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# New Format for Improving the Digital Competence of Older Teachers in Primary General Education

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## Abstract

Most teachers in the Russian Federation are people at the age of 45 and over. They have good pedagogical competences, but unfortunately, their digital literacy is not as good, and their digital competence *requires development*. At the same time, these teachers have to continue their professional activities in the conditions of digital education implementing the Federal project "Digital Educational Environment".

The System of Advanced Training has resources for the formation and development of digital competence of older teachers. Following the Order of the RF Government, the Union "Young Professionals (WorldSkills Russia)" launched a special Federal Program for Vocational Training and Additional Vocational Education for persons aged 50 and over, as well as persons of the pre-retirement age. This program started in March, 2019, with the support of the Federal Labour and Employment Service within the framework of the Federal Project "Senior Generation" of the National Project "Demography." 120 WorldSkills Russia competencies have joined this program, including the competence Primary School Teaching (R21).

The purpose of this study is the development and testing of content and technologies for improving the digital competence of primary teachers aged 50 years and over, as well as persons of pre-retirement age, through the implementation of relevant practical-oriented training programs and methodological set for their support.

In the course of the study, both theoretical and empirical methods of research were used. As the result of the study, three training programs have been developed based on the WorldSkills standard for the competence *Primary School Teaching*.

The results of the study may be interesting to teachers, methodologists, researchers in the field of advanced training of teaching staff in the conditions of digital education.

*Keywords:* digital education, advanced training, digital competence, information and communication technologies, interactive technologies, professional activity of the teacher.

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## Introduction

According to statistics provided by the Ministry of Education of the Russian Federation, the teaching staff today is made up by people of a venerable age: 23% of teachers who have crossed “the retirement line”, and 19% of teachers who are approaching it (<https://tass.ru/obschestvo/7092590>). Unfortunately, the number of teachers of these ages tends to increase, and we can observe it not only in the RF but also in many countries abroad. This is a consequence of demographic and socio-economic processes, which have become global.

Having an extensive experience in professional activities, teachers aged 50 and older, however, are not always ready to react dynamically to the objective conditions of the changing world. They will have to continue teaching in the context of digital education implementing the Federal project "Digital Education Environment" (Federal Project “*Digital Education Environment*”, 2018). This project aims at the creation of conditions necessary for the introduction of a modern and safe digital educational environment by 2024. To achieve the goals of this project, competent teachers are needed, ready for vocational self-development in a digital educational environment.

In accordance with the Order of the RF Government, the Union "Young Professionals (WorldSkills Russia)" launched a special Federal Program of Vocational Training and Supplementary Vocational Education for persons aged 50 and over, as well as persons of the pre-retirement age (Government of the Russian Federation, 2018). The program started in March 2019 and was supported by the Federal Labour and Employment Service within the framework of the Federal Project "Senior Generation" of the National Project "Demography" (National Demography Project, 2018). The competence *Primary School Teaching* (R21) was among 120 WorldSkills Russia competencies which joined this program.

The Academy, as a structural division of the Union "Young Professionals (WorldSkills Russia)," was established in 2017 with the support of the Agency for Strategic Initiatives with the aim of disseminating the best world and domestic training experience. In 2019, it actively joined the implementation of the Project "Senior Generation" within the framework of the National Project "Demography". The Academy implements the network principle of training on programs using the potential of Specialized Competence Centres (SCC), having modern equipment and teams of highly qualified certified specialists, who are able to develop and test special educational content. One of such Centres was created in the city of Orekhovo-Zuyevo (Moscow Region, Russia), at the State University of Humanities and Technology. In 2019, it got the status of the National Centre of Competence (NCC) R21 Primary School Teaching

(Yakovleva, Voiteleva, & Krasilova, 2018; Yakovleva, Voiteleva, & Krasilova, 2019). Since 2019, the *NCC Primary School Teaching* has been implementing the project with the aim to train 40 primary school teachers of the senior age category. The Centre provides the development of scientific and methodological support to the project.

