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coding for social promotion

Output 2.2:
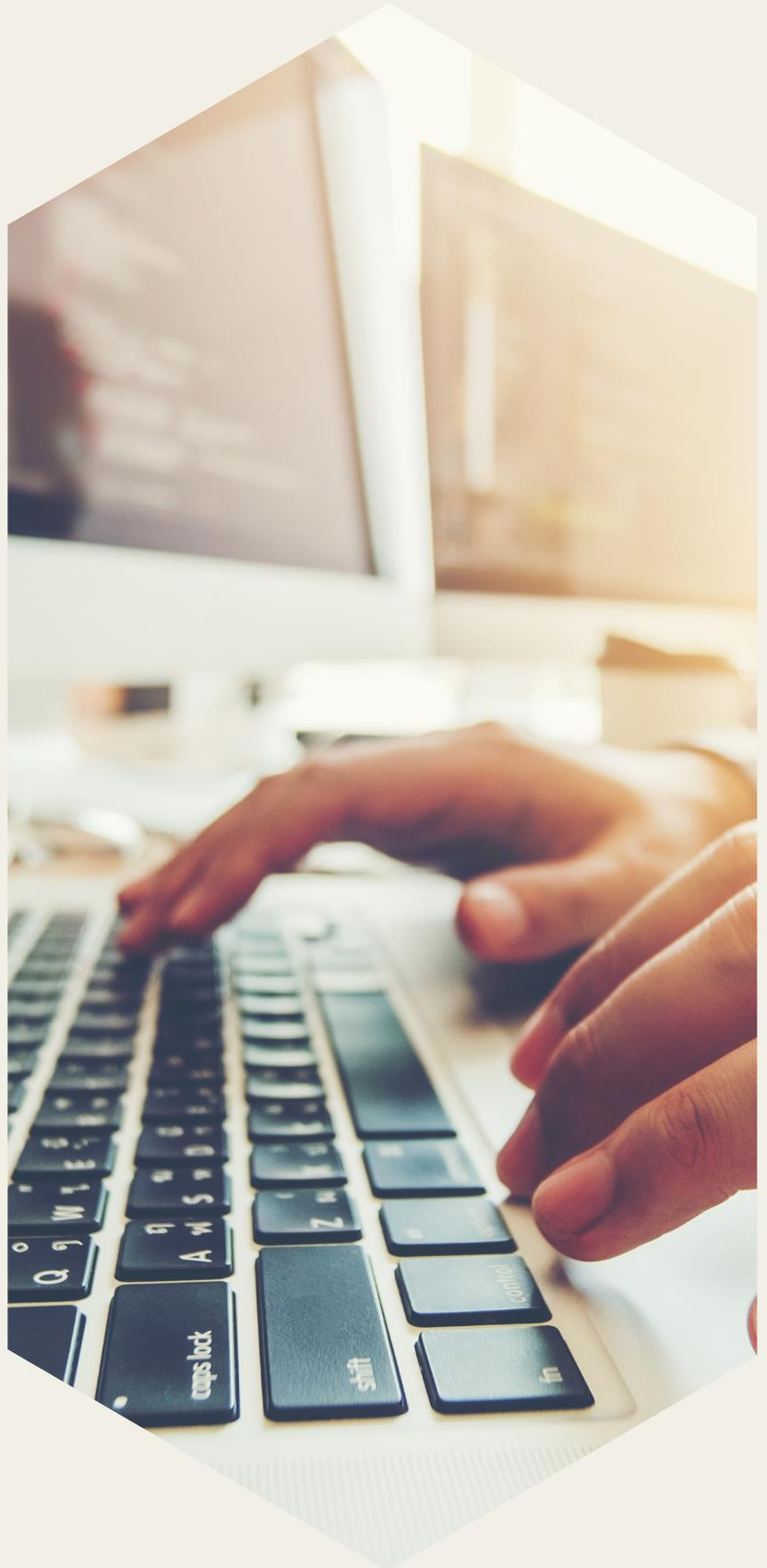# Good Practices on coding in non-formal education contexts

WP2:
Knowledge Exchange and Transferability Plans

Compiled Report

Prepared by:

Center for Social
Innovation

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SUMÁRIO EXECUTIVO

O presente Sumário Executivo representa um sumário do Relatório Compilado para a utilização do Pacote de Trabalho 2 do Projeto "Code4SP - Programação para a Promoção Social".

As Boas Práticas do CodeDoor

O CodeDoor começou como uma iniciativa privada com uma pessoa, apoiada por duas pessoas com grandes ideias em 2015. Ao longo dos últimos anos, evoluiu de uma entidade de ensino de competências de TI para uma infraestrutura que pode apoiar todas as organizações sem fins lucrativos e instituições de educação no seu trabalho e expansão.

Multilíngue, orientada para o utilizador e independente de fontes específicas, a infraestrutura do CodeDoor pode ser adaptada por organizações em todo o mundo às necessidades dos seus formandos. A solução de software permite uma experiência de aprendizagem personalizada e que pode ser gerida pelos funcionários das organizações, mesmo se estes não possuírem eles próprios competências de TI.

Atualmente, estudantes de 15 países trabalham com a plataforma - mais de 2000 pessoas ao mesmo tempo. A infraestrutura do CodeDoor ajuda os utilizadores a aprenderem a aprender - porque assim que alguém tiver aprendido a aprender, o mundo fica aberto a essa pessoa. Desta forma, os formandos podem tornar-se excelentes programadores em menos de um ano, ao mesmo tempo que fecham o fosso entre as qualificações e o início de uma carreira. A plataforma é uma ferramenta de aprendizagem com base em projetos, suportada por IA, que permite que os seus utilizadores aprendam a pensar como programadores através da metodologia, transferência de competências e compreensão de problemas.

Análise de Boas Práticas

Cada parceiro realizou uma investigação documental como parte do Pacote de Trabalho 2.2 e identificou boas práticas nos países parceiros (Alemanha, Portugal, Grécia e Chipre) que utilizaram metodologias de programação com sucesso, como forma de integração económica de populações desfavorecidas ou marginalizadas. Todos os parceiros identificaram entre 3 a 5 boas práticas nos seus respetivos países. No total, foram identificadas 14 boas práticas.

Em Portugal, várias boas práticas foram estabelecidas, que utilizaram com sucesso metodologias de programação como forma de integração económica de populações desfavorecidas ou marginalizadas. Mais importante, deve notar-se que 4 das 5 boas práticas identificadas em Portugal têm como objetivo o aumento da consciencialização e competências em relação à programação e literacia em TI em geral. Contudo, apenas 1 das 5 boas práticas está relacionada diretamente com linguagens de programação, enquanto que as outras 3 são mais relevantes para a programação e competências de TI gerais. 3 das boas práticas identificadas destinam-se a grupos marginalizados na sociedade, mais especificamente a refugiados e a idosos. Por exemplo, a melhor prática 'SEE.TELL.LISTEN' foi implementada pelo Conselho Português para os Refugiados para ajudar refugiados e requerentes de asilo a melhorar as suas competências de literacia digital. Do mesmo modo, a boa prática 'Click&Collect4All' destina-se a idosos. Além disso, todas as 5 boas práticas identificadas não têm pré-requisitos de formação anterior em programação ou TI. Por exemplo, a melhor prática 'Sharkcoders' destina-se a ensinar programação e robótica a crianças entre os 6 e os 17 anos de idade. Todas as boas práticas identificadas em Portugal utilizam métodos de aprendizagem e educação não formal inovadores, flexibilidade, formatos simples para os cursos oferecidos e ensino criativo. Por exemplo, a boa prática 'SEE.TELL.LISTEN' utiliza métodos de ensino inovadores tais como a 'narração de histórias' e a 'Sharkcoders' usa ensino criativo através do raciocínio lógico e resolução de problemas. Do mesmo modo, 4 das 5 boas práticas usam plataformas e módulos online para melhorar as competências de programação e TI. Por último, 2 das boas práticas identificadas são completamente gratuitas e de livre acesso para que todos possam utilizá-las.

Da mesma forma, na Grécia todas as 4 boas práticas identificadas utilizaram com sucesso metodologias de programação como forma de integração económica de indivíduos desfavorecidos ou marginalizados. Mais especificamente, a boa prática 'skg code' tem como objetivo aumentar as competências de estudantes sem experiência de trabalho e a boa prática 'Coding for Girls' destina-se a raparigas, mulheres e desempregadas. Todas as boas práticas identificadas na Grécia estão especificamente relacionadas com competências de programação, por exemplo a boa prática 'Patras CodeCamp' oferece módulos, cursos e workshops sobre aprendizagem automática, blockchain e Inteligência Artificial, enquanto que a 'Coding for Girls' oferece módulos sobre Python. 2 das boas práticas identificadas na Grécia foram feitas à medida para melhorar as competências de programação de indivíduos

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vulneráveis, enquanto que outras 2 estão disponíveis para toda a gente, independentemente dos seus antecedentes, sexo, idade ou nacionalidade. Do mesmo modo, 3 das boas práticas identificadas são oferecidas gratuitamente, enquanto que a 'Social Hackers Academy' oferece módulos gratuitos e cursos apenas para indivíduos vulneráveis. Além disso, 2 das boas práticas identificadas usam educação não formal e meios inovadores para melhorar as competências de programação dos participantes. A boa prática 'skg code', por exemplo, adota uma abordagem de 'simulação de emprego' onde os participantes trabalham em grupos para produzir um resultado final e a 'Social Hackers Academy' usa mentores que trabalham em estreita colaboração com os participantes para melhorar a sua experiência de aprendizagem.

