

## The Age Factor in the Digital Divide: The Edges of Inequality



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**Abstract.** At the end of the 1990s – beginning of the 2000s, due to the spread of the Internet at an increasing rate in certain countries, while others were lagging behind, it became necessary to study the digital gap issues. At the present stage, when the existence of the digital divide in the world and individual states is obvious and proven, researchers have focused on studying its factors. The article aims to assess the influence of the age factor on the scale and prevalence of the digital divide within a three-level model. To do this, we consider theoretical and methodological approaches to studying the age factor of the digital divide; we analyze trends in the use of information and communication technologies by representatives of various age groups, and the inclusion of children, adolescents and the elderly in the digital environment. The model of three levels of the digital divide developed by modern scientists is used as a theoretical basis. According to the model, inequality manifests itself in access to technical means, differences in the digital literacy, and the benefits derived from digitalization. In the course of the work, we use a set of general scientific methods. We reveal significant differences in the practices of using personal computers and the Internet among representatives of different age groups and calculate the time periods necessary to reduce intergenerational gaps in Russia and the Vologda Oblast. We assess the impact of online habits on a person's life, the purposes of using the Internet and the possibility of receiving bonuses from it, the availability of digital skills for various age groups of Vologda Oblast population. The scientific novelty of the study consists in assessing the influence of the age factor on the prevalence of digital gap parameters at the regional level. The results can be used for identifying the groups that are at risk of being excluded from the processes of digital development. The findings will be also useful in formulating the relevance

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of social retraining programs for the able-bodied population in accordance with the requirements of new jobs, in teaching older people digital skills, and in making managerial decisions for successful digital development.

**Key words:** information and communication technologies, digital divide, age factor, youth, elderly people, older people, middle-aged people, digital skills, Internet.

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### Introduction

Studying the digital divide has become a topic issue of research in the context of large-scale digitalization of the economy and everyday practices of the population. And if in the initial period of modern information technologies development studies were interested in the access to the information and communication technologies (technical, physical, and the need for them in the value and cultural framework and reference points of modernization development), then now, when every second person on the Earth uses the Internet (or 53.6 people out of 100 in 2019<sup>1</sup>), it is most relevant to study the technology itself, their goals and factors contributing to unequal access to them.

Digital technologies are produced and used unevenly, there are differences both between and within countries. This has become the subject of numerous foreign and Russian researches (Nieminen, 2016; Ragnedda, Kreitem, 2018; Ragnedda, 2018; Gruzdeva, 2020; Shinyaeva et al., 2019; Gladkova et al., 2019). Along with this, issues related to the drivers of the digital divide especially at the local level (in the case of Russia – between and within regions and municipalities), remain insufficiently studied. Besides, one of the current issues related to the digitalization of

society is to understand the mechanisms that will change established, institutionalized forms of interaction in society, social perceptions, values and orientations in a new social context (Zarubina, Vlasova, 2018). Thus, at the modern stage of the digital development trends appear in one way or another related to people of different age groups and generations earlier digital inclusion of children (Shabunova, Korolenko, 2019), digitalization of jobs, which is relevant for people of working age, population aging and the resulting barriers to digital participation on par with its increasing importance for older people (Senokosova, 2018; Smirnykh, 2020). This predetermines the relevance of research in this direction.

The purpose of our study is to assess the influence of the age factor on the parameters of the digital divide in a three-level model. To achieve this goal, we have set and implemented the following tasks: considered the theoretical and methodological approaches to the study of the age factor influence on the digital inequality; analyzed trends in the use of ICTs by people of different ages, the features of digital inclusion of children and adolescents, representatives of the third age.

The scientific novelty of the study is to assess the impact of the age factor on the prevalence of parameters of the digital divide at the regional level.

