covering several key competencies: national programme IMST (Innovations Bring Schools to the Top), aiming to improve among others the instruction in information technology. This programme started in 1998 and will be extended from 2013 for further three years. Gender sensitivity and gender mainstreaming are important principles of this programme and their implementation is supported by the Gender Network.¹⁸

Germany The Federal Ministry of Education and Research launched a High-Tech Strategy in 2006 to encourage the development of new products and innovative services. This strategy has been extended to 2020. Worth mentioning in the context of ICT-Go-Girls! is the aim to attract more young people to courses in the so-called MINT subjects (mathematics, information technology, natural sciences and technology) and the National Pact for Women in MINT Professions, thus also including the field of ICT. In addition, the Kultusministerkonferenz issued in 2009 recommendations to reinforce MST education (mathematics, science, technology), including among others the improvement of the image of science in society, changing curricula and teaching approaches.¹⁹

Belgium Here, the Department of Economy, Science Policy and Innovation has launched the action plan Science Communication and a related science information network.²⁰

Poland According to the Eurydice report, Poland is currently working on several strategy documents, one of them being the Strategy for the Development of Social Capital 2011 – 2020. Of interest for ICT-Go-Girls! is here the fact that this strategy envisages to support the development of ICT competencies and recommends the wide use of ICT in learning activities. Annexed to the Strategy is a document entitled “the LLL Perspective”, including the aim to “education and training tailored to the needs of the economy and to changes in the labour market”, thus directly referring to the development of key competences.²¹

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16 EACEA/Eurydice 2011, p. 26-28

17 EACEA/Eurydice 2012 a, p. 57

18 EACEA/Eurydice 2012 a, p. 58

19 EACEA/Eurydice 2012 a, p. 59

20 EACEA/Eurydice 2012 a, p. 57

21 EACEA/Eurydice 2012 a, p. 62

Integration of entrepreneurship and ICT into national curricula

In the context of this project it is important to remember that „secondary education“ might cover different age groups, depending on the duration of primary education as well as the age entering primary education. Therefore, before presenting an overview on the integration of entrepreneurship and ICT in the national curricula of the countries involved, you find below an overview to the classification based on the International Standard Classification of Education (ISCED), which is used in the different Eurydice reports forming the basis for the following chapter. Relevant for primary and secondary education are ISCED 1 (primary), 2 and 3 (lower and upper secondary education).

Duration and age groups for primary and secondary school level in ES, BE, PL, DE, AT

Source: numbers taken from the Eurydice information on national educational systems (as May 2013)

Country	Primary Education ISCED 1		Lower Secondary Education ISCED 2		Upper Secondary Education ISCED 3	
	duration	age	duration	age	duration	age
Spain	6 years	6 - 12	4 years	12 – 16	2 years	16 – 18
Belgium (Flemish)	6 years	6 - 12	2 years	12 – 14	4 years	14 – 18
Poland	6 years	7 - 13	3 years	13 – 16	3 years	16 – 19
Germany	4 years	6 - 10	6 years	10 – 16	2 - 3 years	16 – 18 (19)
Austria	4 years	6 - 10	4 years	10 – 14	4 years	14 – 18

Entrepreneurship in national curricula

According to the EACEA/Eurydice report on Entrepreneurship education in Europe, there are different approaches to integrate entrepreneurship education in curricula: cross-curricular, integration into existing subjects or introduction as a separate curriculum subject. In most cases, there are many different combinations of approaches throughout Europe. Moreover, the overall pattern of provision changes significantly from one school level to another.

In general lower secondary education (ISCED 2), subject areas most likely incorporating entrepreneurship education are economics, business studies and careers education, either as compulsory or as optional subjects. Beside this, social science subjects are mentioned being still the locus of entrepreneurship education in many countries, with a majority of countries offering it as compulsory subject.²² At lower secondary level, Spain is the only country within the consortium which has entrepreneurship education as a subject.

In general upper secondary education, all countries recognize entrepreneurship education in the steering documents, even if the exact term ‘entrepreneurship’ is not always used.²³ According to the report, Poland is the only country, also in the context of all 31 countries studied, where entrepreneurship is included as a separate compulsory subject in upper secondary education, which was introduced 2009 with gradual implementation until 2016. Austria is one of the countries where entrepreneurship education at upper secondary education is optional or part of a specific branch. It should be noted that the integration of entrepreneurship into subjects like mathematics, sciences, technology or ICT is rather seldom in general secondary education in the countries of the European Union.

²² EACEA/Eurydice 2012 b, p.13

²³ EACEA/Eurydice 2012 b, p.16



The following table gives an overview of the level of integration of entrepreneurship as set out in the official steering documents for school curricula at primary and secondary level. As to primary education, the Eurydice report does not include more detailed information on the subjects, in which entrepreneurship might be integrated. However, one can see that entrepreneurship plays a role for three out of five countries involved in ICT-Go-Girls! already in primary education.

Subjects integrating entrepreneurship education in primary (ISCED 1) and general secondary education (ISCED 2 & 3) in the school year 2011/2012

Source: based on figures from EACEA/Eurydice 2012 b

ISCED 1 primary education	BE nl	DE	ES	AT	PL
Not explicitly mentioned in steering documents	x	x			
Cross curricular			x		
Separate compulsory subject or integrated in comp. subjects				x	x

ISCED 2 general lower secondary education	BE nl	DE	ES	AT	PL
Cross curricular	x	x	x	x	
Separate subject or integrated in subjects					
Entrepreneurship					
Economics, business studies and careers education					
Social sciences					
Maths, sciences, technology, ICT					
[Arts and Music]					

ISCED 3 general upper secondary education	BE nl	DE	ES	AT	PL
Cross curricular	x		x	x	
Separate subject or integrated in subjects					
Entrepreneurship					
Economics, business studies and careers education					
Social sciences					
Maths, sciences, technology, ICT					
[Others: Ethics/French]					

Non compulsory/optional branches
 Compulsory for all

ICT and digital competence

First of all, it should be noted that the information given in this section is based mainly on the Eurydice report on Key data on Learning and Innovation through ICT at school in Europe, drawing on data of the school year 2009/2010. Therefore, the following overview can provide only some first orientation, as ICT have changed rapidly in recent years and consequently, the different forms and frequency of its use.



Similarly to entrepreneurship, the development of digital competences can be found either as cross-curricular, separate compulsory or optional subject or as integrated into another compulsory or optional subject. In this respect, the Eurydice report 2011 emphasizes that ICT should be embedded across the whole curriculum and through specific tasks in all subjects, thus ensuring the development of digital fluency. Generally, the approach to integrate ICT as a general tool used in different subjects is applied in all five countries involved in ICT-Go-Girls!. In addition, ICT can be found as a separate subject in Poland at primary level. Furthermore, ICT is included in technology subjects as well as a separate subject at secondary level in all countries of the project except Belgium.²⁴

On the other hand, national steering documents not only make recommendations for the use of ICT by students, but also by teachers. As to students, all countries involved except for Poland suggest that students use ICT in relation to specific subjects.

Student use of ICT by subject area according to official steering documents in primary and general secondary education (ISCED 1, 2 and 3) 2009/2010

Source: based on figures of EACEA/Eurydice 2011

Students ISCED 1 primary education	BE nl	DE	ES	AT	PL
Language of instruction					
Mathematics					
Foreign languages					
Natural Sciences					
Social Sciences					
Arts					

Students using ICT ISCED 2 and 3 secondary education	BE nl	DE	ES	AT	PL
Language of instruction					
Mathematics					
Foreign languages					
Natural Sciences					
Social Sciences					
Arts					

Students use ICT in class
 Students use ICT in class and for complementary activities

In BE, ES, AT and DE, the use of ICT recommended for teachers in subject areas is suggested; in the case of DE only for the field of natural sciences. For Poland, no reference is made in relation to the use of ICT by teachers, which might have changed since the period included for the report, which is 2009/2010.

²⁴ ACEA/Eurydice 2011, p.40



Teacher use of ICT by subject area according to official steering documents in primary and general secondary education (ISCED 1, 2 and 3) 2009/2010

Source: based on figures from EACEA/Eurydice 2011

Teachers using ICT ISCED 2 and 3 secondary education	BE nl	DE	ES	AT	PL
Language of instruction					
Mathematics					
Foreign languages					
Natural Sciences					
Social Sciences					
Arts					

If linking the development of EU key competences with ICT, all countries involved in this project make explicit references in their steering documents. It should be noted that in the overall picture for the European countries, ICT is least frequently recommended for the key competences of „learning to learn“ and „entrepreneurship“.²⁵ However, if looking at the five countries involved in ICT-Go-Girls!, most of them make explicit reference to use ICT in developing the key competence „entrepreneurship“ (BE, ES, AT, PL).

EU key competences and the use of ICT in central steering documents for primary and general secondary education (ISCED 1, 2 and 3) 2009/2010

Source: based on figures from EACEA/Eurydice 2011

ISCED 1 primary education	BE nl	DE	ES	AT	PL
Mother tongue					
Foreign languages					
Digital competence					
Mathematical and scientific competence					
Learning to learn					
Social and civic competences					
Entrepreneurship					
Cultural awareness and expression					

ISCED 1 primary education	BE nl	DE	ES	AT	PL
Mother tongue					
Foreign languages					
Digital competence					
Mathematical and scientific competence					
Learning to learn					
Social and civic competences					
Entrepreneurship					
Cultural awareness and expression					



General reference



Using ICT suggested

²⁵ EACEA/Eurydice 2011, p.33

In the following table, specific learning objectives related to the use of ICT are set out. One observation is that skills like „knowledge of computer hardware and electronics“ and „developing programming skills“, which are more oriented towards „designing ICT“, are hardly addressed at primary level in the countries involved in ICT-Go-Girls!, except for Spain and Poland. As it has been pointed out earlier, there might be some overlapping in more countries when it comes to the actual grade and age of the students, due to differences in duration of primary and secondary schools. However, “knowledge of computer hardware and electronics” or “programming skills” are addressed mainly at secondary level, except for Belgium/Flemish Community.

ICT learning objectives in central steering documents for primary and general secondary education (ISCED 1, 2 and 3) 2009/2010

Source: based on figures from EACEA/Eurydice 2011

ISCED 1 primary education	BE nl	DE	ES	AT	PL
Knowledge of computer hardware and electronics			X		X
Using a computer	X	X	X	X	X
Using mobile devices			X		X
Using office applications		X	X		
Searching for information	X	X	X	X	X
Using multimedia	X	X	X		
Developing programming skills					
Using social media			X		
other	X	X	X	X	

ISCED 2 and 3 secondary education	BE nl	DE	ES	AT	PL
Knowledge of computer hardware and electronics		X	X	X	X
Using a computer	X	X	X	X	X
Using mobile devices		X	X		X
Using office applications		X	X	X	X
Searching for information	X	X	X	X	X
Using multimedia	X	X	X	X	X
Developing programming skills		X	X	X	X
Using social media		X	X	X	X
other	X	X	X	X	X

Differences in using ICT in School and at Home

A detailed insight into the different forms of integrating ICT in school activities, including information on software use and social media can be found in research findings of the already mentioned project PREDIL – Promoting Equality in Digital Literacy. The research report, published in 2010, focuses on gender issues in the context of digital literacy and compares ICT use in school and private in several European countries, among them Spain, Poland and Germany. One interesting finding is that across all countries studied only little use is made of different sorts of software both at home and at school. According to the report, 50% of pupils say that they never programme or create web pages either at home or at school; more than 50% of pupils report that they never download data at school. It should also be noted that the majority of respond-



ing pupils belonged to the age group 16 and older (upper secondary level). Another interesting feature was found in relation to the social use of computers: Here, the authors report a lack of software use in school while it is used very commonly by pupils outside school, notably surfing the web, using email, using social networking software and chat. Also, software that receives a good deal of media attention, such as blogging and VOIP, find little use in school. Furthermore, authors found a marked lack of interest in programming both at school and at home. If at all, then the little which is done at home in this respect is found to be consciously done by more boys than girls. Little use is made of forums at school and only moderate use made at home; use was found more frequent by boys than girls. When it comes to the use of social networks, from all social networking activities, instant messaging (texting) was found consistently the most common for boys and girls, and, consistently, a much higher proportion of girls than boys are engaged. A much higher proportion of boys than girls engage in playing games. Furthermore, the analysis shows that surfing the web is a very popular activity in schools, but at home even greater.²⁶

Online Safety

One important topic in developing digital literacy among young students is that of online safety (OS). Drawing on data from a detailed study on Education on Online Safety in Schools in Europe (2010), online safety is considered to be of high importance and as such found to be a constant topic in curricula, covering the following main six main elements: safe online behavior, privacy issues, cyberbullying, downloading and copyright issues, safe use of mobile phones and contact with strangers. From these, the study emphasizes the importance of the topic „contact with strangers“ in national curricula. Similarly, cyberbullying and safe use of mobile phones – even though less apparent in curricula as an online safety issue - are mentioned to be of growing importance. All these topics are included in education programmes for primary and general secondary education in the countries involved in ICT-Go-Girls! except for the Flemish Community of Belgium. Here, the topic “safe use of mobile phones” is not mentioned at all in primary or secondary education.²⁷

Learning outcomes in entrepreneurship education linking to ICT competences

The already mentioned Eurydice study on Entrepreneurship education looked also at specific learning outcomes defined by central educational authorities.²⁸ Without going to deeply into the results of the report, some learning outcomes mentioned at national level should be highlighted here, as they mention explicitly ICT in conjunction with learning outcomes in the field of entrepreneurship education. This helps to get a better understanding of how ICT so far is intended to be linked to entrepreneurship education, thus a relevant aspect for the development of our project:

Poland At the level of ISCED 2, lower secondary education, the study mentions an IT example in relation to entrepreneurship: to use a calculation sheet for solving arithmetical problems such as planning of expenses; prepare presentations of data and reports; At level ISCED 3, upper secondary education, the study mentions as example for the use of IT skills in entrepreneurship education data collection and presentation and the use of databases.

