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CODING EDUCATION FOR ELDERLY PEOPLE – THE SILVER CODE PROJECT

Introduction

The Silver Code Project is part of the ERASMUS plus KA2 programme (No 2016-1-BG01-KA204-023736) and it focuses on two concepts: (1) active ageing and social inclusion and (2) development of digital literacy of seniors. It aims to promote active ageing through the development of digital skills of elderly people, not just by teaching a passive use of digital devices, but by making them able to program and actively learn the basics of coding. Furthermore, the project aims to offer high quality learning opportunities tailored to seniors' needs: the elderly will acquire digital skills and transversal skills that are of high value for both their personal fulfilment and social contacts.

At the initial stage of the project, researchers from the partner countries investigated the level of social exclusion and of competency in coding skills. This article presents basic information about the demographics of the partner countries and statistical information about the level of digital exclusion of elderly people in those countries. The results of research regarding the level of interest in coding among seniors are also presented.

Seven countries are engaged in the Silver Code Project: Austria, Bulgaria, Italy, Poland, Portugal, Romania and Slovenia. Table 1 presents the main information about the partner countries. Based on this general information, it may said that Italy has the highest population (over 59.5 million people), and Slovenia the smallest one (only 2 million). The biggest country is Poland (over 311 thousand sq. kilometers), and the smallest one Slovenia (20,273 sq. km). The mean age is lowest in Romania (39.9) and highest in

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Italy (45.1). Italy has the highest share of people over 65 (20.0%); the smallest share is in Poland (16.4%). The fertility rate in each partner country is quite similar: with the lowest rate in Italy (1.12), corresponding with the highest share of people over 65. On the other hand, the highest fertility rate is in Bulgaria (1.48). The partner countries are located in the region of Christian culture, and the major religions are Roman Catholicism (Austria, Italy, Poland, Portugal and Slovenia) and the Orthodox Church (Bulgaria and Romania). From the economic perspective, significant differences are noticeable between all the partner countries, as exemplified by their GDP per capita. The lowest GDP per capita is that of Bulgaria (7,368 USD), the highest one of Austria (44,498 USD).

Table 1

Main information about the partner countries

	People over 65	Area (km^2)	GDP U.S.$	GDP per capita U.S.$
AT	18.5%	83 879	386.752	44,498.370
BG	18.5%	110 994	52.418	7,368.516
IT	20.0%	301 230	1,850.735	30,507.181
PL	16.4%	311 888	467.591	12,315.649
PT	20.3%	92 345	204.761	19,831.608
RO	17.4%	238 397	187.039	9,465.418
SLO	17.9%	20 273	44.009	21,320.160

Source: the author's own work, based on: Central Intelligence Agency (n.d.) and International Monetary Found (2017).

Ageing societies – analysis of the demographics and the phenomenon of digital exclusion in the partner countries

It is obvious that the demographics of the partner countries differ from each other, which is why they are presented separately.

Austria [AT]. According to Statistik Austria (2014), Austria's population was estimated to be 8.72 million in April 2016. Austria is known for its cultural activities and high standard of living. According to Eurostat, in 2010 there were 1.27 million foreign-born residents in Austria, constituting 15.2% of the population. The total fertility rate in 2013 was estimated at 1.42 children born per woman. The population is growing older: the mean age is 43.8 years (male: 42.7, female 44.9 years). People older than 65 account for 18.5% of the population. Life expectancy at birth was 78.3 years for Austrian men, and 83.3 years for women.

Bulgaria [BG]. Bulgaria is currently in a demographic crisis. It has been experiencing negative population growth since the early 1990s when the economic collapse led to a long-term emigration wave. Between 937,000 to 1,200,000 people left the country by 2005. In 2013, the total fertility rate (TFR) was estimated at 1.43 births per woman, which is below the population replacement level of 2.1. A third of all households are composed of only one person and 75.5% of families do not have children under the age of 16. Consequently, population growth and birth rates are among the lowest in the world, while death rates are among the highest. According to the National Statistical Institute of the Republic of Bulgaria (n.d.), this population aging results in a demographic change. In 2015, the number of Bulgarians over the working age was 976 496, in the total population of 7 168 009; and the predictions say that by 2070 the number of people over 70 have been 1 273 915, and it is estimated that the total Bulgarian population will have dropped to 5 132 023.