<sup>1</sup> Source: ITU World Telecommunication Indicators Database. Available at: <https://www.itu.int/en/ITU-D/Statistics/Pages/default.aspx>

### Materials and methods

The research is based on the three-level model of digital inequality, which is widely spread abroad (one of the prominent representatives of this direction is Massimo Ragnedda) and is being developed in Russia (research school of the HSE University – M.Yu. Arkhipova, V.P. Sirotin; Lomonosov Moscow State University – A.A. Gladkova; Kazan Federal University – V.Z. Garifullin; Ulyanovsk State University – A.R. Safiullin, O.A. Moiseeva et al.) (Arkhipova et al., 2018; Gladkova et al., 2019; Safiullin, Moiseeva, 2019). According to the model, the digital divide can manifest itself at three main levels: 1) the level of public access to the Internet and other ICTs; 2) the level of digital competence of users and digital literacy; 3) the level of social benefits that users receive with the competent and full application of digital technologies in professional and private life. In the joint work of one of the founders of the model M. Ragnedda (UK) and scientists from Russia – A.A. Gladkova (Lomonosov Moscow State University) and V.Z. Garifullin (Kazan (Volga region) Federal University) outlined the range of possible indicators to assess each level of inequality (Gladkova et al., 2019), which formed the basis of our study.

To implement the goals and objectives, we used a set of scientific methods, in particular, comparative analysis, statistical analysis, sociological methods. To analyze the results, we applied methods of system-structural and cross-tabulation analysis, to assess the dynamics of gaps – the method of “distance in time”, there is a comparison of all-Russian data with regional data. Theoretical base consists of the scientific works on digital divide issues, its prevalence, assessments methods, determinants.

The object of the study is the Vologda Oblast. The research period in each case is limited by the availability of statistical data.

The information base for the work was the official data of the International Telecommunication

Union, collections of statistics published jointly by Rosstat and the Higher School of Economics: *Digital Economy Indicators*, *Information Society in the Russian Federation*, and *Information Society: Main Characteristics of the Constituent Entities of the Russian Federation*. We also took into account the data of several regional surveys of the population, conducted by Vologda Research Center of the Russian Academy of Sciences:

1. Survey of the Vologda Oblast population in August 2020 (sample size – 1,500 people, the sample is representative, the error does not exceed 5%, the method of conducting – survey at the respondent’s home).

2. Survey of families with children aged 3 to 17 years in the Vologda Oblast in 2018 (sample size – 1,500 people, the sample is representative, the error does not exceed 5%, the method of conducting – survey at the respondent’s home).

3. Survey of the elderly “Quality of life of the elderly” in the Vologda Oblast in 2015, 2018 (sample size – 1,500 people aged 50 years and older, the sample is representative, the error does not exceed 5%, the method of conducting – survey at the respondent’s home).

4. Survey of the Vologda Oblast population “Active ageing and its factors” in 2021 (sample size – 1,500 people aged over 18, the sample is representative, the error does not exceed 5%, the method of conducting – survey at the respondent’s home).

### Findings

The analysis of sources on the digital divide revealed that the authors often consider income level, education level, age, gender, territory of residence, and technical capabilities among its factors. No doubt, these parameters can determine the digital divide in a complex, as they themselves have points of contact with each other. At the same time, they can be considered separately, if during the analysis we take as a hypothesis that the parameter is dominant, which was done in this case.

Modern researchers, when studying digital divides or barriers, in one way or another address the relationship between the age of personal computer and Internet users and the formation and extent of the digital inequality<sup>2</sup> (Volchenko, 2016; Shinyaeva, Slepova, 2019; Robinson et al., 2015; Yates et al., 2015). It has been proven that age affects the use of digital services, particularly financial services (Kuchmaeva, Arkhipova, 2017), consumer behavior online (Gorelova, Serebrovskaya, 2021). The paper (Varlamova, 2022) shows that the dynamics of the intergenerational gap in access to the Internet are quite stable and, in the absence of external shocks, will remain within the existing boundaries in the short term.