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26 PREDIL country report Germany 2009, p. 9-11

27 EACEA/Eurydice 2011, p. 41-42

28 The following definition of learning outcomes was used in the report: Learning outcomes are statements of what a learner is expected to know, understand and/or be able to demonstrate on completion of a learning activity including any specific intellectual and practical skills gained. The report points out that the concept of learning outcomes is still under development and widely discussed. For the analysis of learning outcomes in the different countries the authors used the adapted model of Heinonen and Poikkijoki (2006), pointing out that the comparability between countries is limited as the understanding and use of learning outcomes varies nationally. And a common European understanding and approach to learning outcomes for entrepreneurship education is still to be developed. EACEA/Eurydice 2012 b, p.19



Spain In Spain the study states a high level of career guidance activities, thus linking also to entrepreneurship education. In relation to the use of IT, the study mentions learning objectives like to “search, interpret, assess and use the information related to training and professional paths, using ICT as an essential tool for making any decision.” Within assessment criteria the following learning outcomes related to ICT are mentioned: “to adequately employ ICT, as well as the other resources and sources of information available in order to get some information about training and employment opportunities”.

Belgium – Flemish Community There is no explicit mentioning of ICT skills or digital skills relevant to develop entrepreneurship competencies. However, the report states that schools in this region have a high level of autonomy to determine the curriculum and teaching methods.

Germany No explicit mentioning of ICT skills or digital competencies in the learning outcomes related to entrepreneurship competencies. But this needs further exploration due to differences in the educational system at level of the Länder.



Why girls do (not) participate in ICT? Why do women leave the ICT sector?

Why girls and young women opt (or not) for ICT

In a qualitative study done with girls and young women from seven European countries²⁹, Zauchner et al. found the following aspects on the question why girls would opt (or not) for a career path in the field of ICT, scientific or engineering professions:

- » *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 only knew very typical jobs in the fields (in ICT: web designer), and could not imagine a realistic working day in one of these fields. Among the women interviewed, the lack of job information was mentioned as major impeding factor to pursuit careers in the field.
- » Linked to the previous point, *relevance of context-practical applicability in these fields was questioned* and here, the importance to integrate theoretical concepts with the applicability and, even more, the issue of „doing good for society“, to do something „meaningful“ and being „creative“, to develop new ideas or products which could be beneficial for society or at least be practically relevant for other people. This hints to the theoretical orientation of education with too little practice mentioned by the girls in the workshops as impeding factor, but also a lack of appropriate information concerning the professions.
- » The *decisive role of family, teachers and peer group* was stated by the women interviewed, the same is for the next factor:
- » *Early playful experiences with computers* was stated as decisive role for the women
- » Girls mention as impeding factors *long training periods*, which they imagine to be very difficult and *requiring a high degree of intellectual abilities*. In this respect, especially the young girls were less confident about their abilities to pursue such a career.
- » *Balance between work and family life* was seen as endangered in the context of such professions.
- » In addition, both girls and women stated that they may (girls) or do (women) *encounter gender-based discrimination* in such professions. Thus, non-acceptance of women in „male areas“ is regarded as impeding factor as well.³⁰

These reasons show the many different aspects for opting (or not) towards a career seen as non-traditional for girls and women, or, as it is often formulated, in „male-dominated areas“. A good model on factors affecting decision-making about careers in IT has been developed by Miliszewska and Moore 2010, covering as main aspects: ongoing school/college influence, ongoing family influences, ongoing peer group influences, but also influences of Higher Education (subject status, currency of IT qualifications) and images and uses of IT in popular culture / the media. On the latter case, this touches not only the images of „nerds“, or the imagination of jobs in ICT seen as unsocial per nature, both old and often found stereotypes. It touches as well the question how girls and women in general are depicted in media, which is put into question.

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 29 Findings of the study are based on a qualitative approach including results from workshops with 261 girls aged 12 – 18 and 37 interviews with female professionals or students in ICT, science or engineering aged 19-30; covering Greece, France, Austria, Poland, Romania, Spain, Czech Republic. See Zauchner et al 2007a.

30 Zauchner et al. 2007a, p. 297-298



Two central questions for professional career choices

According to Jacquelyne Eccles (2007), educational and professional career choices are primarily based on the following two questions:

- » Can I do this?
- » Do I want to do this?

As authors of the Dutch trends analysis of girls in higher STEM education³¹ point out, the answer to “Can I do this?” is closely linked to the girls’ self-concept. If girls have a lower self-concept in relation to STEM subjects than boys, and if more girls than boys have the impression that STEM is difficult and only feasible to those excelling in related subjects, they are much more likely to answer this question with “No, I cannot”. Consequently, answering this question negatively makes it rather unlikely that they will choose a STEM career. This lower self-concept of girls is reinforced (or even built) by the attitude and behaviour of parents, teachers and career advisers. In addition to the first question “Can I do this”, this translates directly into question towards the girls, “Can you do this?”.

As to the question “Do I want to do this?” the same authors point out that it relates to the question whether girls enjoy STEM. In this respect, it is an important aspect whether girls are encouraged (or not) to get involved with STEM and thus have opportunities to develop an affinity in order to enjoy it. Here, it should be underlined what has been observed in various evaluations of projects and initiatives³²: Interest is something to develop and highly influenced by beliefs and attitudes in society in relation to gender, how men and women are supposed to be like. Here, the high impact of role models becomes apparent, when seeing and meeting real persons and based on this, answering the question “Do I want to do this?”. As relevant and closely linked is how much girls are encouraged by parents, teachers and career advisers to do what they like, thus echoing the girls’ own question as “Do you want to do this?”.

Therefore, when planning the project ICT-Go-Girls!, but also for other, similar projects and initiatives, it is of high importance to keep in mind the relevance of these questions and answers by girls (or young women) and also, by teachers and career counselors.

Why women leave the ICT sector?

Based on autobiographical interviews, Griffiths and Moore tried to understand why women leave the ICT sector once they have been in. The starting point for their research was the high percentage of women opting out from the ICT sector in UK once they have been working in it, showing that there is not only a problem in attracting women to work in the ICT sector, but also to retain them. Findings highlight the problem of combining work and personal/family life, as the sector shows a culture towards long working days and, even though there are lots of possibilities nowadays to work remote, a still persisting presenteeism. All this makes it difficult to combine work with family obligations or, to make this even more explicit, with motherhood. It relates both to the physical load of carrying out a child and the problem of combining family life with unchanged expectations of full (or over) time availability for career advancement. It also relates to the mere fact that the necessary break for maternity leave has shown to draw back women in their career.

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³¹ Booy et al. 2012, p. 17

³² For example, this can be found in the evaluation reports for the Austrian-German project „female” and the German project „Roberta.”



In addition to these aspects, overt and covert forms of bullying or harassment, discriminatory and sexist behavior by male colleagues were mentioned by interviewees, which underlined the „unusualness“ of these women working in a technical field. Other reasons for opting out were ageism, illness or disability. As to the latter, it should be mentioned it is the high stress of the sector women said that it led to physical constraints.³³

These findings drawn from the viewpoint of female professionals in ICT are of high interest for the development of any supportive initiatives or projects, because they clearly reflect the reasons given by young girls, why they wouldn't opt for a technical career: future motherhood, related responsibilities for a child and how to combine this with an working environment perceived as highly stressful is an aspect relevant for girls; the same is for worries on possible discrimination in a male-dominated environment. It meets also the formulation of „uncomfortable rooms for women“ mentioned during the Girls in ICT Day in Brussels 2013, or „chilly workplaces for women“, as Faulkner formulated it in the final report of the project „Strategies of Inclusion: Gender and the Information Society“.³⁴ These aspects are of relevance also in relation to the two questions for career choice mentioned above: „Can I do this“ and, even more, „Do I want to do this“. Here, in addition to the aspects of mere competence and interest for the subject, the „intellectual capability“, it is the perceived working environment of the ICT sector itself which is questioned in relation to gender. If linking this for example with the model of factors developed by Miliszewska and Moore, this questioning is echoed by teachers, job counselors, parents, peers, future employers etc. This shows the importance to address in activities promoting girls in ICT, the existing worries of girls in relation to the working environment and work life balance, or, to be more specific, on motherhood and how to react on harassment. Also, it underlines the many facets that still need to be changed in the ICT sector in order to make it an attractive future workplace for girls.

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³³ Griffith and More, 2010

³⁴ Faulkner, 2004



Part II Findings from Projects and Initiatives on Successful Project Design

In this chapter, main findings from analyzing projects and initiatives in the field of promoting girls in ICT and entrepreneurship education are presented, starting with some general observations from the analysis in both fields.³⁵ Later, we abandon the differentiation between projects in the field of ICT and in entrepreneurship education and structure our observations from both fields around the most salient features we found in our review. As such, the two areas, so far hardly connected, are combined for the purpose of the project ICT-Go-Girls!. On this basis, we will formulate recommendations to guide the development of the methodology for ICT-Go-Girls!, which will be presented at the end of this report.

General Note on Projects and Initiatives Promoting Girls in ICT

Depending on the perspective of stakeholders involved, the starting point for projects and initiatives focusing on ICT and girls is often the lack of qualified human resources in certain areas like engineering, ICT, science. Another reason closely linked is the gender gap in related subjects at upper school levels, in higher education and in vocational education leading to well known gap later on in the ICT sector. A problem often addressed in this respect is the opting out of girls from technical/scientific subjects in school or studies, even though it is reported that girls start with same interest in early childhood, often having even better educational results in areas relevant for STEM. The combination of ICT subjects in school with entrepreneurship in the ICT-sector has not been much addressed in the projects analyzed. Instead, projects and initiatives are rather oriented towards increasing girls participation in STEM, as future highly qualified human resources, but not for becoming a woman entrepreneur in the ICT sector. Below, features and approaches to raise secondary school girls' interest in ICT and more generally in STEM are presented:

- » ***Often designed for girls only, gender aspects of high importance*** Most of the projects and initiatives in the field of promoting ICT and / or STEM among girls are designed and conducted for girls only. Few exceptions of projects working with mixed groups are: Roberta, Roberta goes EU, Gesebo, manuals for equality in education Austria, the ni+ni initiative.
- » ***Activities between schools and in collaboration with stakeholders outside school*** Many of the projects and initiatives are realized between schools and companies, universities, but also in relation to opening up higher secondary schools with technical profile for special girls days, girls scouts programs etc. To mention here the Austrian initiative "HTL4girls" or "Girls towards Polytechnical schools" in Poland. One of the central reasons for such collaborations is to get an insight into certain job profiles, to create personal contact with specialists working in these companies etc.. Also, collaborative activities between schools and companies are often referred to as "career counseling"
- » ***Role model approach*** This approach can be found often and is described as very effective, as it provides missing insights into how it is to be a woman in a non-tradition job profile, for example in ICT. Formats used are for example the presentation of job profiles via information brochures, but also depicting girls more prominently in information material. Films are often used to present role models; also more often realized during the above mentioned activities in collaboration with companies/universities: meeting real role models.
- » The importance of ***practical, hands-on activities*** are emphasized, where girls can try out different things themselves

³⁵ For the full list of projects and initiatives see Annex 2.



The approach of game based learning was not as often used in practice, though its potential is often underlined in literature, for example, when it comes to exploring different roles, life styles etc.³⁶ Also, we observed that despite the fact that projects are usually drawing on research from gender studies and acknowledge the different factors and actors influencing gender stereotypes, most of the reviewed projects focus on the girls and their behaviour only. We would like to highlight this also in the context of a central issue in promoting girls (or women) in ICT described earlier in this report: the aspect of responsibility for the gender gap (girls only?) in ICT and how this problem is tackled in practice. Our review showed that projects often neglect the highly influential factors known from research: teachers, parents, counselors and employers.

General Note on Projects and Initiatives Promoting Entrepreneurship

First of all, it should be noted that projects explored in this analysis and from information given in the diverse reports on gender/ICT, it appears that projects or initiatives to promote entrepreneurship address both girls and boys. Another finding is that gender aspects and consequently, gender sensitive didactics or project design is not much in the center of attention related to entrepreneurship education.³⁷ In the projects analyzed one can even see that male and female stereotypes are often even enforced, being it in language, pictures, stories or choice of topics used in teaching materials. Furthermore, there are so far no projects targeting entrepreneurship in the ICT sector at school level, for example addressing the question of women entrepreneurs and/or women entrepreneurs in the ICT sector. This aspect is insofar of interest, as promoting entrepreneurship among women has become an important issue in European policy in recent years and which is reflected in several initiatives presented in the www.gender-it.eu project or www.gender-it.org/projects. Another important observation is that projects and initiatives in the field of entrepreneurship education actually include more or less explicitly the aspect of using ICT in entrepreneurial activities, for example in order to enhance business processes. This should be underlined, as it relates to the issue pointed out earlier: the difference between using and developing ICT. Below, widely used approaches and features in projects and initiatives promoting entrepreneurship at secondary school level are summarized:

- » Activities are always realized in *mixed groups* of girls and boys.
- » *Mini companies* or “virtual companies”, “student companies”, often realized as group work and ranging in their activities from the verification of demands, development of related products or services, the definition of the internal organizational structure of the company and presentation of these features to the level of putting these products or services into practice, that is to produce and distribute products, to offer services in “real”, in the framework of school life, special markets, competitions up to virtual settings.³⁸
- » *Simulation games* simulating economic processes as well as activities of firms or other stakeholders in this context (for example, governments) are often used in educational contexts, described as being helpful to develop a better understanding of abstract economic processes.
- » As a general feature often emphasized in entrepreneurship education, *practical, hands-on activities* are often mentioned as helpful, successful approaches. In this respect, the role of the teacher is often underlined to act as facilitator, for support.

