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## DIGITAL COMPETENCIES OF THE POPULATION AS A FACTOR IN THE FORMATION OF DIGITAL HUMAN CAPITAL IN KAZAKHSTAN

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As the title implies the article describes the processes of digital transformation of society that led to changes in the manifestation and development of human capital. The digital literacy as a whole, and its digital competences precisely, has come to the fore. This article is concerned with analyzing the digital competencies of the population of Kazakhstan as a factor in the development and formation of digital human capital in the country. The study is initiated based on the competence approach to the research of digital literacy of the population using the basis of comparative analysis of economic-statistical data. The information base of the research was the data of the Bureau of National Statistics of the Strategic Planning Agency for 2018 and 2021. The results of the analysis show that Kazakhstan has a very high level of digital literacy and the highest level of computer literacy. The most developed among Kazakhstanis are communicative competences, followed by information and media competences. In Kazakhstan, digital competences contribute to the formation and development of digital human capital, and different stages of formation and development of digital human capital in Kazakhstan are observed in the regions of the Republic. Thus, it is most developed in the cities of Nur-Sultan and Almaty, and least developed in the regions of Western and Southern Kazakhstan. The practical value of the work lies in the fact that the conclusions of the study may be of interest to a range of people engaged in scientific and practical study of the development of digital human capital

## ЦИФРОВІ КОМПЕТЕНЦІЇ НАСЕЛЕННЯ ЯК ФАКТОР ФОРМУВАННЯ ЦИФРОВОГО ЛЮДСЬКОГО КАПІТАЛУ В КАЗАХСТАНІ

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### Ключові слова:

цифрова економіка,  
людський капітал,  
цифровий людський капітал,  
цифрова компетентність,  
цифрова грамотність,  
цифровізація,  
компетентнісний підхід

Відповідно до назви, стаття описує процеси цифрової трансформації суспільства, які призвели до змін у прояві та розвитку людського капіталу. На перший план вийшла цифрова грамотність загалом та її цифрові компетенції зокрема. Стаття присвячена аналізу цифрових компетенцій населення Казахстану як фактору розвитку та формування цифрового людського капіталу в країні. Дослідження ініційовано на основі компетентнісного підходу до вивчення цифрової грамотності населення на основі порівняльного аналізу економіко-статистичних даних. Інформаційною базою дослідження стали дані Бюро національної статистики Агентства стратегічного планування за 2018 та 2021 роки. Результати аналізу показують, що Казахстан має дуже високий рівень цифрової грамотності та найвищий рівень комп'ютерної грамотності. Найбільш розвиненими серед казахстанців є комунікативні компетенції, за ними йдуть інформаційні та медіа-компетенції. У Казахстані цифрові компетенції сприяють формуванню та розвитку цифрового людського капіталу, а в регіонах республіки спостерігаються різні етапи формування та розвитку цифрового людського капіталу в Казахстані. Так, найбільш розвинений він у містах Нур-Султан і Алмати, а найменш розвинений в регіонах Західного і Південного Казахстану. Практична цінність роботи полягає в тому, що висновки дослідження можуть становити інтерес для кола осіб, які займаються науковим і практичним вивченням розвитку цифрового людського капіталу.

## Literature review

Initially, in accordance with the works of T. Schultz, «human capital» was defined as valuable qualities acquired by a person, which can be multiplied by appropriate investments (Schultz, 1971). Nowadays, the definition of human capital has expanded. It consists of a wide range of personal skills, qualities, value orientations, indirectly influencing the results of industrial activity (Veshkurova et al., 2021). An important qualitative characteristic of human capital is professional competence, the increase of which indicates the development of human capital (Evgrafova, 2019). With the processes of digital transformation of society there have been changes in the formation and development of human capital. The digital literacy of the population, namely its digital competences came to the fore. The concept of «digital human capital» (Grimpe et al., 2022), the basis of which is digital inclusion, which requires access to technology and basic computer literacy (Bach et al., 2013), has been widely developed. Digital human capital is defined as «the relevant stock of knowledge, skills, and abilities that are realized in the labor market and are associated with the intensive use of ICT in the process of creating customer value» (Alekseev et al., 2019). At the organizational level, the digital human capital model is a concept of human resource development based on digital capabilities in performing their duties and functions to achieve organizational goals. In doing so, digital human development begins with the digital human process, which begins with finding people with digital capabilities, i. e., having digital competencies (Yahya & Adnan, 2022).