Most often, groups of the population fall under the study, taking into account certain socio-demographic characteristics, with age being a fundamental factor: children, young people and the elderly (more often pre- and retirement age, the third – 60 and older, and the fourth – 75 and older age groups). For each group, digital literacy is measured<sup>3</sup> (Smirnykh, 2020; Solomatina, 2020). Sociology, psychology, pedagogy, and demography have studied the impact of early digitalization on health, academic achievement, and addictions (Chassiakos et al., 2016; Donelle et al., 2021; Shakirova, 2017; Shakirova, 2020). A large part of the research field on this issue is occupied by various aspects of the elderly's position in the context of digitalization. The benefits of increasing the inclusion of this age group in the use of digital benefits are considered,

in particular concerning quality of life (through active involvement in modern changing social life, enhanced communication opportunities, including maintaining intergenerational connections) and possible prospects for employment and extension of employment, retraining in older age (Bikkulov, Sergeeva, 2016; Darinskaya, Moskvicheva, 2017; Dmitrieva, 2018; Lelkes, 2013; Anderson, Perrin, 2017; Mitzner et al., 2019).

A number of authors consider computer and Internet use to be an important tool for preserving sustained cognitive function and extending longevity among older people (Charness, Boot, 2009; Berner et al., 2012).

Thus, a review of the literature shows a clear interest in the issue of age in the study of different aspects of digitalization. There is a lot of experience in the study of particular groups of users. However, a general picture of the differences in access to ICT, digital skills, privileges in the use of the Internet by age groups, in particular at the regional level, is not formed, which confirms the relevance of research in this direction.

Turning to the direct influence of the age factor on the prevalence of the digital inequality, we will analyze its characteristics according to a three-level model.

*The first level of inequality.* As a result of analysing the data of Russian sociological observations regarding the practice of using personal computer (PCs) and the Internet, we have revealed a significant age heterogeneity. The World Wide Web is used by almost all teenagers, young people and people of active working age (ranging from 93% to 99% in 2019; *Tab. 1*), and only a small part of older people aged 55 to 74 years. In addition, an important trend worth noting is the significant growth rate of Web usage in older age groups, with an average annual growth rate ranging from 3.7 p.p. for the 45–54 age group to 5.8 p.p. for the 65–74 age group.

<sup>2</sup> The digital divide: What threat does it pose to Russia and what is its scale? Available at: <https://iq.hse.ru/news/465308186.html>

<sup>3</sup> Zhulin A.B., Artamonov R.E., Titov E.A. (2021). Estimation of digital readiness of Russia's population: Report to the 22nd April International Scientific Conference on Problems of Economic and Social Development, Moscow, April 13–30, 2021. Moscow: The Higher School of Economics Publishing House.

Table 1. Practices of using personal computers and the Internet in different age groups (Russia), % of respondents

Age	2016	2017	2018	2019	Changes, 2019 to 2016, p. p.
15–24	98.1	98.2	98.7	99.0	0.9
25–34	96.1	97.2	98.2	98.2	2.1
35–44	91.8	93.9	96.4	96.8	5.0
45–54	79.0	85.7	90.4	92.5	13.5
55–64	57.9	66.8	75.4	78.1	20.2
65–74	32.9	41.7	50.7	56.1	23.2

Applying the “distance in time” method, we can calculate the distance that the generation of current retirees (55–64 and 65–74 years old) must travel to reach the level of digitalization of today’s young people. The maximum value of access to the Internet was recorded in the youngest of the groups surveyed (young people aged 15–24), so it was chosen as the base. We found that at the current rate of growth of Internet access and the absence of external shocks, representatives of the 55–64 age group need 4.2 years to reach the level of digitalization, comparable with the youth cohort; for representatives of 65–74 age group this path will be 7.4 years.

Regional data repeat the national trend, 98% of young people aged 18–30 use the Internet. The least included in various aspects of digital activity are older people. However, the situation is changing. Regular study of lifestyles of the elderly in the Vologda Oblast, due to the particular relevance of this issue, suggests that digital technology is increasingly entering the familiar way of life of this category of the population. We revealed that in the period from 2015 to 2021 the proportion of the

elderly who use the Internet has increased in the region from 36 to 59% (the average annual growth rate is less significant than the Russian average and is 3.3 p.p.; *Tab. 2*). The frequency of use is also increasing, now 20% already get on the net daily, another 25% – several times a week (this is 12 and 11 p.p. more than 6 years ago).