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36 See for example, Zauchner 2007 a.

37 With the exclusion of one Polish initiative and the example of HP life, as to the Polish initiative, teaching material is provided addressing the issue on business woman; HP life includes stories on women – also young women – as entrepreneurs; a non-discriminatory or inclusive approach is important in this initiative here, focusing on age and ethnic groups.

38 One in-depth discussion on this approach can be found in the evaluation report “Entrepreneurs without borders” by Briessinck 2010, analyzing the project ECE “European Commitment to Entrepreneurship”. Also of interest in this respect is the report “Best procedure project: mini-companies in secondary education” published in 2005 by the European Commission.



Stressed in theory, overlooked in practice: gender sensitive didactics and career counseling

As discussed above, the issue of raising girls' participation in ICT (and consequently, women working in the ICT sector) is that of a complex relationship of many different factors. Gender stereotypes are reinforced by many different actors – being it parents, teachers, job counselors, employers, the media or the peers (girls and boys) themselves, calling for responsibility of these. Drawing on findings from biographical research³⁹ it can be said that of utmost importance for girls choosing a non-traditional career path are supporting parents and teachers. It is not only missing knowledge about professional profiles in ICT, the geek image linked to ICT, but also about challenging stereotypes on gender and ICT in the sense of “girls do this, boys do that”. To challenge these stereotypes on gender and ICT, gender sensitive didactics and reflexive coeducation are central concepts for the success of projects aiming to improve girls' participation in non-traditional educational and professional pathways.

Gindl et al. describe gender sensitive didactics not as much by certain contents or methods, but as a conscious raising of awareness towards all questions on gender relations in designing learning processes.⁴⁰ Dimensions of gender sensitive didactics are set out by Derichs-Kunstmann et al. as follows:

- » methodology and didactics
- » addressing gender relations content-wise
- » reflecting of gender specific acting of the teachers
- » gender awareness in the organization of framework conditions.⁴¹

It should be underlined that the concepts “gender sensitive didactics” and “reflexive coeducation” put teachers and teaching activities in the center of attention, their influence on communication processes in the classroom (between pupils, and pupils and the teachers), on topics and their presentation, language use. This also includes the teachers' own beliefs and stereotypes on gender as well as on their understanding about which career paths are normal in which areas. Beside the importance of training those conducting educational activities (teachers, job counselors, volunteers etc.), the influence of the design of educational materials is also stressed. This covers the aspects of language, pictures and stories used in order to avoid the perpetuation of stereotypes. A further aspect included in this concept and mentioned in several project evaluations and in research as highly influential is that of how topics in school subjects – in our case: ICT – are chosen and presented, thus making them more attractive for the girls. This aspect underlines findings mentioned earlier, where the importance of linking technology to practical problems, providing solutions for practical problems was underlined as important aspects to make technical fields attractive for girls.

Defining target groups: whom to address - whose problem is it?

Having this said, it should be noted that gender sensitive didactics or reflexive coeducation are often overlooked in practice, despite the high potential to bring in change. Among the activities and projects in the field of promoting girls in ICT, we found only few projects which were addressing other groups than the girls

39 For example, the already mentioned qualitative study by Zauchner et al. 2007 a, but also findings in the analysis done for the project WITE – women in technical education, for Northern Italy, in 2011.

40 Gindl, M., Hefler, G., Hellmer S., 2007

41 Derichs-Kunstmann, K., Auzra, S., Müthing, B., 1999 „Von der Inszenierung des Geschlechterverhältnisses zur geschlechtergerechten Didaktik“, 1999



themselves, for example parents or teachers. Instead, projects focus mostly exclusively on the girls, aiming at a change of their attitude and not challenging the attitudes and viewpoints of teachers and parents. Only few projects include teacher trainings in gender sensitive didactics, gender mainstreaming or similar, thus addressing the question of gender stereotyping directly to the teachers involved. As to projects and initiatives promoting entrepreneurship education the aspect of gender awareness or gender sensitive didactics is not treated at all.

Another example how quickly the role of teachers is forgotten is the following: In 2013, a Code of Best Practices for Women and ICT has been published, seeking to be a „rallying point for stakeholders wishing to support and promote the greater participation of women“ in the ICT sector, ensuring that more women choose careers in the sector. The report gives recommendations toward different sectors, including education and more precisely towards schools and higher education institutions. Acknowledging the high importance of having achieved such a document calling for attention of the problem among several stakeholders, we would like to stress that the role of teacher training in gender sensitive didactics in the above described sense is not addressed here, despite the fact that there is evidence on the high and continuous influence of teachers in the choice of educational and career pathways. Another example to illustrate how quickly teaching itself and the teacher as actor disappears in activities promoting girls in „non-traditional fields“ is the mentioned model on factors affecting decision-making about careers in IT: related to the school's influence, we find general factors like „quality in IT teaching“, which might hint also towards gender sensitive teaching. However, if looking more closely at the field of intervention, which is in this case the girls computer club, the facilitators influence is explicitly mentioned, thus making a clear reference to the responsibility and influence of people involved. The same is for „family influences“ (mothers', fathers' competences, attitudes mentioned) or in relation to peer groups. According to the Eurydice report 2010 on Gender differences in Educational Outcomes, the general impression is that attitudes of teachers and teacher educators to gender issues are often conservative and reproduce traditional gender stereotyped ideas and expectations and that most teachers do not learn how to promote gender equality in schools.⁴²

Educational material as key area to reinforce gender stereotypes

This leads to the next aspect often overlooked in practice: that of educational material and how these reinforce gender stereotypes in terms of language, pictures or stories. If girls (and boys) spend a lot of time in school, with their teachers – thus being in touch with certain role models and beliefs – the same can be said about the exposure or time they spent with educational material. As to material developed to promote girls in technical fields, gender aware design of content – being it language, pictures and stories – is an issue in many cases, and naturally so. Opposed to these, it can be said that for projects and initiatives promoting entrepreneurship education the inclusion of gender sensitive didactics is not relevant for the development of material and thus, gender stereotypes are even reinforced. In one example for material developed in the context of entrepreneurship education, one can find only male figures depicting the “head” or “boss” of a company, even though the lesson focuses on different forms to organize a company. If mixed groups of teams are depicted, the number of women is usually less than men. Stories – as often used in educational materials, to exemplify or contextualize a certain problem – also reproduce often stereotypes.

These observations meet findings from other reports. In the PREDIL project, researchers looked also at school books on informatics and information and communication technologies, revealing in the case for Germany, that these materials – with some exceptions – include gender stereotypical contents, where girls are under-represented both in text as in pictures as well as in leading positions or as acting persons. Pre-

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⁴² EACEA 2010, p. 111



liminary analyses of online material for pupils indicate similar results.⁴³ In the case of material from Spain, authors analyzed a portal on “education on values”, dedicated to teaching resources and a teacher training portal. For students the learning material was an online resource portal for the school subject “technology” and another one for the optional subject “informatics”. The results, even though preliminary in this case, too, show that gender stereotypes are still dominant in educational resources, even in the digital format, for example in relation to the predominance of male pictures, language referring rather to male actors. Furthermore, sexist expressions have been found.⁴⁴ The Eurydice report on Gender differences in Educational Outcomes mentions a Polish study indicating that Polish school textbooks are highly stereotyped, reproducing traditional beliefs, where important female figures as well as the goals and achievements of feminist and women’s organizations are ignored. Nevertheless, it can be observed that topics on the social position of women and gender are beginning to appear in Poland, primarily in new textbooks and teaching materials prepared on the basis of recent curriculum reform. Another study on school books in Spain describes differences in the representation of women in pictures, but also in terms of colours, when pale and pink are used for women as well as characterization and behaviour based on gender stereotypes. Another aspect mentioned is the spatial representation showing men mainly in public and women in private spaces or settings. Also, it was said that the composition of the editorial teams producing the texts had little impact on the levels of stereotyping.⁴⁵

What has been stressed about the importance of role models can be repeated also in the context of gender sensitive design of educational materials: with gender sensitive language, pictures and stories these can bring perspectives and stories in the school context different from the ones outside of school – for example, in the media – in order to support girls (and boys) in their imagination of possibilities. Also, reflexive coeducation can also help to compensate stereotypes presented in existing educational material. Even though it would be preferable to have gender sensitive teaching material and resources in general, this is not the case in many countries as described above. Furthermore, as we have seen above, gender stereotypes are built through very different sources and here, the media industry plays an important role. In this respect, gender awareness among teachers can help to address and compensate this situation, too. The same applies to educating young people in how stereotypes on gender, sexist language and images in the media etc. are used: This can also be thematised when working with educational material if it includes a lot of gender stereotypes.

Choice of topics for material etc. Interest needs to be raised, but cannot be expected among girls

It has been pointed out by different researchers that the interest in ICT and to assume a career in this field can be expected as coming by itself, given as something naturally among students – both girls and boys. Instead, as we know from the projects fe|male or Roberta, interest in STEM subjects is something that needs to be discovered and developed step by step. In this respect the way of how technology is presented is important. Research has shown that it is relevant for girls to see how technology and technology development can be applied to concrete practical problems. This touches again the above mentioned question of content design in gender sensitive terms.

Summing up, we found it quite striking to observe how quickly activities on promoting gender sensitive didactics or reflexive coeducation are overlooked or forgotten in practice, despite the policy frameworks on

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⁴³ Baron et al., 2009, p. 56

⁴⁴ Baron et al. 2009, p. 70-71

⁴⁵ EACEA 2010, p. 27



equality education existing in several countries. Thus, the importance to include gender aspects in teacher training, further continuing education and consequently, in teaching practice, with related impacts on the design of teaching materials, the way of presenting topics etc. cannot be overestimated. The same is for the importance to include trainings for main actors involved in projects or initiatives – for example, teachers or job counselors. “Gender” is a social category and nothing stable, it is a result of social practices, best expressed in the formula of „doing gender“.

Resources for Gender sensitive didactics & career counselling

Education to Equality between Women and Men

Didactic manuals have been developed to support teachers, school directors and others in order to put the „educational principle to equality between women and men“ into practice. Materials include a manual for lower secondary schools, containing also practical suggestions on how to realize gender sensitive language in education, on gender sensitive educational material and professional orientation. Includes scenarios to address the issue in all different subjects, including IT. Last update in 2011, available in German.

www.bmukk.gv.at/schulen/unterricht/prinz/erziehung_gleichstellung.xml

Guidelines for gender sensitive design of educational material

Also developed in the framework of the „educational principle to equality between women and men“, helping authors of educational materials and teachers to realize an equal representation of women and men in educational texts and materials for teaching. Last update in 2004, available in German.

www.bmukk.gv.at/medienpool/10336/leitfadengeschlechter.pdf

Gesebo tool box for gender sensitive professional counseling

Gesebo is a resource for teachers and job counselors including 3 manuals on gender aware professional orientation at primary and lower secondary schools: didactical material for (1) classroom activities at primary and secondary level, (2) professional orientation and (3) teacher training courses. In German.

www.gendernow.at/gesebo

Tips for gender sensitive use of ICT in education

The material provides practical help on how to ensure gender awareness when using ICT in education, focusing on gender aware language, images and course design. Published 2012 by the Austrian Ministry of Education, available in German.

www.bmukk.gv.at/medienpool/22645/iktleitfadeninternet.pdf

Ni + ni -, iguales (Neither but neither less, equal)

Didactical material developed 2009 in Spain to address the topic of equality between men and women and educational pathways and further professional careers. The material provides a wide range of didactical scenarios for different subjects, including a card game. Most of the materials are also available online. Available in Spanish.

www.gencat.cat/empresaiocupacio/nimesnimenys/content/inici.html



This shows the importance for self-reflexive approaches and gender awareness of people involved in education, and even more when it comes to the field of promoting girls in ICT: Here, missing awareness about the issue and self reflection among teachers about own beliefs in relation to gender can deepen stereotypes, though unintentionally.

Furthermore, coeducation is an organizational reality of many schools nowadays. Thus, when it comes to realizing activities to promote girls in ICT and organizing these exclusively for girls, this is often seen as “problematic” in terms of organizing class activities: What should the teacher do with the boys during that time? In this respect, reflexive coeducation – and here, the competences of a teachers in this field – offers an approach which is not only meeting the mere organizational question on what to do with the boys. Moreover, reflexive coeducation brings also improvements for the boys as the Roberta initiative in robotics.



Role models – getting in touch: making visible what is possible

In our analysis, we could observe that the approach to include role models is used very often in projects aiming to attract girls in ICT, or, more broadly, in STEM. The relevance of role models has been underlined in several reports, as it is a form to answer the lack of knowledge due to missing role models leading girls not to opt for certain educational and professional pathways. For example, the Women in ICT report 2009 states difficulties for young women to enter the sector due to serious lack of role models to identify with, to follow and possibilities for mentoring: „The stereotypes of the sector cannot be broken unless there is a critical mass of women role models to do so.“⁴⁶ This applies also to the lack of women working at senior level in subjects related to ICT in academia or in a leadership position in general. Formats for the application of the role model approach are very diverse, most commonly used are the following:

- » **Presentation of profiles on women or young female students** This is done in different formats, for example, via profiles on websites, in brochures, magazines, films etc.;
- » **Meeting role models in person** Here, women or young female students are invited to meet with girls during school events;
- » **Engaging ambassadors or female mentors** Often used in practice, especially in the field of promoting STEM among girls is mentoring between young students enrolled in higher education or vocational education. Other forms applied are for example engaging older girls from technical subjects in secondary education to inform and attract girls from primary level to think of non-traditional choices in further school career.

As to profiles given online, very often personal portraits of women are used based on a text telling about the women or a profile, including age, likes/dislikes and often accompanied by a picture. Still, it can be found that texts are often focusing highly on the educational pathway of the women and less on how the day-to-day in their job looks like. Texts are sometimes presented in the format of an interview, with questions and answers, making the presentation thus more appealing and lively. Due to the increased technical possibilities, audiovisual presentations as small videos are becoming more and more popular.

