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Enhancing Educational System Human Resources as a Pillar of National Security

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Abstract

The article examines the role of human resources in education in ensuring the state's national security. The multiplier of investments in education development on economic growth in Ukraine and EU countries is calculated. The current trends in managing the development of human resources in education and ways to improve approaches to its formation, development and use in the context of current global trends and new challenges associated with wars, pandemics, the industrial revolution and digitalisation are outlined. The features and main problems of developing the human resources of educational systems in the context of modern security challenges are analysed in the example of Ukraine. Benchmarking the effectiveness of managing the educational human resources of Ukraine and the EU is carried out, and a profile of the human resources of Ukrainian educational systems is formed in the context of the prospects for integration into the European Education Area.

Keywords: Human Resources, Educational Systems, National Security, Human Resources Management, Strategies

Introduction

National security in today's world is inextricably linked to knowledge, which is a strategic resource for ensuring the state's sustainability, development, and defence. The development of science, education, and technology creates the basis for current sustainability and the country's long-term prosperity. In this context, educational systems' human resource potential is paramount, as they can provide high-quality training for the economy and strengthen strategic industries, which are the foundation of a strong and stable state.

In today's era of rapid social, technological and economic change, investments in the development of educational systems and science are a key factor in increasing the resilience of countries, ensuring their long-term security and competitiveness. The Organisation for Economic Cooperation and Development (OECD) emphasises that “investing in human capital can be a source of long-term stability and ensure the well-being of future generations, especially in countries with large youth populations” [1]. The World Economic Forum's research shows that investing in education is essential to protect the economy from crises and rapid changes in the labour market.

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The G7 meeting in Hiroshima in May 2023 highlighted the importance of education for achieving the UN Sustainable Development Goals. It recognised that education is a key tool for global peace and security beyond its social and economic benefits [2]. Research by the World Economic Forum has confirmed that the education sector also contributes to job creation. There are about 85 million teachers in the world, but in the coming years, 69 million more will need to be hired to achieve the UN Sustainable Development Goal 4: Quality Education. In addition, there will be a need for additional positions in education management and specialised and support roles, creating even more employment opportunities in the sector [3].

Thus, education, the main driver of which is highly qualified personnel, plays a crucial role in guiding society towards sustainable economic development, peace, and stability. In this context, the problems of formation, development, and effective use of educational systems' human resources are crucial for ensuring national security. In Ukraine, which is at war, one of the most valuable resources for protecting national security and resisting the enemy is human potential, the quality of which is formed in educational systems.

The aim of the article is to study modern approaches to the development of human resources in educational systems, analyse the impact of educational systems on national security, assess the effectiveness of human resources management in Ukrainian education in the context of modern challenges, and carry out comparative benchmarking of human resources and management systems of education in Ukraine and the EU.

Literature Review

An educated population is needed today more than ever to ensure gender equality, overcome climate crises and create a safer and more prosperous world for future generations [4]. Today, education is seen as one of the ways to prevent conflicts, and in particular, low accessibility and quality of education can contribute to the outbreak of conflicts. UNESCO's estimates confirm that doubling the proportion of young people with secondary education can halve the risk of conflict. At the same time, countries with high levels of horizontal inequality are more likely to experience violent conflict. For example, in regions where educational inequality has doubled, the likelihood of conflict has also more than doubled [5].

Since national security policy faces several challenges caused by existing threats and risks in the new environment, it is more important than ever to develop and implement a new, scientifically sound security policy and strategy for its implementation [6]. In this context, improving training programmes for future specialists in areas critical to national security is important.

The impact of educational systems on national and economic security has been studied in [7, 8, 9]. The authors emphasise the importance of investment in education and its role in economic and social development.

A topical area of research on improving the quality of education, reducing educational losses, and developing the potential of educational systems in the face of global challenges is adapting educational systems to global challenges (wars, pandemics, natural disasters) [10].

Researchers Endrawati Titin, Sabirin Sabirin, and others consider the main directions for improving university efficiency and identify the main factors that stimulate higher education personnel to improve themselves. Higher education should be a lifelong learning process, as reliable human resources are helpful throughout life in the professional and social environment [11].