Do mesmo modo, 2 das boas práticas também incluem formações de competências pessoais para além da formação em programação. Mais especificamente, a 'skg code' oferece formação em competências pessoais e a 'Social Hackers Academy' uma 'abordagem holística' para melhorar as competências de programação, ao também incluir módulos e cursos de competências pessoais na sua plataforma. Além disso, a boa prática 'Coding for Girls' oferece um certificado de conclusão após a conclusão do curso, que pode ser usado como referência para as competências adquiridas.

Por último, 3 das boas práticas identificadas estão em curso ou são realizadas anualmente. Na Alemanha, 3 das boas práticas identificadas têm como objetivo melhorar as competências de indivíduos vulneráveis, e mais especificamente, de refugiados. Além disso, a 'ReDi School of Digital Integration' também oferece cursos específicos para mulheres e crianças de níveis de capacidades diferentes, enquanto que o objetivo principal da 'DCI' é ter impacto social. Da mesma forma, as 3 boas práticas estão relacionadas com programação e competências de TI. Por exemplo, a 'Kiron School' oferece um amplo espectro de especializações, como cursos de Desenvolvimento Web, Inteligência Artificial e informática. Além disso, é importante referir que as 3 boas práticas também oferecem cursos de competências pessoais e de línguas, para além dos cursos de TI e competências de programação. Mais especificamente, a 'ReDi School' oferece cursos de competências de apresentação, networking, criação de CVs e de portfolios. Da mesma forma, a 'DCI' oferece cursos de alemão para refugiados. Semelhantemente, é importante destacar que a 'ReDI School' também oferece aconselhamento de carreira em conjunto com competências pessoais e técnicas e a 'Kiron School' também oferece apoio pessoal a estudantes e participantes. Do mesmo modo, é importante notar que a 'ReDi School'

também oferece aconselhamento de carreira para além das competências técnicas e pessoais oferecidas e a 'Kiron School' também oferece apoio pessoal a estudantes e participantes. Em relação aos métodos de ensino, todas as 3 boas práticas usam métodos de educação não formal inovadores. Por exemplo, a 'Redi School' pratica ensino presencial e oferece 3 níveis de cursos: Iniciante, Intermédio e Avançado, enquanto que a 'Kiron School' oferece ensino online 'personalizado' com a possibilidade de matrícula numa Universidade para ganhar créditos. Por último, a 'Kiron School' e a 'DCI' também oferecem um certificado após a conclusão do curso e a 'Kiron School' é gratuita para refugiados enquanto que a 'DCI' oferece apoio financeiro aos alunos.

Por último, no Chipre, apenas 1 das boas práticas identificadas está especificamente relacionada com a melhoria de competências de programação. As outras 3 boas práticas identificadas relacionam-se com competências de TI e informática em geral. Por exemplo, a 'Training Centers' oferece competências básicas de TI e a 'HelpRefugeesWork' oferece tanto cursos básicos como avançados de informática. Em relação aos beneficiários das boas práticas, 3 das 4 boas práticas identificadas no Chipre destinam-se a melhorar as competências de pessoas de grupos socioeconómicos mais desfavorecidos. Por exemplo, a 'Colorful Societies' e a 'HelpRefugeesWork' destinam-se especificamente a refugiados e a nacionais de países terceiros, enquanto que a 'Training Centers', apesar de estar disponível para toda a gente, oferece descontos nas propinas para as pessoas mais idosas e pessoas de grupos socioeconómicos mais desfavorecidos. Do mesmo modo, 2 das boas práticas identificadas são oferecidas gratuitamente. Além disso, 2 das boas práticas identificadas oferecem formações e cursos de competências pessoais e de línguas para além de competências informáticas e de TI. Mais especificamente, a 'Training Centers' oferece uma grande variedade de cursos de línguas para principiantes (incluindo cursos de grego e inglês) enquanto que a 'HelpRefugeesWork' oferece cursos sobre como criar um CV. Além disso, 2 das boas práticas identificadas usam formas de educação inovadoras e não-formais para melhorar competências informáticas e de TI enquanto que as outras 2 boas práticas usam um método presencial mais tradicional. Por exemplo, tanto a 'Training Centers' como a 'Colourful Societies' têm lugar numa situação de 'sala de aula' enquanto que a 'HelpRefugeesWork' é uma plataforma online e a 'Learn to Code with Python' é uma escola de verão de 5 dias 'inovadora e divertida' que permite que os jovens se foquem num assunto específico durante um curto período de tempo. Além disso, as 4 boas práticas não requerem experiência anterior para participar nos programas e 2

das boas práticas ocorrem anualmente. Por exemplo, a 'Training Centers' realiza-se durante todo o ano, exceto nos períodos de verão, e a 'HelpRefugeesWork' está disponível a qualquer altura.

Resultados das Entrevistas com Especialistas em TI

No total, foram entrevistados 20 especialistas em TI no Chipre, na Grécia, em Portugal e na Alemanha. Dos 20 entrevistados, 17 foram do sexo masculino e 3 do sexo feminino.

Os entrevistados dos países parceiros tinham uma grande variedade de percursos académicos, mas todos eles tinham 2 a 20 anos de experiência em programação e/ou uma área relacionada com TI.

Quando questionados sobre competências programação e a procura destas, todos os entrevistados de Portugal, da Grécia e da Alemanha concordaram que ser programador é uma profissão exigente, principalmente por estar em constante mudança e devido à complexidade do processo de aprendizagem. Quando questionados se existe procura para empregos relacionados com programação, todos os participantes de Portugal, da Grécia, da Alemanha e do Chipre concordaram que existe cada vez mais procura por trabalhos de programação, principalmente devido ao facto de vivermos numa era digital e devido aos avanços tecnológicos e digitalização. Além disso, foi pedido aos participantes que explicassem que competências alguém deve possuir para ter sucesso numa posição de programação. A maioria dos participantes de todos os países parceiros afirmaram que é importante para os profissionais de programação possuírem tanto competências técnicas, como por exemplo linguagens de programação, como competências pessoais relacionadas com a comunicação e trabalho em equipa. Em relação às competências de programação, a maioria dos participantes dos países parceiros concordaram que o que um programador faz depende de e varia consoante a área do seu trabalho, uma vez que existem muitas áreas de Programação.

Em relação aos benefícios dos empregos na área da programação e em relação aos motivos pelos quais um indivíduo poderá escolher seguir uma carreira nessa área, os participantes em todos os países referiram quase unanimemente que os benefícios relacionados com o salário são a principal vantagem a ter em conta. Além disso, os participantes também referiram que trabalhar a partir de casa é também uma das principais vantagens. Pelo contrário, em relação

aos desafios sentidos pelos indivíduos interessados numa posição de programação, os entrevistados de todos os países parceiros concordaram que talvez o maior desafio seja a necessidade constante de estudar e fazer formação, diariamente, devido à natureza mutável do trabalho. Por último, em relação ao desenvolvimento de capacidades, os participantes referiram que é importante ter formação contínua, que deve começar com formação para competências técnicas e depois incluir formação para competências pessoais, formações e cursos de línguas, cursos de motivação e formação sobre como criar um CV ou procurar um trabalho.

Resultados das Entrevistas com Recrutadores/Orientadores de Carreira ou Especialistas em Recrutamento

No total, 20 recrutadores/orientadores de carreira e especialistas em recrutamento foram entrevistados no Chipre, na Grécia, em Portugal e na Alemanha.

Todos os participantes possuíam uma vasta variedade de percursos académicos e educativos e todos tinham pelo menos 1 ano de experiência de trabalho nas áreas de recrutamento e/ou aconselhamento de carreira.

Para começar, todos os entrevistados em todos os países parceiros concordaram que existe de facto um aumento na procura de empregos de programação como resultado do número cada vez maior de empresas à procura de especialistas em TI, devido à pandemia de Covid-19 e aos novos avanços tecnológicos. Contudo, apesar da procura cada vez maior, os entrevistados concordaram que a oferta é muito mais baixa face à procura cada vez maior. Em relação às competências que alguém deve possuir para ter sucesso numa posição de programador, os participantes em todos os países concordaram que as competências técnicas, como o conhecimento de várias linguagens de programação, são muito importantes. No entanto, a maioria dos participantes também concordaram que as competências pessoais como competências de comunicação também são muito importantes. Em relação aos requisitos mínimos para conseguir um trabalho na área da programação e o que é que os empregadores procuram num potencial candidato, as respostas variaram entre países com alguns participantes a referirem que um curso universitário é essencial enquanto que outros referiram que um curso universitário nem sempre é necessário. Além disso, os participantes também

afirmaram que ter experiência de trabalho relevante é também muito importante e normalmente os empregadores pedem aos candidatos que tenham experiência de trabalho.

Em relação aos benefícios publicitados para posições de programação e porque é que alguém estaria interessado em procurar tal posição, nos 4 países, a maioria dos entrevistados afirmaram que o maior benefício publicitado numa posição de programação e a razão pela qual a maioria das pessoas escolhem seguir uma carreira nesta área é o salário elevado oferecido e a elevada procura por trabalhos de programação. Além disso, os participantes também mencionaram a possibilidade de teletrabalho e a flexibilidade como benefícios. Em relação aos desafios da profissão de programador, as respostas dos entrevistados variaram, variando desde a natureza mutável da profissão a uma grande competitividade entre os candidatos.