For example, in the Vologda Oblast, it takes 11.7 years for older people over 50 years to reach the same level of Internet accessibility as for young people, if the trends of involvement in the digital space continue.

Despite the different rates of growth in the involvement of the elderly in the average Russian regions and in the Vologda Oblast, there is a trend toward the convergence of generations in the use of digital benefits, which is confirmed in the Russian research. So in the work (Bikkulov, Sergeeva, 2016) on the basis of sociological data obtained in 2015 in Saint Petersburg and two district centers (Gatchina, Chudovo), it is concluded that older people are narrowing the gap with other age groups in the use of the Internet, they actively use it as a source of information and a tool for communication, spend

Table 2. Internet use among the elderly in the Vologda Oblast

	2015	2018	2021	Changes, 2021 to 2015, p. p.
Internet use	36.0	42.2	59.2	+23.2
<i>Frequency of use</i>				
Everyday	8.5	13.4	20.5	+12.0
Several times a week	13.3	15.1	24.1	+10.8
Several times a month or less	9.8	11.1	11.5	+1.7

Source: data from the population survey “Quality of life of the elderly population”, 2015, 2018, “Active aging and its factors”, 2021, VoIRC RAS.

much time at the monitor. “Non-user” worlds are shrinking. Also, the active push of e-commerce development received during the pandemic led to the conclusion of a change in the consumer behavior of the older population. Researchers (Gorelova, Serebrovskaya, 2021) found that the share of online shoppers over the age of 55 increased from 24% in 2019 to 53% in 2020.

Undoubtedly, the reasons for less Internet activity of the older generation are related to several aspects, which are discussed in the article. One of them is the general trust in information technology and assessment of its impact on life. The most engaged groups of the population evaluate them more positively, while negative and ambiguous assessments prevail among older people. However, during the available 5 years of observation the situation is significantly changing among the elderly: the confidence in the Internet is increasing (thus, among the people aged 55 to 64 the proportion of positive assessments increased by 23 p.p., among the people aged 65 to 74— by 24 p.p.; *Tab. 3*). For younger representatives, the changes are not so significant; they are initially characterized by predominantly positive assessments.

*The second level of inequality.* Let us turn to more narrow characteristics, namely the manifestation of Internet activity. The results of sociological research show a significant difference in the purpose of using the Internet in terms of age

groups — all of the options under consideration are significantly more common among young people under 30. The older a person is, the lower is the representation of different types of their activities in the network (*Tab. 4*). People aged over 55 years are 11 times less likely than young people under 30 to download software, use distance learning services, 8 times less likely to play games, 6 times — search for jobs and information of interest, post their opinions on social and political events, 5 times — upload personal information for public access and download something interesting, 4 times — make online purchases, use messengers and seek information for their cultural development and broadening their horizons, etc. Even with regard to the much-popular participation in social media, which is declared to be an effective tool for intergenerational communication and reduction of isolation and loneliness of the elderly, you can see a threefold difference. When comparing young people to middle-aged people, differences are not significant for such purposes of Internet use as participation in social networks (87 and 71%, respectively), conducting financial transactions (44 and 42%), using e-mail (41 and 37%), and buying and selling goods (32 and 29%). Vologda residents aged 30–55 are noticeably less frequently than young people to use the Internet to download software, movies, music, video or computer games, and distance education.

