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WP6 – Attracting people to ICT: innovative learning and teaching

DELIVERABLE 6.3 – Catalogue of teaching and learning courses and resources

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Main editor (s):	Tomislava Recheva (EUN), Tommaso Dalla Vecchia (EUN)
Contributor (s):	Carrera Martinez (EUN), Hans Martens (EUN**)**

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1 Introduction to the deliverable and scope

1.1 Short introduction to the deliverable

This document represents Deliverable 6.3 - Catalogue of teaching and learning courses and resources that was produced in the framework of Work Package (WP6) of the DIGITALJOBS project. The catalogue aims to serve as a guide through some of the most useful resources and teaching and learning opportunities in the area of ICT, available online and offline in Europe today. It is meant to enable users (students, teachers, adults, etc.) to take advantage of a wider access of materials and learning opportunities.

Additionally, the "*Catalogue of teaching and learning courses and resources*" wants to allow potentially any interested stakeholder to use the listed material to populate other open repositories of educational material.

1.2 Description of work package

The objective of DIGITALJOBS WP6 is to contribute to tackling the digital skills gap by promoting innovative teaching and learning approaches and consequently working towards a structural change of educational systems in order to achieve a greater alignment between supply and demand sides of ICT jobs.

This WP has been designed as a comprehensive response to the problem of educational systems lagging behind the dynamic digital development of industry and society. With regard to this, the activities delivered by EUN in the framework of the DIGITALJOBS project have tried to give new impetus to the cooperation between interested stakeholders by facilitating dialogues and fostering collaboration on both regional and national level.

The work conducted by EUN in this context has comprised **research** and **need analysis** work, practical development and deployment of **teacher training programmes** as well as dissemination and promotion of relevant **education opportunities and resources,** identified as innovative.

These three lines of actions have been integrated in a common approach and synergies have been explored as much as possible. In fact, the work of **research** of best practices enabled EUN to integrate in the **training** programmes the most innovative tools and resources, while the educators engaged in the courses put forward solutions to be promoted, some of them user-generated, in addition to the ones originally identified.

Figure 1- integration of the three main axis of work within WP6

1.3 Description of the deliverable

Deliverable 6.3 compiles the main teaching and learning courses and resources identified by EUN, including a detailed description of the approach used to select the materials and the modalities of promotion of the materials.

Although it offers a systematic collection of resources and courses (Annex 1), the deliverable does not constitute a complete list of all teaching materials and learning opportunities currently available in Europe, nor of all the resources identified by EUN, as this would not result on a readable document. The catalogue is instead meant to collect the most commonly shared/used resources and courses with proven high quality and to identify reliable databases where equivalent materials can be found.

These databases, and their connection to the Grand Coalition for Digital Jobs and more specifically to the DIGITALJOBS project activities, are also described in this document.

In order to acknowledge the work of the Grand Coalition pledgers in the teaching and learning strand, the catalogue points out to some of the successful programmes and opportunities which have been implemented as a result of their activities within the Grand Coalition for Digital Jobs.

1.4 Methodology

The resources identified for the preparation of this catalogue have been selected through bi-annual checks and occasional consultations with relevant pledgers and stakeholders of the Grand Coalition for Digital Jobs.

More specifically, the regional workshops on computer science education, the European workshops and seminars organised yearly on digital skills teaching and learning (Task 6.3) and the awareness raising workshops organised for educators and students (task 5.1.2), represented fruitful opportunities for the identification of best practice teaching and learning methods.

Resources and materials have also been identified through the activities of a number of EUN's other projects and the organisation's interactions with entities active in the education domain and particularly providers of innovative teaching and learning. In addition, comprehensive desk research has been conducted as a complementary activity, utilising EUN's expertise in the area.

For the purpose of achieving greater effectiveness in promoting the selected materials and reaching out to a wide audience, EUN identified repositories tailored to final users (students, teachers, adults) which have been used as hosts of the collection resulting from task 6.3.