If linking this approach with what has been found in research on gender in ICT, it should be noted that beside information about the educational pathway of the role models, it is important to include also information about:

- » the role models personal life, in order to stress a picture on how to combine work and family, if applicable, with motherhood;
- » insights into typical working activities of the role model – to get a better understanding of the many different aspects in ICT related jobs and entrepreneurship.

Working/studying in ICT is not a guarantee for an effective role model

The Dutch national expert organisation on girls/women and science/technology VHTO has a long standing and wide experience in working with role models in professional guidance activities. What had started in 2005 with a project on role models in ICT (ICTsters – in English “ICT stars”), has developed during the last years towards a large database with over 1900 role models, comprising the heart of activities related to

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⁴⁶ European Commission 2009, p.10



promoting girls in science and technology. In their Trend Analysis: Gender in Higher STEM Education 2011 VHTO underlines the importance of messages a role model puts forward to the girls – being it either in workshops, speeches, speed dating activities etc.: Here, it is important to avoid statements like “it is hard work”, “I am different anyway”, or “I go along well with boys”.⁴⁷ Such statements are very much likely to enforce existing worries among girls – either, that they themselves are not capable to do what the role model did, as this is hard and complicated. Or that they are afraid of working in an environment with mostly men as colleagues – in this respect, statements like “I go along well with boys or men” is of little help. Instead, it is important to address these possible worries of the girls and how to get along with these. Therefore, VHTO undertakes different efforts, all central to the success of the role model activities, making it as effective as possible: telephone briefings for role models as well as the provision of guidelines for role models and schools to prepare for activities involving role models. This refers much to what has been said earlier about gender sensitive didactics or reflexive co-education: with these briefings of the role models and guidelines, VHTO addressed particularly the role models, asking them to reflect on themselves, their attitudes and own stereotypes on gender before starting with the actual activities.

Relevance of closeness in terms of age and place

In addition, the principle “the closer, the better” seems to be an important one: this relates to meeting the women in person or presenting more appealing, lively forms of learning about them virtual, for example via videos instead of presentations based on text only. Secondly, this is also of relevance in terms of age: It is not so likely for young girls to relate to a much older women working in a highly exceptional position – for example, like the German Chancellor – , but more to a young female student or at least a younger women, just starting her career. New interactive approaches might develop in this respect using the possibilities of ICT and here, social media in particular, for example as meetings with role models might be held as a online chat.

Use of tangible objects during role model events

Another experience on successful approaches in conducting role model events given by the Spiegelbeeld initiative: role models should bring something tangible to the event, which is important for their work (product, instrument they work with, etc.). Other interesting approaches applied during role model events by Spiegelbeel are speed datings between girls and the role models.

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⁴⁷ Booy et al. 2011, p. 15



Getting in touch with peers: meeting other girls who are interested

Another helpful approach with some similarity to the role models needs to be highlighted: the role of peers for the girls as important aspect for building confidence especially in nontraditional areas. Here, providing and strengthening opportunities for girls to meet other girls is described to be very helpful. Similar to the role models, it is an important aim to make girls aware of the many other girls elsewhere in the city, country or world, who are also interested in ICT, technical subjects etc.

Here, many options are possible. One form to give more visibility of girls interested in ICT is in organizing events, for example in the context of competitions exclusively for girls. These are found in different girl's days in several countries and are often linked to the possibility to meet and talk to role models.⁴⁸ A good example is the recently organized competition "technikqueen" by the Austrian company OMV late 2012 and beginning of 2013: In addition to the aspect of meeting role models from the companies involved and learning about their lives, joint action with other girls interested in the competition and the competition's topic is an important feature of the program, both in meeting in real and within a specially designed virtual space. Organizers of projects consciously applying the peer approach emphasize the very symbolic and important moment, when all girls or young women meet in one place and see and feel that their choice is actually "normal", that there are also other women or girls interested in a certain field. This gives a lot of self confidence to the girls to keep on doing what they like, even though it is considered to be a "male domain".

In this respect it might be worth considering also virtual environments to build contact to peer groups, using social media. Here, the recently launched initiative of the Girls in ICT Day must be mentioned, as it makes much use of social media. Thus, it brings together many different perspectives, projects, initiatives and might be an important resource for girls to see that there are also other girls and young women considering a career in ICT. Furthermore, it is worth exploring already existing networks set up by and for girls in ICT exclusively in the context of national and international strategies, initiatives or projects.

Other forms to promote girls to get in touch with other girls interested in ICT are online portals and computer clubs for girls. As to the portals, these are often linking different kinds of information on educational pathways, jobs and career paths in the field etc. with leisure activities like games, small competitions where girls can win a prize, information on related events and activities etc. and which also include internal spaces like discussion fora, chat rooms or even the option to set up an own virtual profile within the girls network. Computer clubs for girls are usually organized directly at schools in the context of extracurricular school activities. As these computer clubs are focused on ICT, resources online – that is, the online part of the girls computer club, are also used.

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⁴⁸ See for example the documentation of the Girls in ICT day 2012 in Serbia www.youtube.com/watch?v=t3OCjQ80HXk



Resources on Role models

Spiegelbeeld and ICTster

Outstanding database, covering approximately 1900 role models from different areas in STEM, around 350 in the field of ICT. Starting point of the database was the project “ICTster”, a project on role models in ICT. Of interest from our project might be material provided to prepare role models before meeting the girls and the wide experience in forms to organize interesting and effective activities with role models, including speed dating. Materials include guidelines on how to run an role models event, available in Dutch. www.spiegelbeeld.net and www.ictster.nl/index.php

Sitcom

Beside interactive games providing the possibility to explore the role of six different women in different personal settings, the platform Sitcom offers over 35 biographies on women and young female students from different European countries working or studying in different fields of STEM, 19 biographies are in the field of ICT. The role models are presented by photo and text, focusing also on personal life, what the women concretely do and like in their job or training. The biographies are available in EN, ES, FR, HU, DE. The platform has been technically improved and translated into Italian recently. www.donau-uni.ac.at/sitcom

Gendernow role models

In the framework of the coordination point for Gender mainstreaming in Lower Austria “Gendernow”, information on 12 female role models have been provided, available online, with different professional background. The profiles (text and photo) address also the issue of combining professional and personal life. Available in DE. www.gendernow.at

Girls and ICT initiative Australia

Includes the online presentation of 4 female role models of women working in ICT. Of high interest for ICT-Go-Girls! is the profile of Sonja Bernhardt, linking ICT and entrepreneurship. The website includes a kit on how to run a role models event. Further role models given in the framework of the girls’ computer club go go gidgets within the same initiative
www.learningplace.com.au/deliver/content.asp?pid=27803
www.learningplace.com.au/deliver/content.asp?pid=35002

Tech girls are chic (not geek)!

Australian book on 16 women working in ICT, published in 2008, with some content available online: 2 of the stories; furthermore brief information on the women portrayed. www.techgirlsarechic.org

Girls in ICT Portal

Website run by ITU, the International Telecommunication Union, promoting girls in ICT careers, which provides at the moment around 36 profiles on women in ICT at different levels of their career from all around the world. In some cases, small films with interviews are included as well as contacts to get in touch, for example via facebook or linkedin. Languages: all in EN, planned to be in other languages, for example French and Spanish. The films might be in different languages, if so, English subtitles are provided. Includes a kit for organizing a girls-in-ICT event. www.girlsinict.org



Providing resources on ICT jobs – addressing women and the image of ICT

One reason given by girls and women why they wouldn't go for ICT is the mere fact of missing knowledge about job profiles in ICT and the broad spectrum of job profiles related to ICT, the many different areas the ICT sector relates to described in chapter 1. Apart from this, the missing knowledge on how work in the sector is like – especially challenging the image of “unsocial, lonely work in front of the computer”, needs to be addressed by information given about jobs. This missing knowledge translates into inappropriate images on people working in the sector. To get in touch with more appropriate knowledge is relevant both for girls as well as for teachers, career counselors and parents.

This reminds us also of another relevant aspect mentioned earlier: If focusing in projects and initiatives on using ICT standard applications, there might be the risk to miss out on the technical side of technology, especially when it comes to girls nowadays, as this generation is highly ICT literate. In our observation, projects dealing with entrepreneurship education often focus on making use of standard ICT applications, for example spreadsheets, databases, power point presentation, text processing etc., all of which are mere office tasks not requiring a high of technological knowledge as it would be for example programming.



Resources on Networks and Social Media

Computer Club for Girls CC4G

Online computer club for girls exclusively, with online and offline resources; running since 2005, with 135.000 girls participating so far. Fee for a schools licence is around 350 Pounds. Based in UK. All in EN.
www.cc4g.net

Go Go Gidgits

Online computer club for girls developed in the framework of the girls in ICT initiative in Australia. Unfortunately, the club and related games are not working anymore, but structures can still be explored in the archive of the project. The project used chats and activities including profiles of girls participating in the project, developed during several stages of the project. All in EN.
www.learningplace.com.au/defaulteqa2.asp?orgid=48&suborgid=535

Lizzynet

Online portal and community for girls. Started 2003 as initiative to support girls in ICT, supported by an additional portal for teachers' support called „lea.net“, which is not working anymore. Lizzynet includes many different resources and activities to get in touch and socialize with other girls, not always exclusively on STEM or ICT. Nice mix on topics towards job counseling in non-traditional fields with leisure activities of a youth online journal to read for leisure. Girls can create online communities within Lizzynet by smaller groups, apart from those open to all registered members, where they can decide themselves who to invite. In DE.
www.lizzynet.de

Monanet

Austrian online portal to support girls in job counseling, but also other areas from a gender perspective. Provides a membership portal which includes online opportunities like to set up an own website, develop own greeting cards, to make an own online diary etc. In German.
www.mona-net.at

Technikqueen

Competition in the field of STEM, conducted by OMV Austria. Linking in several stages individual work, group work, and a final with meetings and activities in person for girls; included online community for the girls participating in the contest. Running from late 2012 to 2013.
www.technikqueen.at

Other virtual communities for girls

Beside the above mentioned projects, initiatives and online portals, several new communities came up during recent years making use of the many opportunities of social media, for example techgirlsneeded.org run by ITU. Central here is to share own stories with other girls via facebook, youtube, twitter or email.
www.techneedsgirls.org



Hands-on experiences

It is often stated in literature that jobs in the field of ICT are often seen as unattractive and linked to many stereotypes like the geeky image, lonely work in front of a computer, non-creative work with machines and less of societal relevance, or, as it is based on technology, demanding high intellectual skills. In addition, interest in technology and more specific in ICT is something which cannot be taken for granted by nature, but is something that has needs to be developed through getting in touch and doing. Therefore, opportunities for girls to try out typical tasks with their own hands is often described to be helpful approaches to engage girls in ICT. In order to do so, some projects aim at creating spaces for activities through which girls can make their own experiences and thus, develop interest as well as self confidence. Thus, they might find new, different answers to the questions "Can I do this?" and "Do I want to do this?". These are some examples for hands on activities linked to ICT and realized during girl's days in firms or universities:

- » building or taking apart: for example, a computer or laptop;
- » first steps in programming: for example, creating an website, a game, an app;
- » using software (for example, drawing program) to design own business cards etc.

Resources on ICT-related jobs

IT jobs for life

Information source on approximately 107 job profiles related to IT, launched 2012 by the Austrian Economic Chambers as part of their IT 2020 initiative. The profiles include information on the job profile, which tools are relevant, most important tasks to do and the locality where the job usually is situated. In some cases, films are included or statements done by women on what they like about the job. In German.
www.it-jobfuersleben.at

Brochure for girls "I will qualify in computer science"

The brochure was published by the German Competence Center for techniques, diversity and equality, which is coordinating the German Girls day; its German titel is „Ich werd Informatikerin!“. It includes interviews with and texts about 15 girls and women studying or working in the ICT sector. Two of the interviews are also related to self employed women in IT. Online available as PDF, in German.
www.kompetenzz.de/Produkte/2006_Informatikerin

CEN Agreement and eCompetence Framework

Good resource to develop an understanding of the many facettes and to localize highly specialized professions or fields of professional activities in the ICT sector. Beside these, it might be worth to look into information provided by national unions or associations of professionals working in ICT.
www.ecompetences.eu

See also resources on role models...

... as they give insights into educational pathways, what the daily work looks like, in some cases linking to personal life, from the perspective of women.



Another widely used approach is that of working with educational kits to design and build technology. In this respect, the initiatives First Lego League, Roberta and Roberta Goes Europe need special mentioning: These aim at engaging young children in science and technology with activities in the field of robotics, organized either at school level or, in the case of the US, by parents. The core element of both is a kit to build robots based on a societal challenge announced each year. Outcomes are presented at regional, national and international level. Differently from Roberta, the initiative First Lego League is not driven by the aim of closing the gender gap in science and technology, nor has it a conscious gender sensitive didactical approach. However, the so called “core values for participants” reminded us of features mentioned in literature from gender studies as being supportive for and appreciated by girls: teamwork, learning together, spirit of friendly competition, more important to discover and less to win, sharing experiences with others, to have fun. In relation to teachers or parent supporting the teams, their role being that of a facilitator is emphasized, but not more. Furthermore, one factor for successful activities is to link technology to practical problems, that is: how technology can solve problems. Besides in First Lego League, such approaches can be found in Technikqueen, Sitcom and others. Furthermore, this aspect relates highly to the question of how “content” (or activities) are presented to the girls, already mentioned as one dimension of gender sensitive didactics.

Another factor to make activities interesting for the girls mentioned in project reports and evaluation (for example, fe|male, Roberta, girl's day activities) is the relevance of creating and obtaining a direct, tangible result. This is emphasized especially in short term activities as the girl's day: here, experience shows that it is attractive and interesting for girls to create something small they can “take home” (or use later on). Besides enlarging self confidence, linking a concrete tangible result to the experiences made, such objects remind girls later about what they have done.