Por último, de forma semelhante aos especialistas em TI, os participantes afirmaram que a formação deve ser contínua e incluir formação em várias linguagens de programação, assim como competências pessoais, como por exemplo competências de gestão de projetos, comunicação e línguas. No entanto, ao conceber uma formação para pessoas desfavorecidas, a maioria dos entrevistados concordaram que incluem formação em competências pessoais, incluindo competências de comunicação, aconselhamento de carreira, assim como formação sobre como criar um CV e preparação para entrevistas de emprego, para além das competências técnicas.

INTRODUCTION

The present report represents the utilization of Work Package 2 of the Project 'Code4SP" Coding For Social Promotion'.

The project 'Code4SP: Coding For Social Promotion' aims at fostering digital skills and competences of digitally excluded individuals and groups, including older people, migrants and young people from disadvantaged background. Moreover, Code4SP aims at enhancing digital skills and competences of digitally excluded individuals by 'scaling up' good practices (replicating good practice on a wider scale/transferring it to a different context or implementing it at a higher/systemic level) on inclusive education and/ or promoting common values initiated at a local level. Also, Code4SP aims at transferring a good practice – CodeDoor Best Practice – on the transfer of computer programming (Coding) skills to people from vulnerable socio-economic groups.

The 'CodeDoor Best Practice' has been implemented locally in different towns in Germany and is in constant evolution for improvement. Over 90% of the CodeDoor's alumni have been able to find a job or an apprenticeship in the last four years or have set up their own start-ups and many CodeDoor alumni act as mentors for the new generation. Similarly, alumni find themselves in a higher socio-economic position and many provide online coding expert support to the current CodeDoor trainees.

The present report concerns the implementation of Work Package 2: 'Knowledge Exchange and Transferability Plans'for the project Code4SP and more specifically of Work Package 2.2: 'Connecting CodeDoor best practice, needs analysis and existing good practices on Coding in Non-Formal Education contexts in all the participating countries'. Consequently, the purpose of WP2.2 of Code4SP is to create a comparative report which will investigate and analyze national schemes on coding, along with their impact at a policy level.

This report will identify best practices from all partner countries (Portugal, Cyprus, Greece and Germany) which have successfully employed coding methodologies as a means of economic integration of disadvantaged or marginalized populations (e.g. for migrants/refugees) and determine specific needs and interests, by giving emphasis on detected gaps in terms of

local/regional/ national policy considerations that could potentially be tackled by the current project.

Thirdly, this report will provide a summary and commentary of interview results conducted in each partner country with IT experts and recruiters/career guidance officer or recruiting experts in order to receive a more complete picture of the state-of-the art in each partner country. The report will present and analyzed up-to-date information about regional/national job profiles (needed skills for technicians and ITs) and development opportunities of the digital job market.

Lastly, this report will embed the most significant points that will have derived from the entire qualitative process, ending up with a comparative analysis on the results of different national contexts, highlighting the common points and the main socio-cultural-economic differences between each implementation country. The report will conclude with an assessment of the main risks/threats for the application of the CodeDoor best practice in each implementation country.

BEST PRACTICES ANALYSIS

Each partner conducted desk-based research as part of Work Package 2.2 and identified best practices in the partner countries (Germany, Portugal, Greece and Cyprus) which have successfully employed coding methodologies as a means of economic integration of disadvantaged or marginalized populations. All partners identified between 3 to 5 best practices in their respective countries. Overall, 14 best practices were identified.

Portugal

In Portugal, 5 best practices were identified which have employed coding methodologies as a means of economic integration of disadvantaged or marginalized populations.

42 Lisboa

The first best practice identified in Portugal is 42 Lisboa[1]. Founded in Paris in 2013, 42 now has over 10,000 students in over 20 countries and is recognized as one of the best programming schools in the world. Studying at 42 is completely free, requiring no academic background or programming experience. The only requirement is that applicants must be at least 17 years old.

At 42 Lisbos, students learn practically by developing projects, among peers, in a model that works like a game. Thus, in addition to technical skills, each pupil develops teamwork, problem solving, adaptability, determination, autonomy and resilience. Studying in this organization is 100% free, as the Board believes that everyone deserves the opportunity to develop their talents, regardless of their background and resources. The support of several sponsors who are committed to education is key and ensures that no tuition is charged to students.

Of all 42's students worldwide, about 50% have never programmed before, and yet more than 80% received a job offer even before completing the program.

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[1] https://www.42lisboa.com/en/about/

There are no teachers and no books. Learning is done in pairs, through the development of projects that allow you to earn points and advance to the next level, like a game. Once the basics are learned, each student is free to create his or her path, choosing the projects that allow him/her to gain knowledge in the areas that interest them the most.

Besides learning to program, students learn to solve problems, to overcome challenges, to learn how to learn, to be responsible for themselves and others. At 42, the methodological approach is learning by doing, and two internships after the course are part of the curriculum. The growing weight of technology in several industries is undeniable, as well as the lack of professionals in the area - in Portugal alone it is estimated that 30,000 programmers are needed.

Given the flexibility with which students at 42 can access, free of charge, a complete, up-to-date, and free teaching program, these features must be also included in the Code4SP project. The interpersonal skills resulting from the learning fit the profile of today's worker and are pertinent to include in any course of this nature. Offering an internship at the end of the course is a key element of this good practice, and it may be particularly useful for the Code Door project to look at this trait.

RECODE Portugal

The second best practice identified in Portugal is a platform called RECODE[2]. RECODE Portugal is a digital platform of courses with certification from large companies such as Microsoft and PMI (Project Management Institute - Educational Foundation), totally for free and for everyone. It is comprised by online programming courses, entirely in Portuguese, including the App Inventor - code software developed by Google for the creation of Android applications. The courses are made in a simple and intuitive format so that the trainees understand the concepts that are being treated. Learning the logic of programming, knowing what an algorithm is, and applying the application knowledge in practice are among the objectives. In 40 hours, in this course you will learn programming logic and how it works. It is the basic theme of logical thinking and essential for a programmer. You will also learn the importance of and understand what an algorithm is, what a programming language is, and put it into practice with App Inventor.

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[2] https://cdi.org.pt/recode-portugal/

Given that this is a free course and shaped for everyone, in addition to teaching about fundamental tools in the area of programming with the Microsoft trust-mark, the Code4SP Consortium could study the way the course was structured and adapt it to the needs of the project. The fact that all materials are available online and asynchronous allows a flexibility that the project team should also consider.

SEE.TELL. LISTEN

The project SEE.TELL.LISTEN[3], implemented by the Portuguese Refugee Council, The project SEE.TELL. LISTEN aims to endorse the reskilling and upskilling of refugees and asylum seekers by providing tools and expertise which are key to self-sufficiency in the current knowledge economy, particularly regarding digital literacy. It does so through inventive methods that can foster cultural expression and increase self-confidence of refugees, and their mastery of their own narratives. It does so by developing an innovative adult training curriculum and testing it in pilots in three countries.

The first step was to create a draft Training Curriculum, including modules of Digital literacy, Digital Storytelling and Photovoice methods, based on non-formal educational methods developed by 4 different partners in the consortium.

The Training Module on Digital Literacy for Refugees offers information, materials and activities needed for the upskilling or reskilling regarding digital competences as well as for the training of digital literacy and digital citizenship for refugees and asylum seekers. This module provides an introductory approach to the digital world, allowing participants to gain capacities needed for the development of the other two modules, as well as to daily life in the digital world. This module addresses a skill gap among adult refugees and asylum seekers, namely the need to understand how to use technology in an effective and safe way, underlining privacy, and security issues.

The changes brought by the Internet claim careful considerations regarding responsibility and accountability that unavoidably fall under the respect for others and the human rights. The Training Module on Digital Literacy for Refugees is a tool that can be used to take advantage of the different opportunities and to confrontation the various challenges the Internet brings.

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[3] https://www.seetell-listen.com/

Looking back from the start of the project up and till the end, the conclusion can be drawn that the developed Training Curriculum, in its special combination of digital skills, storytelling and working with images, has been proven to be very successful. The participants were very satisfied and learned a range of new skills. Some very practical, others more in the field of identity building and reaching out to unknown audiences. They also had the opportunity to bond with others, including their highly valued trainers.

The various steps in the project from concept development, to train-the-trainer sessions and the implementation of pilots in three different countries has led to a Curriculum that has been tested and proven in many ways. All six partners in the project will integrate this Curriculum in their programmes and projects for the upcoming years.

As we can learn from the evaluations of the partner organisations of the project SEE.TELL.LISTEN, all of them are convinced the Training Curriculum is very suitable for implementation by other organisations in the pilot countries as well as in other European countries.

It is wise to have a good image of the participants one is aiming at. The differences in knowledge, life experience and skills, can be enormous. This does not mean however, that working with homogeneous groups is preferable. In mixed groups participants can learn from each other and stimulate each other to overcome barriers. Older people for example, know the value of life stories and memories, more than younger people. At the start of mixed groups on storytelling e.g. a division in tasks can be made, in which the younger ones handle the video camera or mobile phone, while the older ones tell the first stories.

When working with mixed groups it is important to prepare for language difficulties. Working with an interpreter slows things down a lot. A solution would be to work with mixed couples or sub-groups who speak the same language, of which one person also speaks the language of the course and can explain things to the others.

In the pilots, the courses were shortened because of the limited time of the project and the COVID-19 measures. If possible, in other circumstances, it is advised to take more time for the courses on Digital Storytelling and Photovoice. Once the participants are engaged these

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modules offer a lot of new experiences for them and very fruitful opportunities to enlarge their self confidence and self-esteem.