The eSkills for Jobs Campaign repository has been chosen to promote the educational resources and courses aimed at equipping young people and adults with a broad set of digital skills, and represented one of the main and more effective channels of dissemination, considering the interdependence of the initiative to the work and scope of the Grand Coalition for Digital Jobs.

Once the website of the European Coding Initiative has been developed and officially launched in October 2015, a specific section was designed to host and promote educational resources specifically relevant for teaching and learning computer programming and computing.

As EUN acknowledges the importance of providing the interested stakeholders with up-to-date information on the teaching and learning resources and opportunities available in Europe, dissemination of relevant content has been delivered parallel to the activities of collecting materials.

2 Courses and resources identified

One of the main priorities of the Grand Coalition for Digital Jobs has been to facilitate the deployment of training opportunities and to raise awareness about the different opportunities that its stakeholders offer for teaching and learning computer science and ICT. That is why this deliverable also acknowledges the effort made by pledgers in the teaching and learning strand by sharing an overview of courses and resources initiated and deployed by pledging organisations to the Grand Coalition.

It identifies pledgers' main thematic focus and target users by also sharing short description of the available courses and resources. EUN has identified over 20 teaching and learning opportunities resulting from Grand Coalition pledgers' activities. Many of the resources and courses have international scope with significant part of them offering opportunities for online use in various languages. This represents an effort for delivering a comprehensive strategy for addressing the skills gap in Europe from companies such as Microsoft, Samsung, Adobe, HP and SAP.

Other pledging organisations offer initiatives and resources with a specific national or regional scope. They offer training opportunities onsite within defined geographical region/country or offer training resources in a specific language. Initiatives of such kind are Talentum Startups, DIDASCA and Telerik Academy.

The effort of pledgers to apply a comprehensive approach to equipping EU population with ICT skills is made evident by the fact that their resources and training opportunities address frequently the wider audience of students, teachers, young people, offering even more advanced knowledge for IT professionals. Examples of such approach could be found in the activities of Microsoft, Samsung, HP and others.

It is important to notice that primary education is not the main focus of many resources and courses as much as secondary school students. While it is not self-evident that digital competences should be developed from early ages, it is however important to integrate elements of this skills-set at primary school level in order to support the development of a positive attitude towards technology and digital competence related studies and careers among EU students.

In addition to the Grand Coalition pledgers activities focused on offering teaching and learning opportunities, a number of other resources and courses have been identified by EUN. They vary in their focus, ranging from materials and courses on digital creativity to specific opportunities for integrating ICT and Maths. Most of the identified materials and courses are accessible online and require a certain level of English language skills.

It should be highlighted that many of the organisations offering online resources and training opportunities often aim to create an offline community with local events and workshops. A good example of such approach is Coder Dojo and it community of 400 centres around the world.

The work conducted by EUN within task 6.3 has also resulted in the collection of a considerable number of resources focusing specifically on teaching and learning coding. This demonstrates an increased effort from different organisations to support teachers in applying innovative ways of integrating coding into their teaching practices. Many of the available resources aim to transform learning computer science and coding into an enjoyable experience for both students and teachers.

3 Dissemination of identified teaching and learning materials

There are several websites in Europe dedicated to the dissemination of specific teaching and learning resources. However these are usually targeting a geographic and linguistic group or are narrowing down their scope of action to a specific competence or age group. Moreover, despite the existence of such resources' libraries, the most crucial aspect remains the promotion and dissemination of such material, in order to allow a wide uptake of the best solutions offered at European Level.

Considering the interesting initiatives and resources identified through the activities within Task 6.3, it has been crucial to deliver a comprehensive dissemination activity to inform students and teachers of the various opportunities they could take advantage of to improve their digital skills.