Table 3. Assessment of the impact of information technology and information and communication networks on the lives of people in different age groups (Russia), % of the total population of the relevant age groups

Age	Positively			Ambiguously			Negatively			Nothing has changes		
	2015	2018	2019	2015	2018	2019	2015	2018	2019	2015	2018	2019
15–24	90.6	95.9	94.9	3.6	2.3	2.2	0.3	0.1	0.2	2.3	0.9	1.0
25–34	85.5	92.8	92.1	6.2	4.2	4.6	0.6	0.2	0.3	3.8	1.7	1.5
35–44	76.5	88.7	88.2	10.4	6.6	7.0	1.3	0.5	0.5	5.3	2.5	2.1
45–54	64.1	81.2	82.0	13.3	9.8	9.9	2.5	1.1	1.1	10.0	4.5	3.4
55–64	46.4	67.3	69.4	16.0	14.5	14.4	4.7	2.3	2.2	15.7	9.4	7.2
65–74	29.0	48.9	52.9	16.3	19.0	18.1	8.2	4.8	4.3	21.0	15.0	12.5

The sum of the answers is less than 100%, as there was an option “Hesitate to respond”.  
Source: Information Society in the Russian Federation. 2020: Stat. collection.

Table 4. Purposes for using the Internet (Vologda Oblast), % of respondents

Respond option	Under the age of 30	Aged 30–55 years	Over the age of 55
Social networks	87.1	71.3	31.9
Search for information about products and services	56.9	48.4	17.1
Phone or video calls (e.g. via Skype)	66.4	48.6	25.2
Downloading movies, pictures, music; watching videos; listening to music or the radio	66.8	38.8	14.5
Sending or receiving e-mails	41.4	37.4	11.1
Obtaining knowledge and references on any topic using Wikipedia, online encyclopedias, etc.	32.3	24.4	10.1
Making financial transactions	44.0	41.5	18.9
Search for information related to health or health care services	23.7	21.5	12.3
Upload personal files (books/articles/magazines, photos, music, videos, programs and other content) to websites, social networks, cloud storage for public access	31.9	22.8	6.3
Video or computer games / mobile games or downloading them	37.9	24.0	4.6
Sale/purchase of goods and services (including through auction sites)	31.5	27.8	7.2
Reading online or downloading newspapers or magazines, e-books	22.4	15.8	7.2
Communication via instant messaging systems (chats, ICQ, QIP, etc.)	23.7	14.6	6.2
Search for information about cultural heritage objects and cultural events, take virtual tours of museums and galleries, etc.	12.9	11.6	3.0
Search for information about education, courses, trainings, etc.	22.4	15.4	3.7
Search for jobs	25.0	14.3	4.1
Downloading software (except computer games)	15.1	7.7	1.2
Participating in online voting or consultations on social and political issues	8.2	5.6	2.5
Distance learning	24.6	11.8	2.1
Participation in professional networks (e.g. LinkedIn, Xing, E-xecutive.ru, etc.)	3.4	2.3	1.1
Publication of opinions on social and political issues through websites, participation in forums	3.0	2.6	0.5
Other	0.4	1.1	1.6

Source: data of a population survey conducted in August 2020, VoIRC RAS.

Next, we turn to the analysis of digital skills. It is logical to assume that they will be determined by the respondents' education and the time when it was acquired. Conventionally, if the representatives of today's older people received their education at a time when there were no computers, telephones, and modern means of communication, then the representatives of the middle age were more immersed in this environment, not to mention young people. But it is worth clarifying that we are mainly talking about skills formed at the household level (the use of ICT for personal purposes) and often used by service sector employees, public sector workers and other professionals who spend their working time at a computer, applying certain skills on a daily

basis. In this case, the trend described above repeats itself: young people have more developed digital skills than older people. It is worth clarifying that we are not talking about the sufficiency of skills for certain purposes, as this requires additional study and theoretical and methodological elaboration. The goal is only to determine the scale of the differences. Thus, most significantly older people lag behind young people in special narrowly focused skills, which is due as well to the difference in education. However, they are much less likely to have skills that are common to most of the population: working with spreadsheets, connecting new devices (4 times; *Tab. 5*), transferring files from external devices to the computer, copying information inside files