Some women, as is the experience in Portugal, could be best addressed in separate groups. Not only because in some cultures mixed groups with male are a problem, but also because the digital skills of some women are very low, because of lack of education. (In storytelling however, they are often masters).

A good image of the participants is also helpful to adjust the sessions to their needs and possibilities. The Digital Literacy Module offers a good and practical base, but had, as has been recommended by the developers, to be adjusted for each group, depending on the participants previous knowledge and needs.

The Photovoice module can at first lead to some hesitations, but it is very interesting, why participants find it difficult to cut their own image and to make this hesitation a topic in the conversation with group. What is identity? And what constitutes it? Can I be deprived of my identity if someone borrows my photographed eyes? Do I, in fact, add something new to another picture?

In all pilots at first it was difficult to recruit participants. Digital communications and flyers did not seem to give the expected response. One-to-one invitations in which the purpose of the training could be explained and curiosity in the persons experiences and skills could be shown, worked a lot better.

The place where the training is given is also important. It is preferable to choose a location that is not too formal and does not look like a setting for compulsory activities. Although it is sometimes hard to imagine travelling, also within the city itself, is always an obstacle. It seems better to choose a location close to the place where most participants live. If it is thought to be important to show them other parts of the city, use the Postcard sessions to make a guided tour to interesting places in the city.

It is important that the equipment needed, which is described in the Curriculum, is available on the spot. The Photovoice sessions e.g. need a special printer to immediately print the (self) portraits of the participants. Be aware if the participants have smartphones and if additional computers and video cameras are needed.

In the Curriculum the products made by the participants and the process of learning and bonding are equally important. The postcards, Roboteca and recorded stories, and if possible, group performances, are very important to strengthen the self-confidence of the participants and to change the dominant narratives on refugees. Working with social media to spread the results of the projects can be a way for participants to practice the new digital skills.

Sharkcoders

Sharkcoders[4], the first Portuguese network of schools for programming and robotics, aims to help children and teenagers, aged 6-17, to be prepared for the future. According to its founder, teaching is done playfully, teaching what is the literacy of the future, programming, development of games, mobile applications and robotics. The teachings have a very positive transversal impact on the development of certain skills, such as logical reasoning, problems, English, mathematics and teamwork, among other aspects.

Sharkcoders started to be designed in 2016 when it was noticed that kids needed to have this type of experience from an early age, to develop skills.

The business is focused on three areas, which range from offers for families, offers for municipalities, groups or schools and the production of content for internal or external consumption (franchising network). Schools are introduced programming and courses are given where young people can, for example, create their own applications and games

The fact participants can create their own applications and games is very interesting for the purpose of the Code4SP project, since it can act as the 'final project' of the participants, who can sell it furthermore;

The extension of the project to the local authorities can be advantageous, since it can be adapted to provide local populations with coding and programming notions.

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[4] https://www.sharkcoders.pt/

Click & Connect 4 All

Click & Connect 4 All[5] is a programme of computer classes for elderly people from the Portuguese and Latin American community in the United Kingdom, run by Portuguese educator Nuno Vinhas, from the Oldalone UK organisation, having been awarded the honour Best Diversity and Inclusion Impact 2020, by the Institution of Engineering and Technology (I&T). According to its founder, the project was designed to consolidate and embrace the Latin American community, especially the elderly. Everything was planned to reach people with little academic education, which meant a visual, oral and neurolinguistic programming adaptation.

The mission of Oldalone themselves is to help fight loneliness among older people by providing them with companionship and leisure. Their aim is to reduce the number of older people affected by loneliness and to make sure they can lead a fulfilling and meaningful life. Oldalone UK is working tirelessly to achieve its purpose under the banner of its values: Integrity, Kindness and Empathy in the hope to achieve ever growing age-friendly communities. Click & Connect 4 fits perfectly on this view and goals.

Those in charge of this programme may be contacted in order to learn about the methodology used to establish a link between all the participants, who face, apart from info-exclusion, problems related to loneliness, often derived from cultural, linguistic and neurolinguistic differences.

Greece

In Greece, 4 best practices were identified which have employed coding methodologies as a means of economic integration of disadvantaged or marginalized populations.

skg.code

skg.code is an educational program that is addressed to students, as well as graduates of IT departments and related faculties, with little or no work experience. It is a work simulation where participants work in a group project under the guidance of programmers and psychologists.

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[5] https://www.oldaloneuk.org.uk/

The program was created in 2018 out of frustration as an alternative to standard job interviews for entry-level candidates. The conclusions that can be drawn from a 30-minute interview with a candidate under stress are -in fact- inconclusive. skg.code allows to get to know candidates in depth, to draw safe conclusions and at the same time to give them a chance to enrich their CVs.

skg.code tries to fill the gap that exists between entry-level candidates in the IT sector and the minimum requirements demanded by IT companies for their respective positions. It provides training and evaluation in basic technical and interpersonal skills with the ultimate goal of culture-based recruitment & soft skills training and evaluation.

The program is free and is work oriented, meaning that it aims to improve the employability of the participants. It also provides training and evaluation in basic technical and interpersonal skills with the ultimate goal of culture-based recruitment and soft skills training. Skg.code also provides career consulting and soft skills training and is available to individuals with only basic knowledge of web technologies.

"Coding for Girls"

The initiative 'Coding for Girls'[6] was created by the Scientific College of Greece, in collaboration with the Cisco International Center for Digital Transformation and with the support of the Public Benefit Corporation of the Municipality of Thessaloniki and was implemented between October to December 2020. The initiative was available to girls, female students and unemployed women.

'Coding for Girls' offered six modules in relation to coding, including Introduction to Python, Data types, variables basic Input-Output operations, basic operators, Boolean values, conditional execution, loops, lists, and list processing, logical and bitwise operations, Functions, tuples, dictionaries and data processing, Modules, packages string, and list methods and exceptions. Upon completion of the program, participants received a Certificate of Successful Completion and had the chance to take the Industry Certification exam entitled PCAP: Certified Associate in Python Programming.

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[6] https://scg.edu.gr/coding-for-girls/

Patras Codecamp

Patras CodeCamp[7] started in 2016 as mini workshop series about coding and programming, under the framework of Europe Codeweek. It is repeated every year and has benefited a lot of people in the city of Patras, especially young people and older people.

The aim of Patras Codecamp is to promote programming, to show young people, adults and older people how give life to their ideas & to reach their goals through writing code. Also, the program aims to simplify the skills involved in coding and programming and to increase the knowledge of people interested.

The program offers free courses in coding and web technologies, Web & Game Development, Programming Languages, STEM, Blockchain Technology, Machine Learning, VR, AR etc.

Most importantly, Patras Codecamp is annual and provides multiday workshops which are addressed to anyone interested -all people who want to learn more about technology and programming and includes introductory workshops in programming and web technologies covering a wide range of themes. The program is also free of charge and upon completion, participants receive a certificate of completion.

Social Hackers Academy

Social Hackers Academy[8] is an organization that was established in 2017 and aims to teach vulnerable groups how to become web developers. The core courses it offers include the Coding School (Full Stack Web Development), Wordpress Trainings (front end web development) and Computer Literacy Classes (basic computer skills trainings). It has embraced a flexible and adaptable way in achieving its mission and that's why it can partner with other organizations and enlarge its beneficiaries' pull. It has developed its own e-learning platform (Athena) in order to provide the courses and also it has launched a recruitment platform in order to support employers to recruit their next employees from their graduates. All students in SHA are supported by three people: One person who will do code review, a mentor will meet with the

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[7] https://patrascodecamp.eu/patras-codeweek-2016/
[8] https://socialhackersacademy.org/

student one hour per week and by online technical assistants (OTA), who are a group of people volunteers who are constantly online who will answer questions any time.

The courses are delivered online but there is also a cooperation with some Non-Governmental Organizations in order to use their resources and equipment in case a student does not have access to internet. The courses are delivered for free for individuals belonging to vulnerable target groups (unemployed, migrants, asylum seekers and refugees). Other target groups pay a fee but there is also the possibility to pay the fee once a student gets a job in the IT industry.

The courses that are offered are Part-time: 6 months of learning + 1 month for the final project or full time 3 months of learning + 2 weeks for the final project. Soft skills learning is also integrated in the courses.

Germany

In Germany, 3 best practices were identified relating to the economic integration of disadvantaged or marginalized populations, and mores specifically through coding methodology initiatives.

ReDi School of Digital Integration

The non-profit social enterprise ReDi School of Digital Integration started life as "Refugees on Rails" in 2015. In February 2016, Refugees on Rails split to become two separate projects, one of which is the Berlin-based ReDI School.
ReDI offers courses on a wide range of topics and caters to various ability levels, including complete beginners. Courses typically involve two hours of in-class instruction per week plus homework projects for a four-month semester.

Financing for ReDI has come mostly from private companies, largely but not exclusively in the technology sector, including Facebook, Cisco, and Klöckner & Co.
Originally operating only in Berlin, it now offers courses in Munich, Copenhagen, north rhine Westphalia and offers the opportunity to study online as well.

ReDI has also launched programmes specifically for women and children. Starting with a hodge-podge of stand-alone courses, it is gradually reshaping the curriculum into streams, where courses more explicitly build on one another and cater to different ability levels. (Mason, B., 2018)

Today ReDI offers: IT- and programming courses, Workshops, Tech talks, Company visits, Conference visits, Hackathons, HR summits, Innovation projects and Career Counseling. Laptops, internet access, classrooms and study rooms are available throughout the course to all participants without cost to the participant. Their participants are still mainly refugees and migrants. They work closely with companies and organizations looking to hire IT talents, to address the shortage of skilled workers in the IT sector in Germany.