As per the description of work, EUN has adopted a strategy focusing on sharing the selected information on already established platforms, exploiting the communities already visiting such portals. With regard to this, in order to increase the usefulness of the selected resources, EUN has used databases which represent well- structured repositories with high visibility and with very well established target audiences. The selection of databases has been guided by the close relation of the Grand Coalition for Digital Jobs to the eSkills for Jobs campaign and the European Coding Initiative.

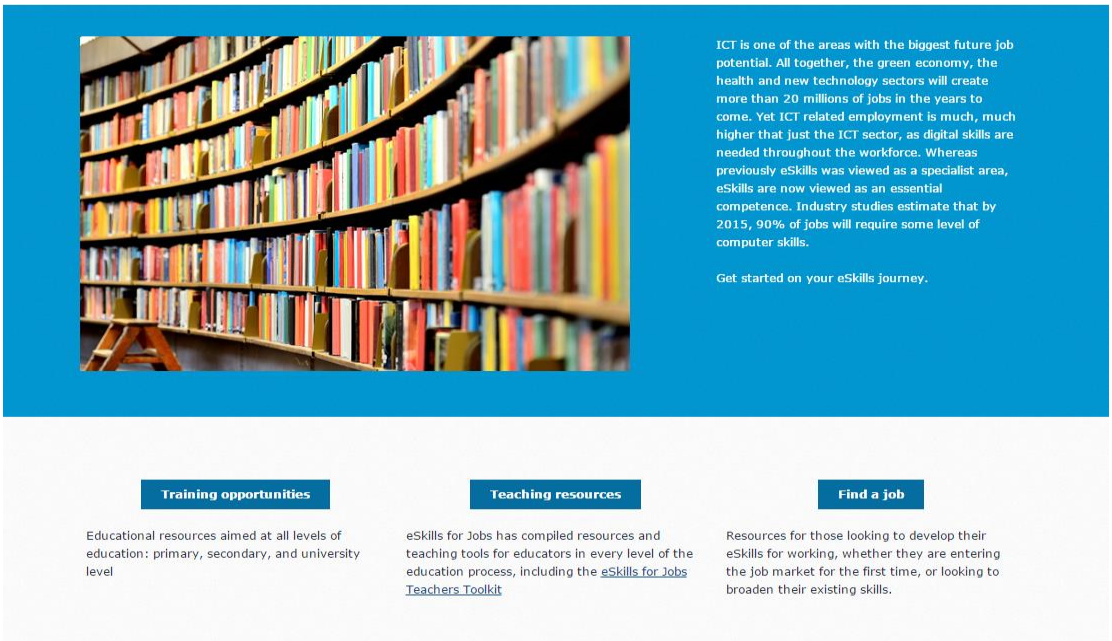


Figure 2 - Resources page on the eSkills for Jobs Campaign website

As in WP5 the work on Task 6.3 has taken advantage of the strong convergence between the awareness raising activities of the Grand Coalition Secretariat and those of the eSkills for Jobs 2015-2016 campaign. It is for this reason that EUN decided to use the eSkills for Jobs repository as a major channel for dissemination of the collection of teaching and learning courses and resources.

Secondly, EUN established a link between the repository and the European Coding Initiative. Since its launch, the European Coding Initiative has worked towards building an extensive and user friendly database of resources for teaching and learning coding. The Initiative has been established as a result of the activities of several pledgers to the Grand Coalition for Digital Jobs which try to address one specific priority that is to raise awareness on the importance of coding skills and computational thinking. Considering the role of the Initiative within the overall Grand Coalition campaign and the significant number of resources specifically focusing on coding within Deliverable 6.3, EUN has regarded as important to feed into the database of the European Coding Initiative and promote widely its resources.

It should be noted that EUN considers the above mentioned repositories as powerful tools to reach out to a wider audience. That is why they will remain the major platforms for sharing useful learning and teaching resources and opportunities identified in the future, even after Deliverable 6.3 is submitted.

3.1 eSkills for Jobs repository

As mentioned in the introduction to this deliverable, the activities of Task 6.3 have been implemented in synergy with activities and the eSkills for Jobs campaign, namely its website and the resources repository.