Table 5. Digital skills among the Vologda Oblast population, %

Skill	Under the age of 30	Aged 30–55	Over the age of 55
Using a text editor	83.2	72.5	37.0
Sending an e-mail with attached file(s)	84.1	71.3	33.9
Copying or moving a file or folder	81.0	69.3	33.2
File transfer between a computer and peripheral devices (digital camera, player, cell phone)	80.6	68.2	30.0
Using the copy and paste tool to duplicate or move information in a document	77.6	60.8	25.4
Using photo, video, and audio editing software	70.7	58.3	20.8
Working with spreadsheets	69.4	52.8	17.1
Connecting and installing new devices	64.7	50.8	16.2
Creation of electronic presentations using special programs	57.8	44.4	11.8
Changing the parameters or configuration settings of the software	49.1	33.8	9.7
Installing a new or reinstalling the operating system	42.2	30.5	8.8
Writing software using programming languages	36.6	24.4	7.2
Source: data of a population survey conducted in August 2020, VoIRC RAS.			

and editing photo, video and audio files (3 times), working with a text editor, copying files and folders, sending e-mail with an attached file (2 times). As found earlier, when comparing goals for Internet use, the differences between seniors and middle-aged people are mostly erased by specialized skills, in other cases the gap is closer to the differences with young people.

The revealed age differences in using the Internet and having the skills are also confirmed by the reasons for not using the Internet. For young people, all of the suggested reasons were not as pronounced as for older people. Almost 42% of people aged over 55 have no need to use the Internet, another 27% refuse due to lack of skills, 5% are concerned about security and privacy issues on the Internet, while young people are almost not concerned about this topic.

*The third level of inequality.* Speaking about the level of social benefits that users receive with the competent and full application of digital technology in professional and private life, most researchers refer to the most popular topic in everyday life – receiving state and municipal services online (Khvatov, Vatoropin, 2017; Ershova, 2018; Dobrinskaya, Martynenko, 2019).

The authorities are also interested in studying the demand for digitalization of this interaction area between society and the state. For example, the federal project “Digital public administration” of the national program “Digital Economy of the Russian Federation”<sup>4</sup> involves comprehensive digitalization and using the Internet to solve most of the life situations of Russians. This, in turn, implies a certain willingness and ability of the population to be involved in these processes. Age profile of ways to receive various services revealed the following picture: young people under 30 prefer to receive almost all services through the Internet (for the most part using the “Gosuslugi” portal), the only difference lies in respect of social services related to pensions, benefits, allowances, which is rather due to their low accessibility for this age group (*Tab. 6*). Speaking about other surveyed population groups by age (30 years and older), it is worth noting that they are more used to receiving services directly by visiting the office. If for people aged 30–55 for a number of popular services (such as health services, addressing issues related to housing, utilities,

<sup>4</sup> Official website of the Ministry of Digital Development, Communications and Mass Media of the Russian Federation. Available at: <https://digital.gov.ru/ru/activity/directions/858/>

transportation, driving, receiving benefits) are in equal demand both online and offline forms, for the population of preretirement and retirement age for all categories of services used prevails personal application for a service without the use of the Internet, state and municipal portals.

The next important question in the study of Internet activity is what bonuses and privileges are received by users of digital services. We have analyzed what benefits people of different ages see when using the Internet for themselves and their relatives/friends. As before, the differences were significant: while 59% of young people and 47% of middle-aged people note the benefits of the Internet, for older people it is not so obvious (the proportion of responses is only 24%). There were also twice as many among the elderly who answered that there

were generally no positive effects compared to the young (14% vs. 7%). Of course, about a quarter of all age groups surveyed were pragmatic and said they were receiving some harm in addition to the benefits. Speaking of specific and measurable benefits from using the World Wide Web, it is worth noting that about half of those surveyed of all ages have not yet managed to earn or save money/time while using the Internet. However, among young and middle-aged people approximately equally common are practices using the Internet, including remote employment (21% each), examples of selling or exchanging things on Internet resources (16% each), making profitable purchases (33% for young and 24% for middle-aged people), saving time by using online services, deliveries, and so on (21 and 23%, respectively; *Tab. 7*).