Italy [IT]. Italy has implemented a number of demographic initiatives, especially during the European Year of Active Aging organised by the Department for Family Policies of the Italian Presidency of the Council. In 2012, Italy, with 148.6 elders per 100 young people, ranked second in the aging index among European countries, after Germany (Instituto Nazionale di Statistica, 2014). In Italy, one of the oldest countries in Europe, focusing on older people is becoming ever important as they possess a non-tangible cultural heritage (experiential knowledge, skills, beliefs, etc.) that needs to be preserved, maintained, and transmitted to younger generations.

Poland [PL]. Poland, with 38 433 000 inhabitants, has the eighth-largest population in Europe and the sixth-largest in the European Union. In the total population of Poland, 52% are women. In 2016, the average Pole was 40.2 years old (median age). For men, the median age was 38.6 years and for women, who are older (due to longer life expectancy), 41.9 years (Znajewska et al., 2017, p. 44). Poland, as well as other European countries, is facing the problem of aging population, resulting from the prolonged lifespan and the falling birth rate. Life expectancy increases systematically in Poland. In 2016, life expectancy was 73.9 years for men and 81.9 years for women. At the end of 2016, the post-working age population amounted to more than 7.8 million persons, while its share in the total population was 20.2%. In comparison to 2015, the number of persons of post-working age increased by more than 237 000. (0.6 percentage points) (Znajewska et al. 2017, p. 46).

Portugal [PT]. Portugal is among the EU countries with the lowest fertility and infant mortality rates (3.4 deaths in the first year of life per thousand live births, compared to 7.9 in 1994). It is also one of the most

aged EU countries and undergoing an accelerated ageing process – 17.1% of seniors in the total population in 2008 vs. 20.3% in 2015, which is well above the EU-28 average of 18.9%. (Instituto Nacional de Estatistica 2017b). The ageing rate of the population was 102 in 2001, 128 in 2006, and in the future this situation is likely to become even more serious. In the worst-case scenario (Instituto Nacional de Estatistica, 2017a), Portugal will have 3 elderlies per a young person in 2060. Significant is also the estimated average life expectancy for those who reach 80 years of age. In 2050, the average 7.6 years that women today can expect to live longer at age 80 years, will increase to 10.2; and the expected 5.9 years for men to 7.3 years.

Romania [RO]. As of January 1, 2017, the population of Romania was estimated to be 19 272 886 people. This is a decrease of -0.79 % (-153 664 people) compared to the population of 19 426 550 one year earlier. In 2016, the natural increase was negative, as the number of deaths exceeded the number of live births by 68 381. Due to external migration, the population declined by 85 283 (Romania populations, n.d.). Life expectancy at birth is one of the most important demographic indicators. The total life expectancy (both sexes) at birth for Romania is 74 years. This is above the average life expectancy at birth of the global population, which is about 71 years (United Nations 2017). Male life expectancy at birth is 70.5 years and female life expectancy at birth is 77.7 years.

Slovenia [SLO]. The total population of Slovens is 2 000 000. Most of them live within the territory of Slovenia, with large minorities in Austria and Italy. The fertility rate has always been low (now 1.36); even in the baby boom era in the 1950s, it never rose above 2.6. The population is growing older: the mean age of the total population was 38.8 years in 2000; in 2011, it increased to 41.8 years. The mean age has increased by 3 years over the last eight years. In 2011, the mean age of men was 40.2 years; of women 43.4 years (Prebivalstvo 2012). People over 65 account for 17.9% in the total population. Life expectancy at birth is increasing due to improved health and social conditions. A female born in 2011 can be expected to live 82.9 years, a male born in the same year can be expected to live 76.6 years (Older people in Slovenia 2011; Prebivalstvo 2012).