Much attention is given to the fact that digital competence has been identified by the European Commission as one of the eight core competences for lifelong learning (Carretero Gomez, 2017). In accordance with the European Commission's classification, digital literacy is one of the three main categories of digital skills and competencies, along with specialized digital skills for certain professions and digital skills for ICT professionals. Digital literacy includes a number of basic digital skills covering information and data skills, online communication and interaction, digital content creation, security, and problem solving (Brolpito, 2019). According to Gilster (1997), digital competence refers to «the ability to understand and use information provided in various forms using an electronic computing machine,» expressed in the following skills: media competence, information competence, and communication competence. Many factors influence the formation and development of digital competencies in the population, including gender, age, and level of education (Neagu, 2022; Guillén-Gámez, 2021).

Therefore, professional competence is an important qualitative characteristic of human capital. At the same time, the increase in professional competence indicates the development of human capital. With the processes of digital transformation of the economy and society, digital competence of the population has come to the fore, which in turn is the basis for the formation and development of digital human capital.

## Materials and methods

The conceptual framework of the study was the provisions of the theory of human capital, in particular used the competence approach of digital literacy on the basis of economic-statistical and comparative analysis. The information base of the study was statistical data on digital literacy of the Bureau of National Statistics of the Strategic Planning Agency for 2018 and 2021. Microsoft Excel software was used to process the statistical data.

The hypothesis of the study was as follows: the digital competencies of the population of Kazakhstan have a high level of development and contribute to the formation of digital human capital in the country.

In order to determine the level of development of digital competence, it is proposed to present the indicators of digital and computer literacy in the form of a numerical scale (Table 1).

Table 1 – Numerical scale of digital and computer literacy indicators and their interpretation

№	Value	Description
1	90–100	The highest level
2	80–90	Very high level
3	70–80	High level
4	60–70	Above average
5	50–60	Average level
6	40–50	Below average level
7	30–40	Satisfactory level
8	20–30	Low level
9	10–20	Very low level
10	0–10	Unsatisfactory level

Source: Alibekova et al., 2018

It is worth noting that there are no indicators describing media competence («ability to perceive information expressed in various semiotic systems»), information competence («skills to find necessary information and tools to work with it, ability to quickly master these tools») and communicative competence («skills to communicate with other users») in Kazakhstan. In this regard, the following statistical indicators were used to describe the relevant competences:

1) information competencies: «using software to work over the Internet, to edit text documents, tables or presentations», «getting information about goods and services»;

2) communicative competencies: «posting or instant messaging», «participation in social networks», «sending and receiving e-mail», «telephone conversations via the Internet/VoIP»;

3) media competencies: «access to chat rooms, blogs, news and online discussions,» «read or download online newspapers or magazines, e-books».

## Results and discussion

In order to develop digital competence in Kazakhstan in the period 2018–2022, the State program «Digital Kazakhstan» is being implemented, one of the directions of which is the development of human capital. The level of digital literacy of the population is one of twelve target indicators, which by

the end of 2022 should reach 83%. It should be noted that according to 2021, the level of digital literacy in Kazakhstan was 87.3%, i. e., the plan was fulfilled ahead of schedule. At the same time, the pandemic contributed to the growth of digital literacy in the country (Figure 1).

In 2018 it can be noted that the level of development of digital literacy in Kazakhstan was high, starting from 2019 it is very high. At the same time, there are no significant regional differences in the level of digital literacy of the population of Kazakhstan (Table 2).