ReDI School offers students valuable digital skills as well as contact to a strong network of companies, technology leaders, mentors and alumni to create new opportunities for all people involved. ReDi's educational goal is to provide students with useful knowledge that is appreciated by industry and academia to support their accelerated integration into the German labor market and into German society.

The program offers modular learning curricula for three levels: Beginner Level (goal: basic understanding), Intermediate Level (goal: application and analysis) & Advanced Level (goal: capable and competent).

In addition to technical skills, they also focus on the development of: IT core competencies (presentation skills, GitHub portfolio creation, agile project development etc.), professional soft skills (Curriculum Vitae, Interview Training, Linkedin Profile etc.) & professional networking (company visits, TechTalks, conference visits etc.).

The teachers at ReDI School are mostly volunteers who have work experience in the technology industry. They can both share theoretical knowledge as well as explain how things work in practice. In addition, the teachers can tell stories from their own careers, give advice on their own career paths and open doors to the companies they work for. (ReDi School's Website. 2021, 14. May. Our Mission. https://www.redi-school.org/mission)

DCI - Digital Career Institute (former "Devugees")

The DCI was launched by Stephan Bayer, CEO of "Sofatutor," and Steffen Zoller, former managing director at "Kununu" and current managing director of the DCI. In September 2016, the continuing education program was launched for the first time in Berlin. DCI at first called "Devugees," and was initially aimed exclusively at refugees interested in gaining technical qualifications in the German labor market. (Hofmann, A., 2019)

At the beginning, Devugees (a portmanteau combining 'developer' and 'refugees') was created by a Berlin-based group of tech professionals, including both programmers and human resource specialists. The idea was hatched in 2015, and the organisation was founded in April 2016. Whereas most coding schools are non-profits, Devugees operates as a for-profit social enterprise that considers positive social impact as its primary objective.

Devugees opted to operate from within the system of state-recognized and subsidised vocational training. It succeeded in becoming a certified provider of vocational courses, which allows most students to enroll through and receive financial support from the Jobcentre (an institution run jointly by local authorities and the Federal Employment Agency). They fully financed its operations through its core programs, specifically through government funding.

Devugees offered two different courses. In a four-week introductory course, students learn some basics of software development and participate in a number of 'company tours' during which they talk with developers about their jobs. Those who are sufficiently enthused by the introductory course can enroll in a 12-month course focused specifically on front-end web development, which involves nine months of intensive training followed by a three-month internship. Both the introductory course and the one-year course are full time. Students attend class from 9 am to 4 pm, five days per week (in the one-year course, one of the five days' focuses on developing German language skills). The stated goal is that after completing the one-year course, students will be able to get a job as a junior front-end developer. (Mason, B., 2018). Today Devugees is called DCI - Digital Career Institute - but the basic model has remained largely the same. One important difference though, today DCI is not only exclusively for migrants and refugees, but open for everyone who wants to build up special tech knowledge.

In a one-year course, all participants should acquire the necessary skills, such as hard and soft skills, to qualify for the German job market with a focus on web development. At the end of the 12 months of classes - during which the participants have developed a representative portfolio of projects - the course participants go into two-month unpaid mandatory internships. In cooperation with the Federal Employment Agency and through the awarding of scholarships, the course offering is free of charge for all participants.

On average, between 10 and 15 students are accepted per class. The course language is English, because this allows the program to reach as many people as possible. However, participants can also take courses such as German as a foreign language or job application training.

In addition to the courses, additional training is offered in the areas of soft skills training, agile project management, job coaching and mentoring. DCI has over 400 corporate partners, 553 alumni, over 1200 students and an employment rate within 6 months of 87%. (Digital Career Institute's Website. 2021, 14. May. https://digitalcareerinstitute.org/tour)

Kiron Open Higher Education

Founded in 2015, the start-up "Kiron Open Higher Education gGmbH" (former "Kiron University", before that "Wings University") enables refugees worldwide to access successful learning as well as higher education through digital solutions.

Kiron tries to implement the blended learning approach and offers offline services in addition to comprehensive online teaching and support. For example, 'Study and Student Weekends' have also been offered in Germany since 2017, which are designed to prepare students for a transition to offline universities, among other things. Kiron has already received numerous national and international awards. (Bork, M. & Mason, B., 2020)

Through an online study program, Kiron offers tailor-made online study programs by clustering Massive Open Online Courses (MOOCs) from renowned educational providers and Open Educational Resources (OERs).

Since the beginning of 2019, Kiron has also been providing short certificate programs focused on imparting knowledge and skills which can better prepare learners for the job market. (Kiron Annual Report, 2018)

Kiron offers program participants the opportunity to transfer to one of its partner universities to receive an accredited bachelor's degree following the option to receive credit for online credits earned at Kiron. Thus, the institution itself is not a state-recognized university. ("Kiron Open Higher Education", 2021)

According to its own statements, Kiron currently cooperates with 145 partners worldwide. Kiron's main office is in Berlin, but they also have branches in Jordan and Lebanon. (Kiron's website, 2021)

Kiron is supported by a core team of about 70 people and a pool of over 400 volunteers and supporters - social entrepreneurs, refugees, students, refugee practitioners, academics, and partners from business and politics.

For refugees, online study at Kiron is free of charge. Since its founding, Kiron has been financed by grants from the public sector, foundations, companies and through sponsorship and private donations, and is developing various sustainable financing models in parallel. Its sponsors include major players such as the Bertelsmann Foundation, the BMW Foundation Herbert Quandt, Volkswagen, Deutsche Telekom, UBS and Ernst & Young. ("Kiron Open Higher Education", 2021)

Through their online learning platform, the "Kiron Campus", they try to empower learners worldwide and equip them with the tools, skills, and networks they need for future success. In May 2021 they had over 10000 active students from 45 nations. (Kiron Annual Report, 2019)

Further Kiron offers personal support as well as recommendations on which lessons, tutorials and language courses the learners need to reach their goals. They can track their own progress and access a large student community, where they can connect with other students worldwide. (Kiron's website, 2021) Kiron offers a broad spectrum of specialisms and courses including Graphic design, Excel Skills, Web Development & Web design, Language courses, Artificial intelligence, Data Science, Introduction to psychology, Policy making, How to teach online and Google IT Support Professional Certificate.

Cyprus

In Cyprus, 4 best practices were identified which have successfully employed methodologies as a means of economic integration of disadvantaged or marginalized populations.

Ministry of Education and Culture Training Centers

The Ministry of Education and Culture Training Centers offer non-formal education to Cypriot Citizens seeking to gain professional experience in a wide array of topics and skills. The Training Centers aim at enhancing the development of each individual and their social, cultural and economic progress. Similarly, the Training Centers aim to promote 'Life Long Learning' for Cypriot citizens of all ages, economic/social backgrounds and educational levels. Being established in 1960, today the Training Centers over 70 different courses with over 20,000 participants each year.

The Training Centers offer classes and courses from the beginning of each academic year until the end of May and are comprised of 25, 90-minute lectures/classes. Over 500 personnel are employed every year to teach each class/course. Similarly, classes are available both in the morning as well as in the afternoon and at night in cities, rural areas and villages across Cyprus.

Moreover, the Training Centers offer very good packages in regards to fees and registration. Cypriot citizens with disabilities are given free access to all courses, people over the age of 65 are given a 50% discount on all courses and people residing in rural areas also get a discount of 50% on the fees.

Lastly, the Training Centers offer Certificates of Participation to all participants who have completed 80% of the course and also allow for the opportunity for participants to undertake formal government exams based on the skills acquired through the classes/courses.

In regards to the framework of Code4SP, the Training Centers offer as part of their curriculum a couple of IT/programming courses. Most notably, the Centers offer 'Basic Computer Skills' classes, 'Computer and Multimedia' classes and 'Computers - Website Design' classes.

However, the Training Centers only offer their courses in Greek, Turkish and Arabic and only to Cypriot Citizens. For example, asylum seekers or migrants are not yet allowed to follow the programs. Similarly, the courses offered in relation to IT skills and programming are very few and offer basic IT skills and there are no opportunities for Coding trainings.

Aglantzia Municipality: Training, Capacity Building and Orientation

In 2016, the Municipality of Aglantzia had undertaken the utilization of the project 'Colourful Societies' as the main stakeholder.

The project 'Colourful Societies' which is running for 3 years is co-funded by the by the European Asylum, Migration and Integration Fund and the Cyprus Government. The project aims to support, through the Local Authorities, third country nationals during the integration process, by eliminating the risk of social exclusion.

Under the project 'Colourful Societies', in 2017, the Municipality of Aglantzia offered training, capacity building and orientation seminars to third-country nationals, migrants, recognized refugees/ subsidiary protection and asylum seekers in order to enhance their IT/ Computer skills. The seminars which took place between 07/01/2018 – 18/01/2018 provided the aforementioned beneficiaries with two free seminars conducted by IT professionals on how to use computers and enhance IT skills. The aim of the seminars was to provide the beneficiaries with IT knowledge and skills through informal education in order to enhance their inclusion into society and increase their professional opportunities. Moreover, according to the newsletter published after the completion of the IT seminars, it was concluded that 162 third country nationals, recognized refugees/subsidiary protection, migrants and asylum seekers were benefited by the seminars. It was also noted that 12 of the beneficiaries were underage children.

