dComFra

Digital competence framework for Ukrainian teachers and other citizens

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WP 1.2: REPORT ON ANALYSIS OF EXISTING DC TRAININGS FOR TEACHERS

Research Report

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Results Overview

The report contains state-of-the-art overview for digital skills trainings for teachers in the EU countries - project partners and in Ukraine. The comparative analysis of the development of skills and digital competences of school teachers in universities of the countries participating in the project is carried out. The conclusion concerning the high level of development and effective organization of system of professional development of school teachers in DC area in the EU countries - project partners is made.

The methodology of analysis of DC trainings for teachers and its results in universities in Austria, the Czech Republic, Lithuania, Poland, Romania and Ukraine is described. The trainings are focused on teaching basic digital skills and competencies in IT. Data on DC trainings for teachers collected by universities participating in the project; the data include names of training courses, their volumes, digital competencies acquired as a result of their study, and levels of proficiency of competencies. The most successful DC trainings for teachers of Program Countries' Universities are selected. As a result it makes sense to use these trainings in order to increase the effectiveness of Ukrainian system of professional development of school teachers in DC area.

Introduction

Aims and goals

The main goals of WP1 are to develop major requirements for building the dComFra program by using the WP1 results for target groups' DC needs on a base of UA and EU labour market, EU DigComp[1] frameworks analysis, existing experience of UA partners, and Program Countries best practices; and to launch Ukrainian National Digital Coalition (UNDC). The aim of deliverable 1.2 is to carry out the comparative analysis of the development of skills and digital competences of school teachers in partner countries and Ukraine for the use of progressive European experience in Ukrainian system of professional development of school teachers in DC area.

The output of this research will serve as a starting point for:

- Conceptual Design of DC office: technical, pedagogical, methodological.
- New public structure – UNDC and signed memorandum by UA stakeholders. UNDC action plan for coming year.
- At least 11 DC Profiles based on interview the specialists of various areas, DC frameworks and EU experience.

Target groups

Target groups within the research were:

- Partners themselves.
- Experts in DC teaching from participant countries universities that are not participants of project consortium (for collecting information about existing DC programs for teachers and learning materials in WP 1.2.

Review. Legal and regulatory framework for qualification improvement (including DC) in European partner countries and in Ukraine

Many world, European and Ukrainian sources of information indicate the relevance of digital competences in the education of school teachers at various stages of their education.

A comparative analysis of the systems of professional development of teachers of developed foreign countries suggests that, with the general tendency of their evolution, each of them has its own specifics. So, in the USA the leading is the comparative-psychological approach. It ensures effective performance of teachers by functional duties, improvement of the socio-psychological climate in

[1] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/digcomp-21-digital-competence-framework-citizens-eight-proficiency-levels-and-examples-use

school, progress in their role behavior and interaction with students, and enhancement of the culture of the emotional sphere.

Functions of teacher training in Great Britain: auxiliary, adaptive, re-qualifying, expanding, innovative, specialized - in many respects, are similar to the functions of the Ukrainian qualification system. They provide identification of disadvantages in teacher qualification and their elimination: they assume assistance to beginners in adapting to the new conditions of the school, experienced teachers - in the teaching of the second subject, in the implementation of the connection of the latest theory with practice, in obtaining additional qualifications of a methodologist, director or his deputy etc.

The Land Principle in Germany provides clear targeting and feedback, which allows you to adjust the work of the institute to improve the skills of teachers, to transfer the main functions at the district, municipality and school levels. The official qualification improvement in Germany is not mandatory, but it contributes to career development at the subject, methodology and management levels.

Other developed foreign countries have similar characteristics. However, it should be emphasized that all countries seek to enrich the systems of professional development, to borrow positive experiences, seeing in this the further development of national education.

The improvement of the qualifications of school teachers in the European Union, in particular in the partner countries, differs in the initial and subsequent stages of their careers[2].

Knowledge and skills acquired during initial teacher education (ITE) are only the starting point. Induction and mentoring programmes at the early stages of their career allow teachers to develop their professional skills and develop fruitful links within the school environment. Continuing professional development (CPD) gives teachers the opportunity to improve their competences and adapt them to today's fast changing environment. Support from other colleagues and from professional specialists can also help them tackle complex issues and better perform demanding tasks.

Induction

Induction is a structured support phase provided either for teachers new to the profession or for prospective teachers. During this phase they carry out wholly or partially the tasks incumbent on experienced teachers, and are remunerated for their work. Induction has important formative and supportive components; it usually includes additional training as well as personalized help and advice.

In the vast majority of European education systems, prospective teachers or teachers new to the profession have access to induction programmes. In 26 systems, a structured induction phase is made compulsory through top-level authority regulations, while in Estonia, Slovenia and Finland, induction is recommended.

[2] https://publications.europa.eu/en/publication-detail/-/publication/435e941e-1c3b-11e8-ac73-01aa75ed71a1/language-en

Status of induction programmes in project participant countries in primary and secondary general education (ISCED 1-3) according to top-level authority regulations, 2016/17, is follows[3].

Austria: Compulsory only for graduate teachers who have followed the consecutive route through ITE and who can teach in Allgemeinbildenden höheren Schulen (ISCED 2-3). Duration in months: not regulated;

Lithuania: no top-level regulations; Duration in months: not regulated;

Czech Republic: no top-level regulations; Duration in months: not regulated;

Poland: Compulsory; Duration in months: 9;

Romania: Compulsory; Duration in months: 12.

Continuing professional development

Previous studies have identified a number of elements influencing teachers' participation in CPD and its suitability. The Eurydice report, The Teaching Profession in Europe (European Commission/ EACEA/Eurydice, 2015), shows that the time teachers in lower secondary education spend in CPD is higher in countries where it is mandatory. The study also underlines that the mismatch between the CPD offer and the needs expressed by teachers is generally lower in countries where schools and teachers themselves are responsible for defining training priorities. According to TALIS 2013 Results (OECD, 2014), higher participation rates are also associated with higher levels of financial support and to the possibility of attending CPD activities during working hours. The most common barriers to participation indicated by teachers in lower secondary education are indeed a conflict with work schedules and the absence of incentives. This section looks into the status of CPD in European countries, for example, whether it is mandatory or not. It investigates in which countries schools must have a CPD plan and, where this is the case, what the main requirements are. It also analyses the involvement of schools and teachers in defining CPD needs and activities. Finally, the main incentives to encourage teachers to become involved in CPD and specific measures in place to facilitate their participation are described.

Broadly speaking, CPD in Europe may be regarded as mandatory (i.e. there is a minimum amount of CPD that all teachers must complete); it may be one of teachers' statutory duties according to regulations, relevant policy documents or employment contracts (but no minimum time is centrally defined); or it may be optional for teachers.

Possible status of CPD programmes in EU countries in primary and secondary general education (ISCED 1-3) according to top-level authority regulations may be one of the follows:

Mandatory: CPD is considered to have mandatory status when there is a set minimum number of hours, days or credits that all teachers are obliged to complete. Professional duty: CPD is considered to be one of teachers' professional duties according to regulations or other relevant policy

[3] https://publications.europa.eu/en/publication-detail/-/publication/435e941e-1c3b-11e8-ac73-01aa75ed71a1/language-en

documents but a minimum number of compulsory hours is not defined. Optional: There is no statutory obligation for teachers to participate in CPD.

Status of CPD programmes in project participant countries in primary and secondary general education (ISCED 1-3) according to top-level authority regulations, 2016/17, is follows[4].

Austria: the minimum number of mandatory CPD hours per year refer to primary teachers and Neue Mittelschulen teachers (ISCED 2); for teachers in Allgemeinbildenden höheren Schulen (ISCED 2-3), CPD is mandatory but a minimum number of hours is not centrally; defined 15 hours per year;

Lithuania: Mandatory (defined minimum time), required for promotion or salary progression: 5 days per year;

Czech Republic: Professional duty;

Poland: Professional duty; required for promotion or salary progression;

Romania: Mandatory (defined minimum time); required for promotion or salary progression: 90 credits per 5 years.

Partner countries play an important role in promoting all forms of professional development, including the development of digital skills in the teacher's initial teacher training program and teacher training. Their role also includes guiding schools about incorporating digital technology goals into school policies, strategies and shared vision. To promote the professional development of teachers and the further integration of ICTs into education, Erasmus + offers many successful tools for sharing best practices, mutual learning and professional development of teachers at EU level (for example, with tools such as eTwinning, School Educational Gate, Teachers' Academy , SELFIE - (eg through tools like eTwinning, School Education Gateway, Teacher Academy, SELFIE)). We need joint efforts to further expand and popularize them among schools, teachers and politicians. In addition, the recognition by these Member States of these existing tools (for example, by integrating eTwinning into the curriculum) and the remuneration for using these tools will be key[5].

The Teaching and Learning International Survey (TALIS) asks teachers and school leaders about working conditions and learning environments at their schools to help countries face diverse challenges[6]. The TALIS study identifies areas of high/moderate need for professional development, in particular 57% of teachers lack training in 'ICT skills for teaching.

Professional development for teachers is compulsory at every level in about three-quarters of OECD and partner countries with available data. While it is required of all lower secondary teachers in 17 countries and for promotion or salary increase in 8 countries, it is not required in 6 countries.

[4] https://publications.europa.eu/en/publication-detail/-/publication/435e941e-1c3b-11e8-ac73-01aa75ed71a1/language-en

[5] https://ec.europa.eu/digital-single-market/en/news/2nd-survey-schools-ict-education

[6] http://www.oecd.org/education/talis/

In most countries, decisions about the compulsory and non-compulsory professional development activities to be undertaken by individual teachers are most commonly made by teachers and school management.

Teacher training is increasingly seen as a process of lifelong learning. While initial teacher education provides the foundations, continuous professional development provides a means for improving the quality of the workforce and retaining effective staff over time. These kinds of activities allow teachers to refresh, develop and broaden their knowledge and understanding of teaching and to improve their skills and practices[7].

DC is included in Continuous professional development. In accordance with Digital Education Action Plan the 2nd Survey of ICT in Education of schools was conducted[8]. It covers several ISCED levels including ISCED level 1 primary schools, ISCED level 2 lower secondary schools, ISCED level 3 upper secondary schools.

One of the key findings of the research is a teachers' training. Member States have the important role to promote all forms of professional development, including incorporating digital skills in the curriculum of initial teacher training and in-service training of teachers. Continuous professional development is key for teachers to integrate digital technologies into their teaching practices. In fact, the results of the 2nd Survey of Schools show that more than 6 out of 10 European students are taught by teachers that engage in professional development activities about ICT in their own time. In contrast, participation in a compulsory ICT training is less common. In short, as teacher training in ICT is rarely compulsory, most teachers end up devoting their spare time to develop these skills.

At EU level, only around 25-30% of students are taught by teachers for whom ICT training is compulsory. The provision of professional development in Europe is delivered in three ways: free courses by public authorities; through subsidies for schools, and professional development where teachers participate in courses provided by the 3rd parties and apply for the funding of the costs.

Moreover, in some countries, Continuous Professional Development is a duty or required for promotion whereas in other countries, it is less regulated or left as a voluntary activity9. There is also variations on actors who define teacher professional development needs in the first place. Eurydice reports that this responsibility is shared in the majority of education systems between three actors: (1) the top-level authority for education (usually the national Ministry of Education), (2) local education authorities or schools themselves, or (3) individual teachers[10].

The top level topics in professional development programmes in Europe includes ICT skills for teaching depending on level (from 35 till 57 %).

In all developed countries, in the last decade, there are processes of modernization of teachers' qualification upgrading systems, since it is this part of the educational system that is one of the most

[7] http://www.oecd.org/education/EAG2014-Indicator%20D7%20(eng).pdf
[8] https://ec.europa.eu/digital-single-market/en/news/2nd-survey-schools-ict-education
[9] https://eacea.ec.europa.eu/national-policies/eurydice/home_en
[10] https://ec.europa.eu/jrc/en/publication/innovating-professional-development-compulsory-education

important mechanisms of the development of any society, the main form of preparation of highly skilled specialists, necessary for all branches of the economic and spiritual life of the state.

The modernization of the teacher training system has become the focus of many scholars, educational and research institutions, international organizations - UNESCO, the Organization for Economic Cooperation and Development (OECD), the European Union, etc.

One of the most important conditions for the successful implementation of the tasks facing the Ukrainian qualification system is the study of the experience of European countries. The partner countries of the project have shown that the modernization of the teacher training system and the development of their digital competences is one of the priority directions of the state policy and provides for the growth of the creative personality of the specialist-teacher.

That is why the systems for improving the digital competences in these countries, and especially the search for new forms, methods and content of study, deserve close scrutiny.

Ukraine is also gradually entering the world economic community. In the XXI century, it is envisaged to create conditions for sustainable social development and the formation of an environment that will promote the realization of the creative potential of the individual. In the conditions of expansion and deepening of interconnections and interdependence of all countries of the world, the development of the system of raising the skills of teachers, their digital competences, in Ukraine can not be considered in isolation from processes and trends of development of the world educational space. In many European countries there is an intensive targeted research work on comparative pedagogy in the field of training teachers in information and computer technology. It is coordinated by regional (Western Europe, USA) and world (UN, UNESCO) centers, as well as international and regional centers for comparative pedagogy.

In Ukraine, taking into account the best world trends, the modernization of pedagogical education is being carried out; the teacher qualification system is moving to a new multilevel structure. The requirements for the level of knowledge of the students who have passed advanced training courses in institutions of additional pedagogical education are developed and implemented in practice. Certain measures are being taken to decentralize management and financing of the system of continuous pedagogical education.