The margins that illustrated the highest level of digital literacy are observed in the population of Nur-Sultan (94.7%), Almaty city (91.5%) and Almaty region (91.0%). Compared to 2018, the digital literacy of the population in these regions has increased. Several prerequisites contribute to this. Firstly, the digital infrastructure is developed in the cities of the republic, secondly, the amount of funding for the development of digital competence is sufficient, and thirdly, most of the educational institutions that promote digital competence are located in these cities. In addition, public and private support for the development of digital competence is more developed in developed cities. It should be noted that the development of digital competences in urban areas is higher than in rural areas. In recent years, in these regions, the digital competences of the population have increased, largely due to the mass transition of education from the traditional format to the online format, especially because of the pandemic. Teachers and other workers have been forced to increase their digital competence in order not to interrupt the learning process. Research confirms that online learning during the pandemic increased the digital competence of the population.

The positive trend of this indicator is also observed in other regions. The low value of digital literacy in the West-Kazakhstan region (79.2%). At the same time, the highest level of computer literacy in the country – 93.9% in 2021, which is higher by 6.5 percentage points (p. p.) compared to 2018, most of them (64.7%) are ordinary users. Digital infrastructure is poorly developed in the West-Kazakhstan region, with limited access to the Internet. Moreover, the low computer literacy of this region can be associated with a low standard of living. The North-Kazakhstan region can also be attributed to such regions.

The highest value of this indicator is in the Kyzylorda region (99.4%) and the cities of Nur-Sultan (98.0%) and Almaty (96.3%), the lowest – in the North-Kazakhstan region (86.1%). Digital competence requires the population to have digital gadgets. In regions where the

income of the population is low and the infrastructure is poorly developed, digital competence will be low as well.

At the same time, there are significant regional differences in the context of specific digital competencies. It should also be noted that in 2021, compared with 2018, there is a decrease in most of the indicators characterizing the digital competencies of the population of Kazakhstan, with the exception of telephone conversations over the Internet, the value of which increased by 3.2 p. p. Significant decrease in the indicator for posting information or instant messaging – by 6.9 p. p.

The most developed among Kazakhstan citizens are communicative competences, then informational and media competences. Communication competences, information and media competences are related to the development of social networks, such as Facebook, Instagram, TikTok. In recent years, the activity of media personalities or bloggers has increased in Kazakhstan, which in turn can increase these competencies among the population. It should be noted that the number of bloggers has increased, because as earnings on online platforms are many times higher than the earnings of traditional specifications, in connection with this population seeks to find its niche in the online space. Social networks have helped to increase the digital competence of the population, especially through various online sales workshops, SMM targeting, online consultations, online advertising, etc.

According to the indicators under consideration, the population of Nur-Sultan and Almaty, especially in Almaty, the level of digital competencies is higher compared to other regions, while the population of the regions of Western and Southern Kazakhstan is largely characterized by low digital competencies.

Thus, the digital and computer literacy of the population of Kazakhstan is at a very high level. However, there are regional disparities in the development of individual digital competencies, as well as a decline in most indicators of digital competencies, with a mixed trend across regions. The pandemic has contributed to an increase in digital and computer literacy in the republic. In connection with the increase in digital and computer literacy, we can talk about the development of digital human capital in Kazakhstan, and the different level of development of individual digital competencies in the regions of the country indicates the different stages of formation and development of digital human capital in Kazakhstan. Therefore, it is most developed in Nur-Sultan and Almaty, and least developed in the regions of Western and Southern Kazakhstan.