Despite the success of the seminars, the seminars provided regarded only basic computers skills and basic IT knowledge. Similarly, the seminars were only offered for one month and were not repeated again.

HelpRefugeesWork

HelpRefugeesWork is a joint initiative of the Cyprus Refugee Council and United Nations High Commissioner for Refugees Cyprus. HelpRefugeesWork is a provider of an online job platform which is mainly designed to support refugees in finding employment in Cyprus and foster/enhance their social and economic integration through work.

The initiative HelpRefugeesWork not only functions as a job platform, but also offers more than 90 training programs for refugees and asylum seekers who are conducted in both English and Greek and are available for free. The initiative works together with over 60 training providers. Consequently, the aim of HelpRefugeesWork is to increase both employment opportunities and the skills for the beneficiaries in order to help them rebuild their lives in the host society.

Through their training programs, HelpRefugeesWork offer a couple of trainings regarding IT skills and programming. More specifically, they offer a Basic Computer Class which teaches asylum seekers and refugees basic IT skills and a more advanced Computer Skills workshop which teaches the beneficiaries more advanced IT skills and some programing. The IT seminars and workshops aim at enhancing IT skills of refugees and Asylum Seekers in order for them to have access to the competitive technical job market and thus enhance their chances of integration in their host country.

Overall, since HelpRefugeesWork was initiated in 2018, it is reported that 450 job applications were made by refugees and that over 200 were shortlisted by employers. Participation in training opportunities reached over 500 referrals to various training providers.

A gap in HelpRefugeesWork is that the IT skills provided through the trainings are not very advanced and only concern basic computer skills and basic programming skills.

Learn to Code with Python

The Cyprus International Institute of Management is a an international business school which aims to empower individuals to take control of their lives and become a force of change through transformative learning. They also aim at making individuals realize their full potential and influence a conscious impact in society. The Institute was founded in 1990 and since then it has

focused on a modular educational model which enables students to focus on a specific subject in a short period.

The Cyprus International Institute of Management offers a five-day summer school for students aging between 14-18 with no programming or coding backround in order to provide them with coding training. The short summer-school course called 'Learn to Code with Python' aims at teaching students through the use of practical examples how to code using python.

The summer school course also highlights the importance that coding and programming play in today's world and how important it is that younger generations adapt to today's technological needs.

Despite the innovative nature of this unique summer school course which aims at providing youngsters with non-formal education in coding, programming and Python, the course has a different target group than Code4SP and the course is also undertaken by paying a fee for the students to attend the summer school. Similarly, there was no information indicating that this course can be undertaken by vulnerable groups (for example migrant/refugee children) or youngsters of lower socio-economic backgrounds who may not be bale to afford the fees for the summer school.

IT EXPERTS INTERVIEW RESULTS

As part of Work Package 2.2 of Project Code4SP, in order to receive a more complete picture of the state-of-the art in each partner country, in addition to the best practices analyzed through the desk-based research, partners have completed interviews with stakeholders in their area. Each IT partner (P2, P4, P7, P8) interviewed 5 IT experts in order to compile up-to-date information about regional/national job profiles (needed skills for technicians and ITs) and in order to draw more precise conclusions on the needs in coding education.

Demographics

In total, 20 IT experts were interviewed in Cyprus, Greece, Portugal and Germany. Out of the 20 interviewees, 17 were male and 3 were female. Germany was the only country with 3 female IT participants.

In Portugal, 3 of the participants acquired their coding and programming experience from their academic backgrounds which included computer engineering and information engineering. The other 2 participants in Portugal acquired their coding and programming knowledge through their professional experience. Similarly, in Greece 4 participants studied courses relevant to coding and programming, for example Web Development, while 1 participant who studied Mathematics acquired his knowledge on coding through his professional career in the IT sector. In Germany, 4 out of 5 participants studied something relating to programming and in Cyprus all interviewees had an IT academic background.

All interviewees in all 4 countries have between 2 to 20 years of experience in coding, programming and/or in an IT related field. In Portugal, interviewees had IT experience between 8 to 10 years, while most of the interviewees in Portugal work wither as IT/ programming teachers/ trainers or in an IT related company. For example, one participant had experience working in the BMW Group. In Greece, participants had 12-18 years of experience in the IT sector and more specifically working in Web Development and Web Design, Internet Applications and Software Development. Similarly, in Germany participants had between 2 to 20 years of experience and all of the interviewees worked and are currently working in midsize

and big companies. None of the participants in Germany are working in a rather small company or within a startup environment. Lastly, in Cyprus, all of the interviewees work as programmers in companies, and one of them runs his own business. Some of them started working on coding during their studies at university or school.

In regards to their skills, IT professional interviewees from Portugal have experience and skills in Website building, coding, robotics programming, computer applications, software communications and Java Development. In a likewise manner, participants in Greece have experience in a full-stack development, Internet applications, product building, Web development and coding. In Germany, participants acquired their coding knowledge partly through their studies or various courses. Nevertheless, all participants in Germany stated that they had gained most of their knowledge through self-teaching/self-learning and practical training, e.g. during an internship, job or on projects. Lastly, in Cyprus most of the participants stated that they acquired their knowledge from their studies while 3 of them also hold a postgraduate degree in a relevant field.

Coding Competences and Demand

In Portugal, Greece and Germany all interviewees agreed that coding is a demanding profession. Some participants in Portugal stated that this is because a career in coding requires success in several 'complicated' disciplines, such as Mathematics, Algorithmics, and Computer Science. Similarly, interviewees in Greece also mentioned that coding is a demanding job because of the complexity of the learning process.

More specifically, the number of diverse languages, new technologies, software changes, updates in browsers, etc., make the learning process difficult and constant. Some of the participants mentioned that -at the beginning of the process- it is difficult to achieve a point where all the knowledge fits together, makes sense, and can apply practically. In a likewise manner, participants in Portugal also mentioned that coding is a demanding job because of the fast pace at which technology evolves which means that the programming area requires its professionals to be constantly updated and to remain 'fresh'. Furthermore, participants in Portugal stated that coding is an area that requires a lot of responsiveness, commitment and a strong capacity to deal well with pressure while participants in Germany also added that the level of how

demanding a coding job is also depends on the position you are working in and that it might vary from time to time. Lastly, in contrast to the other 3 countries, in Cyprus some of the interviewees stated that coding is demanding while others stated that it does not have high requirements and what matters is to have a sharp mind.

In regards to whether there is demand for coding jobs, all participants from Portugal, Greece, Germany and Cyprus agreed that there is a great and growing demand for coding jobs. This is because, according to the interviewees from Portugal and Greece we are in the midst of a digital age with a rise in technological advancements.

Moreover, interviewees from Germany and Cyprus also agreed that the rise in demand for coding jobs is also related to digitalization meaning that there is an attempt to transform everything into digital form. Lastly, interviewees from Portugal also mentioned that demand will continue to increase due to the rise of remote work and because companies are striving to catch up with these innovations in order to improve their performances.

Furthermore, participants were asked to explain what skills should someone possess in order to succeed in a coding position. Most participants from all partner countries stated that it is important for coding professionals to have both hard skills (for example coding and IT skills) as well as soft skills. Participants in Portugal stated that hard skills that are essential for a coding professional are logical reasoning, algorithmics, programming languages and mathematics. More specifically, in regards to programming languages, interviewees in Greece stated that HTML, CSS and JavaScrip are essential hard skills to have. Similarly, interviewees in Greece, Germany and Cyprus agreed that problem solving skills are also very important for a coding professional. In regards to soft skills, interviewees in all partner countries stated that communication skills are very important for coding professionals. Other soft skills mentioned included team-work, creativity, multitasking and flexibility. In a nutshell, based on all interviews in all 4 countries, the best coding professional is not the one with the best technical skills and knowledge, but the one who combines some of those skills with good communication skills and soft skills in general.

Moreover, in regards to coding competencies, participants were asked to describe what a person working in coding does. Participants in Portugal, Greece and Cyprus agreed that what a

coding professional does depends and varies on the area of their work since there are a lot of Programming areas, not only websites and app development. Similarly, interviewees in Cyprus stated that what a coding professional or programmer does also differs from company to company as they depend on the object of the company and the projects. In general, participants in Portugal stated that now programmers work a lot with cell phones, tablets and web programming, an area which has almost doubled during quarantine and because of the COVID-19 pandemic due to online learning in schools and teleworking. Moreover, participants in Germany stated that a coding professional are often involved with the testing and reviewing of programs and writing codes while participants in Greece stated that in an 8 hours shift of a Junior Developer, it is estimated that there are around 5 hours of coding. Similarly, it was noted that the more senior the profile, the less time spent coding.

Lastly, it is important to note that interviewees in all countries commented on the gender disparity in the IT sector. As mentioned above, 17 out of 20 IT professionals were males and only 3 female IT professionals participated. In general, it was agreed that this gender disparity exists and this reflects the structure of the countries' society in general. The female interviewees added that a few male colleagues do not like to work with women especially if they are more competent, however male participants agreed that there is disparity but denied gender discrimination in the sector. However, all agree that in programming there is always room for anyone who excels, whether male or female. Based on the answers given by female interviewees and based on their perceptions, it can be concluded that gender inequality in the IT field can be a burden for women, but they should not be intimidated by it, so that there can be a long-term effective change. Moreover, this discrepancy occurs not only in companies but also in universities. Some of the interviewees mentioned the natural appetite of boys from an early age to deal with computers and technology, as perhaps they are more stimulated in this direction by their families. Adding on to this, interviewees stated that there should be a push in the universities to make the academic space equal for women.