The eSkills repository has been established as a point of reference for students, job seekers, teachers and other interested stakeholders. It provides a user friendly searchable database of resources and information about available courses. Furthermore, the database is conveniently structured around the main audiences which the eSkills for jobs campaign is trying to address.

In line with this, EUN has decided to take advantage of this already existing platforms to contribute to the creation of a common extensive source of information on teaching and training opportunities and resources publicly available, rather than setting up a new repository.

Figure 3 - eSkills training opportunities resources

As a result of this, the eSkills for Jobs 2015-2016 campaign platform includes now resources on a variety of topics which could easily be filtered depending on the interest of the visitor.

The full repository of resources makes available about **146 among educational materials and courses**, and is fully and openly available online.

The resources available are listed accordingly to the following categories:

- Apps
- Coding resources
- Competitions
- Courses
- Digital creativity
- Games
- ICT for maths
- Job profiles
- Training for teachers
- Robotics
- Women in ICT
- Other

In order to provide a sense of the type of resources available on this platform, a selection of best practices, sorted per topic, is reported in this document, paragraph 5.1 *Table 1. Examples of eSkills repository content by topic*.

3.2 European Coding Initiative repository

Promoting teaching and learning coding has been identified as priority of the Grand Coalition for Digital Jobs. EUN, together with the other Secretariat partners, has focused a lot of effort into engaging more stakeholders and fostering a quality discussion around the topic. This is also evident by the establishment, within the Grand Coalition for Digital Jobs, of the European Coding Initiative.

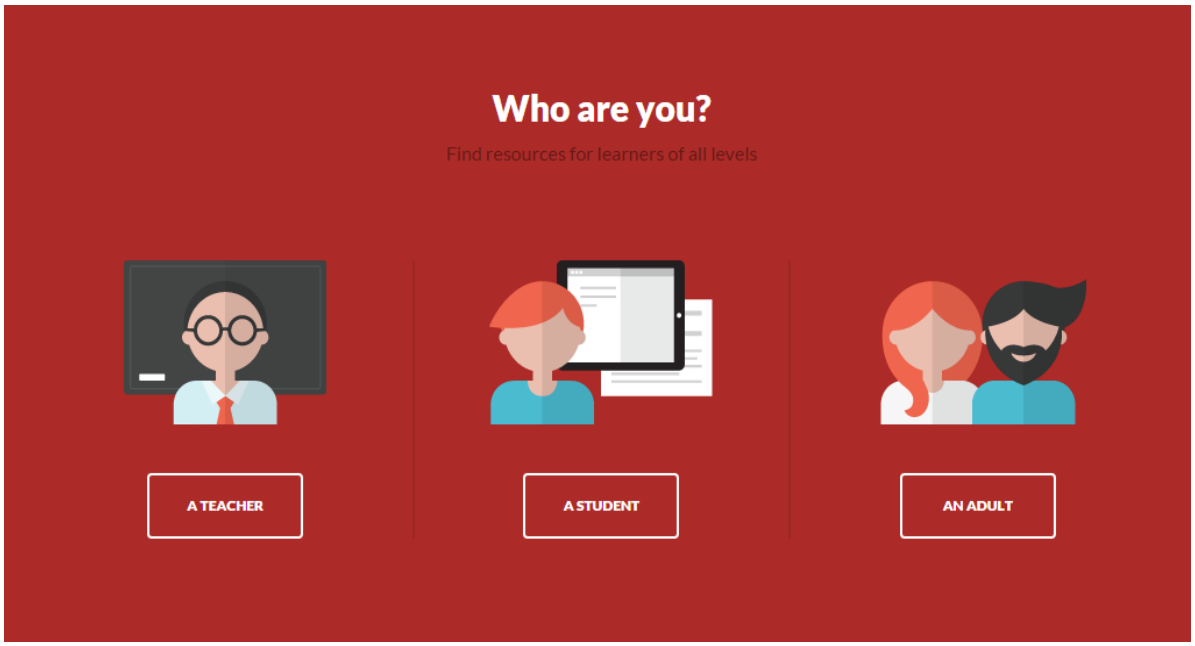
The activities carried out in the framework of the Initiative have led to the accumulation of quality knowledge and resources on the topic of coding and computer programming which represent a significant contribution to Deliverable 6.3.