The authors Yao-Ting Sung, An-Pan Lin, Mao-Chiao Chi, and Ming-Huei Cheng analyse the features, challenges and benefits of human resource management in Taiwan's educational systems, emphasising that the primary goal of educational systems today is to help identify and support talent development. The book analyses modern models of talent development aimed at improving university education and ensuring sustainable human resource development [12].

The impact of the war on the state and development of educational systems in Ukraine has been studied by international organisations [4, 5], national institutions and authorities in Ukraine [13, 14, 15], and the scientific community [7, 16, 17]. The experience gained in managing educational systems in wartime can be helpful in substantiating strategies for developing education and science in turbulent conditions that are characteristic of the current period of global development.

Further steps to improve the European education system are considered in the strategic document “European Education Area 2025”. It is noted that during the period 2018–2019, some success was achieved in the education system at the EU level [18]. Research organisations have studied various aspects of the effectiveness of EU education systems [15, 19, 20]. At the same time, education systems and human resources management in education need further improvement, as educational personnel play a significant role in shaping graduates' personalities and professional skills. Another important task is to formulate strategies for developing and implementing the human resources potential of educational systems by the requirements of the present and the predicted trends associated with the transformation of cultures and worldviews, globalisation, security challenges and changes caused by the emergence of new technological modes.

Material And Method

In writing the article, a systematic review of peer-reviewed articles published over the past five years in human resource management was conducted. Official documents from the EU, the International Economic Forum, and international organisations were analysed to identify key trends in the development of the human resource potential of educational systems in the context of current challenges. A statistical comparative analysis of the effectiveness of education in the EU and Ukrainian economies is carried out based on the share of qualified personnel in the structure of the employed as the main product of educational systems. The multiplier of investments in education is calculated to assess and compare the role of educational systems in ensuring economic security in Ukraine and the EU countries. The structural and dynamic changes in the human resource potential of educational systems in Ukraine in the context of modern challenges and war are studied. The benchmarking of the development of human resources in educational systems in Ukraine and the EU is carried out to determine the main directions for optimising educational systems in Ukraine in the context of the prospects of integration into the European Education Area.

Data Analysis

Current Trends in Managing the Development of Human Resources in Education in the Context of Security Challenges

Employee performance in educational systems largely depends on their knowledge, skills, behaviours, and values, which together form the human capital of organisations. As enhanced abilities and competences contribute to improved productivity and efficiency of an organisation, investments in education and development are considered long-term strategies that bring ongoing benefits [21].

Human resources in the higher education system are the professional, intellectual, creative, personal, and organisational capabilities of teaching and managerial staff in the educational sector. In higher education institutions, there is a direct correlation between human resources and the university's performance indicators used for ranking, namely teaching, research, citations, and international perspectives [22].

In modern conditions, the human resource management systems of educational systems need to be updated since, in the context of rapid changes and labour requirements, they cannot ensure a high-quality process of formation, use and motivation of educational personnel [23]. One of the areas of optimisation is the introduction of HR management systems, which are effectively implemented at enterprises, taking into account the specifics of teaching activities.

Modern educational systems face growing challenges in the formation and development of human resources, including a shortage of qualified personnel in specific regions or disciplines, staff exhaustion due to overload and lack of structured requirements, growing competition for highly qualified personnel in the labour market between the educational and commercial sectors, insufficient professional development and retraining programmes that meet the requirements of today, significant interregional and inter-sectoral disparities in wages, access to technology, and access to technology and material and technical support of educational systems [24].

Human resource management in education includes staff support and management of personnel relations. Education should be attractive by creating favourable conditions for teachers [25]. The government should pay more attention to the education sector and improve its functioning, as education remains the basis for the development of all other areas of society.