The above data show the growing problem of population ageing in all the partner countries. The aging of their populations, influenced by factors such as the prolonged life of individuals and the simultaneous lowering of birth rates, turns seniors into a group of particular interest to society. In addition, the dynamic development of new technologies and the information society have consequences in the form of digital exclusion of seniors. The statistical research conducted by the European Union indicates that the

use of computers and the Internet is the lowest among people over 65. This problem concerns all the analyzed countries. The percentage of individuals using computers within the last 12 months is presented in Table 2. Data refer to 2017.

Table 2
The percentage of individuals using computer within the last 12 months

	All individuals	16-24 years old	25-34 years old	35-44 years old	45-54 years old	55-64 years old	over 65 years old	over 75 years old
BG	64	86	83	80	71	47	18	nd
IT	61	80	73	71	64	52	26	8
AT	87	99	98	96	88	80	52	nd
PL	77	99	96	93	75	55	31	nd
PT	70	97	93	88	71	51	30	nd
RO	68	92	87	80	68	48	25	nd
SLO	79	97	94	95	84	58	41	nd

Source: the author's own work, based on Eurostat (2013-2017).

The percentage of people using computers within the last 12 months is highest in Austria (52%) and Slovenia (41%), at the other end of the spectrum, with the lowest percentages, are Bulgaria (18%), Romania (25%), and Italy (26%). In each country, a decrease in the use of computers could be observed for people over 65.

The percentage of individuals using the Internet within the last 3 months is presented in Table 3. Data refer to 2017.

Table 3
The percentage of individuals using the Internet within the last 3 months

	All Individuals	16-24 years old	25-34 years old	35-44 years old	45-54 years old	55-64 years old	over 65 years old
BG	65	92	88	81	68	47	19
IT	74	92	90	85	79	63	37
AT	87	99	98	96	93	77	54
PL	78	99	98	93	78	55	33
PT	75	99	98	93	79	53	33
RO	71	94	90	84	72	51	25
SLO	80	99	95	94	85	58	47

Source: the author's own work, based on Eurostat (2013-2017).

As in the case of the use of computers, the use of the Internet decreases for people over the age of 65. The lowest shares of seniors using the Internet are in Bulgaria (19%) and Romania (25%), and the highest in Austria (54%) and Slovenia (47%). The percentages in Italy, Poland, and Portugal are almost equal (33-37%). What is interesting is that in Italy, in the group of people over 65, the percentage of people who use the Internet is higher than the percentage of those who use computers. It could be explained with the number of seniors using mobiles in this country. In other countries, the percentage of computer users and of Internet users seem to be similar.

Research methodology and response rate

To investigate the level of social exclusion of seniors from coding, the researchers used qualitative methodology and prepared a survey questionnaire based on the assumptions of the Silver Code Project. This survey was developed in cooperation, but mostly by the Slovenian Third Age University on the basis of consulted reference sources and experiential knowledge. The Silver Code Survey on Computer Skills and Coding included the following problems: (1) the level of social exclusion of seniors, (2) seniors interested in coding training, (3) seniors' preferences for coding training programs and methods.

The survey questionnaire was translated into national languages by each partner and the OneClickSurvey tool was used for processing the survey. In order to carry out this survey, each partner used a variety of ways to get as much feedback as possible. The response rate in each country is presented in Table 4.

Table 4

Response rate in the partner countries

	AT	BG	IT	PL	PT	RO	SLO
A	136	98	216	216	240	65	574
B	66	56	31	89	71	60	243

Note: A – the total number of respondents, B – the fully completed questionnaire.

Source: own research.

The differences between the total number of respondents and the number of fully completed and submitted questionnaires is based on the answer to the question "Are you interested in coding?". If respondents were not interested in coding, they did not have to fill in the rest of the questionnaire form.

Results

The number of respondents in the first part of the questionnaire was 1545. The most representative age category were people between 60 and 64 – 25%. 23% of the respondents in the age category 65-69, 15% of the respondents in the category 70-74, and 13% of the respondents were in two age categories: 55-59 and under 55. The remaining participants fall into the following age categories: 75-79 (7%), 80-84 (3%), 85-89 (1%), and over 89 years of age (0.5%). See Fig. 1.