The European Coding Initiative launched in October 2015 an online platform, www.allyouneediscode.eu, to inform on, and advocate for, the introduction of computing into formal education settings as well as in non-formal learning environments.

As the Initiative's aims include the development of a network of like-minded people and organisations, promising to create a large community of contributors and final users, it was deemed important to build a database dedicated to the topic of coding. This repository would have been of use to students, teachers and adults who wish to advance their skills in the area of programming and coding.

The repository, part of the 'All you need is code' website, includes now materials and resources offered by the partners in the Initiative, as well as all other materials which have been regarded as useful by many students and teachers in Europe.

Consequently, it is important to note that many resources present in Deliverable 6.3 are also present in the 'All you need is code' website. The repository is structured around the three main target audiences (students, teachers and adults) and it aims to direct visitors to the resources for teaching and learning coding, most suitable to their specific needs.



A summary description of the material made available on the repository is also included in this report, paragraph 5.2 *Table 3. Courses and resources on teaching and learning coding*.

Figure 4 – Front page of the all you need is code website

4 Conclusions, sustainability and exploitation

Deliverable 6.3 aims to give a broad overview of the current status of the work done for identifying and promoting useful teaching and learning resources and courses delivered.

These resources, as mentioned in the previous sections, are available in full online and are also summarised in the tables below. An overall collection of the materials are also made available in attachment as a spreadsheet, to allow an easier sorting of the proposed resources per topic, target group, and delivering organisation.

The attached document will also facilitate the replication or the embedding of the main educational resources and course in different repositories by any interested stakeholders.

It is worth mentioning that great attention is and will be given to the continuous exploitation of the outputs and results collected. In fact, as identifying and developing learning resources in various languages for teachers across Europe is embedded strongly in EUN's activities, we will continue the work in this direction adding contributions to the identified databases and promoting their content widely.

Additionally, as teachers engaged in the project activities expressed interest for learning resources targeted to the specific topics they teach and their grades, EUN will explore whether the lessons plans developed during the training programmes can respond to such need.

A first attempt of doing so has been already realised on the all you need is code portal, under the lesson plans section, but more structured way of sorting and presenting similar materials will be explored further.

5 Catalogue

5.1 Table 1. Examples of resources available of the eSkills for Jobs repository

Topic	Institution	Relevant content offered	Target group	Link to website
Robotics	Mindstorms- Lego Education	Resources to enable students (11+) to build robots and use software to plan, test and modify sequences of instructions from a variety of real life robotic behaviours.	Students/Teachers	Lego Education
	School or Robotics Robopartarns	eLearning platform that contains different materials and courses to enable teachers and students to learn how to use and build a robot.	Students/Teachers	School or Robotics Robopartarns
Apps	Apps for good	Global movement empowering a generation that partners with educators in schools and learning centres to deliver courses to young people (10-18 years of age) where they have to develop their own apps to design and make products.	Students/Teachers	Apps for good
Coding resources	Tynker	Online courses for 7-14 year olds that provide a complete learning system with interactive exercises, guided tutorials, creativity tools to enjoy programming.	Students	Tynker
	App inventor	Tool that teaches students how to programme and create Android apps. Appropriate for middle school children and up.	Students	App inventor
Digital creativity	Stem to steam	A global movement that aims to integrate art and design into the STEM equation in education. The website includes case studies and links to various resources.	Students	Stem to steam
	Autodesk	Free access to professional design software, creativity apps and real-world projects.	Students/Teachers	Autodesk
Games	Hopscotch	iPad app which helps teach 9-11 year-old students the basics of coding by creating games, animations, apps, etc	Students/Teachers	Hopscotch
	GameStar mechanic			GameStar mechanic