Unfortunately, in Ukraine, this process takes place under conditions of a long-term economic crisis. From here, there are some difficulties and contradictions that can be attributed:

- inconsistency of material and financial resources with the needs of the development of the system of advanced training;
- tendencies for improvement of the system of professional development and retraining of pedagogical workers and low efficiency of functioning of the system of education in the state as a whole;
- tendencies towards democratization and humanization of education and reduction of social protection of teachers by the state;

- reduction of the number of teaching staff in the state in case of the urgent need of educational institutions in highly skilled teachers capable of assimilating new pedagogical technologies and conducting training on the basis of personality-activity approach using digital technologies, informational computer and other electronic teaching aids;
- growing interest in European content and organizational forms of advanced training and limited opportunities to use positive international experience in domestic practice.

The Ministry of Education and Science of Ukraine approved a Typical Program for the improvement of the skills of teachers of the New Ukrainian School of Institutes of Postgraduate Education.

The corresponding order No. 36 of January 15 is posted on the website of the Institute for the Modernization of the Content of Education[11].

"The rethinking of the social and professional mission of the teacher of the New Ukrainian School will highlight the need for training specialists adapted to modern socio-cultural conditions capable of creatively working, taking non-standard solutions in situations of market competition, avoiding stereotyping and templates, assimilating new professional roles and functions, to implement educational projects of national scale, to withstand competition in the European and world market of educational services, etc. "- explained in the general terms of the Program.

A typical educational program involves an internship-distance education. Distant form of education - passing an online course on the EdEra online education studio website.

The main form of training is organized by the institutes of postgraduate education, which includes:

- trainings;
- Interactive lectures;
- master classes;
- discussions (thematic and podium);
- conferences (for the exchange of experience, summary, scientific, Internet conferences, etc.);
- independent work - monitoring and evaluation of the results of the proposed educational changes.

The program also includes a mandatory and selective part (see the document below for details).

Mandatory - consists of full-time sessions (60 hours) and a distance course (60 hours) and includes professional training modules.

Selective - provides free choice of modules in the eye, internally, remote or distant formats, taking into account the individual needs of teachers totaling 30 hours.

The urgency is to prepare the teacher of the New Ukrainian school for the implementation of the educational policy of the state by mastering the latest practices, technologies, methods, forms,

[11] https://nus.org.ua/wp-content/uploads/2018/01/PROGRAMA_PIDGOTOVKY_NUSH.pdf

methods of professional activity on the basis of innovative educational approaches taking into account the needs of teachers, the state and the globalized world.

The main idea of improving the skills of primary school teachers is to provide individual and personal and professional self-improvement of students on the basis of enhancement of their basic education, acquired professional and life experience in accordance with individual-personal interests, social demands of the state for the effective performance of official duties, sings Profiles of basic competences of elementary school teachers include the basic individual and personality and occupational-activity qualities necessary for the successful implementation of the strategic goal and objectives of reforming primary education:

information and digital competence - the ability to navigate the information space, to receive information and operate it in accordance with their own needs and requirements of modern high-tech information society.

The new law "On Education" proposes a fundamentally new approach to the development of a teacher and his pedagogical freedom. This is stated in the comments of the Ministry of Education concerning some innovations envisaged by the law.

In particular, the law formulates the following new principles for teacher training:

- the total number of hours to qualify for further 5 years will be at least 150 hours. In this case, the teacher has to decide on his own how many hours of this volume he will use to study annually;
- the teacher himself decides where to upgrade his qualifications;
- the state, through special educational subventions, as well as local authorities, pay for teacher training, even if teachers choose tuition fees.

The law also encourages teachers to learn new teaching methods through external independent certification. Teachers who have passed it will receive an additional salary surcharge of 20%.

Project partners desk research analysis

Overview

This document provides a comparative analysis of the development of skills and digital competences of school teachers in partner countries and Ukraine for the use of progressive European experience in Ukrainian system of professional development of school teachers in DC area.

The results of the report are based on a systematic analysis of data from questionnaire that was prepared by a working group and sent to project participants from Program Countries' and Ukrainian Universities. Representatives of the Universities working groups collected and submitted the necessary data for analysis.

- The object of the analysis is systems of training organization for the acquisition of digital competences by teachers in European Partner Countries and in Ukraine, focused on teaching basic digital competences and skills.
- The subject of the analysis is comparative analysis of trainings on the acquisition of digital competences by teachers in European partner countries and in Ukraine.
- The purpose of the analysis is a comparative analysis of the development of skills and digital competences of school teachers in Partner Countries and Ukraine and select the most successful programs and curricula of Program Countries 'Universities for the use of progressive European experience in Ukrainian system of professional development of school teachers in DC area.

Methods

For research purposes according to WP1.2, the partnership used the following methods:

- desktop research;
- data processing;
- analysis;
- data summarizing.

Main activities of the research were prepared by Lead partner P11 to facilitate the research for partners in their own countries. P14 prepared questionnaire and template for country analysis, contributed reviewing whole report and provided feedback.

The questionnaire template was used in order to collect the data and to identify the best examples of trainings on the acquisition of digital competences by teachers in Program Countries' and in Ukrainian Universities:

- Vytautas Magnus University (VMU), Lithuania;
- Carinthia University of Applied Sciences (CUAS), Austria;
- Czech University of Life Sciences Prague (CULS), Czech Republic;
- Pedagogical University (UP), Poland;

- University Polytechnics of Bucharest (UPB-CAMIS), Romania;
- Kyiv National University of Culture and Arts (KNUCA), Ukraine;
- Taras Shevchenko National University of Kyiv (TSNUK), Ukraine;
- National Technical University “Kharkiv Polytechnic Institute” (KHPI), Ukraine;
- Donetsk National Technical University (DONNTU), Ukraine;
- Yuriy Fedkovych Chernivtsi National University (CHNU), Ukraine;
- Kharkiv National University of Radio Electronics (NURE), Ukraine;
- Kremenchuk Mykhailo Ostrohradskiy National University (KrNU), Ukraine.

It contains more detailed information about the training courses, including:

- partner name;
- training title;
- subject annotation;
- training form;
- training outcomes of the subject;
- subject content;
- target groups;
- study hours;
- evaluation procedure of knowledge and abilities;
- availability of certification;
- trainings method;
- training material;
- other important information;
- links.

The form of the questionnaire WP1.2 is presented in Appendix 1.

In our opinion, the questionnaire allows us to evaluate the existing training systems for school teachers in Partner Countries and Ukraine in terms of DC development based on the needs of the EU and Ukrainian educational needs and requirements of labor market, highlight best practices and experiences of Program Countries’ for the use of progressive European experience in Ukrainian system of professional development of school teachers in DC area.

Austria

Austria is among the countries with the highest education expenditures, it achieves only moderate education outcomes in an international comparison of basic skills[12]. The government has established a Federal Centre of Societal Learning to improve the quality of teaching and enrich research into teacher education. Established in 2013, the 'Bundeszentrum für Gesellschaftliches Lernen' has influenced initial and continued teacher training at all levels and in all school types through its didactic and basic scientific research. It is at the centre of a network including all institutions involved in teacher training, and communicates among other things through conferences with teachers and by developing competence-oriented teaching material. Teachers in initial teacher training have to take citizenship, but citizenship teachers normally have bachelor or master degrees in 'History, social studies and citizenship education'.

Digital skills in Austria have continuously improved and are above the EU average, though below the level of the Nordic countries. Austria is part of the cluster of EU countries with average performance on the adult population's digital skills[13]. Even so, Eurostat's composite indicator on digital skills for 16-74 year-olds improved by 2 pps in 2018 over the previous year. Austria remained in eighth position in the EU. The digital skills of those in jobs or looking for work have not shown any progression over the last 3 years, in line with the overall EU trend. Though it has a higher proportion of people with 'above-average' basic skills (the highest category) than the rest of the EU, Austria still trails considerably behind the Nordic countries and the Netherlands. Concerning teacher trainings, a new Master Plan for Digitisation includes a modular teacher training on digital skills and digital didactics ('digi.folio'). Teacher training is reinforced through the setting up of 'Education Innovation Centers' as virtual learning areas in teacher training colleges. In line with concept of 'Teachers - training and further education', e-content and innovation is systematically introduced into teacher training. Digitization strategy „School 4.0. – it's getting digital" of the Austrian Federal Ministry of Education presents a comprehensive concept covering the entire school career. According to its strategy Digital Competent Educators programme was launched[14].

The prerequisites for achieving these goals are teachers who use digital media effectively in their classes. They must have digital competencies and media competency in order to be able to pass them on to the pupils. These competencies were defined in the „digikomp" model. Among activities are:

a. Digital competences training during teachers' initial training.

From autumn 2017 onwards all new teachers will acquire standardized digital skills during the first three years in the job. While in their training the teachers will demonstrate their digital competencies, including using technology in learning scenarios. The teachers are requested to

[12] https://ec.europa.eu/education/sites/education/files/document-library-docs/et-monitor-report-2018-austria_en.pdf
[13] https://ec.europa.eu/info/files/2018-european-semester-country-report-austria_en
[14] https://bildung.bmbwf.gv.at/schulen/schule40/index.html

present their digital skills in a compulsory portfolio within their first three years in the job. The digital portfolio consists of the following components:

- digital competency check (digi.check) at the beginning of their training (first 3 years in the position);
- completion of a modular course of 6 ECTS for digital didactics in the subject („Fachdidaktik") within 3 years;
- reflecting one's own teaching activity in a digital portfolio through compilation of a collection of artefacts that document teachers' development Digital Competent Educators.

b. In service teachers' training.

In order to be able to expand their digital competences in professional life, the course is also offered to in-service teachers. Principals will be given the opportunity to obtain this training at the University Colleges of Teacher Education and offer it at their schools.

In addition, the programme of the Virtual University College of Teacher Education („Virtuelle Pädagogische Hochschule") is expanded.

c. Establishment of digital learning centre.

To promote digital learning and to support the nationwide networking of schools, the Ministry of Education set up a federal center at the University College of Teacher Education in Burgenland. It is called "Virtual Teacher Training College".

d. Education Innovation Studios (EIS).

Established at University Colleges of Teacher Education in all federal states. They pursue the goal of increasing the competences of teachers regarding child-friendly programming environments, robotics and creative digital design.

e. Future learning lab.

In addition, the first Austrian Future Learning Lab was set up in cooperation with the Federal Ministry of Families and Youth (BMFJ) at the Pädagogische Hochschule Vienna. There, teachers can now experiment with digital tools and are trained to use them.

Planning and implementation of a compulsory basics curriculum for the career phase (entry level), to be completed within the first three years of professional life.

Several Austrian eLearning school networks, such as eLSA („eLearning im Schulalltag" or eLearning at school), eLC (eLearning Cluster) and IT@VS („IT in the Volksschule" or IT at primary school) were brought together under the umbrella of the „eEducation Austria". This was done in order to increase the dissemination of digital and informatics skills. Teachers in Experts' Schools have the opportunity to work together on e-education and international projects, to take part in relevant meetings, and to share knowledge and learn from each other.

The Schools that want to actively participate in the programme and enhance the digital skills of their pupils and teachers are invited to become members of „eEducation Austria". The new Federal Center will accompany the school development process with further training measures, individual development consulting and suitable materials in future.

The Law of Austria "On Education" provides for a mandatory minimum of courses for advanced training - at least 15 hours per year. A certificate of training (training) is the basis for claiming a higher position.

In addition, the program of the Virtual University College of Pedagogical Education is expanded («Virtuelle Pädagogische Hochschule»).

Analysis DC education for teachers in Austria

The experience of teacher training on ICT competencies is examined by the example of the "Digital competent teacher" course, that has been developed by specialists of the University College of Education teachers at the University of Applied Sciences (Carinthia). This course is aimed on primary and secondary school teachers who want to acquire knowledge and skills in using information technology for teaching and learning.

The course is presented in both classroom and online formats during 2 semesters, for the general use of 10 ECTS credits, which lasts 5 hours. The course consists of lectures, practical and group sessions (classroom and distance online), as well as practical pedagogical studies.

After completing the course, participants acquire:

- basic knowledge and skills in pedagogical practice, Internet and digital media resources;
- practice skills on information and communication technologies including software tools for solving pedagogical problems;
- operating systems and standard software, special school syllabus hardware and software systems;
- basic competences for graphic design and multimedia content;
- knowledge on cloud computing, storage and processing of data, the use of online platforms;
- Internet Security Knowledge, Security Content for Protected Students;
- the ability to develop algorithms for solving and write simple programs for their implementation in certain programming environments.

Course content consists of 2 modules.

Module 1 "Life and work with digital media" consists of 2 parts.

Part 1.1 "Operating Systems and Custom Software" contains the following topics:

- Operating Systems;
- foundations of computer sciences;

- local and cloud data, file management;
- installing and configuring standard software;
- Practical work with standard software (Office 365) in the Internet and offline;
- search, critical evaluation, selection, development, representation and exchange of information in digital media;
- communication and collaboration with digital media.

Part 1.2 "Digital Life" includes the following topics:

- responsible and critical use of social media;
- Identify and troubleshoot Internet safety issues;
- rules of conduct when using social media (non-stick);
- Internet as a public space;
- the legal basis for data protection;
- the influence of social media on personality.

Module 2 "Multimedia and Computing Thinking" also consists of 2 parts.

Part 2.1 "Graphics and Multimedia" introduces students to the following topics:

- tools for creating graphical and multimedia content;
- editing graphics, photos, videos and audio content;
- media design with educational and didactic objectives;
- digital media platforms.

Part 2.2 "Computational thinking" offers students the following topics:

- computer simulation;
- algorithms;
- programming structure;
- programming environment.