Table 6. Distribution of responses to the question "Have you applied for the following categories of services in the last 12 months, and in what form?" (Vologda Oblast, ranked by the share of online applications), % of respondents

Service category	Under the age of 30		Aged 30–55		Over the age of 55	
	Applied online	Applied in person	Applied online	Applied in person	Applied online	Applied in person
Health services (medical appointments, disability confirmation)	22.8	18.5	22.1	22.0	9.5	28.9
Apartment, construction and land (payment of utilities, building permits, redevelopment, property registration, etc.)	20.3	10.3	20.0	17.3	8.1	20.3
Transportation and driving (car registration, driver's license, fines, etc.)	18.1	7.3	13.6	12.6	2.5	7.4
Pensions, benefits and allowances	9.1	11.6	13.7	13.3	4.8	25.2
Taxes and finances (debts, declarations, etc.)	9.9	6.5	12.6	16.1	4.8	10.4
Family and children (civil registration, maternity capital)	10.8	6.5	11.1	10.1	0.5	1.8
Passports, registrations, visas	13.8	11.6	8.7	8	0.9	3.5
Education (application for an educational organization, kindergarten queue)	11.6	5.2	7.7	7.0	0.5	2.1
Work and employment (unemployment registration, unemployment benefits)	4.7	4.3	4.4	4.4	1.2	1.2
Licenses, certificates, accreditations (for weapons, hunting, certificates of the Ministry of Internal Affairs, etc.)	7.3	3.4	2.6	5.4	0.9	2.6
Business, entrepreneurship, non-profit organizations (registration of legal entities)	3.0	0.9	3.6	2.7	0.5	1.1

Source: data from a population survey conducted in August 2020, VoIRC RAS.

Table 7. Distribution of responses to the question “Have you ever managed to earn or save money and time with the help of the Internet?” (Vologda Oblast), % of the number of respondents

Respond options	Under the age of 30	Aged 30–55 years	Over the age of 55
No, I have not managed to earn and/or save money and time while using the Internet	45.3	46.6	56.1
Yes, I work(ed) using the Internet	21.6	21.1	5.3
Yes, I have successfully sold/exchanged my stuff using online resources	16.4	16.7	3.9
Yes, I have made profitable purchases on the Internet	33.2	23.7	6.3
Yes, with the help of the Internet I saved my time (received state and municipal services online, ordered home delivery, etc.)	21.1	23.4	7.2
Other	0.9	0.6	0.7
Source: data from a population survey conducted in August 2020, VolIRC RAS.			

For people of retirement and pre-retirement age, all of the above practices are not popular and account for less than 10% of responses each.

As part of the study of the age factor contributing to the digital divide, the younger and older age groups are of research interest. The former are viewed from the perspective of early initiation into gadgets and the Internet, threats to health, barriers and drivers of learning and educational achievement, the latter from the perspective of greater exclusion from digitalization processes, less competitive advantage to occupy new digital jobs, and new perspectives on intergenerational communication using new technologies.

This issue was also studied at the regional level. Thus, within the framework of the research project on the formation of human potential of children, it was found that modern children join the use of gadgets and the Internet much earlier (in 2018 among preschoolers the average age of beginning to use 3.6 years; younger students – 6 years; teenagers 11–14 years – 7.6 years; high school students – 9.2 years). For high school students, digital skills for the most part have a positive impact on school performance (modern requirements for the school curriculum involve active use of ICT), while for representatives of the junior school the opposite is true (Shabunova, Korolenko, 2019). In our opinion, this is determined by two main

factors: the age of initiation and organization of the child’s use of the World Wide Web on their own (self-discipline) and parental control (direct and through the implementation of alternative types of joint activities/leisure time). The results of Russian surveys also show that the main purposes for children<sup>5</sup> to use the Internet are equally entertainment (79%) and preparation for lessons, school projects (79%), 54% is communication in social networks, a little less than 4% is distance education. The phenomenon of people born after the digital revolution and got used to receive information through digital channels is also of research interest in contemporary scientific discourse. So-called “digital natives” are endowed with attributes of high technological giftedness, orientation to multitasking, fast information processing, preference for hypertexts, greater efficiency when working online than offline, calling for large-scale institutional restructuring (for the most part the education system) (Ershova, 2019). However, the results of research show the overestimation of the named characteristics of the new generation, many negative consequences of greater inclusion of children in the digital environment and call for careful (and not radical) changes in the social structure.