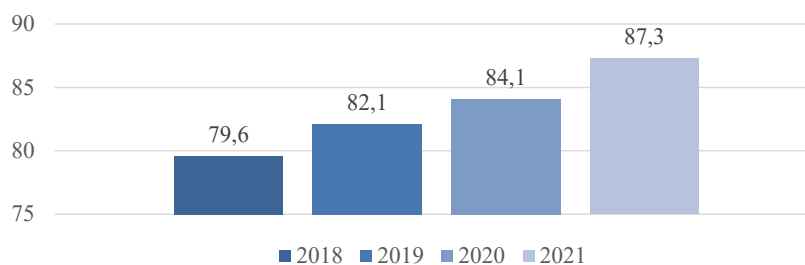


Fig. 1 – The level of digital literacy in Kazakhstan, 2018–2022

Source: compiled by the authors

Table 2 – Digital competencies of the population in the regions of the Republic of Kazakhstan, 2018 and 2021, % of the population

Region	Digital Literacy by age in the context of regions (ages 6–74)		Level of computer literacy (ages 6–74)		Information competencies				Communicative competencies				Media Competencies							
	2018		2021		Using software to work over the Internet to edit text documents, spreadsheets, or presentations		Getting information about products and services		Posting or instant messaging		Participation in social networks		Sending and receiving email		Telephone conversations via the Internet / VoIP		Access to chat rooms, blogs, news, and online discussions		Reading or downloading online newspapers or magazines, e-books	
	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021	2018	2021
Republic of Kazakhstan	79.6	87.3	87.4	93.9	4.7	3.8	36.8	36.9	75.4	68.5	69.7	65.5	32.6	30.2	19.6	22.8	25.9	26.0	12.1	11.8
Akmola region	68.9	81.5	75.6	87.6	3.8	5.1	36.1	35.6	83.6	84.5	84.3	76.6	41.8	41.2	34.6	30.5	32.6	20.2	25.4	20.4
Aktobe region	78.0	86.8	87.1	95.8	1.6	0.7	43.3	34.9	80.6	73.4	81.5	74.0	44.1	37.4	31.9	30.6	34.0	29.9	12.7	12.8
Almaty region	86.7	91.0	90.0	94.6	7.9	4.2	47.7	46.4	69.8	46.1	54.2	47.8	34.1	24.7	13.1	25.5	24.1	28.7	7.4	2.1
Atyrau region	81.2	85.2	81.3	88.0	2.3	0.4	36.2	16.0	86.4	79.7	83.1	79.6	38.8	29.5	12.2	13.6	27.8	21.1	17.8	4.6
West Kazakhstan	76.4	79.2	94.5	95.3	18.9	1.8	39.7	37.4	86.6	50.9	74.3	50.9	33.8	28.0	23.8	22.6	42.3	20.2	14.9	10.4
Zhambyl region	78.2	85.8	86.5	94.2	2.1	0.5	23.2	10.4	71.5	60.5	74.1	55.5	24.0	11.0	16.3	17.0	25.9	9.4	7.9	4.9
Karaganda region	70.6	83.3	85.2	96.6	8.4	11.3	53.9	62.1	87.2	86.8	82.5	83.2	53.7	58.5	36.3	40.9	33.4	42.8	23.3	47.8
Kostanay region	80.8	90.8	82.1	90.6	4.0	2.3	44.5	38.4	78.9	77.1	76.1	80.0	32.5	35.8	26.1	33.6	17.9	23.6	13.7	16.7
Kyzylorda region	78.6	89.3	91.9	99.4	4.5	1.4	24.5	21.1	59.4	44.7	68.4	41.4	19.6	16.2	14.1	13.2	18.1	19.1	9.3	2.9
Mangistau region	78.1	84.9	93.2	95.5	1.9	0.4	23.6	9.7	79.1	75.3	75.1	69.2	24.1	17.9	22.5	20.5	37.4	32.9	5.8	1.5
Pavlodar region	79.6	85.1	85.5	92.9	2.4	5.5	47.4	42.1	77.9	81.8	78.9	74.1	31.1	24.2	19.1	21.5	30.0	35.1	11.3	12.3
North Kazakhstan	74.8	80.2	80.9	86.1	2.5	7.1	33.0	38.5	83.9	88.7	85.0	81.3	36.2	31.3	26.9	19.8	31.3	22.9	12.6	19.7
Turkistan region	76.9	87.2	88.4	95.6	0.5	4.9	24.7	41.1	67.1	76.7	69.4	67.8	25.2	34.5	13.0	24.5	25.5	36.9	7.6	9.0
East Kazakhstan	77.8	84.7	81.9	89.5	1.6	1.5	36.5	29.9	71.7	64.3	50.1	50.6	19.1	22.5	13.3	9.9	19.0	14.1	6.5	6.7
Nur-Sultan	85.4	94.7	94.8	98.0	4.4	5.4	26.5	28.3	78.9	61.2	64.2	62.0	51.8	24.7	13.9	17.6	24.8	21.2	23.7	9.7
Almaty	87.2	91.5	92.9	96.3	7.7	4.7	49.7	53.4	69.4	70.2	58.0	73.9	35.8	44.1	20.7	22.7	22.1	27.0	11.8	13.6
Shymkent	80.8	87.5	85.0	90.0	1.2	0.9	15.0	28.6	81.6	65.2	83.6	62.4	9.2	8.3	14.1	13.1	16.4	17.2	6.0	3.0