Enabling the module materials will allow the students:

- select and use software for creating and editing graphic and multimedia data;
- know the principles of pedagogically-oriented use and production of photographs, videos and slideshows and use them for their own lessons;
- publish media products in appropriate formats on digital platforms;
- structured to describe the processes of everyday life;
- to formulate, reproduce and develop algorithms for solving problems;
- master the basic programming structures, create simple programs in the relevant development environments for the solution of application tasks.

In case of a successful completing the course, the students receive a certificate from the University of Applied Sciences.

Czech Republic

The policy of education in the Czech Republic until 2020 was approved by the Government on July 9, 2014. She sets three main priorities[15]: reducing inequalities in education; supporting high-quality teaching and teachers; governing the system in a responsible and efficient manner. All of them based on digital education policy including[16].

One of the key element of digital education strategy that focused on opening- up education to new teaching methods and techniques is implementation of digital technologies. To be on line with such a policy the appropriate conditions for the development of digital competencies and computational thinking amongst teachers should be provided. The 'Strategy for education policy 2020'[17] identified support for teachers as a prerequisite for high-quality education. It proposed implementing a new career system and improving future teachers' education and training. Concerning ICT, it's integration into curricula is the responsibility of each school director, but the subject of ICT is included in the curriculum documents for elementary and secondary education.

For teachers, there is no mandatory testing of digital competence. However, within the Digital Education Strategy (SDV), the Standard for Teachers' Digital Competence was created within the Podpora práce učitelů (Supporting Teachers' Work) project[18]. The standard is supposed to be incorporated into the programmes of universities that prepare future teachers. In the future, it can thus be expected that teachers' digital competence will somehow be verified.

Among the general public teachers had an opportunity to participate in the IT Fitness test (CZ) in 2015. It is part of the eSkills for Jobs campaign that had been supported by the European Commission, DG Enterprise and Industry. According to the statistic nearly 16 000 people in 2015 and 10 000 in 2016 completed the freely-available test online. Ii includes internet, security and computer systems, collaboration tools and social networks, office suite and complex task.

Training programs for teachers

Tools for teacher's training

As a part of European project MENTEP[19] a self-assessment tool for teachers (TET-SAT) was developed and tested in the 2016/2017 school year. The testing took place in lower secondary schools (52 Czech schools participated in the project, more than 7 000 teachers participated from 11 countries). Currently, the tool is freely available for all teachers. This tool focuses on four areas: Digital pedagogy, Digital Content Use and Production, Digital Communication and Collaboration, Digital Citizenship. Each area contains several sub-items and, for each item, teachers choose one out of five statements which they consider the most fitting (i.e. Newcomer – Beginning – Capable – Proficient –

[15] http://www.vzdelavani2020.cz/
[16] http://www.msmt.cz/vzdelavani/skolstvi-v-cr/strategie-digitalniho-vzdelavani-do-roku-2020?lang=1
[17] https://ec.europa.eu/education/sites/education/files/document-library-docs/et-monitor-report-2018-czech-republic_en.pdf
[18] https://digifolio.rvp.cz/view/view.php?id=12726
[19] https://www.dzs.cz/cz/eun/mentep/

Expert). To pass the test, the teacher is asked to answer 30 questions, choosing among the 5 statements the correct answer, which best suits their pedagogical practice. Afterwards, the teacher receives the test result, as well as a reference to the national and European ecosystem (list of recommended resources for further professional development in the field of digital technologies).

At the national level, a tool entitled 'Profil Učitel21' (*Profile Teacher21*) was developed. This tool is being prepared within the Supporting Teachers' Work project (PPUČ – Podpora práce učitelů) [4], which has been supported by the OP VVV (Operačního programu Výzkum, vývoj a vzdělávání – OP VVV) and which is coordinated by the NÚV . As part of the project, a Standard for Teachers' Digital Competence has been compiled and is expected to be incorporated both into undergraduate teacher training and into the Profile Teacher21 tool, which is currently being prepared[20]. The Profile Teacher21 tool will use the principle of self-assessment and it will target all teachers (regardless of their specialisation or type of school). The aim is to create a tool that allows teachers to assess how they are able to integrate digital technologies into teaching. Also, the tool should encourage them to further develop their digital competencies. When completed, it will be freely available online on the Methodological Portal RVP.CZ, where it will supplement the already existing (and currently updated) tool called 'Profil Škola21' (*Profile School21*, a tool for monitoring and managing the integration of digital technologies into teaching at school level)[21].

It should be noted, nowadays there is no mandatory tool for verifying digital competencies of initial or in-service teachers Czech Republic.

Digital technologies in initial teacher education

Two projects financed by OP VVV had been also launched by universities that prepare future teachers, in particular University of South Bohemia and Charles University in Prague. The first one focuses on computational thinking and other one focused on digital literacy. Both projects are obliged to cooperate with NÚV and to verify in practice (in schools) the updated version of the curriculum documents. These projects also aimed on development of open resources for schools related to ICT and digital literacy, to provide trainings for teachers in schools (especially e-learning courses and MOOCs), to incorporate computational thinking and digital literacy into university courses for future teachers.

In Czech Republic one of the aims of the Digital Education Strategy is to strengthen the preparation of future teachers in the field of digital technologies. Students as a future teachers at secondary schools choose a subject specialization, they usually choose two specializations/subjects and one of them can be ICT (the study programme is usually called Information technologies in education). Primary school teachers and nursery teachers are usually thought in overall curricula.

[20] https://clanky.rvp.cz/wp-content/upload/prilohy/21757/Pu21_analyza.pdf
[21] https://skola21.rvp.cz

ICT in in-service teacher education

According to the Act on Pedagogical Staff, teachers are entitled to 12 calendar days off per year for their further professional development. However, the form (self-study, seminars etc.) and content of such education are up to the headmaster. Nonetheless, the annual report of the ČŠI indicates that courses and seminars focusing on the development of digital competencies rank to the frequent topics of teachers' further education, especially in case of upper-secondary schools teachers.

Further teacher training courses are provided by a number of national and regional organisations and companies, while universities are also important providers of further training for teacher. In recent years, there has also been a rise in the number of online courses and webinars (e.g. the eTwinning webinars, the webinars on rvp.cz, online meetings within the framework of Google Edu Group CZ, etc.). Another form of ICT education are conferences; some of the largest national conferences on the subject of ICT include the 'Počítač ve škole' (*Computer at School*), 'ICT ve školství' (*ICT in Education*), the regional conference 'KVIC on ICT', 'Učitel IN'etc.

Also, a Standard for Teachers' Digital Competence has been arranged. "Creating a universally available offering of education for teachers towards accomplishing the Standard for Teachers' Digital Competence – i.e. a variety of on-line seminars and full- time and part-time studies using e-learning" is planned within the SDV. Teachers in the Czech Republic also have a possibility to obtain the "European Computer driving license" (ECDL) or CISCO Academy certificates.

Analysis DC education for teachers in Czech Republic

It makes sense to pay attention to the experience of teaching ICT competencies for teachers in the Czech University of Natural Sciences (Prague). To focus students on the use of ICT in teaching and learning, a program for the training course "Information and Communication" was developed[22]. This is an auditorium with 5 credits of ECTS, which consists of 24 hours of lectures, 24 hours of practical classes and 77 hours of individual work of the listener.

Course lectures are provided with modern ICT tools and materials such as Learning Management System (LMS) Moodle and case studies.

Subject content:

- Informatics, information society and ICT development.
- Architecture and principles of the computer.
- ICT in communication. Formal and informal communication channels.
- ICT in decision making.
- ICT in learning.
- Interpretation of relevant information.

[22] https://is.czu.cz/katalog/syllabus.pl?odkud=;zobrazit_sklad=0;zobrazit_obdobi=0;obdobi=;zpet=/katalog/index.pl?vzorek=Informace%20a%20komunikace,Dohledat=Dohledat,obdobi=156,jak=dle_jmena;predmet=141381;typ=1;jazyk=3;vystup=1

- Current standards of software.
- Information systems.
- Global information environment - internet.
- Presentation on the Internet.
- IT security.
- ICT in the state administration, ICT and environment.

Participate in contact teaching (if the student misses more than 20% of classes without accountable reason s/he is not eligible for the exam till s/he does not comply with additional requirements announced by teachers (seminar test).

Once the course completed, graduates will broaden and rehearse their theoretical knowledge and practical skills in fundamentals of computers, hardware, software and computer networks. Acquired knowledge is the latest in the field. Graduates will be aware about basic chances of use of computer equipment for office and managerial work and to present work outputs. Learners will be able to use basic office application suite MS Office to elaborate specific tasks and to produce advanced text documents and spreadsheets. Students will also learn how to present and deliver their results of work in front of audience and how to leverage the electronic presentation in MS Power Point. They can operate effectively in partnership with qualified experts. They can clearly communicate information. They are able to search and evaluate relevant information in scientific journals and the Internet. They are aware of boundedness of their competencies in the area. They are familiar with the need for transferring skills from industry professionals. Learners will be able to continue their study in other relating special courses. They can search information in publicly accessible electronic resources.

Another example is training course "Informatics in Education"[23]. An auditorial course of 125 hours total (5 ECTS credits) consists mainly of self-training (30 hours), project implementation and practical assignments (35 hours), consulting and individual work (45 hours). During the course, only 10 hours of lectures and 5 hours of seminars or practical classes are taught. The aim of the course is to familiarize students with the use of information and communication technologies for education and management processes in education, students learn to work with basic sources of information, so as to understand their structure that can effectively find relevant information, analyze and correctly apply them in practical situations, with a focus the educational process. Forms of teaching of the subject: lectures and exercises.

Subject content:

- Education systems and the Information Society.
- The importance and role of information technology in education.
- Intellectual property protection of digital resources, open educational resources.

[23] https://is.czu.cz/katalog/syllabus.pl?odkud=;zobrazit_sklad=0;zobrazit_obdobi=0;obdobi=;zpet=/_katalog/index.pl?vzorek=informatika%20ve%20vzd%C4%9Bl%C3%A1v%C3%A1n%C3%AD,Dohledat=Dohledat,obdobi=156,jak=dle_jmena;predmet=138936;typ=1;jazyk=3;vystup=1

- Cloud computing and SaaS - the importance of education.
- Google products applicable for education.
- Google products applicable for education.
- Tools for feedback - create surveys and forms.
- Tools for feedback - create surveys and forms.
- The use of visual, auditory and multimedia digital resources for education.
- The use of visual, auditory and multimedia digital resources for education.
- The use and construction of mind maps in education.
- Trends and perspectives of ICT in education.

The combination of lectures and seminars gives the students the opportunity to practically develop their knowledge from lecture in the seminars. The seminars are used also to develop ICT skills among the students. The learning methods are of practical nature. The ICT used are always demonstrated and the students are required to use them in order to achieve appropriate skills. The students work in teams and at home they are required to use their computers to be able to communicate with the necessary IS through remote access. Training materials are in Czech language on Moodle – this is accessible for registered students and instructors only.

After completing the trainings, students or teacher will be able to use software products in education, they can characterise them and assess the suitability of their use in educational processes. Graduates have a good grasp of basic computing branches and can describe the most important trends of development. Graduates process without difficulty all basic tasks that may be possible in education (creating documents, charts, graphs, presentations). Graduates can solve their needs regarding lesson planning, organization and realization of the educational process by means of computer application. Graduates will master the ICT terminology, they will be able to describe and express the ICT needs within the scope of mastered terminology. They will manage to communicate professionally e.g. with an ICT coordinator at school. Graduates can assess the suitability of individual products and their applicability for a particular task. They are able to use appropriate courses of action when using ICT in teaching. Graduates will be able to look for information from ICT independently, they will manage to orientate themselves in their own teaching practice and look for new solutions both in literary and other information sources as well as from their own experience.

Training materials are available online for registered listeners and tutors on the Moodle platform.

Next training course titled "Multimedia in Education"[24].

The aim of the course is to teach students to use multimedia for educational purposes and to understand their structure so that they can efficiently locate relevant information, analyze and correctly applied in practical situations with a focus on the educational process. Forms of teaching the subject: consultative workshops, distance training. The program includes 100 hours. The basic

[24] https://is.czu.cz/katalog/syllabus.pl?odkud=;zobrazit_sklad=0;zobrazit_obdobi=0;obdobi=;zpet=/katalog/index.pl?vzorek=multim%C3%A9dia%20ve%20vzd%C4%9Bl%C3%A1v%C3%A1n%C3%AD,Dohledat=Dohledat,obdobi=156,jak=dle_jmena;predmet=139057;typ=1;jazyk=3;vystup=1

forms of subject teaching are consultative seminars and individual work of the student (85 hours), the lecture is given only 12 hours.

Subject content:

- Visualization in education.
- Use of multimedia applications in the educational process.
- The sound of his properties and ways to record.
- A video clip and the possibility of recording.
- Devices for audio and video recording.
- Basics of editing audio.
- Fundamentals of video editing.
- Software for editing audio and video.
- Preparation and implementation scenarios tutorial video.
- Principles for the use of video in educational process.
- Storage and distribution of video and audio recordings.
- Freely available multimedia resources useful in education.

The graduate will acquire knowledge about the most common procedures for obtaining and editing media and is able to describe and can assess their suitability for use in the educational process. Student processed without difficulty all the basic tasks that are involved when working with basic multimedia. Graduates can be addressed through the application of its needs in the preparation, organization and during the realization of the educational process.