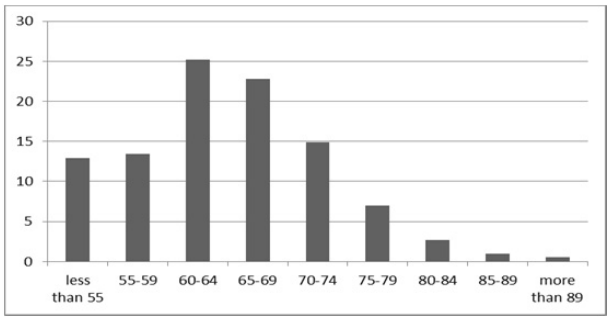

Figure 1. Age categories of the respondents.
Source: the author's own work.

55% of the respondents were female and 45% male. 87% of the respondents live in the city, and 11% live in villages. 51% live with their spouse or partner, 31% live alone, and 15% live with their children. 2.5% of the respondents selected the answer "with other seniors in a nursery home" (Fig. 2).

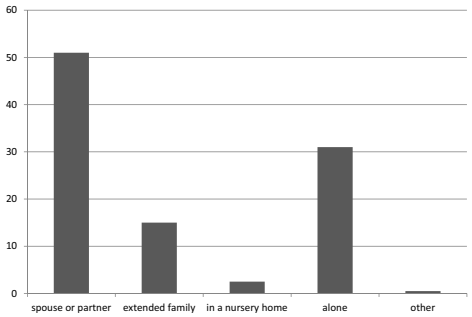

Figure 2. Household of the examined seniors.
Source: the author's own work.

The respondents were well-educated: 6% of the respondents have a PhD degree, 26% have a Master's degree and 29% have Bachelor's degrees. This means that 61% of the respondents have got university degrees. 29% finished secondary or vocational schools, and 8% finished only primary school.

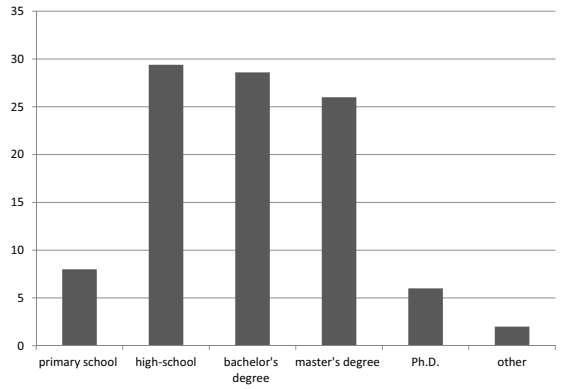

Figure 3. Education levels.
Source: the author's own work.

55% of the respondents were retired and 12 % were retired, but still professionally active. 19% are still in active employment and 7% are self-employed. 4% of the respondents selected the answer "unemployed" and 2% indicated different kinds of occupational status.

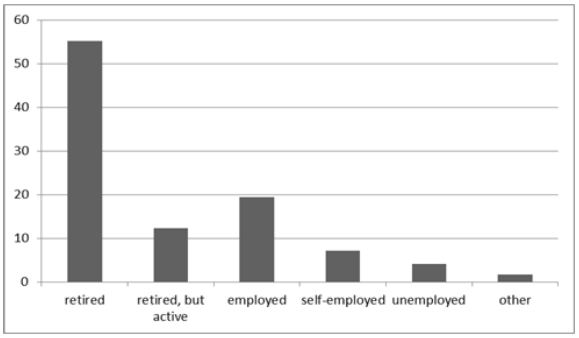

Figure 4. Occupational status.
Source: the author's own work.

The respondents were asked to self-evaluate their digital skills. The biggest group, 40% see themselves as basic users, and 33% regard themselves as independent users. The last two groups were: absolute beginners (16%) and professional users (11%).