Source: compiled based on sources (Bureau of National Statistics. 2018; 2021)

## Conclusion

The hypothesis of the study has been confirmed. Based on the results of the analysis, we can conclude that the digital competencies of the population of Kazakhstan have a very high level of development and contribute to the formation of digital human capital in the country.

The following results were obtained in the course of the study.

Firstly, professional competence is an important qualitative characteristic of human capital, with the increase of which human capital develops. The digital competence of the population has come to the forefront in the digital economy, which is the basis for the formation and development of digital human capital.

Secondly, in 2018 the level of development of digital literacy in Kazakhstan was high, starting from 2019 it is very high. The country has the highest level of computer literacy. The pandemic contributed to the growth of digital and computer literacy in the country. There are no significant regional differences in the level of digital and computer literacy of the population of Kazakhstan. At the same time, the development of digital competences in the regions of

Kazakhstan is characterized by unevenness and the presence of disproportions, as well as a decrease in the values of the indicators characterizing them for the period under review.

Thirdly, communicative competences are the most developed among Kazakhstanis, followed by information and media competences. The increase in digital and computer literacy indicates the development of digital human capital in Kazakhstan, while the different level of development of individual digital competencies in the regions of the country indicates the different stages of formation and development of digital human capital in Kazakhstan. Thus, it is most developed in Nur-Sultan and Almaty, and least developed in the regions of Western and Southern Kazakhstan.

This study can become the basis for future research in the field of digital human capital, in particular digital competences as an important factor in the formation and development of human capital, considering the processes of digital transformation of the economy and society. The conclusions of the study may be of interest to those involved in scientific and practical work on the development of digital human capital.