One more example is course "Internet in Education and Counselling"[25]. The goal is to teach students to work with the main information resources so that they can effectively find relevant information, analyze and properly apply them in practical situations and, focusing on the processes of education and counseling. The main emphasis will be placed on the active use of Internet services, the Internet information resources and learning management systems using Internet technology. It includes also such tools as Web 2.0 in education, an application of basic online tools for e-publications (blogs, wikis), systems for creating and managing (teaching) web content (CMS, LMS), basic principles of organization and structure of web pages (HTML) site (CSS), application tools for analyzing learning outcomes and measuring performance. This 100-hour course includes 20 hours of lectures and 20 hours of practical exercises and workshops.

Students are encouraged to learn the following subjects:

- Internet as an environment for education and counseling;
- didactic aspects of educational content on the internet;

[25] https://is.czu.cz/katalog/syllabus.pl?odkud=;zobrazit_sklad=0;zobrazit_obdobi=0;obdobi=;zpet=/katalog/index.pl?vzorek=internet%20ve%20vzd%C4%9Bl%C3%A1v%C3%A1n%C3%AD%20a%20poradenstv%C3%AD,Dohledat=Dohledat,obdobi=156,jak=dle_jmena;predmet=138937;typ=1;jazyk=3;vystup=1

- basic principles of the Internet structure and organization of data;
- web 2.0 learning environment, cloud applications and their use in education;
- web 2.0 tools and their application in education;
- electronic publishing - e-books;
- basic online tools for e-publishing (blogs, wiki);
- systems for creating and managing (educational) web content (CMS, LMS);
- basic principles and structure of web pages (HTML);
- basic principles and structure of the website (CSS);
- tools for the analysis of learning outcomes and performance measurement site;
- trends and innovations in information technology.

"Learning Management Systems in Education" training course[26], focuses on the application and use of electronic learning management systems (LMS) in the educational process. Emphasis will be placed on the use of available systems, the LMS (Moodle) for creating electronic information support, to ensure their operation and administration, usage of communication tools LMS and application of pedagogical constructivism. Moodle - is a training platform designed to provide teachers, administrators and students with the only reliable, secure and integrated system for creating personalized learning environments. During 150 hours of the course, students will gain knowledge and skills in the following aspects:

- Introduction to distance education and e-learning;
- Didactic and pedagogical aspects of e-learning;
- Moodle - basic characteristics, course, user management;
- Study materials in Moodle and their properties;
- Study activities in Moodle and their properties I;
- Study activities in Moodle and their properties II;
- Testing in Moodle;
- Evaluation of the results of the course and the conditional pass rate;
- Development cycle of an e-course and evaluation of the quality of the course;
- Moodle - installation and administration;
- Standardization in the area of e-learning;
- Other useful tools for e-learning.

These courses are very useful for further professional growth of an ICT teacher.

[26] https://is.czu.cz/katalog/syllabus.pl?odkud=;zobrazit_sklad=0;zobrazit_obdobi=0;obdobi=;zpet=/katalog/index.pl?vzorek=LMS%20syst%C3%A9my%20ve%20vzd%C4%9Bl%C3%A1v%C3%A1n%C3%AD,Dohledat=Dohledat,obdobi=156,jak=dle_jmena;predmet=139054;typ=1;jazyk=3;vystup=1

Lithuania

For 4 years Lithuania will reform education system. The reform is provided by the Program for the Improvement of the Prestige of Pedagogical Professions, prepared by the Ministry of Education and Science. This program is designed for 2019-2022 years. The system of professional development of teachers will be consistently changed to programs of continuing professional development, providing defective or additional competence for a certain time. The teacher can take advanced training courses in a few months or attend the course within one academic year. In accordance with the Law "On Education", each teacher's responsibility is to participate in events to improve their qualifications (including digital skills) for at least 5 days (40 hours) in the academic year.[27]

On 2017, the Minister of Education and Science approved a new description for the Teacher Training Model (Model) prepared by various stakeholders. Its purpose is to create the preconditions for the effective and qualitative functioning of teacher training and a continuous professional development (CPD) system.[28]

Teacher training focuses on the following:

- selection for pedagogical studies;
- pedagogical studies (teacher training);
- professional growth through pedagogical internship, pedagogical activities and the improvement of competences and development of qualifications.

The Center for the Development of Education is the only central institution responsible for ensuring continuing education (including issues related to ICT). At the national level, a series of training seminars for personal training was organized, as well as a distance learning course on the teaching of ICT teachers in schools. Various courses are also organized at the municipal training centers for teachers.

The time spent on advanced training is confirmed by certificates or certificates issued by educational institutions that have the right to do so. First of all: courses, modules, separate academic hours, participation in conferences, seminars, internships, counseling, educational trips.

The certificate received by the teacher indicates the name of the educational program, the place where it is listened, lists all forms of study, the amount of the course in academic hours, received or improved competencies. If the program is not fully implemented within the specified time period, the teacher will be given a certificate confirming the level and extent of the program.

Qualification improvement for teachers is funded from a variety of sources. The basis of funding is the "baskets" of students. They may be supplemented by the funds of local self-government bodies, individuals or legal entities involved in the development of qualifications, funds of school management bodies. At the expense of the state budget or the self-government budget, not only

[27] https://e-seimas.lrs.lt/portal/legalAct/lt/TAD/TAIS.407836
[28] https://eacea.ec.europa.eu/national-policies/eurydice/content/national-reforms-school-education-38_pt-pt

direct courses, lectures, etc. can be financed, but educational trips provided by the program of advanced training. The pupil's "basket" is paid by lecturers, placement of visiting participants of study, registration fee. Qualification improvement abroad is recognized on the basis of certificates received by teachers in relevant educational institutions that carry out this work.

In Lithuania and Romania, raising their own qualifications as a school teacher is both a prerequisite for career advancement and wage increases.29

Analysis DC education for teachers in Lithuania

According to the approved requirements, an ICT-literate teacher involved in the learning process using modern technologies have to know and to be able to:

- creatively individualize the subject and content of student learning;
- purposefully use ICT tools;
- systematically and reasonably apply training and teaching methods.

A competent ICT teacher applying ICT must know and be able to:

- plan the use of these technologies;
- organize the management of technological resources in the teaching and learning process;
- assess and discuss topics relating to the use of ICTs.[30]

The main types of professional development related to ICT conducted by teachers of Lithuania during the last two years are:

- courses on the pedagogical use of ICT in teaching and learning;
- subject-oriented training on training software;
- subject training on the use of ICT equipment.

In Lithuania, learning needs are usually set up through a teacher consultation process, internal and external recommendations, as well as the views of the various stakeholders in the school. A compulsory formal plan for upgrading skills and teacher training is developed by the head of the school.[31]

Teachings and acquisition of digital competences of teachers of Lithuania are considered on the example of programs and training courses Vytautas Magnus University (VMU).

A general understanding of the role of computers and information and computer technology in the modern world, the possibility of their application in educational activities, the basis of work with office applications provides a course "Computer literacy". Course, totaling 100 hours (3,3 ECTS credits), intended for teachers for primary schools, teachers for secondary schools, educators, VET

[29] https://eacea.ec.europa.eu/national-policies/eurydice/content/teaching-careers-europe-access-progression-and-support_en

[30] http://cms.eun.org/shared/data/pdf/cr_lithuania_2009_final_proofread_2_columns.pdf

[31] https://publications.europa.eu/en/publication-detail/-/publication/4b77775b-6d06-11e5-9317-01aa75ed71a1/language-en/format-PDF/source-search

specialists, etc. Students learn classroom (lectures, laboratory and practical work, tests) and in a case of successful learning outcomes the student is entitled to an ECDL certificate.

Several DC trainings for teachers are oriented to the use of ICT in the pedagogical process, among them «Information Technologies for Teaching and Learning» and «UNESCO - E-learning technologies». The main topics of the courses are:

- distance learning, e-learning, ICT-based learning and virtual learning;
- trends and perspectives of using ICT in school, vocational and higher education, in different sectors of education;
- systems for supporting distance education and training in social networks;
- organization of learning using Web-technologies, Google, Moodle and other virtual learning environments;
- information etiquette, protection from Internet threats, social and ethical problems of the information society;
- application of modern information technologies for the development of the content of education;
- practical recommendations on the use of virtual tools and training systems, assessment of the quality of teaching content and ICT-based learning.

Both courses have sufficient volume, provide essential number of lecture hours - 45 and 30 respectively, 30 hours of practice and seminar sessions, more than 80 hours of individual work. Practice is aimed at gaining skills in choosing and using effective information technology and e-learning tools depending on the goals and conditions of learning and the context of the curriculum.

Vytautas Magnus University proposes trainings for teachers dedicated to development of digital competences in certain educational areas such as «Computer Music Technologies», «Application of ICT Teaching Study Subject of Art», «Digital Linguistics», «Digital Humanities». Courses are mandatory (in music and art) or optional (for the humanities and linguistics) for the acquisition of digital competences. Programs designed for teachers engaged in teaching appropriate subjects in secondary schools. After their passing, the students will be able to:

- know and understand the goals and didactic possibilities of ICT in a particular field, their influence on the educational process;
- use ICT in teaching, learning and evaluating students' knowledge;
- apply practical skills to work with relevant software (Music Ace, Auralia, Musition, Groovy, Little Mozart, Soundation, Sibelius, Adobe Photo Shop, Adobe Premiere, linguistic software, word processing using Python, processing and digitization of large numeric and text data , images, processing of cartographic information);
- develop creative, dynamic teaching / learning tools using ICT;
- use complex methods of analysis of social cultural processes and the possibilities of using computer technologies in scientific research;

- apply technology of intelligent analysis of data of various nature, recognition of objects and events, visualization of information;
- effectively and qualitatively present their results using ICT, etc.

It should be noted optional course for teachers of preschool education «Smart systems for pre-school education». This is an auditorium of 4.5 credits, consisting of lectures, seminars and practical classes. After the training students will be able:

- to analyze and evaluate the impact of ICT on preschool children, to solve problems using digital teaching aids and technologies;
- to apply the practical skills of using ICTs for preschool education, create digital content in pre-school education (language, cognition, music, art, social communication skills);
- to improve their own educational activities, using digital technologies, educational and digital innovations;
- to use digital technologies to assess the results of educational and educational activities.

All the learning materials are located on the Moodle Online Learning Platform. Consequently, students have additional opportunities for self-study and assessment of their knowledge and skills.

Experience of Online4EDU and e-GUARDIAN Projects

As a successful example of a modern organization of continuing vocational education for the development of digital competences of teachers, we consider programs with the participation of Lithuania, developed in projects funded by the European Commission: «Introducing

Online Collaboration Methods and tools in education» (Online4EDU)[32] and e-GUARDIAN[33].

The objective of the project “Online4EDU” is to facilitate the development of teachers’ ICT skills, particularly applying online collaboration tools in everyday school life. To reach this aim the project team designed, developed and piloted a training and certification system for teachers and e-Facilitators that includes the complete set of learning and testing tools:

- curricula;
- online learning environment;
- courseware - E-learning materials and an e-course;
- self-assessment test - Online Barometer;
- online certification module “Online collaboration methods and tools in Education“;
- guidelines for implementing the system for teachers.

The main goal of the developed training cycle is to organize the learning process as a complete circle that begins with the selection of the target group and participants’ preliminary knowledge and skills assessment. This stage is followed by training process, when the participants are involved in various learning activities using a variety of training methods and forms. During training, the participants

[32] https://www.online4edu.eu/
[33] http://www.erasmusplus.cy/uploadfiles/IDEP/Publications/EC/Digital_Competences.pdf

practically use and acquire experience of diverse online collaboration tools - including those on the Moodle platform and others. To successfully participate in training, the participants' ability to plan own time and activities, as well as collaborate with other team members and trainers, is essential.

Training should lead to successful certification in the "Online Collaboration Tools in Education" test and the ECDL Online Collaboration test, and Education projects development by the participants.

At the end of the training cycle, teachers have gained new knowledge and skills to be used in the everyday teaching process working with students, and they have also gained the confidence and desire to develop and perfect their use of ICT in the classroom.

There are 2 levels of beneficiaries that could be impacted by the training: the primary target group and secondary target groups.

The primary target group includes teachers in primary and secondary schools; VET specialists and E-facilitators working at telecentres, libraries, adult education centres, etc. This target group will benefit from participation in training and certification, which will improve their knowledge and competencies in the labour market. Although the training material has been aimed for teachers of all subjects, ICT teachers can benefit from participation in the training process.

The second target group is organizations responsible for teachers' skills upgrade and their professional development, mostly different players in the education system: decision makers at schools, adult education centres, state education agencies and offices, and Ministries of Education. They will be able to access and use the developed resources. It is planned to gain formal recognition of the training program as a professional development program.

Another target group who will benefit from teacher training is students - both in the formal education system and in adult education centres.

The learning materials

The curricula and courseware include such chapters as: Key concepts for online collaboration, Cloud computing, common setup standards for online collaboration, online storage and productivity applications, Online calendars, Social media, Online meetings, Online learning environments, Mobile collaboration applications and synchronization.

The curriculum and the corresponding training materials are designed with the objective that at the end of training teachers know:

- concepts of online collaboration, benefits and risks;
- how to set up online collaboration tools and what settings must be considered;
- common online collaboration tools and their usage;
- how to use online collaboration tools on mobile devices;
- how to prepare school lessons with online collaboration tools;
- how to teach with online collaboration tools;
- ways to teach about online collaboration tools (optional).

By achieving these learning aims participants are prepared for the ECDL Online Collaboration Tools in Education certification test.

The content of learning material

The blended learning course is organised in 3 units that are each based on different methodological concepts according to the content that is facilitated.