One of the important factors in developing educational personnel in the context of globalisation is the convergence of educational systems at different levels based on technology transfer, which may include the transfer of learning technologies, technologies for organising educational processes, and standardisation of educational programmes and assessments. The transfer of educational technologies expands opportunities for staff development, providing mobility, access to educational materials, geographical expansion in training and professional development, access to innovations and funding for projects and programmes [26].

Experts from the consulting company McKinsey and Company [27] emphasise the need to reorganise the HR management systems of higher education institutions to ensure greater flexibility in HR administration processes, directing their potential to the development of competences necessary in today's changing environment. It is also proposed to reform standard bureaucratic educational systems into more flexible ones, organised on a project or matrix basis.

Jagdish et al. [28] identify the following functions of human resource management in higher education institutions: recruitment, training and development of staff, performance evaluation, and relations with the workforce. Scholars emphasise that in modern conditions, implementing these functions requires a review of existing bureaucratic management tools and efforts to strengthen the motivation of staff not only to perform their direct duties but also to improve themselves.

The World Economic Forum has defined the concept of modern education as "Education 4.0.", which meets new global trends and challenges. It aims to prepare pupils and students for work and life in the context of global changes accompanied by the rapid development of technology, automation, artificial intelligence, robotics and digitalisation [3]. Modern education systems should provide a range of skills and competences that will help develop highly qualified

professionals who can learn throughout their lives, innovate and actively adapt in the face of continuous change (Figure 1).