Similar approaches are also applied in entrepreneurship education, stressing the importance to give pupils the opportunity to do things on their own, for example to develop and run a company, a central aspect of initiatives like mini or student companies.



Game based learning, but gender sensitive

Often mentioned in literature is the gap between girls and boys when it comes to playing computer games. For example, research findings of the project PREDIL show that playing games is much more common among boys than girls. This is the case particularly at home, being one of the few activities where significant differences between boys and girls were actually found in what is called in the report the “social use of computers”. Here, 35% of the girls and 5% of the boys never play games at home and 55% of the boys and 15% of the girls often play games at home. 50% of the boys and 70% of the girls report they never play games at school, 15% of the boys and 5% of the girls report playing games often at school.⁴⁹ Beside the gender differences, these numbers show also that playing games is still mostly relevant outside school – even though the high potential of games for educational contexts is often mentioned.

Resources for Games

Sitcom

Virtual role game where girls can explore six different jobs in STEM, out of which two are directly related to ICT (network administrator and IT project manager). Available in EN, ES, DE, PL, CZ, FR, HU, DE, IT, GR; includes didactical material on how to use these games.

www.donau-uni.ac.at/sitcom

MENU and FAIR

Card games developed in the framework of the project “See a Game”, which aims to develop entrepreneurship skills among adults, but is also applicable in secondary education. At this stage, the games are developed further towards a virtual format, to make it more attractive to young participants. Includes didactical manuals in EN, DE, NL, NO, LV, IT.

www.seeagame.eu

Music-hero

Virtual game to develop entrepreneurial skills, the context is the music business. The game was developed in Spain, Andalusia, and includes a manual for teachers. Available in Spanish.

www.music-hero.com

See also examples given in the section on internet security

... Lizzylefthand and the Big Brain Learning Game.

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⁴⁹ McCusker et al, 2010, p. 10-11



In entrepreneurial education, simulation games have already some tradition, for example in order to simulate complex business or economical processes. In this context, gender questions are not addressed or at least reflected in terms of teaching material, in some cases even reinforcing stereotypes. In the field of promoting girls in ICT there are only few educational, web based games developed so far, despite the high potential these provide. In their study, Zauchner et al. point out the following aspects which should be considered when designing games, so as to ensure that they are attractive for girls:

- » possibility to play roles, to try out different roles, including the option to adapt characters in games
- » creative tasks should be included
- » opportunity to learn through the games about professions and private life
- » to take part in a game, having the options to change the trajectory of the game.⁵⁰

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⁵⁰ Zauchner et al. 2007 a, p. 298-299



Participatory design

Participatory design describes an approach in product development, where including the target group in the design process is a core component. Zauchner et al. regard the thorough inclusion of the users' perspective as significant quality criterion, breaking down the dichotomy between developer and user, thus developing a product that meets the expectations of the target group.⁵¹ This concept can also be applied for the development of educational projects and initiatives, including products to be developed herein.

One observation made in our review is that the main target group "pupils" or "girls" was only seldom included in the design of products and activities. More often it can be found that activities are evaluated by pupils at a relatively late stage, using results for further improvement. For example, in relation to the project HP life, the aspect to take students' feedback seriously was mentioned being crucial for the success of the project.

Resources Participatory Design and Evaluation

Sitcom

Workshop design to develop the platform, its features needed in general, furthermore, usability test design for the games, evaluation of the implemented games, graphic design etc. In English.

Fe | male

Evaluation concept for the project, including pupils in the evaluation concept.

Roberta and Roberta Goes EU

Evaluation conducted along the project, report. In German.

Girl's day in Germany

Over the last years, the girl's day in Germany has been evaluated continuously, evaluation forms and reports are online available. Evaluation includes the perspectives of the girls, schools, employers. Based on this, the girls day has been improved throughout the years and support material for employers, teachers and parents was developed.

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⁵¹ Zauchner et al. 2007 b, p. 560



Internet security and the fine line between personal life and educational activities

From our review of projects and initiatives we learned that the use of web based resources or virtual environments for educational activities, including social media, the topics security and data protection are of central concern for teachers, schools and parents. Therefore, if not addressing this concern and clarifying mechanisms of data protection etc. related questions might become an obstacle for the successful implementation of the project and its sustainability.

In this section, impeding factors mentioned in some evaluation reports or by project coordinators were related to the use of virtual environments in projects including social media. As the project ICT-Go-Girls! intends to make use of web 2.0 applications and to integrate social media in the learning environment, we will provide here some examples on how to address these concerns.

Internet security – stereotypes and “real issues”

According to the “Women in ICT” report 2009, ICT have made possible and set up new forms of social interactions, activities. Furthermore, social networks are part of young people’s lives. But there are a number of hidden threats such as Data Protection rights, movement of illegal substances, child pornography, human trafficking etc.⁵² This touches also what has been mentioned during the Girls and ICT Event in Brussels 2013 and what is described in research on gender differences in access to the internet: Parents are likely to be more protective towards their daughters than their sons and more likely to hold back their daughters from using the internet and internet related technologies than their sons. Thus, in addition to the previously mentioned aspects (girls and technology as inappropriate combination, missing knowledge about today’s job profiles in ICT, negative images of people working in ICT etc.), another aspect comes in: Being in the position to decide widely on what their children are allowed to do or not, parents communicate in a subtle way towards the girls that for example using computers and internet is not so good for them because it is dangerous, violent (games, websites etc.); instead of encouraging them to use and explore technology as much as possible.

In this respect, the Eurydice report 2011 “Key Data on Learning and Innovation through ICT at School” shows that the issue of internet security is addressed in most of the school systems in Europe. Here, a wide range of topics is addressed, for example personal data protection, but also cyber mobbing, stalking, understanding and using social media and many more. Also, several good learning resources have been developed which can be used in education (see for more information the box on resources).

Blurring boundaries between school and private, teachers and friends etc.

In the fe|male project, the application of web 2.0 technologies was among the central activities. One important learning from the evaluation of this project was that both, girls and boys, mentioned the importance to keep a dividing line between leisure time or personal issues and school related activities. This points out to the necessity to find a good balance in projects using social media in the context of school activities, in order to make the project attractive to the pupils. Solutions to this could be options for the pupils to keep a personal space, where it is upon their own decision what to show to whom, similarly to personal learning environments. Another example for this was found in the girls’ online portal “Lizzynet”, where users have the possibility to create own spaces for smaller groups.

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⁵² European Commission 2010, p. 16



Opportunities of Web 2.0 technologies

From experiences in the female project, we learned that the use of web 2.0 technologies is seen as very positively and appealing to girls. According to research findings from the project PREDIL, social media, virtual networks etc. play an important role in internet activities for girls and boys nowadays: 80% of girls and about 65% of boys report that they often use social networking at home, whereas about 15% of the boys and about 5% of the girls report that they never use social networking at home. Opposed to this, 50% of the pupils say they never use social networking at school and fewer than 20% report that they often use social networking. Thus, patterns of use at school and at home are quite different and girls report that they make more use of social networks than do boys.⁵³ If contrasted by the projects reviewed, it can be found that the use of web 2.0 technology, social networks, interactive design and related possibilities etc. are still rather limited, despite the high potential – as for example social media are flexible enough to give the opportunity to create something, but also in term of building a virtual environment and a virtual network for girls, thus promoting the visibility of girls who share their interests for ICT. At the same time, as we mentioned already earlier, pupils pointed out that they find it important to keep a line between school activities and private life.

Resources Addressing Internet Security

Online Game “The Big Brain”

Game on different topics connected to cyber safety. Learning scenarios for the use of the game and further activities can be found in the project “Virtual Stages against Violence”. Free resource. Available in EN, DE, IT and RO.

www.virtualstages.eu/bigbrain

Virtual Stages Against Violence

Resources from the project “Virtual Stages Against Violence” include a Toolkit on Digital and Media Literacy Education for teachers with a very good methodological framework and examples to address virtual safety issues, provided in EN, DE, RO, IT. Furthermore, the website includes 5 plays, so called “shows”. Available in RO, IT and DE with EN subtitles.

www.virtualstages.eu

Lizzy Lefthand

A girl as ICT expert is taking care of problems some other young people have with their computer, viruses, embedded information on ICT. In German.

www.lizzynet.de/lefthand

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⁵³ Mc Cusker 2010, p. 8



Sustainability

In this section we would like to address some issues which came up during the review of the existing projects from the perspective of sustainability.

Technical update of resources often overlooked

In our review, the need to ensure continuous technical update and support beyond the lifetime of a project or initiative was obvious. Otherwise, parts of developed resources become useless only shortly after closure of the project. Many of the projects – either in promoting girls in ICT or in entrepreneurship education – suffer from missing resources to keep the developed websites, fora or other resources up-to-date, or even developing them further. For example, games like Sitcom, Lizzylefthand as well as the Go Go Gidgits developed in the framework of the Australian girls and ICT strategy like Go Go Gidgits etc. need a technical update as they were programmed several years ago. This is a general feature for many projects: link lists need update, otherwise these are useless, websites need permanent update or at least need to be technical still useable, also after the closure of the project. This is not only relevant in relation to content and that it is state of the art, but as much in terms of technical requirements, technological changes, which go on quite quickly. Other related questions often overlooked in projects and the perspective beyond the project is the question on where the data lies, who has for example the responsibility for users which registered some time ago on some platform and who is responsible to take care of the server etc.

Technical infrastructure at schools relevant aspect

Even though several reports mention that the ICT infrastructure at schools in Europe has improved highly in recent years, it needs to be considered that it still varies from school to school. This is also because of some countries having highly diversified school types, where ICT infrastructure might not be as much in the focus, as the school profile itself is not technical. Cloud services for schools involved in the project might be a solution in the framework of ICT-Go-Girls!, to keep processes / programs running smoothly and independent from the level of school IT infrastructure.

Note on “integrating our activity in the curriculum”

It seems reasonable to include projects promoting entrepreneurship for secondary school girls through ICT into curricula, in order to make them both relevant and sustainable. In this respect, it is important to distinguish clearly the two options existing if we talk about including into the curriculum: it could be either in compulsory subjects and related activities (for all either for certain branches) or in optional subjects and related activities.

Link with or integrate into existing initiatives and resources

Another important question is how to embed the outcomes of a project in already existing activities. As we can see, both in the fields of entrepreneurship education and in promoting girls in ICT, many materials and activities as well as national initiatives and strategies are existing. Therefore, it is important not to start from scratch, but link the products of small scale projects with existing initiatives in education and / or professional orientation. Also, on the regional, local level many activities, initiatives and materials have been



developed in the different countries. Both in respect to materials and activities, it would be of great help and use to integrate these. For ICT-Go-Girls! it would be of interest to integrate into the widely known initiatives for professional orientation like the girl's day or the girls in ICT day. In the context of entrepreneurship education it should be noted that the organization Junior Achievement Young Enterprise is one of the main actors.

Teachers, ICT competences and school profile

Project valuations also show the importance of ICT competences among teaching staff for the success of projects linked to ICT. In this respect it has shown crucial to provide enough resources for technical support, both in terms of functioning tools, but also in terms of using technologies. Apart from this, we know that technical as well as the knowledge on ICT among teachers and pupils can vary highly from country to country, but also within countries. Here, school types are an important factor. The more technical the school profile, the higher is the level of ICT competences and standards. This leads directly to gender gaps, because in secondary schools with high technical profile less girls are enrolled in technical oriented schools, which means that girls in non-technical schools are less exposed to ICT.

Ownership at school level, multipliers and volunteers

In projects and initiatives of larger scale, it can be observed that these – if not funded in the framework of some national initiative – are often based on a high level of voluntary work in addition to financial and other resources, being it teachers, parents, employers or pupils. Also, it has been shown that projects should involve more than one or two teachers from one school, but refer rather to a team at school, buffering the high level of extra work and contributing to the distribution of knowledge instead of keeping it tightly connected to the few teachers involved. Also, it has been shown important that a network structure for the teachers is helpful. Further strategies for a wider integration into the school are:

- » relevance of multipliers among teachers and students for the sustainability of the activities, interesting here for example initiatives integrating pupil or student ambassadors to raise interest among girls at secondary school for ICT either to go even towards younger pupils at primary – before they choose the next school type, as seen for example in the HTL4girls initiative in AT;
- » relevance of opportunities to establish/link to networks for teachers in order to share and transfer their knowledge, as it could be done using the ePortfolio methodology also for teachers, not only for students;
- » partnerships between schools and one or two bigger companies.



Recommendations for developing ICT-Go-Girls!

Based on the previous chapters, the most relevant issues are summarized here, serving as recommendations for the development of the methodology of the project ICT-Go-Girls!

Integrate a gender perspective in materials and training design for teacher

In order to make a difference in the design of actions, leading to impacts in the promotion of girls, we would like to emphasize the following: Teaching or promotional material should use a gender sensitive language and avoid the representation of stereotypes in pictures, story boards etc. used. This is of utmost importance in order to make the variety of choices visible, especially when it comes to gender as well as a professional sector with deeply rooted stereotypes. As to those realizing the action, for example teachers, it is important to support their work with trainings and guidelines on gender sensitive didactics. It has been shown that it is not as much the question of coeducation or not which makes the difference in promoting girls, but rather a self-reflexive, gender sensitive coeducation.

Address the broad possibilities and many different job profiles in the ICT sector

As missing knowledge on the diverse job profiles and routines in the ICT sector as well as stereotypes on the character of people and work in the sector are reasons for girls not to opt for a career in this field, it is important to address the landscape of ICT jobs nowadays, underlining the creative, social and highly communicative side of jobs in this field as much as giving insights into options to work self employed in this sector. As to the later one should acknowledge that emphasizing the two aspects – ICT sector AND working self employed might be understood as double burden; thus it could be of help to stress one aspect of this project (to develop interest and skills to opt for a career in the ICT sector) and address the other one not as prominently.