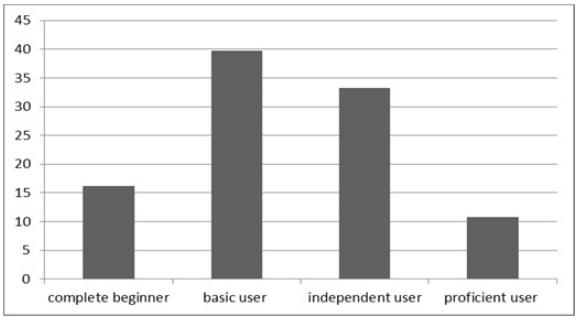

Figure 5. Self-evaluation of the level of digital skills.
Source: the author's own work.

Over half the respondents (57%) stated that they are interested in coding, and only 18% stated that they are not interested in coding. 20% do not know if they are interested in coding. But after that question, ca 60% of the respondents gave up filling in the rest of the questionnaire or filled it in only partly. The remaining respondents provided answers about their expectations regarding coding courses. 616 people responded in the second part of the questionnaire form. The question about the expectations regarding what to learn in the coding training programme was in the form of multiple choices. A significant proportion of the respondents want to improve their basic digital skills by attending coding courses (36%) and to learn the basics of programming (25%). Other answers were chosen with similar frequency: to learn the codes which create computer programmes used on an everyday basis (17%), to learn the logic of computer programmes (16%), to learn how to write a simple computer programme (13%). 5% of the respondents did not know what they expected to learn in a coding course.

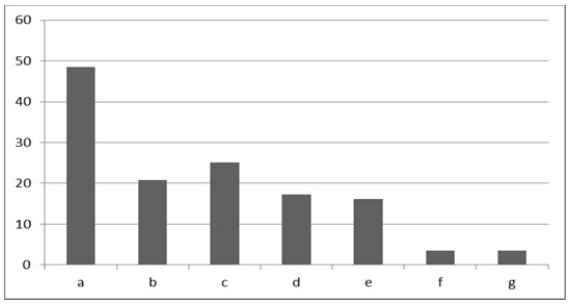

Figure 6. Expectations regarding what to learn in a coding training programme.
Source: the author's own work.
Answers: a – basic digital skills, b – programming language, c – basic computer programming, d – the codes, e – the logic of the programs, f – I don't know, g – other.

The question about the expectations regarding what can be gained by learning coding was also in the form of multiple choices. 30% of the respondents were curious and wanted to learn about what the technology can do. 22% of the respondents wished to develop creativity, maintain cognitive abilities, and widen their interests. A significant proportion of the respondents pointed out that they wanted to learn a programming language (16%), connected coding skills to increasing their self-confidence and self-esteem (8%). They also expected that they would interact and stay connected with younger generations (7%), be able to communicate with the local community and the world (6.5%), and that they would solve a particular problem they have (6%).

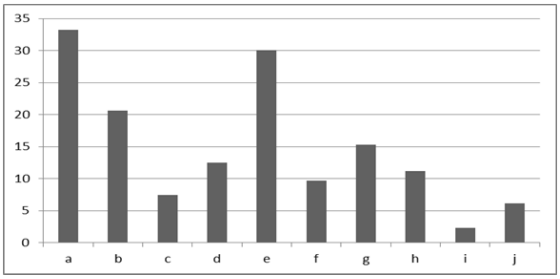

Figure 7. Expectations regarding what can be gained from learning to code.
Source: the author's own work.
Answers: a – curious what the technology can do, b – learn a programming language, c – solve a particular problem I have, d – stay connected with younger generations, e – develop creativity, f – communicate with the local community, g – make my life more exciting, h – my self-confidence would increase, i – make a difference in the world, j – other.

The question about the preferred learning method led the researchers to the conclusion that a coding course programme connecting different methods should be created. The methods frequently indicated by the respondents were games and simulations (30%), self-assessment tools were chosen in 23% of the cases, and quizzes in 20% of the answers. The methods based on competition were not of much interest to the respondents – only 5% indicated them.