Topic	Institution	Relevant content offered	Target group	Link to website
		Game-based quests and courses to help students learn game design and make their own video games!	Students/Teachers/Parents	
ICT for Maths	Jumpido	Learning platform that offers series of educational games for Primary School Mathematics. It combines natural body exercises with engaging Math problems.	Students	Jumpido
	Intel Education Resources	Interactive Maths lessons covering, Measurement and Data, Numbers, and Shape and Space.	Students	Intel Education Resources - STEM

5.2 Table 2. Courses and resources offered by pledgers to the Grand Coalition for Digital Jobs aimed to promote innovative learning and teaching

Institution	Relevant content offered	Target group	Link to website	Topic
Adobe	Global initiative that provides resources and training material to inspire creative thinking among undeserved communities.	Secondary School students/Young people	Adobe Youth voices initiative	Creative media projects and creative thinking
Altran	Provides young graduates with classes, recruitment sessions, training and conferences helping them to stay ahead of technological and scientific innovation developments.	Students/Graduates	Altran Campus Team	ICT skills
BBC	Training and development material: 1000 online videos, 500 blog posts and 1700 articles.	Students/Young people	BBC Training Academy	IT digital traineeships programms
BBC Microbit	A mini-programmable computer designed by the BBC to get children actively involved in writing software for computers and building new things	Students/Teachers	Microbit	Coding
BEBRAS	International initiative providing events and workshops to promote Computer Science and Computational Thinking.	Students/Teachers	BEBRAS	Computer Science
Cisco Networking Academy	Offers industry based ICT education and training in some countries	Students	Cisco Networking Academy	ICT skills
Didasca	Offers courses and resources to improve the digital literacy of the Italian population. Content in Italian only.	Students/Teachers/Adults	Didasca	Digital Literacy
Digital Skills Academy	Training programmes to reskill jobseekers	Graduates	Digital Skills Academy	ICT skills
EMC Academic Alliance	It offers advanced technology curriculum learning and certification options on specialized ICT skills to institutions of higher education.	Students/Adults	EMC Academic Alliance	ICT skills
European Schoolnet	Free online professional development courses for teachers in primary and secondary schools to support them in applying and developing innovative teaching practices.	Teachers	European Schoolnet Academy	STEM

Institution	Relevant content offered	Target group	Link to website	Topic
Hewlett-Packard (HP)	HP LIFE e-Learning offers training and certification on business and IT skills to unemployed youth, focus on entrepreneurship.	Young people	HP LIFE e-Learning	ICT skills
Google for Education	Various programmes for educators and students focusing on computer science and coding.	Teachers	Google Resources	Computer Science
INLEA	ICT training programs and certification	Students/Teachers/Professionals	INLEA	ICT skills
Microsoft (Youthspark)	Microsoft Youthspark aims to make more computer science education courses, trainings and resources available, to help students improve their computational thinking and problem-solving skills that will help you today and in your future.	Students/Young people	Microsoft Youthspark	Computer Science
Ada National College for Digital Skills	Centre of excellence that offers courses for teaching and learning of higher digital skills.	Students	National College for Digital Skills	ICT skills
Microsoft (Educator Community)	Courses and resources for professional development, as well as different inspiring lesson plans and access to live lessons and virtual field trips.	Teachers	Microsoft Educator Community	Computer Science/Digital Literacy
Oracle	Offers a variety of best practices, workshops and courses for training in computer science and ICT skills	Students/Teachers	Oracle	Computer Science/ ICT skills
Samsung	Digital Education enables digital inclusion through improved learning of ICT skills for underprivileged children.	Students/Young people	Samsung	ICT skills
Academy Cube	Platform that offers free training courses based on a job-seeker's self-assessment to teach the specific qualifications required by a job profile.	Graduates/Young people	Academy Cube	Computer Science/IT