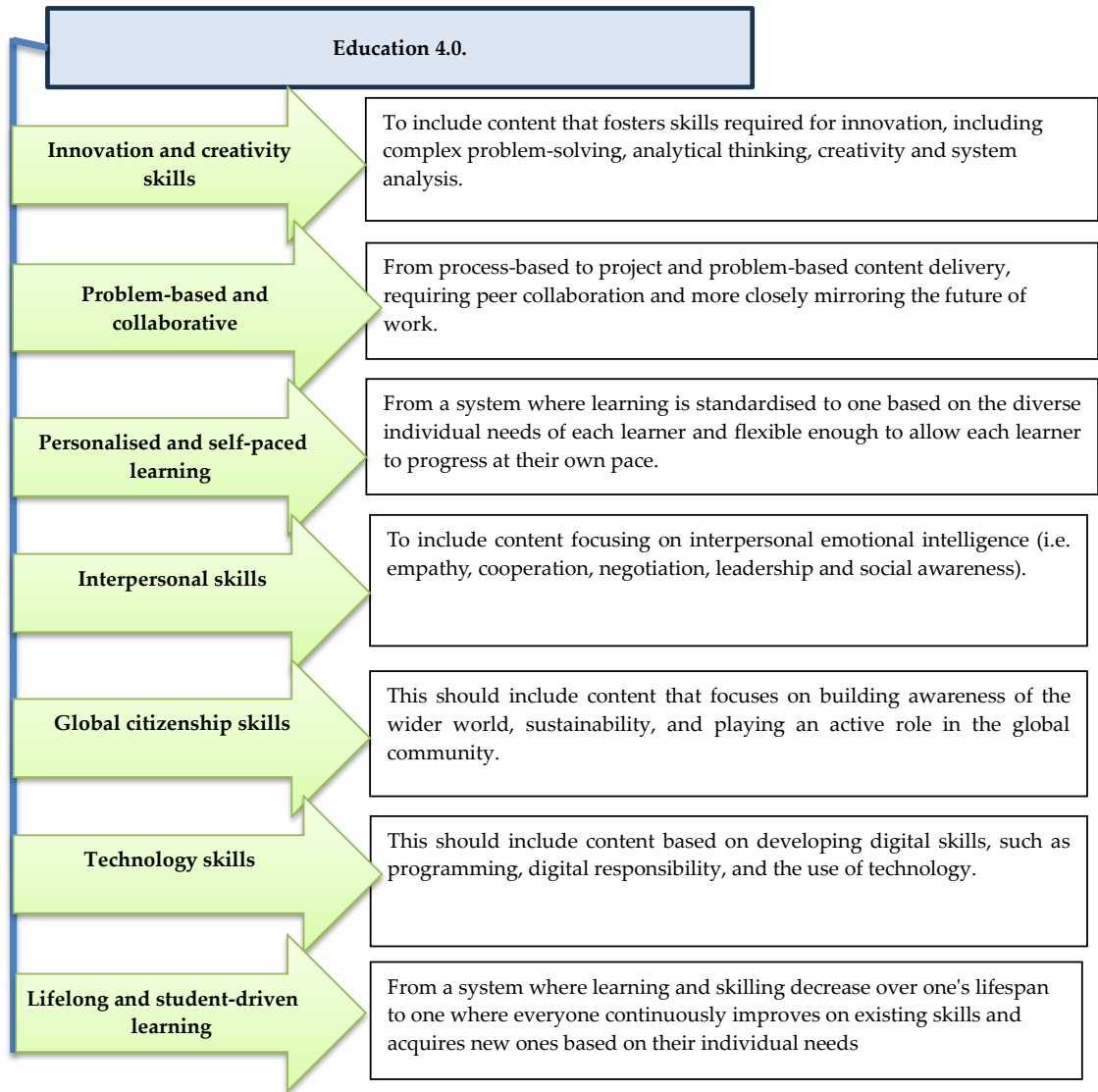


Figure 1. Modern education systems should provide skills in the context of the fourth industrial revolution

Source: compiled by the author based on data from [3]

The formation of these skills at different levels of educational systems requires the development of modern strategies for education development, taking into account global trends and optimising human resource management systems at the macro, meso, and micro levels.

Based on the conducted research, it is possible to identify the main trends in the development of human resources in educational systems at the present stage of development:

- 1) Making decisions on human resource management based on big data, including using modern

analytics tools to make decisions related to recruitment strategies, employee engagement, and optimisation of internal processes [2, 29, 30].

2) Integrating the principles of sustainable development into the personnel management of educational institutions by promoting environmental initiatives, reducing the carbon footprint, and introducing a circular economy.

3) Focusing on the well-being and psychological support of the educational workforce. Universities and other educational institutions offer well-being support programmes, work-life balance initiatives, psychological support services, flexible work schedules, and expanded opportunities for remote work [9, 28, 31].

4) Digital transformation in education reflects the degree to which digital technologies are integrated into the learning and teaching processes organised in educational institutions. Common examples include online courses, open digital educational resources, digital platforms for collaboration between students and teachers, and curricula that focus on developing digital competences as key educational outcomes [32, 33, 34]. Digital transformation of educational systems, introduction of learning platforms, applications, chatbots, and differentiation of learning materials and formats expand access to education and training for students. At the same time, digitalisation requires the development and adaptation of digital competences of educational personnel, revision of assessment systems, training and retraining of educational staff, and adaptation of curricula.

5) Overall development of HRM in higher education. Human resource management in educational institutions is adapting to modern challenges, focusing on attracting and retaining talent, ensuring diversity and inclusion, and complying with regulations and standards. Integration of technology and focus on new trends are critical to ensure the effectiveness of HRM, meeting the needs of faculty and staff, and supporting the sustainable development of universities [17, 27].

6) Maintaining a supportive work culture that values diversity, equality and inclusion, encourages collaboration and recognises employee contributions. A positive work environment has a significant impact on employee satisfaction and retention [29];

7) Diversification of sources of investment in the development of educational systems, notably higher education, through enhanced cooperation between educational institutions, businesses, international organisations and other stakeholders [19].

Effective management of the human resources potential of educational systems requires taking into account these trends, which will ensure the competitiveness of education and science and contribute to the country's economic security. Thus, the management of the human resources of educational systems involves an organic combination of the state strategy for the development of education and the human resources of the educational sphere by national priorities and needs for the development of the economy, society and national security, and the human resources management policy at the level of educational institutions, which involves the formation of effective human resources management systems.

The Role of Educational Systems in Ensuring National Security

Education is a strategic resource of any country and has a significant impact on its economic growth, human resource development, and national security, as it shapes society's intellectual, cultural, and economic potential [31]. In addition, education plays an important role in reducing social inequality, creating opportunities for youth self-realisation, and preventing radicalisation

[35].