- Unit 1 is meant to raise participants' awareness about the use, benefits and risks of online collaboration tools, introduce technical aspects.
- Unit 2 is intended for the acquisition of practical use of online collaboration tools in teachers' daily work and learning process.
- Unit 3 requires the participants to apply the acquired knowledge and demonstrate the newly acquired skills while developing own projects with online collaboration tools. Each unit consists of sections; sections consist of topics and if needed topics can be divided into subtopics where relevant.

At the end of every topic there is an individual and a group assignment. In each week of the course there are six to eleven topics and therefore assignments. Participants are obliged to submit one individual assignment and one group assignment each week.

Module 1 is designed for 4 weeks in total. The planned employment of participants is from 2 to 3 hours per week. Participants who do not have digital media experience need 6 to 8 hours a week. Module 2 is designed for 3 weeks with similar time costs for participants. Module 3 is designed for 4 weeks, participants have to organize their time independently. Expected investment time for participants - 2-3 hours per week. Estimated investment time for trainers - two hours a day.

At the end of training the participants are ready to take two tests: the ECDL Online Collaboration test and the "Online Collaboration Tools in Education" test.

Project E-GUARDIAN (Version 2.0)

E-Guardian v.2 was created during the EU Leonardo da Vinci Transfer of Innovation project e-GUARDIAN ("Development and certification of skills for European Educators focused on Safe ICT and Cyber threat prevention").

e-GUARDIAN Version 2.0 Syllabus is provided for the certification of European teachers' knowledge on safer Internet and belongs to the group of ECDL programmes. This programme is adapted to pedagogues of educational institutions, who seek to safely use their computers and the Internet, to teach their students, and to protect them from the Internet threats.

e-GUARDIAN programme indicates people's, seeking the certification, aim of training and required knowledge, and skills. The aims are that pedagogues knew possible Internet threats, the basics of safe usage of a computer and the Internet, were able to convey their knowledge to the students, in accordance with their age and socio-cultural environment, to participate in educational institutions,

when assessing the basics of informational security, to consult other pedagogues and parents on the issues of safer Internet

The recommended knowledge – 12-14 hours teaching (learning), by applying practice tasks, discussions, and self-examination issues.

The programmed is prepared as a classificatory of knowledge and consists of five parts.

General e- safety knowledge

General knowledge on informational technology safety is determined in this part. It is required to know the main Internet threats (cybernetic crimes, possibility of computer virus, identity theft, children exploitation, twit, etc.), to understand that these threats are inseparable from contemporary website opportunities, and that appropriate education of users, will help to avoid them.

Privacy and data processing

Knowledge on data and information safety are provided in this part. It is necessary to understand the rules of creation and usage of passwords, the processing of data safety and distribution. It is also necessary to know about backup copying and recovery of lost data.

Safety measures and network security

The required knowledge about safety, when using computer networks, is indicated in this part. It is necessary to understand the usage of common resources on networks, to know how to use safety measures, provided in the operational system – antivirus and other measures, preventing from harmless program equipment, the Internet Firewall, to know how to download and to install updates.

Juveniles and beginners online

This part of the programme requires understanding the benefits and limits of security program equipment, teaches to educate juveniles and new users about safety online. It is necessary to know various methods to educate, monitor, and control the usage of content and services online.

Social networks and safe usage of the Internet

It is necessary to know how to ensure your safety and privacy, when you are online, and how to safely use e-services. It is focused on safety and privacy on social networks, on recognition of communication threats, on appropriate and safe usage of communication measures.

Preparation for certification can have the following levels:

- evaluation of initial knowledge;
- learning in distance courses;
- e-guardian tests.

The purpose of evaluation of initial knowledge – to evaluate participants' initial knowledge, to determine their gaps, and motivate participants targeted learning. The evaluation of initial

knowledge is implemented in automatic way, by tests online. The questionnaire consists of 30 questions, containing from 2 to 4 answers to chose. The questions, in accordance with their difficulty, have different weight. After the test, detailed evaluation, summarized evaluation and learning recommendations are provided to the participant under the basic fields of knowledge.

Distance learning course is prepared under e-GUARDIAN programme; it consists of teaching materials (reading, links to external sources, other documents and video games), self-examination questions, tasks and tests, and measures of participants' communication, provided in a definite order. Course materials are about 12-14 hours learning volume. The lecturer (curator) helps the participants of courses.

When properly prepared, e-GUARDIAN tests are held. The questionnaire consists of 30 questions, containing from 2 to 4 answers to chose. All questions are of equal weight. The tests are held in accordance with the procedure, determined by ECDL foundation, by signing in on the Internet and by the participation of a certified person, who tests, time provided for a test is 45 min. When there are 24 correct answers of 30 questions, the international e-GUARDIAN certificate is provided.

Poland

During the last years, Poland has developed a national strategy for teacher training and introduced many new regulations. The aim of the new legal solutions is to prepare teachers as competent specialists in appropriate field, accomplished in didactics and pedagogy34.

In Poland teachers are required to develop their professional knowledge and skills in line with the needs of their schools. Teachers training are organized in 3 stages similar to that of the teacher of any subject, that is:

- Initial teacher training/education. 5 years of unified studies (with the pedagogical and catechetical preparation) leading to a Master's degree.
- Induction. The process of providing training and support during the first few years of teaching or the first year in a particular school. The school of the new teacher is in charge of providing induction. In Poland the amended Teachers' Charter.
- Teacher development or continuous professional development. In Poland this is optional, but it is clearly linked to career advancement and salary increases. According to teacher training standards, teachers should undergo continuous professional development, which is organised by Regional In-Service Teacher Training Centres.

The Education Strategy in Poland focused on academic training with link to training in pedagogy, didactics and ICT.

Digital technologies in initial teacher education

In Poland there are no valid education standards or official curricula for students of teaching faculties in the field of information and communication technology. Universities educating students in teaching specialties have full autonomy in this area.

Starting from October 2019, some selected teaching faculties (mathematics, physics, Polish philology, arts and education, geography, history and civics) will implement a study program based on a document developed and announced by the Ministry of Science and Higher Education , named " The model of education for future teachers[35] which states that after completion of the training for the teaching profession in the field of information and communication technology (ICT) and computer science the graduate[36]:

- uses the basic knowledge and skills in the field of information technology, composes graphic illustrations, creates and edits text documents, performs calculations in a spreadsheet, can obtain data and information from databases, uses services in computer networks, acquires, collects and processes information;

[34] http://cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.ojs-doi-10_15633_pch_908

[35] https://www.gov.pl/web/nauka/opracowanie-modelowych-programow-ksztalcenia-nauczycieli-w-ramach-dzialania-31-kompetencje-w-szkolnictwie-wyzszym

[36] https://www.gov.pl/documents/1068557/1069061/Propozycja_nowego_modelu_kształcenia_przyszłych_nauczycieli.pdf/355ab916-780b-2ba3-e655-d5b8ec16d9c5

- applies and develops own methods of education and assessment using ICT in the area of the subject being taught;
- inspires and engages pupils for learning, creativity and development of computational thinking;
- promotes and shapes students civic attitude and responsibility in the world of digital media,
- uses ICT environments in his own professional development.

The report presents a model of ICT education for the above-mentioned majors. In each field of teacher education, a basic course is conducted: “Information technology”. In addition, the following courses are proposed as part of model education:

The name of the course	Number of hours (laboratory exercises)	Number of ECTS points
Microlearning Tools **or** Micro-services in education	15	1
Algorithmic games **or** Educational project	10	1
Virtual learning environment **or** Innovative teaching methods	15	1
Digital educational measurement tools	5	

It is obviously there is demand in strengthening the links between the provision of continuous professional development and the initial teacher training institution.

ICT in in-service teacher education

More teachers in Poland take part in professional development (94%) than in other countries (88%) participating in the 2013 OECD Teaching and Learning International Survey (TALIS)[37].

Participation in in-service training/continuing professional development (CPD) is required for professional promotion in order to assess the teacher’s professional level. It covers the extent to which the teacher concerned has implemented an agreed professional development plan. In-service training is provided by higher education institutions (HEIs) in the form of non-degree postgraduate programmes, and by teacher training colleges which offer various courses, but the main providers of this type of training are in-service teacher training institutions[38].

Accredited in-service teacher training institutions may provide such types of qualification courses as pedagogical / teaching qualification courses for practical training teachers; special education / special

[37] http://www.oecd.org/education/talis/

[38] https://eacea.ec.europa.eu/national-policies/eurydice/content/continuing-professional-development-teachers-working-early-childhood-and-school-education-53_en

pedagogy courses for practical training teachers; pedagogical / teaching qualification courses for teaching a foreign language; pedagogical / teaching qualification courses for early foreign language learning; qualification courses in school education management.

The CPD system for teachers covers three levels:

- central (national) level: organised by the minister of education, the minister of culture and national heritage and the minister of agriculture (supervising, respectively, art and agricultural schools);
- regional (province) level: organised by province-level (województwo) local government bodies and supported by the heads of the regional education authorities in their respective provinces;
- local (local-government) level: organised by local government bodies at the commune (gmina) and district (powiat) levels.

In-service teacher training institutions are perceived as one of the elements of the entire support system which consists of various institutions, including counselling and guidance. The National Centre for Supporting Vocational and Continuing Education(KOWEZiU- Krajowy Ośrodek Wspierania Edukacji Zawodowej i Ustawicznej[39] is a national-level public in-service teacher training institution, supervised by the Ministry of National Education. On 1 July 2016, KOWEZiU was integrated into the Centre for Education Development (Ośrodek Rozwoju Edukacji). The Centre for Education Development as a public in-service teacher training institution operating at national level and supervised by the Ministry of National Education. It aims to undertake activities improving the school education system and the quality of school education in line with national school education policies in the area of education and general education. There are also public practical training centres (PTCs). PTCs provide practical training based on curricula for a given occupation, and continuing education in non-school settings. A PTC may collaborate with in-service teacher training institutions in upgrading professional skills of vocational education teachers.

Teachers' professional training and tools

Concerning trainings for teachers that aimed on ICT skills improving the ECDL programme is unconditional leader. Its general aim has been to improve teaching practices and general education levels in rural and urban areas by providing ICT skills to almost 6000 teachers throughout the region[40]. For example the project "Teachers' Professional Training in Information Technology Use" that was delivered by ECDL Poland, the 'Regional Labour Office in Cracow' and the 'Małopolska Training Centre', in cooperation with the 'Marshal Office of the Małopolska Region' and other local governments. This project was directed at the teachers of non-ICT subjects working in the Małopolska Region and provided fixed training (which is an 80-hour course) or blended-learning (16 weeks virtual training coupled with four on-site/physical sessions). Training was based on three subject areas: general computer use, Internet use, and multimedia in teaching. Participation in the

[39] http://www.eurodesk.pl/nasza-baza/organizacja/PL0010000168
[40] http://ecdl.org/education/case-studies?i=2148

full training programme enabled candidates the possibility to take tests for the 4 module ECDL Start1 certification free of charge. The project progressed very well, with 3,441 teachers having received training by August 2010.

Poland invests also in ICT infrastructure and online teacher support materials for all Polish teachers to promote the use of innovative didactic methods supported by ICT. Under the Digital School programme (2012)[41], open educational resources (e-textbooks) are made publicly available, and more free school books will gradually be introduced.

Analysis DC education for teachers in Poland

In order to improve teachers qualifications programs of digital teaching are offered by Krakow Pedagogical University. Basic knowledge and skills of ICT students are received on the course "Information Technologies". The main purpose of the course is make it possible for students to use of basic office programs including text editor, spreadsheets, multimedia presentations editor in effective way. Students' acquaintance with certain aspects of copyright and etiquette will allow them to use the resources available on the Internet. At practical classes in equipped laboratories for 30 hours and during individual training (60 hours), students gain knowledge and experience on the following topics:

- basic concepts related to the set of text, paragraph, page, section, etc.;
- use styles to create various automatic elements in a document (content, illustrations);
- creation of multilevel lists, graphic objects (drawings, graphs, diagrams, screenshots), tables and use of their non-standard formatting;
- formatting multipage documents containing headers, headers, indexes, content, list of illustrations;
- types of addressing (relative, absolute, mixed), ways of writing functions and their syntax;
- do calculations in a spreadsheet using different types of addressing and known functions;
- processing of data collected in a sheet, use of filters, lists, sorting, construction of diagrams;
- rules for creating multimedia presentations (color selection, text placement and graphics on slides);
- development of presentation templates, principles of the choice of content and graphics;
- effective search for materials needed for training, online and e-learning platforms for own materials, use of various information sources to expand their knowledge;
- key points of intellectual property rights regulations and network etiquette.

This course is aimed on teachers of primary and secondary school. Course matrices are available for registered users on the Moodle platform.

The “Microlearning tools” course is useful for primary school teachers who are just starting to study information technologies. Microlearning provides for the division of educational content into small

[41] https://centrumcyfrowe.pl/czytelnia/digital-school-e-textbooks-program-a-year-and-a-half-later/

completed blocks, which are presented in short periods of time. Microlearning includes mobile learning, video learning and gaming.

During the course, students have acquainted with ICT tools that allow them to prepare educational materials for micro-learning. The main topics of the course are:

- Introduction to micro-education.
- An overview of affordable mobile solutions and websites on the example of selected Khan Academy Kids, Bini Bambini Academy, Rosetta Stone, Bussu, Fiszkoteka, Peak and more.
- Tools for developing multimedia educational content: presentations, notes, smart cards, comics, quizzes and tests, audio and video, etc.
- Publishing and distributing content using popular weblogs of blogs and podcasts.