Institution	Relevant content offered	Target group	Link to website	Topic
SAP	Training and education courses, learning management solutions, education programs, and SAP software certifications.	Adults	SAP	ICT skills
Talentum Schools	Schools Talentum promotes digital vocation by offering motivational tools for developing students' creativity and innovativeness. Enables students to be creators of digital tools.	Students	Telefonica Talentum Schools	ICT skills
Telerik Academy	Tech-ed platform that offers on-site professional ICT training to Bulgarian students and to many ICT workers to refresh their current skills for the new digital jobs.	Students/Teachers/Adults	Telerik Academy	Computer Programming
Ubiqum Code Academy	Offers different training courses in programming for beginners and advanced learners, covering HTML, CSS, JavaScript, Java, Ruby on Rails, etc.	Graduates/young people	Ubiqum Code Academy	ICT skills

5.3 Table 3. Courses and resources aimed to promote teaching and learning of coding

Institution	Relevant content offered	Target group	Link to website	Topic
Academy Cube	Platform that offers free training courses based on a job-seeker's self-assessment to teach the specific qualifications required by a job profile	Adults	Academy Cube	Computer Science/IT
Barefoot computing	Teacher-focused resources on CS concepts and technologies to help primary school teachers in the UK prepare for the introduction of computer science into the curriculum	Teachers (Primary School)	Barefoot computing	Computer Science
Code combat	A multiplayer open source programming game that offers the students the possibility to learn to learn how to code.	Students	Code combat	Coding
Code week	Pan-European coding initiative that organises local and national initiatives; it provides toolkits, guides, lesson plans and other resources to promote coding.	Teachers	Code week	Coding
Code.org	Online courses and tutorials created so as to develop students' coding skills. Workshops for professional development and partnerships to support and expand computer science learning in schools.	Students/Teachers	Code.org	Coding
Codecademy	Coding classes in 9 different programming languages including Python, Java, PHP, JavaScript(jQuery, AngularJS), and Ruby, as well as markup languages HTML and CSS.	Students/Teachers	Codecademy	Coding
Coder dojo	A variety of tutorials, resources and projects created by the CoderDojo Community for teaching and learning how to code.	Students/Teachers	Coder dojo	Coding

Institution	Relevant content offered	Target group	Link to website	Topic
Khan Academy	It offers practice exercises, instructional videos, and a personalized learning dashboard that empower learners to study at their own pace in and outside of the classroom.	Students/Teachers/Parents	Khan Academy	Computer Programming
Kodu	A visual programming language that offers self-learning courses and tutorials to allows children to create games with no design or programming skills.	Students/Teachers	Kodu	Games development
Lightbot	Educational video game that offers an easy way for kids to learn software programming concepts	Teachers	Lightbot	Computer Programming
Pocket code	A programming environment with free educational apps and tutorials for children and teenagers where students can develop their own games, animations, interactive music videos, and many kind of other apps, directly on their phone or tablet.	Students	Pocket code	Games development
Raspberri Pi	Teaching resources to use with the Raspberry Pi, the tiny and low-cost computer	Students/Teachers	Raspberri Pi	Computer Science
Scratch	A free programming language and online community where students can create their own interactive stories, games, and animations and share those creations online.	Students	Scratch	Coding/Games development
Scratch Jr	Introductory programming language that enables young children (ages 5-7) to create their own interactive stories and games	Teachers	Scratch Jr	Coding/Games development
Small Basic	Tutorials, free tools and learning activities focused on helping students to make programming accessible for beginners with only 15 keywords and an inviting development environment.	Teachers	Small Basic	Programming

Institution	Relevant content offered	Target group	Link to website	Topic
Microsoft YouthSpark Hub	Initiatives which aims to make more computer science education courses, trainings and resources available, to help students improve their computational thinking and problem-solving skills that will help you today and in your future.	Students	YouthSpark Hub	Digital Skills