 In relation to the first two recommendations, it should be noted that reflection within the project team members is as important, being part of the “intervention”: this is relevant in terms of our own images and stereotypes related to (a) girls and ICT, and (b) towards our knowledge about the ICT sector and job profiles, due to the mere fact that most of the project members are not working directly in the ICT sector themselves, but in educational contexts.

Include role models

This approach to get girls in touch with female role models is widely used with different formats from presenting biographies of women online to ambassadors or databases with women available to meet girls during events at schools etc. Here, we would like to underline the importance to give insights not only into the job profile and a usual working day, but to ensure also an insight for the girls into the personal life of these women. Future family life, motherhood and how to combine this with work, in particular when it comes to a male dominated sector, is of high relevance for the girls and their future choice of career. When designing actions with role models, the principle of “the closer, the better” is helpful in terms of meeting in person, but even more in relation to the age difference to the girls.



Participatory design approach

It is highly recommended to include in the development process right from the beginning the perspective of those for which the material or action is aimed at, in our case the girls. This includes also the design of games, platforms etc. In practice, materials are often designed without this perspective, thus missing out the viewpoint of the girls and what is appealing and important to them. This becomes even more urgent if recognizing “gender” as something “in motion”, being constantly renegotiated by the individuals depending on the context and situation. Furthermore, the teachers need to be included in the design process.

Switching from user to designer

In order to involve girls in the use of ICT, experience shows that it is very effective to give girls the chance to create themselves things, thus switching from a users role towards being that of an active designer. This perspective is of high importance given the fact that at the moment many initiatives head towards ensuring user skills in ICT (digital literacy), which differs greatly from the “making of ICT”. In this respect, web 2.0 technologies offer a wide range of possibilities for activities, as they are attractive and easy to use.

Plan enough resources for supporting teachers

It is highly important to support those responsible to realize the actions – for example, teachers: this includes technical support and maintenance as well as trainings on how to use material – being it tool boxes, 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 learning and experiences, for example in building up communities. Supporting teachers touches also the question of taking seriously the time effort needed to engage in something new. Here, the official recognizing of training activities in the framework of obligatory teacher continuing education is one way to support, another one could be to integrate activities into school activities like project weeks, school clubs or, if possible, into the curriculum.

Take care of security issues

Internet security has many dimensions, depending on the personal perspectives of main actors involved in the educational process: teachers, parents, pupils. Related to this we would like to underline three perspectives relevant for design of the pilots, especially when developing products which involve social media, platforms for online registration etc:

- » Parents: are protective towards their children, especially if girls and ICT; issues relevant here are cyberbullying, security of personal data (addresses, knowledge on personal activities).
- » Teachers, schools: are responsibility for the pupils while in school and during school activities, therefore, these have also a perspective on the above mentioned issues. Therefore, it is important in the school environment to use a closed, secure environment.
- » Pupils: interested in keeping the line between school activities and private activities, especially when it comes to the use of social media.



Anchor project into existing activities and seek for partnership

- » We should think of a pattern to anchor the initiative within the countries involved and related activities: It might be worth to consider here the Girls Day or, more particularly, the Girls in ICT day, as these initiatives are gaining more and more ground in different countries.
- » Also, partnership with similar projects and/or companies (for example, from the ICT sector), organizations with similar goals is highly advisable.
- » Also, we need to identify „real drivers“ for the pilots, that is: school principals, teacher, who are convinced themselves by the goals and use of the project ICT-Go-Girls!



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Annex I: Model on Factors affecting decision-making about careers in IT

The model below was developed by Miliszewska and Moore 2010, here, linked to the intervention of a computer club for girls (CC4G).

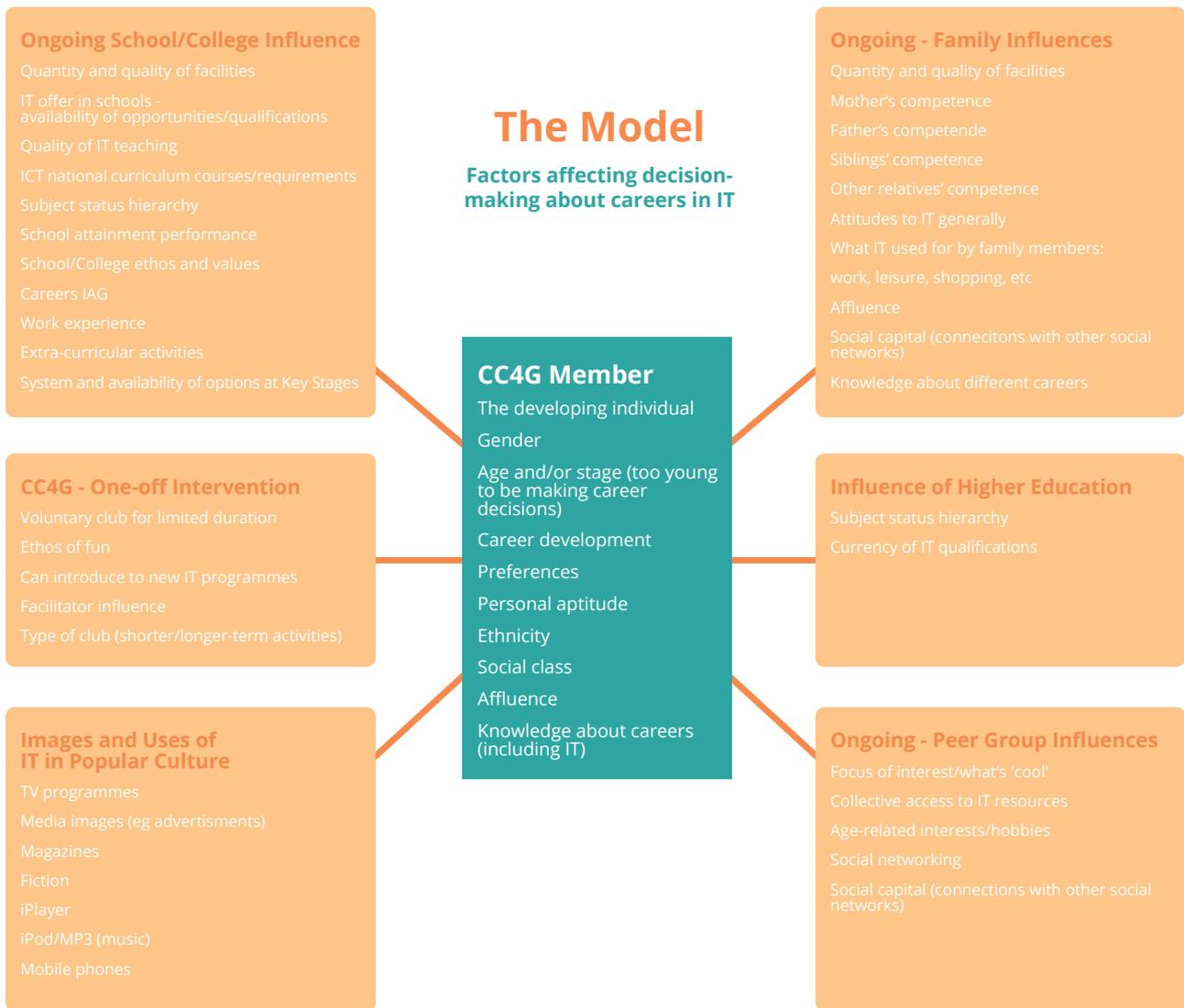


Figure 2: Model of Factors affecting decision-making about careers in IT

Source: Miliszewska and Moore 2010

Annex II: Overview and short description of Projects and Initiatives analyzed

Projects and initiatives in the field of entrepreneurship education

Name of the project	EJE Empresa Jovem Europea
Website	www.valnaloneduca.com/eje/en (in English and Spanish)
Running from – to	2009-2012 Andalusian (Spanish) project (by the Consejería de Economía, Innovación, Ciencia y Empresa and the Consejería de Educación) linked with ECE (see below)
Country/countries	Co-operations with a broad range of schools and companies in Spain, Belgium, Chile, Denmark, Ecuador, England, France, Peru, the USA, etc.
Age group girls/boys	upper secondary (15-18 years) girls and boys
Other groups targeted	teachers/schools
Tools developed	A lot of valuable resources are available at the download area: www.valnaloneduca.com/eje/en/downloads Among the downloads are a teacher handbook and “FAQ” which are a very good orientation for teachers .
Short description	EJE mixes entrepreneurship, international trade, and foreign language learning opportunities. EJE is “an extensive international network of student-run mini-companies exchanging information, catalogues and products” basing on “a methodology based on practical experience where students will have the opportunity to display a wide array of social, personal and business skills”. Students start companies, cooperate with their partner schools via different media, organize themselves, define tasks and analyze results. The “practical experience will offer students the chance to develop, in a real context, skills and attitudes, such as initiative, decision-making, creativity and teamwork. At the same time they will become familiar with basic concepts regarding the creation and management of companies.” (cf. www.valnaloneduca.com/eje/en/cont/presentation).

Name of the project	ECE – European Commitment to Entrepreneurship
Website	www.ece.euproject.org (in English and Swedish)
Running from – to	2008-2010 (Leonardo da Vinci innovation transfer project, based on EJE – see above)
Country/countries	Belgium, Bulgaria, Finland, Hungary, Italy, Spain, Sweden
Age group girls/boys	upper secondary (15-18 years) girls and boys
Other groups targeted	teachers/schools
Tools developed	useful “ECE Entrepreneurship e-Book” in English with graphic presentations and other tools for 14 learning units.
Short description	In this project, the EJE Young European Enterprise method for training entrepreneurs was introduced to new countries, educational establishments and new educational levels. At the same time, the EJE method was adapted for various national learning situations and needs. ECE was a general evaluation of the EJE-project, built on the results and experiences on entrepreneurship of every partner. Unfortunately, the project website mainly contains the project proposal and – except for the abovementioned “ECE Entrepreneurship e-Book” – no information about further project outcomes.



Name of the project	Global Enterprise project GEP (by Junior Achievement Young Enterprise)
Website	sponsor.ja-ye.org/pls/apex31mb/f?p=17000:1016:3394551536481046:::P1016_HID_INSTITUTION_ID:31522 (in English)
Running from – to	09/2011 – 08/2014
Country/countries	Finland, France, Germany, Ireland, Italy, Netherlands, Portugal, Romania, Slovakia, Spain, Sweden
Age group girls/boys	15-18 years girls and boys
Other groups targeted	business communities, teachers
Tools developed	GEP Quiz: interactive quiz (in English) to test knowledge on globalization, possibility to register student companies via “GEP mini-companies” at the network “Enterprise without borders” and to use this network to create joint ventures.
Short description	Partnership of the European Round Table of Industrialists, Junior Achievement-Young Enterprise Europe and European Schoolnet in order to “promote greater understanding and awareness among young people about globalisation, entrepreneurship and the skills they need to succeed in the global economy”. During the project, 40.000 young people are to learn entrepreneurial skills and new ways of applying their knowledge (via student companies, challenges, etc.). Obviously the project relies on business skills input by volunteers from companies (more than 2000 employees transfer their knowledge in classroom visits) as via the website there is mainly information on globalization available.

Name of the project	JA-YE Junior Achievement Young Entrepreneurs
Website	www.ja-ye.eu (in English)
Running from – to	Since 2011, ongoing
Country/countries	Albania, Armenia, Austria, Belgium Flemish, Belgium French, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Isle of Man, Israel, Italy, Latvia, Lithuania, Luxembourg, Macedonia, Malta, Moldova, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom
Age group girls/boys	6-25 years, depending on the project girls and boys The programme is divided in: <ul style="list-style-type: none"> • Primary School: two programs: age 8-10 and age 10-12. • Middle School: two programs for ages 13-15. • Secondary School two programs for ages 15-18. • One program for Post-Secondary School (age 19+)
Other groups targeted	business communities, teachers
Tools developed	Publications: ja-ye.eu/pls/apex31mb/f?p=17000:1002:1395694462833013:::1002:P1002_HID_ID,P1016_HID_INSTITUTION_ID:6895,1 Fact Sheets ja-ye.eu/pls/apex31mb/f?p=17000:1002:1395694462833013:::1002:P1002_HID_ID,P1016_HID_INSTITUTION_ID:7759,1 GEP Brochures sponsor.ja-ye.eu/pls/apex31mb/f?p=17000:1003:3736864079848170:::P1016_HID_INSTITUTION_ID,P1003_HID_ID:31522,9910
Short description	JA-YE Europe is Europe’s largest provider of entrepreneurship education programmes, reaching 3.1 million students in 37 countries in 2011. Funded by businesses, institutions, foundations and individuals, JA-YE brings the public and private sectors together to provide young people in primary and secondary schools and early university with high-quality education programmes to teach them about enterprise, entrepreneurship, business and economics in a practical way. The JA-YE Company Programme is recognised by the European Commission Enterprise Directorate General as a ‘Best Practice in Entrepreneurship Education’.