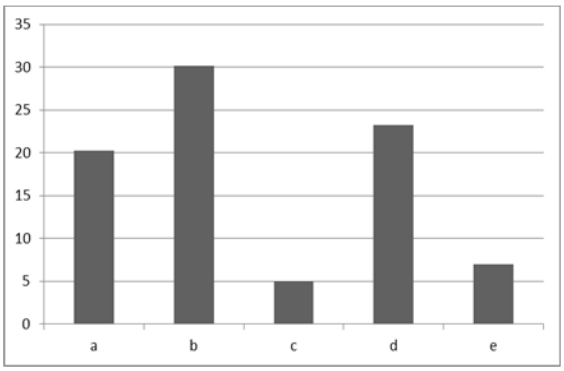

Figure 8. Expectations regarding the preferred learning methods.
Source: the author's own work.
Answers: a -– quizzes, b – games, stimulating programming, c – competitions, d – self-assessment tools, e -– other.

The respondents preferred to learn with a mentor (44%), and were interested in various educational methods (22%).

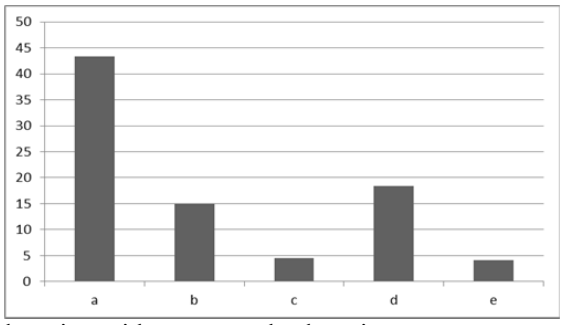

Figure 9. Expectations regarding educational methods.
Source: the author's own work.
Answers: a – learning with a mentor, b – learning on my own, at home, using tutorials, c – with a partner (pairwork), d – a combination of methods and places, e – other.

The initial diagnosis allows concluding that a significant percentage of the senior population (60%) is interested in learning to code. Seniors wish to, first and foremost, learn to understand how modern technologies work and to develop their creativity in this area. What is also of major importance is the opportunity to establish a relation of mutual understanding with younger generations as well as local communities. In a world where seniors are digital migrants (Prensky 2001), the necessity to assimilate with the society familiar with the cyber reality, i.e. the information society (IBM 1997), is all the more obvious. Numerous seniors expected that coding may make them more attractive and exciting in their own self-assessment, the need to be accepted and to belong is clearly visible. The acquisition of new skills is connected with their increased self-esteem and self-confidence. That is why the opportunity to become a member of the cyberspace community has both an intra-social and inter-social aspect (Castells 2001). Regarding seniors' expectations for the course itself, in particular methods and the aims facilitating the acquisition of new skills, the seniors prefer those methods which they are already familiar with: learning with a teacher, problem-solving tasks. However, they are also open to more innovative approaches: games, simulations, problem-solving tasks completed in pairs or individually with tutorials. What is interesting is that many seniors wish to use games when learning to programme, nevertheless, as a principle they do not wish to compete with one another. This is in contradiction with the fact that competition is one of the determinants of games (Tkaczyk 2012). What is crucial is that seniors wish to be aware of their own competences and to have access to self-evaluation tools.

The conclusion presented above needs to be accepted with a limitation: the majority of the research participants are persons with higher education, and this applies also to the pensioners. Nearly half of these respondents wish they would acquire only basic programming skills. Seniors want to understand the languages of programming, the logic of computer programmes, and the basics of code generation (in particular, of the codes used in building digital worlds). It can be assumed, therefore, that educated, retired seniors with free time on their hands may be interested in programming courses.