### **Purpose, objectives of the study**

Development and testing of the content and technologies for improving the digital competence of primary school teachers aged 50 years and over, as well as persons of the pre-retirement age, through the implementation of relevant practical-oriented training programmes and methodological set for their support.

### **Literature review**

The number of teachers aged 50 and over is constantly growing in very many countries. Many pensioners return to school because there is a need for it. For example, according to data of the National Education Association, the shortage of teaching staff in the US schools has become large-scale (Flannery, 2019). As stated by the Economic Policy Institute, this shortage is "real, large, and growing", and the situation is even worse than it has been expected. By 2025, the shortfall of educators in the USA can reach 200,000.

The problem is that teachers born during the "baby boom" period have reached the retirement age, and young teachers, "the candidates who could fill their jobs are simply not there". In 2016, the number of college students ready to major in education was only 4.2 percent (the lowest number in 45 years). In 2000, the percentage of such students was much higher (11%). Teaching as a profession is rapidly losing popularity. As a result - an acute personnel crisis.

Sarah Borgman, the former president of the National Association of Education Workers of the United States, said that it is necessary to be grateful to teachers of the retirement age "for the time and zeal and energy that they are still contributing" (Flanner, 2019). These contributions make a big impact on both students and young teachers, for whom older teachers become mentors.

As researches in Western European countries show, the process and reasons for "unretirement" can vary. Many older teachers face psychological problems. Having become pensioners, they gradually lose their connection with the professional community, part of which they considered themselves for many years. According to psychologists, among the basic needs of a person there is the need of belonging (Kenrick, Griskevicius, Neuberg, & Schaller, 2010).

According to some researchers, more than a half of the people who have already reached the retirement age resume their full or partial employment (Maestas, 2010). Very often the decision to continue working after reaching the age of retirement or to unretire is often planned in advance (Diamond & Hausman, 1984). Some retired people would like to realize their opportunities in a different sphere. Perhaps only now they get an opportunity to change their life, to try something new (modern computer, information and communication technologies, for example). However, very often the main reason for unretirement is economic. It is difficult for older people to accept that when they retire, they will not be able to have the resources, material benefits that they used to enjoy (Hurtado & Topa, 2019).

It is possible that a particular person of the retirement age attracts an employer with his unique experience, deep knowledge, ability and desire to transfer knowledge and experience to a younger generation. If knowledge can be acquired through formal or informal education, and this process can be accelerated, experience still takes time and is often unique. However, studies conducted in some European countries suggest that employers do not tend to invest in elderly workers (Principi, Bauknecht, Di Rosa, & Socc, 2020).

Elderly employees (50 years and older), though they have knowledge, experience, face problems the number of which only increases with age. Economically, it is important to keep a balance between labour costs and productivity. Unfortunately, the labor productivity of elderly employees can be boosted (as researches based on human capital theory show). Measures taken in Western European countries to increase the human capital of older employees are the following: career planning, training programs, ergonomic measures and workplace design, as well as decrease of the workload, demotion, and part-time work (Principi, Bauknecht, Di Rosa, & Socc, 2020). It is obvious that some measures can have negative impacts for elderly workers, e.g., demotion can reduce work motivation (Josten & Schalk, 2010).

Modern technologies play an important role in the sphere of education. Problems with ensuring access of older employees to these modern technologies can be not only financial, but, more often, organizational and partly psychological. A good organization of training or re-education of people of pre-retirement and retirement age, combined with psychological support based on knowledge of the specifics of this age group, is a key to success.

Most of the older teachers in our country and abroad are women. As studies carried out in different countries of Europe and America showed, women with a good professional education (higher, secondary and special) have a rather high chance to continue working after reaching the retirement age or to

unretire. (McAllister et al., 2019). Women are often more flexible than men in adaptation to new conditions and requirements.

The strength of teachers of the active age is the high level of development of professional pedagogical competences. Specialists specify six competences based on an analysis of pedagogical activities: competence in the field of personal qualities; in setting goals and objectives of pedagogical activities; in motivation of students; in providing an information basis for pedagogical activities; in the development of programs, methodological and didactic materials; in making pedagogical decisions, in the organization of pedagogical activities (Karpov, Kuznetsova, Kuznetsova, & Shadrikov, 2011; Shadrikov & Kuznetsova, 2012).