JOB RECRUITERS/ CAREER GUIDANCE OFFICER OR RECRUITING EXPERTS INTERVIEW RESULTS

Following the interviews with IT experts, the Social Partners of the Project (P1, P3, P5, P6) had to conduct interviews with job recruiters/career guidance officer or recruiting experts in order to compile up-to-date information about regional/national job profiles (needed skills for technicians and ITs) and development opportunities of the digital job market. Each Social Partner interviewed 5 participants in each respective country.

Demographics

In total, 20 job recruiters/career guidance officers or recruiting experts were interviewed in Cyprus, Greece, Portugal and Germany.

All participants had a wide variety of academic backgrounds, all of whom having at least an undergraduate degree, except only 1 participant. In regards to academic backgrounds, interviewees studied sociology, psychology, mathematics, engineering and communications while many of the participants have either completed a postgraduate degree in Human Resources or a related training in Human Resources. More specifically, in Cyprus for example participants studied psychology, sociology, mathematics and counselling, in Greece psychology, business administration and software engineering. Similarly, in Portugal 3 out of 5 participants have completed a Masters of specialization in Human Resources.

Furthermore, all participants have demonstrated at least 1 years of working experience in the recruiting and/or career guidance fields. In Germany, interviewees had between 3 to 7 years of working experience while in Portugal the range was between 3 to 6 years of experience and in Greece participants had a minimum of 3 years' experience.

Out of 20 participants, only 2 were self-employed while the remaining 18 participants work either at Universities or companies. For example, in Cyprus participant was a self-employed career counsellor, 2 worked for a University career service, 1 worked for a recruiting company and 1 for a career counselling company. Similarly, in Germany 1 interviewee was self-employed while the other 4 worked for big companies mostly relating to commerce, IT Data Technology and

Digital Consulting. In addition, 6 interviewees from Greece and Portugal work for large corporations relating to IT services and the rest work for recruitment companies, University career services and Human Resources.

In general, despite the wide variety of professions, academic backgrounds and experience, all participants demonstrated a well-rounded understanding of the coding job market and were able to provide sufficient information and insight in regards to the coding profession in Cyprus, Portugal, Greece and Germany.

Coding Competences and Demand

To begin with, all interviewees in all partner countries agreed that there is indeed an increase in demand for coding jobs. More specifically, participants in Portugal stated that this is because more and more companies are looking for profiles related to the programming/IT area, since this area has been growing critically in the last 3 decades.

Similarly, interviewees in Greece stated that the demand for people in the programming/IT area is huge and this is further enhanced by the Covid-19 pandemic since the vast majority of the companies were working online. Also, in Germany a participant suggested that the increase in demand for coding jobs is also a result of new software products which are constantly being created that demand has risen sharply not only in metropolitan regions (e.g., Frankfurt), but also in rural areas (where there are also many IT companies). In Cyprus, two of the participants stated that this increase is a result of new software and forex companies that have been established in Cyprus in the last decade. Similarly, two participants also highlighted that the increase in demand for coding jobs in Cyprus are also a result, and are influenced by the Covid-19 pandemic which accelerated technological advancements. Similarly, one participant also suggested that the increase of coding and programming jobs and career opportunities in Cyprus are a result of the 4th Industrial Revolution which represents the new wave of technological advances in artificial intelligence (AI), robotics, the Internet of Things (IoT), quantum computing etc.

Despite the increase in demand for coding jobs, participants in Cyprus, Portugal and Germany agreed that supply is much lower than the increasing demand. More specifically, all participants

agreed that in Cyprus the supply of individuals who are interested in pursuing a career in coding is much lower than the demand due to the service-oriented nature of the Cypriot job market. Even though- as one participant mentioned- the number of individuals interested in pursuing a career in coding increased over the past couple of years, supply is still very low. Similarly, in Portugal the market suffers from a problem of scarcity from and "lack of interest" in coding while in Germany interviewees suggested that there is a general shortage and that approximately 12000 computer science graduates enter the German job market every year versus 55000 open positions in software development.

In regards to what skills should someone possess in order to succeed in a coding position, participants in all countries agreed that hard skills are very important. More specifically, in Greece for example, it was mentioned that it is very important for individuals to have a good knowledge of basic coding languages like C++, Python, Java. In addition, participants in Portugal stated that hard skills are very important but these can vary according to the desired programming language. In Portugal, participants also stated that soft skills such as time management, good communication and clarity are also important skills for someone who wishes to succeed in a coding position. In a likewise manner, in Germany interviewees listed communication skills, creativity and the ability to understand customer needs as key soft skills. In Cyprus, all participants stated that soft skills are also important when seeking a job in coding in Cyprus. Participants mentioned interpersonal skills and communication skills, as well as analytical and logical-thinking skills as being important in succeeding in a job relating to coding. Furthermore, in Greece in addition to hard skills, individuals in coding positions need to have strong team working skills and communication skills, as well as problem solving and time management skills.

Lastly, in relation to the minimum requirements to get a job in coding and what employers look for in a potential candidate, all participants in Cyprus believe that an employer will almost always request a University degree from a potential candidate when looking to employ someone in a coding position. In relation to this, one participant also highlighted that given the small society of Cyprus, some employers may also have a pre-disposition to some 'well-known' universities when looking to hire someone for a coding position. Similarly, in Germany one interviewee stated that IT students are clearly preferred, master's graduates even more so than bachelor's graduates, as are good grades. On the contrary, interviewees from Greece and Portugal stated

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that on several occasions a university degree is not required as long as the candidates have the necessary skills and it is not essential to have a superior education degree, having further training courses and experience are enough.

Moreover, participants also stated that relevant working experience is also very important and usually employers will request working experience from candidates. In Cyprus, participants stated that relevant work experience is very important and is taken very seriously by employers when looking to employ someone in a coding position. One of the participants also stated that from their experience, one year experience in a relevant field is the minimum that employers ask for. In Germany, it was stated that 3 to 5 years of relevant experience is considered a great advantage by employers in order to get a job in coding. On the contrary, in Greece it was concluded that a fresh graduate is able to get a coding job straight out of university because they can demonstrate their experience easily by showing their programming portfolio.

Benefits and Challenges

In regards to the benefits advertised for coding positions and why would one be interested in pursuing such a position, in all 4 countries, most interviewees stated that the biggest benefit advertised for a coding position and why most people choose to pursue such a career is the high salary it offers and the high demand of coding jobs. More specifically, in Greece, a country that has a very big rate of unemployment, the most important benefit for people in the IT sector is the availability of jobs. The average salary is bigger from most other sectors and there is a growing demand.

Therefore, someone that follows a career in the IT sector will have much less chances to remain unemployed from most of the Greek population. Similarly, in Portugal the reasons why someone is interested in these areas is the high employability associated with the future of information technologies in an increasingly digital world. In addition, in Cyprus one benefit that most individuals take into consideration when choosing such a profession is the high salary compared to other professions.

Another key benefit mentioned by participants in Germany was the fact that coding positions offer great flexibility in terms of working hours and in terms of being able to work from home.

Similarly, in Cyprus, interviewees believe that a benefit of coding positions is the fact that working in coding and programming can easily allow you to work from home which is an advantage that many professionals take into consideration. Moreover, participants in Greece mentioned that companies in the sector tend to create a pleasant working environment and that coding jobs offer prospects and possibilities for development and to work from home. Similarly, in Portugal participants stated that the development issue is also very important, since it is more motivating for a programmer to work in different areas, so they can learn about new systems and develop their technical and social competences for the pursuit of their careers. Lastly, in Cyprus participants also mentioned that many students and young individuals choose to follow a career in coding based on their own preferences and hobbies, more specifically being influenced by gaming and website design.

Similarly, one participant also stated that from their experience it is usually young males who decide to pursue a career in coding given their interests in video games.

In regards to challenges faced by person interested in a coding job position, in Portugal the recruiters stated that the biggest challenge is to work under independent contract receipts, like consultants for other companies, and, in that way, they cannot find stability and security. Other people, because of these temporary contracts, are always jumping between different companies and projects, when they would like to connected more with people and be more involved in projects and teams. On the contrary, in Cyprus the biggest challenge identified was the fact that due to the nature coding which is not a 'static profession', someone who wants to succeed in this profession needs to always be updated about the new technological trends and advancements, therefore a coding job can be very demanding. Similarly, in Cyprus participants also stated that students sometimes are discouraged to follow IT studies in order to follow a career in coding because it is considered to be a very demanding and difficult course to complete. In a likewise manner, in Greece interviewees stated that the long hours for work and the fact that the sector is constantly growing and changing, so people need to make a substantial effort in order to stay up to date.

Moreover, in Greece the participants also mentioned that there is growing competition among such candidates. However, supply and demand are not yet even, therefore a candidate will usually have few problems to find a job. The usual situation is that the candidate has multiple offers and has the ability to negotiate a higher salary or perks, and choose which of the offers

they prefer to take. Lastly, in Germany the main challenges identified included the constant need to learn and adapt, long hours of work which make it hard to balance family time or free time with work and the high level of responsibility.

Capacity Building

Lastly, recruiters and job counsellors in all 4 partner countries were asked to explain in what areas should a person interested in coding should receive training.