After completing the trainings, students or teacher will be able to:

- discusses the concept of microlearning, characterizes its most important features;
- describes the methods used in microlearning, including portioning of messages and their visualization;
- characterizes applications and services that enable creating own microlearning content;
- is able to use services that provide micro-courses, especially using mobile technologies;
- can record, edit, publish and share audio materials;
- can record, edit, publish and share video content;
- can create, edit, publish and share presentation materials, mind maps, posters, comics, letters, etc.;
- can create, edit, publish and share quizzes and tests;
- is able to choose a service for effective sharing of your micro course;
- uses mobile technologies, in particular uses microlearning services and applications to broaden one's knowledge and skills;
- has the competence to stimulate pupils' work.

For practical training, laboratories equipped with computers for each student are used, using their own tablets, smartphones, with access to audio and video. Course volume - 50 hours (15 hours - practical classes with a teacher, 35 hours - independent preparation). During practical classes, participants of the course develop their own micro-lessons with their publication in the chosen form, for example, in the form of a series of podcasts.

Another example «Microlearning in Education» of 50 hours devoted to training students to develop application clusters based on computer architecture in a studio based on Docker technology. Students develop their own websites and manage them without the use of virtual machines. Familiarizing yourself with the basics of assembling, running, managing and distributing programs using Docker's container virtualization technology, students will be able to:

- run software containers, manage images and containers;
- develop and run own container for the selected program;
- configure the environment for the container system, create own builds (build);

- work in a group of distributed projects projects.

Each teacher, in his subject, will raise the computational and algorithmic thinking of schoolchildren. This is the course devoted to the "Algorithmic Games" course, in which students will be introduced to examples of exercises, games and educational games that they can use during lessons. During practical work in laboratories (10 hours) and individual work (20 hours), students are considering introducing algorithms, the role of algorithms in education, practical examples of computational thinking, and examples of games that introduce algorithmic problems. Studying didactics through the game and elements of gaming based on modern brain research and learning.

- after completing the trainings, students or teacher will be able to:
- gains knowledge about application containerization;
- has the ability to run application containers;
- can build and run own container for the selected application;
- can configure the environment for the container system;
- gains the ability to work in a group on distributed application projects.

The subject-oriented training "Virtual Learning Environment" provides students with the ability to enquire skills for developing their own and student work in a virtual learning environment (using e-learning platforms and cloud services). The course introduces students to virtual learning environments (VLEs) and massive open online courses (MOOCs). Participants learn the characteristics of the most popular LMS Moodle platform, the basics of managing the course as a teacher, the basics of working with platform modules and content publishing.

Once training completed (45 hours of practical classes and individual work) students will obtain the following competences:

- analysis of the use of own practical virtual didactic space;
- use of modules of distance courses such as MOOC;
- setting the course options on the Moodle platform;
- managing the course users, assigning them roles and assessing them;
- importing and archiving courses, creating their backups;
- work in a remote system using materials hosted on the Internet (for example, on the platform of e-learning);
- cooperation in the group when creating a long-term project.

The courses "Innovative methods of training" and "Digital educational means of measurement" are devoted to the problems of pedagogical use of ICT in teaching and learning. These programs are 30 and 25 hours long only, but focus on studying teaching materials and courses using innovative teaching methods, including ICT tools, Instructional Design, online collaboration basics, collaborative document creation, presentations, video content, wikis, etc. Participants learn to run webinars, introduce methods and tools based on gaming.

Special attention is paid to digital learning measurement tools that include self-assessment tools (surveys using, for example, GoogleForm), as well as cloud services that support the preparation and

implementation of tests (Kahoot, Quizziz, LearningApps, etc.). Students learn how to build reports that generalize didactic measurements using digital data analysis tools (spreadsheets, Flubaroo). To master the skills in this subject, the students themselves prepare several mini-projects in various subject areas specified by the lecturer, conduct testing, evaluate and present their results.

Courses are designed for teachers of elementary and secondary schools. Their materials are available to registered users on the Moodle platform.

Consequently, the courses and advanced training programs at Krakow Pedagogical University cover a wide range of digital competences of teachers and ensure their qualitative and comprehensive training.

Romania

The main regulatory document of Romania, which defines the basic principles of the organization and mechanisms for improving the skills of school teachers, in particular, regarding digital competences, is The Education Law no. 1/2011 on 05/01/2011 updated on 09/07/2018[42]

Its main articles, which regulate the school teachers trainings, are reviewed below.

The national curriculum for the primary and secondary education is focused on 8 key-competence domains determining the pupil's educational profile:

a) communication competences in Romanian and in the mother tongue, in the case of national minorities;
b) communication competences in foreign languages;
c) basic competences in mathematics, sciences and technology;
d) digital competences for using the information technology as a learning and knowledge instrument;
e) social and civic competences;
f) entrepreneurial competences;
g) cultural expression and awareness-raising competences;
h) competences in learning to learn.

The physical education and sports in pre-university education are included in the common trunck of education curriculum plan.

The subject Information and Communications Technology is optional for the pupils in the 1st through the 4th grade and compulsory for the secondary and high-school education.

The school libraries and the documentation and information centres are organized and operate based on a regulation elaborated by the Ministry of Education, Research, Youth and Sports. The Virtual School Library and the eLearning School Platform are established to include school programmes, examples of lessons for all the topics in the syllabi, methodological guides, examples of assessment tests. These digital resources will be protected by the Law no. 8/1996 regarding the copyright and the related rights, as further amended and supplemented, as the Ministry of Education, Research, Youth and Sports obtained the publicaton rights from the authors so that these resources may be permanently and freely accessible to all pupils and teachers.

The education units use the eLearning School Platform to provide the pupils with assistance during or outside the school programme, or for the ones who, for health reasons, cannot temporarily attend school.

[42] https://rio.jrc.ec.europa.eu/en/library/education-law-no15-january-2011

The establishment, management and permanent enrichment of the Virtual School Library and of the eLearning School Platform falls within the responsibility of the Ministry of Education, Research, Youth and Sports.

According to the Order of the Minister – the Continuing training Methodology43 in CHAPTER V - Competences for evolving in the teaching career and professional development, the Teaching Staff must adapt to the requirements used in the European Qualifications Framework (EQF)[44], the National Framework for the Higher Education Qualifications (CNCIS)[45] and the European Competency Framework[46].

The professional competences are the unitary and dynamic ensemble of knowledge and abilities.

The competence system includes five fundamental categories:

a) professional skills: cognitive competences, functional-action competences;
b) complementary competences: digital competences, linguistic competences, counselling competences;
c) transversal competences: role competences, personal and professional development competences;
d) leadership, guidance and control competences; e) competences acquired through professional reorientation programmes.

In the Order description of the competences required for the career evolution (amongst them, digital competences) in correlation with the didactical qualification is provided. The description of the competences acquired through professional development is detailed in the subsequent articles.

The professional development of the teaching, management, guidance and control staff is a component of the continuing training, according to the Law on National Education.

The professional development is performed exclusively through Continuing training Accredited Institutions based on the System for the recognition, accumulation and equivalence of Transferable Professional Credits elaborated by the M.E.C.T.S. (Ministry of Education, Research, Youth and Sports)

The competence system includes pedagogic competences; social competences; competences concerning the class management in the organization and the class and school organization management; professional-scientific competences; information-documentation competences:

a) autonomy in searching, selecting, processing and communicating information;
b) selecting documentary research techniques adapted to the research type;
c) using the information-documentation resources on multiple media in preparing the courses, teaching and evaluating.

[43] https://www.edu.ro/formare-continua
[44] https://ec.europa.eu/ploteus/en/content/descriptors-page
[45] http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetailDoc&id=28729&no=10
[46] https://ec.europa.eu/regional_policy/en/policy/how/improving-investment/competency/

The competences acquired through the professional development by the teaching staff holding management, guidance and control positions are:

- communication and networking competences;
- psychology-social competences;
- management and coordination competences;
- resource management and administration competencies;
- competences aimed at institutional development;
- assessment competences;
- competences regarding the use of information technologies;
- self-management competences.

The evaluation and certification in the transferable credit system

The evaluation of professional competences is compared to the elements described in professional standards for the teaching profession and the quality standards and it is performed as per the performance criteria described in the standards.

After graduating from the continuing training courses, the Professional Competences Certificate is obtained.

The Competences Certificate is awarded by assessing what the candidate knows to do in real-life working conditions.

The career evolution is monitored by the Country/Bucharest School Inspectorates through the Specialised Inspector and by the Principals of the education units;

The professional development is monitored by the Method Teachers/Professional Development Mentors within the Teaching Staff Resource Centres, who are responsible for the continuing training and by the Principals of the education units through specific instruments.

In Romania, improving qualification of a school teacher is both a prerequisite for career advancement and wage increases[47].

In the Order of the Minister no. 5564 as on October 7, 2011[48] - regarding the approval of the Methodology for the accreditation and periodic evaluation of the continuing training providers and of the training programmes they provide, in Annex no. 1, mention is made of the types of competences, such as the I&CT, as well.

[47] https://eacea.ec.europa.eu/national-policies/eurydice/content/teaching-careers-europe-access-progression-and-support_en

[48] https://www.edu.ro/formare-continua

Categories of continuing training programmes	Types of competences	Observations
1.Professional Development Programmes, according to art. 244 para. (5) letters a), b) and c) of the Law on National Education no. 1/2011*	a) developing and upgrading the competences in the specialty field accruing to the occupied didactic position, as well as in the field of psychology-pedagogy and method; b) developing the competences for the didactic career evolution; c) acquiring or developing the management, guidance and control competences.	This category includes all the informatics and I&CT teachers. They are bound by law to attend qualification training every 5 years.
2. Professional development programmes in accordance with the policies and strategies of the Ministry of Education, Research, Youth and Sports, according to art. 244 para. (5) let. e) and f) of the Law no. 1/2011.	a) acquiring complementary competences whereby to expand the category of activities that can be performed in the current activity, such as: Computer-assisted teaching, teaching in foreign languages, educational counselling and career guidance, adult education and so on, and so forth; b) developing and expanding the transversal competences regarding the interaction and communication with the social and pedagogical environment, taking responsibilities regarding the organization, management and improvement of the strategic performance of professional groups, self-control and reflexive analysis of one's own activity, and others.	In this category, all the teachers are bound to attend digital competence development trainings.
3. Modular programmes through internships not related to one's discipline.	Programmes proposed by the continuing training providers aimed at different types of competences than the ones provided for under programme categories 1 and 2.	From this category, the teachers choose the specific courses they wish to attend (in their area of expertise)
4. Special programmes.	The concerned curriculum and competences are established for the respective programmes by the continuing training providers, in accordance with the need analysis.	From this category, the teachers choose the specific courses they wish to attend (in their area of expertise)

Analysis of DC training for teachers in Romania

The positive experience in teaching schoolteachers digital competences has been accumulated at the University Polytechnics of Bucharest (UPB-CAMIS).

Learning course Computer Assisted Training is focused on psychology and pedagogy training for receiving the competence certification for the teaching profession on Level I49. The course volume is 2 ECTS credits.

Through the contents developed for this subject, the students acquire a series of skills which they will use both during the pedagogic training activity, and in their future teaching activity. The acquired knowledge is useful in the tenure exam and in the Full Teaching Registration exam in the preuniversity education system.

During the training such specific DC skills have to be acquired.

- to develop knowledge, digital technologies and software applications for making products, tools, manufacturing equipment and smart tools, integrated in information systems;
- to use smart IT applications for managing the processes and activities performed in industrial organizations;
- to responsibly apply the professional ethics principles, rules and values in the performance of professional tasks and to identify the objectives to achieve, the available resources, the work stages, the performance times, the accruing performance deadlines and the accruing risks;
- to identify the continued training opportunities and to effectively use, for one's own development, the information resources and the computer-assisted communication resources and professional training both in Romanian, and in an international circulation language.

The form of delivering the training is blended. After completing the trainings, students or teacher will be able to get such objectives.

General subject objective is to develop the skills for organizing, designing and assessing the didactic activities by using the computer.

Specific objectives:

- to use the computer in the learning activity;
- to operate with the entities specific for the knowledge field;
- to analyse and select appropriate programmes (software);
- to acquire the notions related to the learning content delivery methods and technologies;
- to create the communication skills and abilities using the new technologies;
- to acquire the abilities necessary for designing and implementing the Assessment Sheets using the information technologies;
- to integrate the teaching game software in the current school activity;
- to transfer and apply the acquisitions in the IT field to the institution development;

[49] https://dppd.curs.pub.ro/2018

- to build a positive attitude towards the new technologies in the virtual environment.

The content of the training includes basic DC knoleges such as:

- Introduction. Short history. Definitions, terminology.
- Computer-aided training. Basic concepts.
- Traditional training and computer-assisted training.
- Theoretical Aspects of IAC Design.
- Technology-mediated communication.
- Designing, developing and delivering learning content.
- Development and implementation of evaluation methods.
- Educational software.
- Elaboration of on-line questionnaires (quantitative research method). Google Drive-Form.
- Collaborative Documents -Google Drive.
- Technology-mediated communication - Web 2.0 technologies. Social Media. Examples.
- Design, development and delivery of learning content.
- Creating teaching materials using Microsoft Office and web2.0 technologies.
- Development and implementation of evaluation methods.
- Web 2.0 applications.

As a result of the training test and computer assisted assessment have to be passed by students. The Certificate for the teaching profession, Level I, is issued after successfully completing the training.

Other training for teachers in University Polytechnics of Bucharest which may be considered as an extension of the previous one is Multimedia in Education50. The training is oriented to psychology and pedagogy training for receiving the competence certification for the teaching profession, Level II. Number of ECTS credits for the training is 5.

During the training such specific DC skills have to be acquired.