Name of the project	SEE A Game
Website	www.seeagame.eu (in German, English, French, Italian, Norwegian, Dutch, Latvian)
Running from – to	2008 – 2010 (Grundtvig)
Country/countries	Belgium, Germany, Italy, Latvia, Norway, Switzerland
Age group girls/boys	students aged 12 and older; girls & boys
Other groups targeted	instructors in entrepreneurship at all levels (from teaching managers to those supporting micro-entrepreneurship development)
Tools developed	<p>Two games, namely MENU, a competitive role-playing game and FAIR, a collaborative card game. The different scenarios proposed in the games allow the assessment and ability to increase the entrepreneurship competencies and attitudes of participants, driven by game challenges. MENU is designed for sessions with 10 to 20 persons, such as in a classroom environment, and is played in groups. It includes different challenges, that can be played over multiple sessions, and it also allows teachers their own challenges.</p> <p>FAIR is designed for sessions with 6 to 24 players, such as classroom environment, and is played in groups. It includes different variants that can be played over multiple sessions fostering reflection. With some practice, teachers can also create their own variants.</p> <p>The handbook contains some general information about the project and the two games, along with practical indication about how to plan, manage and assess game-based learning activities in teaching, with special emphasis on the development of entrepreneurial competencies. The rules and further guides for playing FAIR and MENU are also available on the project website.</p>
Short description	The SEE A Game project, and its two games, has twin aims. On one side the transferring of more practical and concrete ideas to people wanting to start-up a new entrepreneurial activity; on the other hand, trying to stimulate a training approach focusing on motivation and the stimulation of entrepreneurial attitudes.

Name of the project	Creative Learning Communities (CLC)
Website	www.skills4me.eu/index.php/en/ (English, German, Italian, Maltese, Polish)
Running from – to	2011-2013 (Leonardo Da Vinci)
Country/countries	Austria, Italy, the United Kingdom, Malta and Poland
Age group girls/boys	Age groups are not defined
Other groups targeted	VET trainers, learners, VET sector, groups at risk and other stakeholders
Tools developed	<p>Innovative Creative Learning Tools on the basis of key competence 7 “a sense of initiative and entrepreneurship” of the European Union: www.skills4me.eu/index.php/en/clc-tools</p> <p>A Manual: www.skills4me.eu/downloads/man/MAN_EN.pdf</p> <p>An Online Toolbox: www.skills4me.eu/index.php/en/tbx</p>
Short description	<p>The Creative Learning Communities project has actively involved trainers and learners in the creation of a brand new teaching tool that will help people acquire a sense of initiative and entrepreneurship. These skills are vital in helping individuals turn ideas into action, through creativity, innovation and risk-taking, as well as acquire an ability to plan and manage projects therefore increasing their inclusion in society and the labour market. Therefore the effective integration of entrepreneurial teaching into the curriculum is one of the key challenges that education is currently facing as this key competence (hereafter known as KC7) becomes increasingly relevant in today's world and the Creative Learning Communities project (hereafter known as CLC) has sought to respond to this challenge with support of the European Commission in the framework of the Lifelong Learning Programme ‘Leonardo da Vinci’. The answer has been found in the development of a manual and a toolbox that will provide trainers and learners with materials to help them experiment and develop the skills, knowledge and attitudes linked to KC7 in their own specific learning contexts. The CLC project starts from the premise that much valuable work has been undertaken in the effort to improve capacity building and learner confidence with respect to personal development (especially in ‘at risk’ learner groups), but recognises that further progress is required. Guided by the ideas and experience of vocational training professionals, the project will build on existing initiatives and practice, and will aim to promote and enable the creation of Creative Learning Communities that can grow, share, disseminate and implement new teaching and learning tools and approaches. More information: www.skills4me.eu/index.php/en/</p>



Name of the project	Key competences to prepare our students for an entrepreneurial mindset (KEM)
Website	centros.edu.xunta.es/cpiocruce/comeniuskem/ (in English)
Running from – to	2011-2013 (Comenius)
Country/countries	Spain, Italy, Germany, England, Finland, Greece, Poland, Slovenia
Age group girls/boys	Primary, lower and upper secondary (girls and boys)
Other groups targeted	teachers
Tools developed	Different teaching materials and documentation of school projects. Of interest for our project could be the business plan outlines (centros.edu.xunta.es/cpiocruce/comeniuskem/bptasks.pdf) and the slide-show on the “Entrepreneur Week” in England (centros.edu.xunta.es/cpiocruce/comeniuskem/uk.htm), even if it is a primary school project. Maybe also worth looking at is an example of a student’s made business plan of the Greek school: centros.edu.xunta.es/cpiocruce/comeniuskem/grecia/greekbplan.pdf
Short description	Through the webportal there is access to descriptions of school projects, documentation of them in the form of videos, slides, podcast, radio programmes, and some teaching materials. The webportal of the project should also serve as a platform for teacher training and teacher’s community. However, there is to date (May 2013) still a lack of background information about the project and the participating teachers (contact data/link to a webmaster are missing). The project aims at “offering a catalogue of best practices and assessment methods on key competences in different languages (CLIL)” and “products of various collaborative projects (e.g. traveller book, a guide of activities to develop an entrepreneurial mindset from early ages through to vocational and high school)”, therefore interesting outcome can still be expected to be published within the webportal. A further aim of the project is the drafting of a “complete guide of activities to develop an entrepreneurial mindset from early ages through to vocational and high school” (cf.: www.itirighi.it/scuole-napoli/html/86/).

Name of the project	Mobile and entrepreneurial youth
Website	www.przedsiębiorczamlodzicz.pl (in Polish)
Running from – to	2010 - 2012
Country/countries	Poland – Lower Silesia Province (Co-financed by the EU under the ESF)
Age group girls/boys	11-19 years (last classes of primary schools, middle and high schools) girls & boys
Other groups targeted	teachers, parents, school managers
Tools developed	training modules: 96 lessons scenarios in 4 modules: „Young Professional Advisor”, „Young Entrepreneur”, „The Young Investor”, „Young in the Administration” (in Polish)
Short description	The main objective of the project is to implement a comprehensive program to develop the ability to make their own choice about education and professional career, and develop entrepreneurship with the help of ICT. The project bases on a diagnosis of the prevailing problems in schools, as in the Polish school system, there are no separate items or hours devoted to self-discovery or the choice of path in life. The project wants to help to improve teaching, tackling the lack in development of key competencies (especially entrepreneurship) and placing a focus on success in life and career development.



Name of the project	HP Life Initiative
Website	www.life-global.org (in English and Spanish) – parts of the website are available in more/other languages – example: life community @ www.becomelife.org/ (in English, French, Russian, Polish, Chinese, Turkish and Czech)
Running from – to	Since 2007, ongoing
Country/countries	49 countries across the whole world. European Training centers are in BE, BiH, CRO, F, D, Latvia, Serbia, CH, TR and Ukraine
Age group girls/boys	focus on young adults (starting from 16 years) girls and boys
Other groups targeted	aspiring entrepreneurs, small business owners
Tools developed	Free, online training program to “gain the real-life business and technology skills you need to start or grow your business” at: e-learning.life-global.org (in English), Games like “Blossom Flowers” unfortunately seem to have stopped working (tested on 2013-05-23 and 2013-04-06).
Short description	The HP LIFE program was developed to educate people to harness the power of IT in order to establish and grow their businesses, helping to create economic opportunity and change the lives of millions. HP's goal is to help disadvantaged people all across the world by providing them some basic knowledge to facilitate their efforts to become employed or to become micro-entrepreneurs.



Projects and initiatives promoting girls in ICT, technical education and aiming at gender awareness

Name of the project	Ni + ni -, =s (Nor more neither less, equal)
Website	www20.gencat.cat/portal/site/empresaiocupacio/menuitem.32aac87fcae8e050a6740d63b0c0e-1a0/?vgnextoid=a2084fc36e872210VgnVCM1000008d0c1e0aRCRD&vgnnextchannel=a2084fc36e-872210VgnVCM1000008d0c1e0aRCRD&vgnnextfmt=default&newLang=es_ES (in Spanish and Catalanian)
Running from – to	2009-2011
Country/countries	Spain
Age group girls/boys	Lower and upper secondary (ISCED levels 2 and 3) (girls and boys)
Other groups targeted	Teaching teams and other personnel related to vocational guidance (social workers, psychologists, pedagogues, etc.)
Tools developed	Different teaching materials (box with three sets of cards, very complete booklets with detailed activities, resource information guide, CD). Other dissemination materials were developed like corporative pens, folders, posters, stickers, bags and leaflets. During the period December 2009 - February 2010, 2796 boxes with dissemination material were sent to schools. Of interest for our project could be the manuals developed, in particular the proposal related to Girls and Boys, on their way towards equality (www20.gencat.cat/docs/treball/08%20-%20Igualtat%20oportunitats/01%20%20PROGRAMES%20IGUALTAT%20DONES%20EN%20EL%20TREBALL/1.%20Dones%20i%20Treball/1.1%20Dones%20en%20professions%20masculinitzades/EXPERIENCIA3.pdf) – if the link doesn't work, choose "Experiencia3" from the web page mentioned above)
Short description	This project offers different vocational guidance resources addressed both to students and teachers with the aim of working on individual preferences and personal talent trying to avoid youngsters making decisions based on social models or stereotypes of genre. The objectives for students are to promote, by means of learning situations, the acquisition of the personal resources necessary to achieve one's own personal and professional project with a guarantee for equal opportunities; and, to develop the maturity, autonomy, responsibility in young people in different areas of life such as education, society, work, private and family life. On the other hand, the objectives for teachers are to provide methodological guidelines for the development of career and professional counseling practices that are not under the influence of genre stereotypes and to provide didactic instruments to accompany the educational guidance towards adult life on the basis of a genre and equal opportunities perspective.



Name of the project	Lizzynet – die Community für Mädchen und junge Frauen
Website	www.lizzynet.de (in German)
Running from – to	Online portal + community, started in 2003; ongoing
Country/countries	Germany/German speaking community members
Age group girls/boys	No age group defined (girls)
Other groups targeted	Teaching teams and other personnel related to vocational guidance (social workers, psychologists, pedagogues, etc.)
Tools developed	Magazine, online courses - like a course on Internet information quality (“Internet-Recherchekurs”: www.lizzynet.de/wws/5906468.php?sid=12950767001998831737044344439890) - Lizzy Lefthand Game (Online Game on Trojans, Viruses and Worms- www.lizzynet.de/wws/6114596.php?sid=1295076700199883173704434442010). More games and resources in the section “MINTrelation”: www.lizzynet.de/wws/805668.php?sid=12950767001998831737044344444820 .
Short description	Online portal and community for girls, started as initiative to support girls in ICT. To date, it opened the focus and includes STEM and further fields of interest. Lizzynet includes many different resources and activities to get in touch and socialize with other girls, not always exclusively on STEM or ICT. Nice mix on topics towards job counseling in non-traditional fields with leisure activities like riddles, calls to participate in challenges or a youth online journal to read for leisure. Apart from the groups open to all registered members, Girls can create online communities within Lizzynet where they can decide themselves who to invite.

Name of the project	Spiegelbeeld
Website	www.spiegelbeeld.net (in Dutch)
Running from – to	July 2005 till now
Country/countries	The Netherlands
Age group girls/boys	8 till 16-year-olds girls (basic and secondary education)
Other groups targeted	Only the role models take part in Spiegelbeeld. The other projects of VHTO that you can find at www.vhto.nl/activiteiten.html do have pupils, students, parents, teachers etc participating.
Tools developed	Database with role models, training guide for the role models, website.
Short description	Spiegelbeeld is an online role model database. The database is used as a medium for all VHTO projects in basic and secondary education whereby VHTO makes use of role models to give pupils a better image of beta/technique and ICT. The role models are important/conditional at the execution of many VHTO projects (namely at giving information and guest lectures to pupils). By means of the database Spiegelbeeld, ICT role models are introduced in schools of basic and secondary education and are rejecting the stereotype images that students (mainly girls) often have of ICT. The first goal was to fill up the database with 100 ICT women. In the meantime there are about 1950 bèta/technical/ict women in Spiegelbeeld.



Name of the project	SITCOM
Website	www.donau-uni.ac.at/sitcom (in English, Spanish, French, Hungarian, German, Italian)
Running from – to	2004 – 2006 (Socrates-Minerva). The game and the resources are still online, as they are one of the sources for another project (cf. WITE)
Country/countries	Austria, Czech Republic, Greece, France, Poland, Romania, Spain
Age group girls/boys	12-16 girls
Other groups targeted	young women, teachers
Tools developed	Interactive game to explore the role of women in different situations and jobs (in EN, ES, FR, HU, DE, IT), didactic materials for teachers and (job) counselors (in EN, ES, CZ, , DE FR, GR, HU, PL, RO).
Short description	“Simulating IT Careers for WOMen” aims at using the huge potential of simulations and games to motivate girls and young women to enter educational pathways related to information and communication technologies (ICT), science and engineering. Beside interactive games providing the possibility to explore the role of 6 different women in different personal settings, the platform Sitcom offers over 35 biographies on women and young female students from different European countries working or studying in different fields of STEM, 19 biographies are in the field of ICT. The role models are presented by foto and text, focusing also on personal life, what the women concretely do and like in their job or training. The biographies are available in EN, ES, FR, HU, DE.