As it is specified in the Professional Standard for the Teacher in the RF, the developed ICT competence is one of the requirements for a specialist to successfully perform professional functions (Professional Standard for the Teacher, 2013). The development of ICT competence and digital competence of educators is the subject of serious research. Thus, the UNESCO proposes the structure of ICT competence of teachers. It includes the following competences: Understanding ICT in Education, Curriculum and Assessment, Pedagogy, ICT, Organization and Administration, Teacher Professional Learning. The content of each of these competences is arranged in three different approaches to teaching (they correspond to three successive stages of a teacher's development): Technology Literacy, Knowledge Deepening, Knowledge Creation (UNESCO ICT Competency Framework for Teachers, 2011).

Analysing the differences between ICT competence and digital competence, Gaisina points out some new competencies necessary to work in digital environments: ability to use digital tools for identification, access, management, analysis, evaluation and synthesis of digital resources, productively, critically and safely choose, apply information and communication technologies in different spheres of life (including work with content, communication, consumption, techno-sphere) (Gaisina, 2018).

The theoretical basis of our study was the concept of digital competence proposed by Soldatova (2013, 2014, 2015). She identifies the following types of digital competence:

1. Information and media competence. It includes knowledge, skills, motivation and responsibility related to search, understanding, organization, archiving of digital information and its critical understanding, as well as creation of information objects using digital resources (text, image, audio and video).
2. Communication competence. It includes knowledge, skills, motivation and responsibility necessary for various forms of communication (e-mail, chat rooms, blogs, forums, social networks, etc.) and for various purposes.

3. Technical competence. This competence includes knowledge, skills, motivation and responsibility, allowing efficient and safe use of technical and software tools for doing various tasks, the use of computer networks, cloud services, etc.

4. Consumer competence. It includes knowledge, skills, motivation and responsibility, allowing to carry out with the help of digital devices and the Internet various daily tasks related to specific life situations, involving the satisfaction of different needs (Soldatova, Nestik, Rasskazova, & Zotova, 2013).

## **Methodology**

In the course of our study, we used both theoretical and empirical methods of research to ensure the validity of the results. Theoretical methods: analysis and systematization of scientific and methodological approaches to increasing the digital competence of teachers; synthesis of psychological and pedagogical conditions for advanced training of teachers aged 50 and over, as well as persons of the pre-retirement age; integrated analysis of empirical research results. Practical methods: expert survey, experiment.

The experimental base of the study: The National Competence Centre Primary School Teaching (at the State University of Humanities and Technology, Moscow Region, Orekhovo-Zuyevo). Stages of the experiment: ascertaining, formative, control.

At the ascertaining stage of the study, the initial level of digital competence of teachers was determined by methods of oral and written questioning, observation of students during the performance of "trial tasks." The research attention was focused on information and media competence, communicative competence, technical and consumer competence of the students.

The analysis of the results led to the following conclusions. Most students (68%) showed an average level of information and media competence (they were ready to search for information, structure and critically think about it, had an idea of how to store information, but they had limited idea of how to store information, to create materials using digital resources is very difficult for them). The high level of formation of information and media competence was demonstrated by 11% of the students, low level – by 21%.

Only 3% of the students had communicative competence, as a type of digital competence, formed at the high level. 82% of the participants, according to the results of the study, had the average level of communicative competence (they were ready to carry out online communication in such forms as e-mail, social networks, but their use of chat, blogs, and forums was limited). 15% of the students demonstrated the low level (they used only e-mail).

The level of development of technical competence as a type of digital competence was defined as the degree of readiness of teachers to use computers and software for professional tasks effectively and safely. 3% of the students had the highest level of technical competence, 52% – the average (they could use standard Microsoft software), 45% – the low level (they could work only with Word tools and were limited in the use of PowerPoint).

The results of the survey showed that all participants used information resources to do everyday tasks having a sufficient level of formation of consumer competence as a type of digital competence. However, some responses of the students showed that they preferred asking their colleagues to searching on the Internet.