In Cyprus, participants spoke about the importance of enhancing the technical skills of people in the coding sector. More specifically, a participant noted that people interested in a career in coding should receive training on several programming languages like Cisco or Python, while another participant stated that people interested in coding should receive cryptocurrency and blockchain trainings. In Greece, similarly to Cyprus, interviewees also stated that the most important issue is to receive training in the programming languages such as Python and C++, however it was also mentioned that training in soft skills like team-work, programme solving and communication is also very important. Likewise, in Portugal, participants agreed that programming languages like JAVA/C#, English, Mathematics and Physics are key subjects that should be included in trainings. In addition, similarly to Greece, soft skills like problem-solving, organisation and autonomy were also mentioned. On the contrary, in Germany interviewees stated that not only technical language is important. Most often, the working language for coding is English, but the respective national language is usually indispensable for working on projects. Moreover, training given to individuals interested in coding should also include soft skills like project management skills and communication skills.

In regards to whether the training received should be continuous, it was unanimously agreed by all participants in all partner countries that it should be. This is because, according to interviewees in Cyprus, as a result of the changing nature of technology and because coding experts should always be aware of new technological advancements in order to be successful in their profession. Similarly, in Germany, participants stated that training should be 'permanent' and continuous in order to keep pace with technological developments. Moreover, in Greece it was mentioned that people interested in coding should always be up to date with new programming languages and changes in their particular sector of work. For example,

programmers who work on security should be updated even weekly. Another participant has mentioned that developers have to be trained in the state-of-the-art technologies such as augmented reality. Participants mentioned that also soft skills should be part of a continuous training because these are often lacking from people working in IT and there is a great need for them to be updated. Similarly, in Portugal, it was stated that the participants should be trained in soft skills, since many of the candidates are not aware of their importance, and so the continuous training would include this, as well as any other aimed at recycling/updating their knowledge in terms of hard skills, given the evolution of programming languages and other subjects.

Lastly, in designing a training for disadvantaged people, in Cyprus interviewees stated that if they were to design a training program for disadvantaged people to help them find a job in coding, they would include soft skill training including communication skills training, career guidance as well as training as to how to build a CV and job interview training. Similarly, in Germany, it was stated that language training is very important, as well as interview coaching, cultural coaching and mentoring or shadowing in the company itself or coaching by cooperating institutions. On the contrary, in Greece participants stated that training should include high level programming skills, basic languages such as Python, soft skills (problem-solving, communication, teamwork) and applied work in large projects involving other aspiring programmers. One interviewee has mentioned that it would be very important to include issues such as how it is a modern working place and how the relations with the colleagues should be regulated. Another interviewee has mentioned that it would be necessary a high level troubleshooting for programmers skills.

CONCLUSION

Based on the best practices analysis and based on the interview results of both IT experts and Job Recruiters/Career Guidance Officer or Recruiting Experts, several points can be concluded and should be mentioned which can be used when conceptualizing new, innovative solutions to the issues, as is the scope of the Code4SP project. Given that there is indeed a growing demand for coding positions and a low supply of coding professionals in the past years, it is important to adapt the knowledge acquired through the desk-based and field research to the CodeDoor best-practice in order to benefit vulnerable individuals and fill existing gaps in the partner countries.

Based on the results of the desk-based research, several conclusions can be reached. More specifically, it is concluded that several best practices exist that employed coding, programming and IT methodologies as means of economic integration of disadvantaged or marginalized populations in the partner countries. Also, from the best practices identified in all partner countries, several can be useful in the framework of the Code4SP project.

Firstly, it is noted in Cyprus and Portugal most best practices identified aimed at raising IT skills in general while only a few best practices aimed at employing coding specifically as a means of economic integration. On the contrary, in Germany and Greece, almost all best practices were specifically aimed at enhancing coding skills of vulnerable individuals. Despite this, it can be helpful to look at the methodologies identified in all countries which can be useful for the Code4SP project. Consequently, in order to fill the existing gap of lack of coding trainings in Cyprus and Portugal for vulnerable individuals, it is important to create a coding-specific and coding oriented training.

Also, it is important to note that from the best practices identified in Germany, Portugal, Greece and Cyprus, most best practices identified which are aimed at enhancing inclusion of vulnerable individuals were provided for free and required no educational background in coding or programming. It is important for trainings aimed at vulnerable individuals from lower socio-economic backgrounds to be provided for free and to require no academic background in order to increase participation and to make it accessible for all vulnerable individuals who wish to increase their skills, especially in regards to coding which is a very specific discipline. Moreover,

when a course or training is not provided for free, it is important to include discounts or economic support to vulnerable individuals. For example, a good practice to be taken into account is the Devugees in Germany which opted to operate from within the system of state-recognized and subsidised vocational training. It succeeded in becoming a certified provider of vocational courses, which allows most students to enroll through and receive financial support.

In regards to vulnerable individuals, from the best practices identified, most trainings and courses aimed at enhancing the skills of refugees, migrants and asylum seekers, while only a few practices were identified aimed at women, girls, the elderly and/or unemployed youth. As seen from the IT interview results, there is a gap or disparity of women in the field of coding and out of the 20 interviewees, 17 were male and 3 were female. Similarly, in the interviews it was agreed that there are very few women in the field which reflects the structure of the countries' society in general and that sometimes women in the field might face discrimination. Consequently, it is important to include trainings and courses specifically for women as well as other target groups like the elderly and the unemployed as well as refugees. Moreover, regarding targets groups, based on the best practice SEE.TELL. LISTEN in Portugal, it is also important to be aware of different groups with various backgrounds participating in trainings and courses together. The courses or training for vulnerable individuals from different socio-economic backgrounds should take into consideration the differences in knowledge, life experience and skills. This does not mean however, that working with homogeneous groups is preferable. In mixed groups participants can learn from each other and stimulate each other to overcome barriers. Older people for example, know the value of life stories and memories, more than younger people. When working with mixed groups it is important to prepare for language difficulties and working with interpreters slows things down. A solution would be to work with mixed couples or sub-groups who speak the same language, of which one person also speaks the language of the course and can explain things to the others. Similarly, when working with women from different cultures and religions, it is important to consider a flexible schedule so as not to interfere with their role of a caretaker in the family, as well as maybe studying in an 'all women/ girls' class to make them feel more comfortable.

Similarly, in regards to the type of courses or trainings that should be provided, most best practices in all partner countries used innovative and non- formal education techniques to increase the skills of vulnerable individuals from lower socio-economic backgrounds. For

example, most of the courses or trainings were provided online, giving the learner the opportunity and flexibility to undertake the course or training at any given time. It is important to provide such flexibility given the fact that most trainees may be working or have other responsibilities like taking care of a family. In addition, based on the results from the interviews, it was unanimously agreed that training in coding should be continuous given the changing nature of the field. Consequently, having online modules or trainings which can be updated and taken at any time is crucial for coding training.

In addition, based on the best practices and interview results, it is also very important to include other forms of training and services to benefit vulnerable people from lower socio-economic backgrounds and increase their employability. For example, IT experts and Recruiters agreed that soft skill training is also important to include in coding trainings, as well as language trainings, job interview trainings and how to build a CV. For example, the best practice skg.code identified in Greece tries to fill the gap that exists between entry-level candidates in the IT sector by providing training in soft skills and interpersonal skills in order to achieve a culture-based recruitment. Similarly, a good best practice to take into consideration when adapting the CodeDoor best practice is the HelpRefugeesWork platform in Cyprus which not only provides courses and trainings in both hard and soft skills but also is a provider of an online job platform which is mainly designed to support refugees in finding employment in Cyprus and foster/enhance their social and economic integration through work. Furthermore, based on the interview results, when asked what should be included in a training for vulnerable individuals, most interviewees from the IT experts and Recruiters groups agreed that even though hard skills training is very important, soft skill training, language trainings, motivation courses and training on how to build a CV or how to find a job, career guidance and communication skills are also crucial.

Additionally, another important thing to note based on the best practices analysis that should be adapted to the CodeDoor best practice is that it is crucial to issue a valid certificate of completion for the courses undertaken which can be used as proof of certain skills when seeking employment. For example, since the beginning of 2019, the Kiron school in Germany has also been providing short certificate programs focused on imparting knowledge and skills which can better prepare learners for the job market. In a likewise manner, 'Coding for Girls' In Greece offers a certificate of completion upon completion of the course which can be used as a

reference for the acquired skills. Having a certificate to prove their coding skills is crucial for vulnerable individuals from lower socio-economic backgrounds since most of the target groups who will undertake the CodeDoor courses and trainings are people with no academic or coding backgrounds and having a formal certificate to prove their skills will increase their chances of employability. Moreover, as seen from the results of the Recruiters interviews, some participants believed that having a University degree is not crucial for getting a job in coding, consequently having a certificate to prove their skills may be something that will be taken into consideration when hiring an individual with no academic background.

Lastly, another important conclusion deducted from the best practices analysis that should be taken into consideration when adapting the CodeDoor best practice is the need to cooperate with local NGOs, municipalities, Universities and organizations in order to promote the trainings and courses and benefit vulnerable individuals. For example, in the best practice Social Hackers Academy in Greece, the courses are delivered online but there is also a cooperation with some Non-Governmental Organizations in order to use their resources and equipment in case a student does not have access to internet. Moreover, in Cyprus under the project 'Colourful Societies', in 2017, the Municipality of Aglantzia offered training, capacity building and orientation seminars to third-country nationals, migrants, recognized refugees/ subsidiary protection and asylum seekers in order to enhance their IT/ Computer skills. In a likewise manner, Kiron best practice in Germany offers program participants the opportunity to transfer to one of its partner universities to receive an accredited bachelor's degree following the option to receive credit for online credits earned at Kiron.