Name of the project	Learning with robotics - ROBERTA and Roberta-Goes-EU
Website	www.roberta-home.de/en www.iais.fraunhofer.de/index.php?id=4822&L=1 (in German and in English)
Running from – to	Started in 2002-still running in 2013 (no fixed end)
Country/countries	Roberta started as a governmentally funded project in Germany - with Fraunhofer IAIS as project lead - in the year 2002, gained further funding on EU level afterwards. “Roberta-Goes-EU” - founded from 2005 - 2008 by the European Union - carries the Roberta idea to several other EU Member States (Austria, United Kingdom, Sweden, Italy) and Switzerland. Furthermore “Roberta-Goes-EU” builds an European network of Roberta Regional Centers.
Age group girls/boys	lower and upper secondary; age from 10 till 16 (especially from 12 - 16) (girls and boys)
Other groups targeted	Teachers or educational services who like to conduct a ROBERTA-course in school or anywhere else
Tools developed	Gendered didactic material in several languages for teachers and documentation of school projects. www.roberta-home.de/en/was-bietet-roberta/roberta-reihe
Short description	<p>Roberta addresses the lack of engineers by raising girls' and boys' interest in the technical professions. The successful concept of the German project „Roberta“ has been adapted in the EU-funded project „Roberta-Goes-EU“ to investigate its usability and explore opportunities for its dissemination to other European countries. With the use of standardized robotics kits, Roberta allows a hands-on introduction to technology.</p> <p>The objectives of the Roberta program and the following Roberta-Goes-EU program are:</p> <p>Robotics courses which are interesting for girls, conducted by trained Roberta course directors.</p> <p>Training for teachers (and others) who would like to offer Roberta courses.</p> <p>Teaching and learning material that is included in the Roberta series, to be used by trained Roberta course directors for conducting the Roberta courses. The material includes, in particular, didactic advice for gender-sensitive teaching during the robot courses.</p> <p>A network of regional centres that on the one hand offers support to the Roberta course directors in their »local« Roberta Regional Centres, e.g. by lending robot construction kits, and on the other hand provides for the (also supra-regional) exchange of experiences.</p>



Name of the project	First Lego League
Website	www.firstlegoleague.org (in many different languages available - see below on countries)
Running from – to	Since 1999, still running
Country/countries	Over 70 countries and is constantly expanding
Age group girls/boys	10 to 16 years old
Other groups targeted	Teachers from schools, to be coaches of the teams
Tools developed	Teams develop the project using the LEGO® MINDSTORMS NXT Robot and the materials that can find in the project web.
Short description	FIRST LEGO® League (FLL) presents young people between the ages of 10 and 16 with a real-world challenge through the construction of robots that carry out tasks on a game board that refers to theme of the challenge. In FLL, over the course of 10 weeks, 3-10 members teams work with a coach to, guided by their imagination, discover future scientific and technological vocations. Through this program, they learn and contribute positively to society.

Name of the project	WITE – Women in Technical Education
Website	www.wite.it (in Italian and English)
Running from – to	2011-2013 (EU LLP project)
Country/countries	Italy, Germany, Austria, Netherlands, Hungary, Poland
Age group girls/boys	Lower an upper secondary girls
Other groups targeted	young women, teachers, entrepreneurs
Tools developed	Thematic magazine (one issue, printed resource, in English) to introduce girls to technical studies and job profiles. Multimedia simulation game (basing on SITCOM). A video with interviews and pictures on new technical professions is planned.
Short description	<p>The aim of the project is to improve the quality and the appeal of the technical training system in the countries involved, transferring the innovation existing in some partner countries. In particular orienteering initiatives and tools will be imported to the project and thus to Italy (Veneto region) in order to:</p> <ul style="list-style-type: none">» offer girls and their families information about technical training and its advantages strongly based on the development and growth of manufacturing industries and their socio-economical context;» offer girls supporting instruments to think about their aptitudes and the training offer of the high school» create cooperation networks amongst middle schools - high schools – work sector, to promote technical training in the territory, particularly towards girls that have the skills to satisfy exactly the request of the work market.



Name of the project	W STRONĘ DZIEWCZĄT (Towards girls Association)
Website	www.wstronedziewczat.org.pl/o-nas (in Polish, mission statement in English)
Running from – to	Organization, founded in 2006, activities: ongoing
Country/countries	Poland
Age group girls/boys	School age (from 6 years on) (girls)
Other groups targeted	teachers, feminist/human rights activists and scholars
Tools developed	Forms of interaction (i.e. workshops, speed dating, lectures, shadowing etc.) Lesson scenarios dedicated to increase the awareness of girls in creating their attitudes to life and choice of education and career paths, lesson scenarios ready to use during lessons called: „Basics of entrepreneurship”, interactive lessons (in Polish).
Short description	The initiative aims at offering girls knowledge and skills necessary for opposing economic and social inequalities faced by women. It also likes to work with coeducative groups of young people – school classes, workshop groups and others to give examples of good equality practices, respectful co-operation and peaceful, non-violent ways of conflict solving. The association wants to influence the whole society for the purpose of making the life of girls safer, more successful, equal to the life of boys and supported by various groups and in various ways. Among the initiatives of the association are the following: <ul style="list-style-type: none"> » Project „Her portrait.” Proposals for lessons in history, literature and civic education. » Training for teachers, especially module IV: Businesswomen, female managers, chairwomen. (Women in business, economics and the labor market.)

Name of the project	Girls and ICT Strategy (Australia)
Website	www.learningplace.com.au/defaulteqa.asp?orgid=48&suborgid=286 (in English)
Running from – to	2005 – 2007
Country/countries	Australia
Age group girls/boys	secondary school girls
Other groups targeted	Teachers, schools
Tools developed	Kit on how to run a role models event, girls computer club “go go gidgets” (until 2008), online presentation of four role models of women working in ICT (still online: www.learningplace.com.au/deliver/content.asp?pid=39461), evaluation forms for “girls and ICT”-initiatives.
Short description	The Strategy aimed to capture girls' interest and help them realise the potential for success in ICT careers and studies. The strategy was based on research that showed that ICT is a critical tool for living and learning in the 21st Century and particularly drew attention to the low level of enrolments of girls and young women in ICT subjects in schools and further studies. The research indicated that this trend was also reflected in the low participation rates of females in the ICT industry. Aims: Changing attitudes about ICT careers and study opportunities at all levels, changing the practices of parents, teachers, teacher aides and careers guidance officers, To increase engagement of girls with ICT by providing access, appropriate experiences and opportunity for the advancement of girls with ICT.



Name of the project	fe male
Website	www.fe-male.net (in German, project folder in English: files.sparklingscience.at/document/file/683/female_Final_Report.pdf) (in English)
Running from – to	2008-2010 (BMW F – sparkling science – linking science with school)
Country/countries	Austria
Age group girls/boys	Secondary school girls & boys
Other groups targeted	teachers, schools
Tools developed	
Short description	The research project fe male intended to inspire girls and boys to pursue new technologies: fe male explored web 2.0 technologies under the gender aspect and identified opportunities for their deployment on the basis of the competencies and needs of the students. Based on the internet usage habits of pupils, the project pursued three goals: to explore and to develop educational programs with a focus on gender aspects and to hereby awaken girls' interest in technical applications, while taking into account their skills, competencies and content preferences. Selected interested pupils of the respective project teams were empowered to pass on the jointly developed insights in regard to the didactical and gender-sensible teaching and learning scenario within their own educational context, and also within the context of other participating institutions of higher education by means of presentations and seminars.

Name of the project	Gesebo Methodenkoffer
Website	www.gendernow.at/gesebo (in German)
Running from – to	Since 2004, not updated recently
Country/countries	Austria (Lower Austria)
Age group girls/boys	12-14 years (girls)
Other groups targeted	teachers, job counsellors
Tools developed	2 Quizzes on (Austrian) facts on labour and market, manuals for teachers and job counselors (in German)
Short description	Gesebo is a resource for teachers and job counselors including 3 manuals on gender aware professional orientation at primary and lower secondary schools: didactical material for (1) classroom activities at primary and secondary level, (2) professional orientation and (3) teacher training courses.



Further resources worth exploring

- » **“Education to Equality between Women and Men”:** didactical principle and manuals for gender sensitive didactics for different school types provided by the Austrian Ministry of Education. Flyer of before 2007 in English available via WWW at www.bmukk.gv.at/medienpool/9718/PDFzuPublID455.pdf. Collection of teaching and teacher information (brochures, manuals, reports) in German at www.bmukk.gv.at/schulen/unterricht/prinz/erziehung_gleichstellung.xml.
- » **LadyBizIT/ gender-IT | portal:** www.gender-it.eu with a reader “Reflections on Women in entrepreneurship & ICT”, 12 showcases on products ready to use to gain entrepreneurial skills for women using ICT etc.
- » **Mona-net:** www.mona-net.at Austrian online community/magazine for girls, job information etc. In German.
- » **Computer Club for Girls:** www.cc4g.net
- » **Tech needs girls to invent the future:** www.techneedsgirls.org. Run by ITU. Portal with links to facebook, youtube, twitter, ...
- » **Girls in ICT Portal:** www.girlsinict.org. Closely intertwined with techneedsgirls and the Girls-in-ICT-website: www.girlsday.org.

Projects addressing internet security

- » **Virtual Stages against Violence:** www.virtualstages.eu
- » **The Big Brain:** vsav.webducation.info/BigBrain.php?lang=en



Annex III: Framework for analysis of projects and initiatives

Framework for analysis

	Focus	Details
1.	Short description of project / initiative	<ul style="list-style-type: none"> » thematic focus (ICT, entrepreneurship) » objective » Background of the initiative/project: why has the project been developed? » target group(s) » geographical area » since when running (or from-to) » Outreach: approximate numbers on how many students (teachers, parents) have participated so far; how many courses have been delivered (if applicable) etc.: in order to get a feeling for the coverage/outreach of the project/initiative
2.	Target group(s)	<ul style="list-style-type: none"> » girls and/or boys; teacher; parents; other (specify which) » age groups » criteria / process of selecting participants » ...
3.	Features of the project / initiative	<p>Here, describe the format(s) and supporting materials of the initiative/project; i.e.</p> <ul style="list-style-type: none"> » Form of interaction (i.e. workshops, speed dating, lectures, shadowing etc.) » Who is realizing the action? (teacher, student mentor, parents etc.) » Materials developed » Use of ICT » Integration in curriculum or outside » ...
4.	Didactical / methodological approach	Specify the didactical approach (if any), i.e. game based, action learning, gender sensitive didactical issues (if any, which?), ...
5.	Development	<ul style="list-style-type: none"> » level of involvement of target group(s) in the development of the project, materials etc. » ...
6.	As time goes by... sustainability	<ul style="list-style-type: none"> » If project over: materials still in use? How was it sustained? If not – why? » How are resources to continue the initiative assured? » ...
7.	Resources (in order to realize the project)	<ul style="list-style-type: none"> » Financial resources, grants, funding » Contributions from stakeholders » Social engagement » Perspective: most resources needed within the project cycle for X and beyond for Y (i.e. material, human resources, server costs?) » ...



8.	Entrepreneurship (kc 7)	Specify how – if at all – the project addresses the development of key competency 7: » Being able to identify one's personal strengths and weaknesses » Acting proactively » Project development and implementation » Working co-operatively as part of a team » ...
9.	Digital competence (kc 4)	Confident and critical use of ICT for » Communication » School project aimed at entrepreneurship » leisure
	Mathematical literacy and basic competences in science and technology (kc 3)	» Using technology and mathematical data do achieve conclusions » Using maths to plan and solve game business simulations and similar activities
	Communication in foreign languages" (kc 2)	» Opportunity to communicate in a foreign language
	(Development of transversal skills)	» Critical thinking » Experimentation » Money management » Understanding of basic business processes » Leadership » Collaborative work (local/virtual) » language learning
10.	Factors leading to success of the project	...
11.	Factors impeding the success of the project	...
12.	Information sources used	list here reviewed documents and resources (project reports and documentation, online resources etc.



ICT-Go-Girls! Project consortium

as presented on the project website:
www.ictgogirls.eu (access: June 2013)

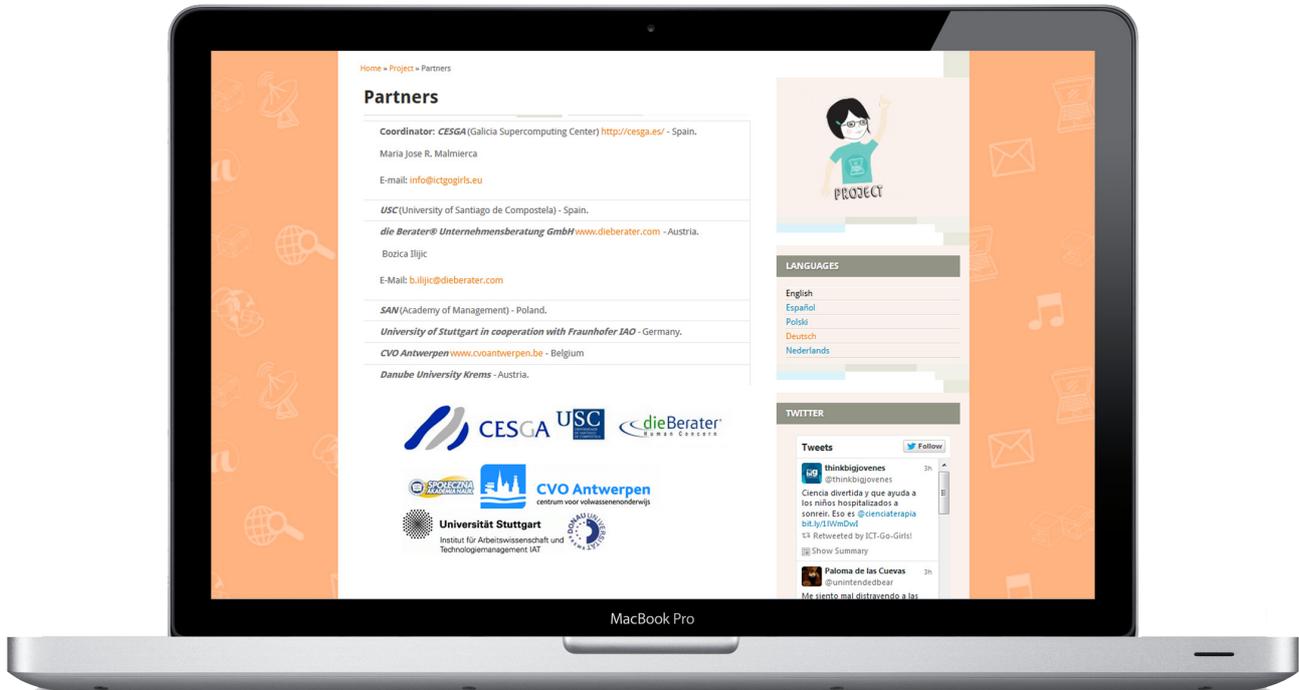


Figure 3: ICT-Go-Girls! Website Screenshot

Source: www.ictgogirls.eu



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