Conclusions

Education plays a role in the systemic as well as individual dimension. In the macrostructural (systemic) dimension, education is a factor which enables development in the context of civilisation. In the microstructural (individual) dimension, in turn, learning allows one to follow the change brought

about by the emerging society, and an individual to develop comprehensively. Education provides access to the wealth of the information society, while preventing marginalisation and social exclusion. It ought to be noticed that the systems are closely linked because an individual human integrates both dimensions. In the macrostructural dimension, an individual, by constantly increasing their knowledge and developing competences, makes possible the development of the said knowledge and technology. In the individual dimension, in turn, education allows a person to participate in social life, to develop, and to find self-fulfilment (Jarvis 2012, pp. 9-26). Dynamic development of new technologies implies, on the one hand, the necessity to seek new, increasingly effective educational methods and, on the other hand, to broaden the educational offer for seniors. One of the ideas behind the Silver Code Project is to introduce seniors to the cyberworld and to present this world to them from the perspective of its creators, i.e. programmers. As the above presented initial analysis of the needs of seniors in this area shows, seniors wish to understand how the „digital world" is created.

The research lead to the conclusion that in the group of seniors even basic computer users could be interested in coding training. The respondents are mainly interested in coding not so that they could become professional software developers, but because they want to see what is behind the devices and services they use on a daily basis. This knowledge combined with a community for sharing ideas and questions will hopefully have a profound effect on their wellbeing and self-confidence. It is important that seniors are open to completely new knowledge, which coding is, and simultaneously prefer traditional methods of learning, while being curious about new methods. The research results lead us to prepare coding courses that address the expectations of seniors from all the partner countries. The plan to develop a coding course dedicated to seniors could be a way to improve the quality of people's life in their late adulthood in the partner countries. This idea reflects the idea of lifelong learning and it could become a valuable contribution to active ageing in Europe. After all, the European Union has been focussing on the education of seniors for a long time (Commission of the European Communities 1995).

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CODING EDUCATION FOR ELDERLY PEOPLE – THE SILVER CODE PROJECT

Keywords: adult education, coding competence, programming, digital exclusion.

The problem of the aging society occupies an important position in the policies of the European Union. With the development of new technologies, the progressing digitalisation, and the evolution of the information society, the digital exclusion of seniors increases. The Silver Code Project focuses on discovering new solutions to prevent this phenomenon, offering education in programming as an opportunity to boost seniors' ICT skills. As part of the project, an initial diagnosis was conducted regarding the level of social exclusion of seniors in partner countries (Austria, Bulgaria, Italy, Poland, Portugal, Romania, and Slovenia) as well as their expectation interest in programming courses and expectations for such courses the methods of implementation. Based on the results of the conducted research, it may be stated that even beginner computer users may be interested in programming, and they expect to be taught with the use of traditional as well as innovative methods. What motivates them to undertake education in programming is the will to participate in social life and understand how digital reality is created.

Ewa Jurczyk-Romanowska

NAUKA KODOWANIA OSÓB STARYCH – PROJEKT SILVER CODE

Słowa kluczowe: edukacja dorosłych, kompetencje ICT, programowanie, wykluczenie cyfrowe.

Problem starzejącego się społeczeństwa zajmuje jedno z centralnych miejsc w polityce Unii Europejskiej. Wraz z dynamicznym rozwojem nowych technologii, postępującą cyfryzacją i ewolucją społeczeństwa informacyjnego nasila się wykluczenie cyfrowe osób starszych. Projekt Silver Code zogniskowany jest na poszukiwanie nowych rozwiązań zapobiegających temu zjawisku, proponując edukację w obszarze programowania jako możliwość podniesienia umiejętności seniorów w zakresie ICT. W ramach projektu przeprowadzona została wstępna diagnoza poziomu wykluczenia społecznego seniorów w krajach partnerskich (Austrii, Bułgarii, Włoszech, Polsce, Portugalii, Rumunii i Słowenii), a także ich oczekiwań w zakresie ich zainteresowania kursami programowania oraz oczekiwań w odniesieniu do takich kursów i metod, jakimi powinny być one realizowane. W efekcie przeprowadzonych badań można stwierdzić, iż nawet początkujący użytkownicy komputerów mogą być zainteresowani problematyką programowania, oczekując zarówno tradycyjnych, jak i innowacyjnych metod szkoleniowych. Motywacją do podjęcia edukacji w zakresie programowania jest chęć partycypacji w życiu społecznym, a także zrozumienie sposobu, w jaki kreowana jest cyfrowa rzeczywistość.