<sup>5</sup> Information Society in the Russian Federation. 2018, 2019: Stat. collection. The data for 2018 are used.

## Discussion

The study made it possible to draw a number of conclusions consonant with the previously obtained results of Russian and foreign studies. In turn, the work contributes to the understanding of the regional picture of digital gaps associated with age.

So, at the present stage, the age factor influences the spread of digital inequality, this trend exists both within the country and within the region. Digital divide manifests itself depending on age at all levels according to a three-level model developed in modern studies: the practices of PC and Internet use, assessment of their impact on human life, the purpose of using the Internet, the availability of digital skills and the use of public and municipal services online.

The digital activity of the elderly differs in comparison with both the youngest of the surveyed groups (18–30 years old) and the middle-aged people, especially on the parameters that require special knowledge and effort to learn and master in practice. Using the “distance in time” method, we revealed how long it will take older people to reach the same level of Internet use as young people. On average in Russia, these figures are 4.2 years for young retirees aged 55–64, and 7.4 years for people aged 65–74. In the Vologda Oblast the intergenerational gap is more pronounced; it will take an average of 11.7 years to eliminate it. This scenario is possible in the absence of external shocks and preservation of the existing growth rates.

Obviously, the age differentiation of digital gaps is determined by the age of exposure to ICTs, the need to use digital skills in the workplace, personal motivation, and trust in technology. In the near future, gaps in access to the Internet will persist.

The conclusions are largely congruent with the results of the studies analyzed as part of the literature review. The main link is the evidence of greater involvement of young people and people of working age in the use of ICTs, the successful practices of benefiting from this, which is dictated by global

trends in the digitalization of the economy and social sphere, the current socio-economic situation in the world and the country, the requirements of new jobs and fundamentally new formats of employment. The other side is the greater exclusion from digitalization and the vulnerable position of the elderly, which is also due to a number of objective reasons (later inclusion, different requirements for the organization of work, lack of motivation and necessary knowledge, mistrust and apprehension). At the same time, if just over 10 years ago researchers did not believe that the digital gap between the young and the old could be completely eliminated (in general, their predictions have come true, as over the years inequality has only increased due to the high activity of young people) (Darinskaya, Moskvicheva, 2017), now the dynamics of Internet connectivity in all areas of human activity already allows speaking about the refraction of this trend (Chassiakos et al., 2016; Gorelova, Serebrovskaya, 2018; Gruzdeva, 2020).

## Conclusion

In the context of increasingly early exposure of children to ICTs, increasing life expectancy, the trend toward digitalization of the economy, social sphere and public administration in the foreseeable future, the entire population will somehow need the opportunity to use at least the Internet, so as not to be excluded from most social processes. In this case we will be able not just to talk about the overall level of the digital divide, but differentiate it at various levels (e.g., basic, user, and professional) for a new understanding of the influence of different factors. This idea requires significant elaboration of the theoretical and methodological framework and constant monitoring of emerging trends in digital development, changes in the regulatory framework, the level of economic and social inequalities among the population, strategic goals in this direction.

The formation of digital equality requires efforts on the part of society (motivation, special skills, etc.), as well as the state, business and non-profit

organizations (training of the population, creation of convenient and accessible online services, etc.). The results of the study are of practical value for the above subjects, in addition, they can be used as part of teaching in higher education, to determine the risk of exclusion from the processes of digital development, formulating the relevance of social programs to retrain the working population for the requirements of new jobs, training older people in digital skills, for management decisions, development of strategic programs by regional and federal authorities, including in as part of the national program “Digital Economy of the Russian Federation”.

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