- to develop the communication and cooperation skills in interactive contexts;
- to understand the new technology importance for the teaching activity;
- to be able to keep an open mind for the fast Web developments;
- to develop the individual and collaborative working skills;
- to acquire the required knowledge about the main computer-based teaching-learning-assessment (testing) models;
- to optimally and creatively value one's potential and to contribute to the students' professional development;
- to make and value the intradisciplinary and interdisciplinary correlations in order to optimize the education process;
- to create virtual communities;

[50] https://dppd.curs.pub.ro/2018

- to have professional networking and complex communication skills in the relationship with the pupils, to be able to empathise with them, to do group work and to cooperate;
- to specific skills to take steps to design, organize, assess and adjust one's professional training activities.

After completing the trainings, students or teacher will be able to get such objectives.

General subject objective is to acquire the skills for organizing, designing and assessing the teaching activities using multimedia means.

Specific objectives:

- to develop teaching strategies using videoconferences;
- to develop interactive resources to support the pupils in their individual preparation;
- to setup an online learning environment (LMS), providing the pupils with the possibility to download resources, to upload homework, to receive feedback, to have access to useful hyperlinks, and to assess themselves;
- to integrate the MOOC's in the teaching process;
- to create and edit the multimedia materials using different online tools;
- to develop strategies to use the virtual media in a blended-learning system;
- to develop strategies to integrate the m-learning tools in the teaching activity;
- to systematically integrate the multimedia materials in the teaching activity;
- to operate with specific concepts;
- to create the skills and abilities to communicate and collaborate in the virtual environment;
- to build a positive attitude towards the use of multimedia in education.

The main topics of the training are oriented to extension of basic DC skills and knowledges acquired before:

- Multimedia in Education.
- Theoretical aspects regarding multimedia development.
- Online communication and collaboration solutions.
- Online solutions / resources for creating and editing (processing) multimedia materials.
- Creating Contexts Blended learning, blended teaching.
- M-learning in education.
- Features specific to multimedia.
- Multimedia development.
- Online solutions / resources / tools for creating and editing (processing) multimedia content.
- Creating Contexts Blended learning, blended teaching.
- Multimedia Learning.

As a result of the training test and computer assisted assessment have to be passed by students. The Certificate for the teaching profession, Level II, is issued after successfully completing the training.

These trainings enable schoolteachers to master the most important digital competencies and use them when preparing and conducting study lessons from their subjects for school children.

Learning course oriented to using Internet technologies for teaching in school and for career counselling and management in the professional and vocational field is proposed by University Polytechnics of Bucharest. The title of the training is The use of IT (WEB 2.0) instruments in the career counselling communication[51]. The learning course corresponds to Master Degree of Educational sciences field of study and it is oriented to teachers for primary schools/ for secondary schools, educators, VET specialists, e-facilitators etc. The course is organized in blended training form; it contains 6 credits ECTS and it is certified by Diploma of Master degree (after 2 years).

During the course studying such specific skills have to be acquired:

- to develop knowledge, digital technologies and software applications for making products, tools, manufacturing equipment and smart tools, integrated in information systems;
- to use smart IT applications for managing the processes and activities performed in industrial organizations;
- to have professional networking and complex communication skills in the relationship with the pupils, to be able to empathise with them, to do group work and to cooperate;
- to have specific skills to take steps to design, organize, assess and adjust one's professional training activities.

After completing the trainings, students or teachers will be able to get such learning objectives.

General subject objective: to acquire the communication skills and abilities using the Web-technologies.

Specific objectives of the trainings are:

- to operate with the entities specific for the knowledge field;
- to acquire information units (concepts, methods, techniques, technologies and services) specific for
- WEB 2.0: blog, wiki, RSS, information syndication, podcast/videocast, collaborative bookmark systems, social systems, etc;
- to analyze and select appropriate online applications;
- to acquire the notions related to the learning content delivery methods and technologies;
- to create the communication skills and abilities using Web-technologies;
- to build a positive attitude towards the new technologies in the virtual environment.

The subject content includes a number of important topics from the area of Web-technologies which may be successfully used in the educational activity of school teachers, namely:

- seeking educational resources on the WEB;
- social Media and new web 2.0 technologies;
- develop an on-line course;
- develop a virtual community;
- open-source e-learning platforms, including Moodle;

[51] https://imst.curs.pub.ro/2018

- M-Learning and augmented reality;
- looking for Resources under the Creative Commons License;
- Information / Documentation / Data Collection;
- searching for and analyzing the applications available on the net useful in the teaching environment;
- using ICT tools in teaching a subject (Electronic Books, Multimedia CDs, Teaching Sites);
- developing a virtual community.

Training materials of the course are presented via videoprojector and also by using classical black/white board for examples and exercises. The required documentation (documentation in Romanian) can be downloaded from the online learning management system of the faculty (MOODLE).

Two modern online DC based learning courses are proposed by CAMIS Center of University POLITEHNICA of Bucharest. Augmented Reality and 3D printing[52] represent areas which need extended level of DC knowledge.

The rapid transformation of hardware technology over the last years, especially in the gaming industry field, made it possible for extremely complicated 3D virtual spaces live display and various users' interaction. Augmented reality (AR) and 3D printing (two emerging technologies) are expected to grow continuously. These two technologies are clearly rapidly revolutionizing the established industries such as healthcare, architecture, manufacturing and education. AR could be used as a preview function of 3D printing. Just as 3D printing speeds up the manufacturing and prototyping process, AR can stimulate the modeling process before it is sent to a 3D printer. Today, the augmented reality is for 3D printing a feature which allows you to preview your object in a live video stream before you even print it. In these course, it is desired to cover the basic elements for teachers who attend these trainings.

After completing the trainings, students or teachers will acquire such skills and knowledge:

- reporting on the evolving history of AR technology and future developments in the field;
- explain the basic working principles of AR, and how the different elements interact together to make up and AR system;
- demonstrate the use of AR with an example, and implement a simple AR system that augments an image with a 3D model;
- knowledge on 3D Printing approach and basic terminology;
- understand the advantages and limitations of 3D printing for different applications;
- knowledge on the process steps for obtaining an object using 3D printing technology.

Certificate issued by UPB-CAMIS is available after successfully completing the training.

Computer Assisted Training and SCORM documentation (theoretical presentation, case study presentations and video demos) are used. The required documentation (documentation in

[52] http://camis.pub.ro/lms/

Romanian/English) can be downloaded from the online learning management system of the CAMIS platform.

Ukraine

Today, in Ukraine, the development of digital technologies is considered the basis for growth of economic development and welfare of the state, which opens opportunities for transforming the technological system of the country. This is evidenced by the priorities of the socio-economic, scientific and technical, national-cultural development of the country, taking into account the world's directions of development and achievements in the field of informatization, the state policy, aimed at solving the most important general social problems (ensuring the development of education, science, culture, environmental protection and human health, public administration, national security and defense of the state and democratization of society) and creation of conditions for Ukraine's integration into the world information space appropriate to-date information geopolitical trends defined by the National Informatization Program[53] and Digital agenda of Ukraine - 2020[54].

Qualitative education is one of the main factors in the successful development of the information society in Ukraine and the teacher is the leader of positive change. That is why the educational policy and professions of educators in Ukraine today are the subject of special attention of state authorities of different levels. During recent years a number of documents aimed at the development of the Ukrainian school and pedagogical education have been adopted. In 2018 the concept of the New Ukrainian School[55], aimed at making the graduate competitive in the 21st century is presented. Information and digital competence is considered in the concept as one of the key competences of future graduate.

The Cabinet of Ministers of Ukraine approved a new State Standard for Elementary Education[56], which also highlights information and communication competence as the mastery of digital literacy for development and communication, the ability of safe and ethical use of information and communication technologies in education and other life situations.

In accordance with the challenges of the development of society, the system of teachers training is being improved. In order to improve the system of pedagogical education for the training of educators and development of modern alternative models of continuous professional and personal development of teachers in Ukraine in 2018 a new Concept for the development of pedagogical education was adopted[57].

Successful professional activity of a pedagogue requires continuous training under dynamic changes and ability to adapt to them. This activity should be permanent and systematic, connected with professional growth and raising the level of pedagogical skills.

Among the key core competencies of the teacher, particular attention is paid to the development of digital teacher competence.

[53] https://zakon.rada.gov.ua/laws/main/74/98-вр
[54] https://ucci.org.ua/uploads/files/58e78ee3c3922.pdf
[55] https://nus.org.ua/wp-content/uploads/2017/07/konczepcziya.pdf
[56] https://zakon.rada.gov.ua/laws/show/87-2018-п
[57] https://mon.gov.ua/ua/npa/pro-zatverdzhennya-koncepciyi-rozvitku-pedagogichnoyi-osviti

According to the implementation plan of the Concept of Pedagogical Education Development, the Ministry of Education and Science intends to develop a description of the digital competency of the school teacher. The corresponding order was signed by the Minister of Education and Science[58]. About two dozen persons are included in the working group on the development of a description of the digital competency of teachers, which are representatives of the Ministry of Education and Science, institutes of postgraduate pedagogical education, higher education institutions, etc.

With such background, an analysis of existing courses, programs and trainings on digital competencies in Ukraine was conducted. The problem is analysed by universities, institutes of postgraduate pedagogical education, communal institutions of continuous education, etc. Mainly the qualification of teachers is raised in two directions:

- training of teachers for the delivering of informatics;
- preparing of teachers to use the DC applications of effectively teaching other school subjects.

Analysis DC education for teachers in Ukraine

This part of the report presents the most typical examples of DC trainings for Ukrainian teachers.

Short scientific and methodical training-seminars "Information Technologists in the Educational Process" duration of 4-6 hours (one working day) each year are held by the Kremenchuk Mykhailo Ostrohradskiy National University. The co-organizer of these events is the National Academy of Pedagogical Sciences of Ukraine. Universities, specialized research and production enterprises, state educational institutions of II-III levels of accreditation, teachers of schools of Kremenchuk schools are invited to participate in the event. The purpose of the training is to highlight the training technologies, methods for delivering labs and practices, the development of an effective technology for evaluating students' knowledge and skills, as well as determining the parameters of learning processes during classroom sessions. The materials of the seminars are regularly broadcasted in open access on the Internet.

The National Technical University “Kharkiv Polytechnic Institute” has developed several courses for informatics teachers from Sumy, Poltava, Kharkiv and Cherkasy regions in cooperation with the CISCO Academy and with the support of the Kharkiv Department of Education.

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The course "Fundamentals of hardware and software for a personal computer" is developed on the basis of the course CISCO Systems "IT Essential: Hardware & Software". The program provides students with basic knowledge of computer hardware and software required to meet the growing demand for entry-level ICT professionals. The course covers information on the basics of computer

[58] https://mon.gov.ua/ua/npa/pro-stvorennya-robochoyi-grupi-z-rozroblennya-opisu-cifrovoyi-kompetentnosti-pedagogichnogo-pracivnika

hardware and software, basic knowledge of laptops, mobile devices, printers and scanners, as well as more sophisticated principles such as computer and network security, network organization, and specialist in ICT. Course duration - 70 hours, which include theoretical and practical classes and labs.

The results of the training are:

- getting the basics of professional skills in the work and setting up of modern computing systems and networks;
- students will be able to learn how to collect and debug the computer, install operating systems and programs, and fix hardware and software defects;
- knowledge and skills of purposeful work with the computer, its hardware and software components;
- consolidation of practical skills of using modern ICT tools in everyday practical, in particular, educational and cognitive activities;
- ability to apply, analyze, transform information models of real objects and processes using ICTs, including - when studying other school subjects;
- development of logical thinking, creative and cognitive potential of the listener, his communicative abilities on the basis of modern computer tools;
- acquiring the student experience in the use of information technology in individual and collective activities;
- familiarity with the security methods and functions available to the standalone or networked computer;
- acquiring sustainable life skills while working with computing equipment.

Upon learning the course, students can optionally to test their knowledge and obtain standard international industrial certificates for hardware and software skills. For example, the CompTIA A + Certificate of Computing Technology Industry Association and Certificate of Administrator EUCIP ICT of Professional Council of the European Professional Informatics Societies. These certificates are evidence of professional training for the international community of employers in the field of ICT.

Basic knowledge of cybersecurity is provided by the "Introduction to Cybersecurity" training. The training involves familiarizing participants with various cybersecurity methods in modern cyberspace. Students are studying modern methods of detecting and solving security problems. Through exercises and laboratory work, students will be able to deploy software and hardware for computer and network security. The curriculum includes sections on network communication skills.

Students receive theoretical knowledge and practical skills on safe work in computer networks, how to avoid threats connected with communication in the network, how to keep personal data and protect them from intruders. The course focuses on the practical application of the skills and procedures needed to install, update hardware and software, and find and remove malware.

Practical, laboratory classes and virtual learning tools develop critical thinking skills and complex challenges. Implementation of training tasks based on simulation models in the CISCO Packet Tracer software package allows students to experiment with projects and network configurations.

Interactive attestations provide an immediate feedback to assess the acquired competencies of the listener in this subject area.

The training consists of 5 modules and lasts for 17 hours. For the formation of practical skills the program of the course provides for 8 practical and laboratory works. For each work (practical and laboratory), it is assumed no more than 20 minutes. The study of each module ends with benchmarking in the form of tests in real time. Study course ends with the final exam. The exam is conducted in the form of tests in real time. After completing the course, students receive a Cisco certificate.

The "Comprehensive Internet" training is devoted to the study of theory and the acquisition of practical skills for the Comprehensive Internet, the interaction of its components - the Internet of people, the Internet of processes, the Internet of data and the Internet of things. The course focuses on the practical application of the skills and procedures necessary to understand the processes of connection "machine - machine", "machine - man", "man - man." The course consists of 5 modules with a total duration of 35 hours.