## References

- Galindo-Domínguez H., Bezanilla M.J. (2021). Digital competence in the training of pre-service teachers: Perceptions of students in the degrees of early childhood education and primary education. *Journal of Digital Learning in Teacher Education*. Vol. 37 (4). P. 262–278.
- Heponiemi T., Kaihlanen A.-M., Kouvonon A., Leemann L., Taipale S., Gluschkoff K. (2022). The role of age and digital competence on the use of online health and social care services: A cross-sectional population-based survey. *Digital health*. DOI: 10.1177/20552076221074485
- Jiménez-Hernández D., González-Calatayud V., Torres-Soto A., Martínez Mayoral A., Morales J. (2020). Digital competence of future secondary school teachers: differences according to gender, age, and branch of knowledge. *Sustainability*. Vol. 12. P. 9473. DOI: 10.3390/su12229473
- Decree of the Government of the Republic of Kazakhstan. On Approval of the State Program «Digital Kazakhstan»: Approved. December 12, 2017. No. 827.
- Merzlyakova E.A. (2019). Transformation of Human Capital in the Digital Economy. *RSEU*. Vol. 4 (47). P. 166–171.
- Khizhak N.P. (2020). Competences of human capital as a factor of spatial development in the digital economy. Spatial development of territories: Collection of scientific papers of the III International Scientific and Practical Conference (Belgorod, November 26-27, 2020) / Edited by E.A. Stryabkova, A.M. Kulik. Belgorod : Belgorod State National Research University. P. 192–196.
- Bureau of National Statistics. State Program “Digital Kazakhstan – 2020”. URL: <https://stat.gov.kz/api/getFile/?docId=ESTAT241372> (date of access 6.05.2022).
- Schultz T. Investments in Human. Investment in human capital. The role of education and of research. New York, NY : Free Press.
- Veshkurova A., Kopylova N., Aleksashina T., Alyamkina E. (2021). The role of human capital in ensuring the digital transformation of Russian companies. *Current Problems of Social and Labor Relations (ISPC-CPSLR 2021) : proceedings of the IX International Scientific and Practical Conference*. 646 p. P. 405–410 p.
- Evgrafova O.V. (2019). Human capital of digital economy: qualitative analysis. *Science and education: economy and economy; entrepreneurship; law and management*. Vol. 8 (111). P. 35–38.
- Grimpe C., Sofka W., Kaiser U. Competing for digital human capital: The retention effect of digital expertise in MNC subsidiaries. *J Int Bus Stud*. DOI: 10.1057/s41267-021-00493-4-2022
- Bach A., Shaffer G., Wolfson T. (2017). Digital human capital: developing a framework for understanding the economic impact of digital exclusion in low-income communities. *Journal of information policy*. Vol. 3. P. 247–266.
- Alekseev A.N., Bogoviz A.V., Lobo S.V., Ragulina J.V. (2019). The cost and value of human capital in the modern digital economy. The Future of the Global Financial System: Downfall or Harmony. “Lecture Notes in Networks and Systems”. Cham : Switzerland : Springer Nature. P. 1224–1230.
- Yahya A., Adnan. (2022). Digital Human: Human Capital Development Formulation to Achieve Excellence Industrial Competitiveness. *Sci Res Jr Eco Bus Mgn*. Vol. 2 (1). P. 1–6.
- Carretero Gomez S., Vuorikari R., Punie Y. (2017). DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use. Luxembourg: Publications Office of the European Union. DOI: 10.2760/38842 (online), 10.2760/836968 (print), 10.2760/00963 (ePub).

16. Brolpito A. (2019). Digital skills and competence, digital and online learning. Turin : European Foundation for Education.
17. Gilster P. (1997). Digital Literacy. New York, NY : Wiley.
18. Neagu G. (2022). Understanding the implications of digital competence for the education process in Romania. A literature review. In: Tomczyk, Ł., Fedeli, L. (eds) Digital literacy for teachers. *Lecture notes in educational technology*. Springer, Singapore. DOI: 10.1007/978-981-19-1738-7\_21
19. Guillén-Gámez F.D., Mayorga-Fernández M.J., Bravo-Agapito J. et al. (2021). Analysis of teachers' pedagogical digital competence: identification of factors predicting their acquisition. *Tech Know Learn*. Vol. 26. P. 481–498. DOI: 10.1007/s10758-019-09432-7
20. Alibekova G., Panzabekova A., Satpayeva Z., Abilkayir N. (2018). Sustainable development issues of Almaty as the largest metropolis in Central Asia. *IOP Conf. Series: Earth and Environmental Science*. Vol. 177. P. 012010. DOI: 10.1088/1755-1315/177/1/012010
21. Bureau of National Statistics. On the Use of Information and Communication Technologies by Households in the Republic of Kazakhstan (2018). URL: <https://stat.gov.kz/api/getFile/?docId=ESTAT301505&lang=ru> (date of access 20.05.2022).
22. Bureau of National Statistics. On the Use of Information and Communication Technologies by Households in the Republic of Kazakhstan) (2021). URL: <https://stat.gov.kz/api/getFile/?docId=ESTAT450285&lang=ru> (date of access 20.05.2022).