As for the cognitive component of digital competence, it is important to note that all participants recognized that their awareness of how to work with information was insufficient. They felt that they needed to know more about practical application of digitalization in education. Most listeners had a good motivation for improving their digital competence. They recognize digitalization as a part of the present-day reality. Among the students' answers were the following: "Of course, you want to keep up with the times. Digital competence is already a professional necessity. There are so many opportunities..."; "Today the kids in my class know more about the computer than me. They are doing everything so fast. I do not want to lag behind. "; " I do not want to be a dinosaur for students, "etc. Analysing emotional and will component of digital competence, it is important to recognize that many students had a high level of anxiety. The answers often contained the words "I am afraid...," I worry, "I am not sure that I can," At my age it is difficult..."

## **Results**

Having analysed the results of the study, we recommended to the participants the following advanced training programs developed in the NCC Primary School Teaching and based on WorldSkills Russia Standards and the Professional Standard of the Teacher: 1) Interactive technologies and robotics in extracurricular activities of primary school children, 2) Pedagogical technologies for the organization of educational process in primary school, 3) The use of Smart technology in primary education. The content of the programs is aimed both at the development of digital competence of teachers and, in general, at the improvement of their methodological culture and their skills in educational process management.

As one of the results of the first program mentioned above, students expanded their understanding of how to form a modern educational environment with the use of interactive technologies and robotics in extracurricular activities of primary school children. They are ready to apply in practice effective

interactive technologies in extracurricular activities of primary school children, to incorporate robotics elements into the design and implementation of extracurricular educational programmes in primary school.

In practical classes students (primary school teachers) were introduced to the content of programs of extracurricular activities with the use of robotics, they designed their own program, created mobile structures with the help of LEGO Education WeDo 9580 and 9585; 2.00, combined them, independently programmed models. The students also developed chronological maps and fragments of extracurricular classes within the framework of the self-development project of the program using interactive equipment and robotics.

The program Pedagogical technologies for the organization of the educational process in primary school is aimed at improving the methodological skills of teachers in the application of verbal and non-verbal communication strategies for the involvement of students into educational process. One of the aims was also the use of effective pedagogical technologies of activity type based on knowledge of laws of personal development and behaviour in the real and virtual environment (technology of productive training, technology of statement of an educational task, organization of educational situations, organization of communication, reflection, self-assessment, technology of design activity, etc.). In order to develop digital competence, teachers learned to apply different methods of information processing, to work with computers as an information management tool, to develop interactive tasks using the Internet service LearningApps.

The problem of the formation of teachers' digital competence was also solved during the implementation of the program "The use of Smart-technology in primary education". The students (primary school teachers of the pre-retirement age) studied the components of the multimedia information environment of the educational process and the regulations of the use of digital multimedia materials, opportunities and criteria for the selection of software tools for solving professional and educational problems.

In the course of the training, the participants independently searched, critically analysed and synthesized information, applied a systematic approach to solving problems. They learned to manage their time, build and implement a path of self-development based on the principles of lifelong education, developed separate components of educational programs (the use of information and communication technologies was included).

The students learned to work with software applications that help create multimedia products, to use effectively modern computer information tools and technologies to incorporate various types of resources,

including media resources, into teaching and learning process, to work with software and hardware to create and apply multimedia.

The following themes were included into the programs: "Messaging. Free Correspondence, "Global Class. E-Learning, "Information Exchange," Electronic Publications, "Database Creation," Telecommunication Excursions." The participants actively interacted in practical classes, searched for information, took part in scientific Internet conferences of different levels. They learned such resources as "Lesson Activity Toolkit 2.0," tools "Shapes" in Smart Notebook, did exercises with the interactive element "Lesson Designer," got acquainted with the technology of carrying out interactive classes of the LAT2.0RU collection.