The main topics of the training are follows:

- the concept of the Comprehensive Internet;
- components of the Comprehensive Internet;
- types of connections;
- the transition to the Comprehensive Internet;
- integrated solutions.

At the end of the course, students can take an online exam, which enables them to get a certificate of attendance.

The course "Introduction to computer networks. Routing and Switching" will help teachers to get knowledge about the basic concepts of the network and technologies, as well as to develop the skills necessary to create and implement small networks with a wide range of software services. The objective of the training is to provide students with an understanding of how people communicate and how devices communicate on the network.

The objectives of the training are follows:

- introduce students to the two main models used in the planning and implementation of the network - OSI and TCP / IP;
- to form a general idea of the approach to networks using the concept of "level";
- consider the OSI and TCP / IP levels in detail to understand the function of their functions and services;
- to get acquainted with various network devices and network addressing schemes;
- get information about the types of media that are used to transfer data over the network.

Upon completion of this course, students will be able to create simple local area networks, perform basic router and switch settings, and implement IP addressing schemes. The course has duration of 70 hours and built on a modular structure.

After studying the course, students can complete an online exam and receive a certificate of attendance. Optionally students can test their knowledge, qualify, and obtain standardized international industrial certificates for hardware and software skills: CCNA - CISCO Certified Networking Associate (Certified CISCO Network Specialist).

All offered courses have the teaching and methodological support, created in support of network academies CISCO, which contains a set of theoretical material, laboratory works, multimedia resources, systems of test evaluation. Access to these resources is free subject to the registration of an educational institution in the system of CISCO network academies.

Interesting trainings for primary school teachers are offered by Donetsk National Technical University in cooperation with Pokrovsk Pedagogical College.

The training "Practical course in informatics (with elements of programming)" is devoted to mastering the basics of programming in the environments of Scratch and LogoMirs 3.0.

After the trainings, teachers will be able to:

- practically use Object-Oriented Scratch and LogoMirs 3.0;
- create animated interactive stories, educational models and games, etc .;
- create and edit computer graphics objects;
- use the basics of algorithmic language, types of algorithms, execution conditions;
- modify, construct algorithms of different structures, find errors in them;
- mastering the basics of programming in Scratch and LogoMirs 3.0;
- understand the capabilities of the PC as a tool for educational and cognitive activity;
- allocate sets, identify links between objects, represent them in new interactions, expand complex objects to simpler ones.

The training takes place within 44 hours.

The training "Beginnings of Informatics" is aimed at forming the basic theoretical knowledge, skills and abilities in informatics for the effective use of modern computer and information technologies, for the development of the basics of information culture and information and communication competence of primary school teachers.

Participants study software and file systems, simple computer maintenance, validate software tools for professional tasks and information exchange, master the work with data processing systems (text editors and processors, spreadsheets , programs for creation of presentations and publications, management of archives, etc.), conduct mathematical calculations, statistical processing of empirical data by a table processor. They obtain skills in using the main features, services and information resources of computer networks, the Internet, creating presentations, using application software

packages for solving pedagogical and managerial tasks, conducting individual and group training with the help of professional-oriented software.

The course participants learn how to create simple web pages, fill them in and publish on the Internet, analyze well-known methods for constructing algorithms, and identify the best for problem solving, create linear, branched and cyclic algorithms, and test the developed algorithms.

The training is conducted in classroom for 80 hours.

The existing trainings on improving the digital competences of teachers proposed by institutions of postgraduate education of Ukraine for advanced training are represented on the example of the Kharkiv Academy of Continuing Education communal higher education institution.

Periodically, several times a year, the course "Informatics" for primary school teachers is organized. The course is blended, it contains classroom lectures and online seminars, practical classes and individual exercises. Course duration is 120 hours (4 credits ECTS).

An additional short-term course "Informatics in Primary School"[59], with duration of 60 hours, is introduced. Teachers receive basic knowledge of new effective IT tools for learning, the creation of their own software products in the Scratch programming environment; discuss the methodological aspects of informatics teaching in the primary school.

Students acquire knowledge about the main components of the computer, information technologies for the creation and processing of multimedia objects, information processes, studying the basics of communication technologies, mastering the capabilities of the MS Office suite to create teaching materials. Considerable attention is paid to the study of algorithms, the basics of the development of algorithms in a specific programming environment. Courses are completed by a ence on experience sharing and final testing.

Basic[60] and extended[61] trainings "Informatics" are proposed for secondary school teachers. Duration of the training is 150 hours for basic course and 60 hours for extended one. trainings are organized in online and offline versions. Students study online services for a modern teacher, modern personal and collective communication tools, the basis of event-oriented and object-oriented programming in the school course of computer science, especially the creation and publication of web resources, databases and database management systems.

Teachers master the section "Fundamentals of algorithmization and programming" in the programming language Pyton, have a pedagogical practice "Creating a set of interactive multimedia teaching materials for a computer science lesson", get acquainted with online services for creating intelligent maps, surveys, questionnaires, infographics, interactive exercises, creation didactic

[59] https://docs.google.com/viewerng/viewer?url=http://edu-post-diploma.kharkov.ua/wp-content/uploads/2019/05/2_Vasulenko_27.05.19.docx&hl=en
[60] https://docs.google.com/viewerng/viewer?url=http://edu-post-diploma.kharkov.ua/wp-content/uploads/2019/01/3_Vasulenko_21.01.19.doc&hl=en
[61] https://docs.google.com/viewerng/viewer?url=http://edu-post-diploma.kharkov.ua/wp-content/uploads/2019/01/9_Vasulenko_14.01.19.docx&hl=en

materials, placing them on a virtual board. The participants of the training increase their pedagogical and didactic skills, studying the peculiarities of the teaching methods of the topic "Computer Graphics", information and communication technologies, trends of their development and use in education, especially the teaching of technology for processing text and tabular data.

These trainings end with a comprehensive control work, a conference on sharing experiences and final testing. Courses are conducted 2-3 times during the school year. They are visited by about 30 teachers of informatics secondary schools in the city of Kharkiv and Kharkiv region.

An interesting form of advanced training is the so-called binary courses organized by the Kharkiv Academy of Continuing Education for teachers of informatics and mathematics[62]. The training organization is blended with duration of 150 hours. The participants of the training increase their competencies with modern tools of personal and collective communication, computer modeling, information technology creation and processing of multimedia objects, database management systems, the bases of event-oriented and object-oriented programming in the school course of computer science. The course includes topics such as "Computer experiments in constructive geometry: modeling and research", "Information and communication technologies: trends of development and their use in education", "Interactive whiteboard as a modern methodological tool for teachers", "Digital educational resources the use of network technologies in the learning process on mathematics","Peculiarities of teaching technology for processing text and table data ", "Peculiarities of creating and publishing web resources".

It should be noted that information and digital subjects are introduced into various courses for the training of teachers of Kharkiv city and Kharkiv region. For example, the topics "Innovative Educational Technologies" introduced into the short-term course of teacher training in the areas of Fine Arts, "Art Culture", the theme "Creation of didactic online materials based on network services" is included in the special course for foreign language teachers who teach primary school students. Classes on the use of digital resources in the process of teaching mathematics are included in the course of improvement of the qualification of primary school teachers "Formation of mathematical competence of junior schoolchildren". To additional short-term courses for the training of teachers in the areas of "Natural History" and "Ukrainian Language and Literature" included topics "Digital Educational Resources. Use of network technologies in the educational process "," Features of the use of general-purpose software in the activities of the teacher ", etc.

[62] https://docs.google.com/viewerng/viewer?url=http://edu-post-diploma.kharkov.ua/wp-content/uploads/2018/11/2_Vasulenko_05.11.18.doc&hl=en

Summary of Country Analysis

The principles of organization of legal and regulatory framework for qualification improvement (including DC) of national education systems of professional development for teachers in project participant countries – Austria, Czech Republic, Poland, Lithuania, Romania and Ukraine have been analysed. The analysis revealed heterogeneity in terms of structure of school teacher professional development systems and approaches to continuous education.

Qualification improvement, particularly in DC competencies, for school teachers in partner countries, differ in their initial and further stages of their careers. Taking into account age, professional and psychological peculiarities, induction and mentoring programs (at the early stages) and continuing professional development (CPD) are used.

According to top-level authority regulations in project participant countries requirements to the qualification improvement programs are different. Induction and mentoring programs vary from compulsory with defined duration in Poland, Romania and compulsory only for graduate teachers without defined duration in Austria to not regulated in Lithuania and Czech Republic. CPD programmes in project participant countries vary from mandatory with defined minimum time in Lithuania, Romania and mandatory for some teachers' categories in Austria to professional duty in Czech Republic and Poland.

EU project participant countries have good basic DC trainings for teachers, including Computer literacy, Digital competent teacher, Information and Communication, Information Technologies for Teaching and Learning, UNESCO - E-learning technologies. These trainings aimed on forming and development of fundamental DC skills and competences which are common for different categories of teachers.

At the same time EU project participant countries have variety of effective DC trainings for teachers focused on particular DC-areas oriented to specific categories of school teachers. For instance, Multimedia in Education, Microlearning in Education, 3D printing.

Other specializations of DC trainings are dedicated to development of digital competences in certain educational areas such as «Computer Music Technologies», «Application of ICT Teaching Study Subject of Art», «Digital Linguistics», «Digital Humanities».

Successful experience in a modern organization of continuing vocational education for the development of digital competences of teachers are represented in results of projects Online4EDU and e-GUARDIAN.

At the same time national education systems of professional development for teachers of all the countries are aimed to lifelong learning concept.

Ukraine is taking steps to fully develop the digital competences of teachers through continuous improvement of their professional qualifications, pedagogical training of information and digital orientation. Lack of standard of secondary education, normatively approved requirements for digital

competences of teachers (the framework of digital competencies) determine the heterogeneous lack of structured focus on the topics of training, their duration, variety of forms. Many of them are focused on only category teachers of informatics.

The basis for the improvement of teachers' qualification development and their digital competencies should be the Ukrainian framework of digital competences, developed on the basis of the experience of European partners.

Current analysis of Ukrainian DC trainings for teachers revealed:

- trainings are not clearly focused on certain digital competences;
- there is no connection "Digital competency - particular training";
- DC trainings mostly oriented to informatics teachers;
- analysis of the digital competency needs for different categories of teachers is required;
- there is no International professional certification for teachers attended DC trainings.

Conclusion. Implications of Results for Programme

This concluding section draws together the results from the desktop research, survey, and analysis to make recommendations for the programme that will form the core of the dComFra project.

- In order to modernize the system of continuing professional development in DC area for Ukrainian teachers it is crucial to develop and implement the Ukrainian framework for digital competences for teachers. It should be based on the experience of European partners.
- Systems of professional development for teachers in EU project participant countries can be considered as a basis for improvement of digital skills and competences for teachers in Ukraine.
- Ensure conditions for the development of basic and specialized digital competencies amongst Ukrainian teachers.
- When developing new DC trainings for Ukrainian teachers it is important to take into account needs of different categories of teachers within the Ukrainian framework for digital competences for teachers.
- Ukrainian DC trainings for school teachers should comply with requirements of Digital Competence Framework for Educators (DigCompEdu) as well as be under umbrella of European certification system.

Appendixes

Appendix 1: Form of questionnaire WP1.2

Erasmus+ dComFra Digital competence framework for Ukrainian teachers and other citizens ECDL Lithuania

Questionnaire about training courses for teachers in EU/UA

This template should be used to accomplish the analysis of programs of full-time DC trainings for teachers in EU/UA and programs/aspects of in-service trainings for teachers in EU (if they are exist).

The primary objective of the research is to identify available existing digital competence programs for teachers and learning materials in partner universities.

The outputs of this phase of the research will (1) provide context for existing trainings and learning material for teachers and (2) generate an input into curriculum development.

Notes on completion:

- Please follow the template guidance as much as possible to ensure consistency between the country analyses.
- Please provide information about trainings and training material (if it is available) as much as possible. If it is possible please provide links to trainings.
- If partner university has more than one trainings, please describe at least 5 study programmes.
- Please aim to have a draft of this complete **by 31 of May, 2019**.

1. **Partner name:**

2. **Training title:**

3. **Subject annotation:**
A brief summary of course indicating the main aim of the training.

4. **Training form:**
Online/auditorium/blended/other (please provide)

5. **Training outcomes of the subject**
Please provide competencies, which students will get after this course.

After completing the trainings, students or teacher will be able to:

- …..

Disclaimer: This project has been funded with support from the European Commission. This publication [communication] reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Erasmus+ dComFra Digital competence framework for Ukrainian teachers and other citizens ECDL Lithuania

6. Subject content.

Please provide main topics of the training.

7. Target groups:

Please provide target group of the training, like teachers for primary schools, teachers for secondary schools, educators, VET specialists, e-facilitators etc.

8. Study hours:

Please provide how many hours is dedicated for each category, if available.

Work in auditorium in hours:

Practical works in hours

Individual student work:

9. Evaluation procedure of knowledge and abilities:

Please provide short information how the knowledge are evaluated after this trainings.

10. Availability of certification.

Please provide information, if it is possible to get international certification after this course.

11. Trainings method.

Please provide training method, like trainings used in formal or informal education.

12. Training material.

Please describe if there is prepared training material, is the training material online or printed, in which language. Training material preparation date (approximately). Please provide link to training material, if it is possible.

13. Other important information.

Please provide other important information related with this trainings.

14. Links.

Please provide links to the trainings, if it is possible.