The final assessment for all programs was in the form of demonstration examination. Conditions close to real were created to make the students do practice oriented tasks in a limited time. Thus, the final assessment of the students of the programs "Pedagogical technologies of organization of educational process in primary school" and "The use of Smart-technology in primary education " was carried out in accordance with the Set of Assessment Documentation № 1.1. of the WorldSkills Russia competence Primary School Teaching. Among the tasks were preparation and demonstration of a lesson fragment (the stage of gaining a new knowledge) in primary school classes on one of the given subjects using interactive equipment, as well as development and demonstration of a self-developed didactic tool according to the specified topic of the lesson.

For the final certification of the students of the program "Interactive technologies and robotics in extracurricular activities of primary school children the Set of Assessment Documentation № 1.2. of the WorldSkills Russia competence Primary School Teaching was used. The demonstration examination included the following tasks: to develop and give an extracurricular class for the general intellectual development using interactive equipment and robotics; to develop of a project passport for the organization of project research activities of primary school children.

Both the demonstration examination results and the results of the experts' survey showed that, in general, the level of digital competence of teachers increased. Indications of it were the following: system knowledge in the field of digital processing of information, software; motivation and readiness to apply information and communication technologies with confidence, efficiency, critical thinking and safety in professional activities.

According to the results of the expert survey, the number of participants demonstrating the low level of formation of information and media competence decreased (5% compared to 21% the beginning of the study). At the same time, the survey showed that the number of participants with the high level increased

by 9% (20% compared to 11% at the ascertaining stage of the study). The high level of communicative competence development as a type of digital competence is demonstrated by 16% of the participants (compared to 3% at the beginning of the study). The percentage of students with the low level of communicative competence, at the same time, has significantly decreased - from 15% to 3%. The number of participants demonstrating the high level of technical competence increased to 17% compared to 3% recorded at the ascertaining stage. Only 6% of the students showed the low level of technical competence at the control stage of the study (compared to 45% in the beginning). The responses of the participants indicate an increase in their understanding of opportunities for the use of information and communication technologies in everyday professional activities, which can be considered as an increase in the participants' consumer competence.

Analysis of the responses of the listeners in feedback format allowed to record significant positive dynamics in changing the content of the cognitive component of their digital competence. Teachers showed readiness to continue their professional and personal development in the digital educational environment. From the point of view of emotional and behavioural components of digital competence, positive changes were obvious.

In the course of experimental testing, these programs and methodological materials proved to be effective in solving the problem of digital competence formation when it concerned teachers aged 50 and older. In the experimental mode, 330 people from 16 regions of the Russian Federation were trained in 2018-2019. 40 teachers were trained in the NCC Primary School Teaching (Orekhovo-Zuyevo), the rest of people were trained in other Specialized Competence Centres.

## **Discussions**

The most important issues discussed in the article relate to the following:

- the demand in national educational systems, including Russian, for teachers of pre-retirement and retirement ages, who have a high level of development of professional pedagogical competences;
- readiness of teachers in this age category to improve their skills by eliminating the professional deficits associated with the development of ICT and digital competence;
- opportunities for them to improve their skills at the WSR Academy centres within the framework of the Federal Vocational Training and Supplementary Vocational Education Program for persons aged 50 and over.

Other issues deserving further discussion are related to the implementation of the project in the NCC *Primary School Teaching* (the State University of Humanities and Technology, Orekhovo-Zuyevo). The project was aimed at the development and testing of the content and technologies for improving digital competence of primary teachers aged 50 years and over, as well as persons of the pre-retirement age, through the implementation of relevant practical oriented training programmes and a methodological set of their support.

## **Conclusion**

Programs of training, advanced training and retraining of older people are becoming more and more popular in the Russian Federation. They are equally relevant for experienced teachers who want to acquire new competencies for successful work in digital education.

The structures involved in the implementation of such programmes are currently receiving substantial state support through the Federal Project "Senior Generation" of the National Project "Demography." In this regard, the implementation of new programs as well as new approaches to training and final control in the format of demonstration examination in the centres of the WSR Academy deserves attention (Yakovleva, Voiteleva, & Krasilova, 2019). The experience of the National Centre of Competence Primary School Teaching is in demand, as at present the register of additional vocational education programs is being developed for further implementation of the project of vocational training and additional vocational education for persons aged 50 years and over.

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