The role of education in the national security system increases during the war. For example, a study conducted by scientists in Ukraine in 2023 proved that during a war, society is focused on strengthening defence, ensuring stability, and achieving strategic and socio-economic goals. According to the survey, 78.5% of respondents consider universities to be key training centres for the defence sector, particularly cybersecurity and information warfare. This indicates an increased social focus on higher education to improve human resource management [7].

Notably, one function of education is to foster conscious citizens through public awareness and civic education, which helps to maintain a stable and secure society. The research and literature analysis results show that while national security is often associated with military defence, it encompasses several broader aspects, including economic and social stability and preparing qualified and informed professionals ready to work effectively.

Human capital, the quality of which results from the functioning of educational systems, is the main driver of economic growth [8, 36]. In this regard, an important criterion for the effectiveness of educational systems is their impact on the country's economic security, which creates the basis for national security. The generalised indicator of economic development is GDP.

We agree with scientists that human resources in the education system are among the most effective public investments. They create sustainable prerequisites and a basis for scientific breakthroughs, ensuring stable development and economic competitiveness in the long term [9].

When analysing the volume of investment in education as a percentage of GDP, it should be noted that Ukraine's share is higher than the EU average (Figure 2).

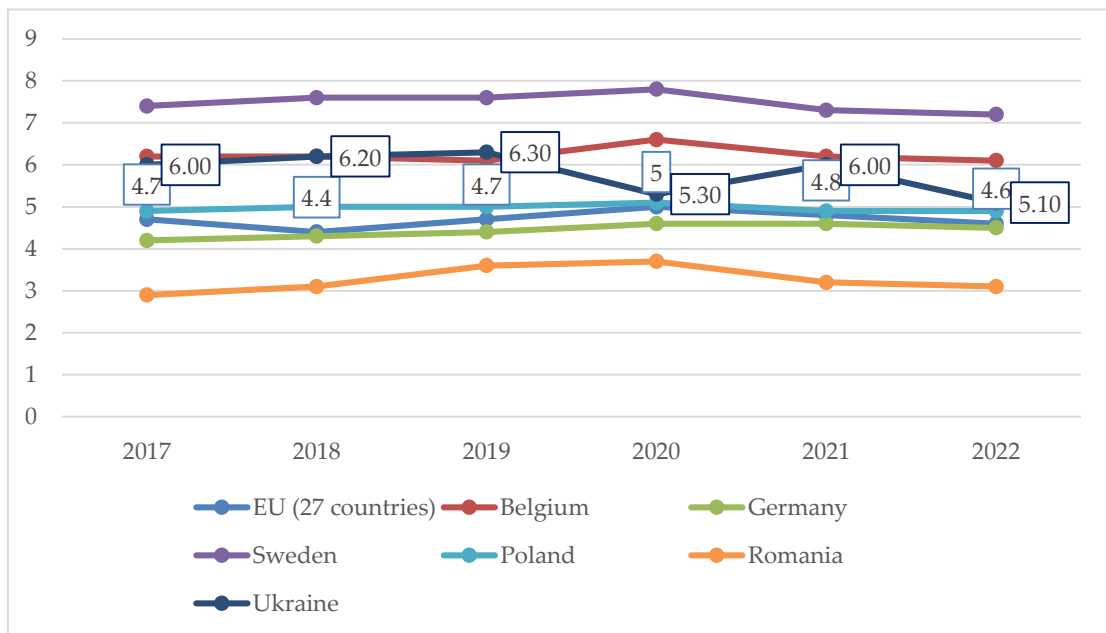


FIGURE 2. Dynamics of public spending on education in Ukraine and the EU
Source: compiled by the author based on data from [37, 38]

In 2021, the share of education spending in GDP was 6%, while the EU average was 4.8%. At the same time, the effectiveness of these investments is important. According to the Ministry of Education and Science of Ukraine, in 2022, the main areas of public spending are: teacher salaries (58%), scholarships (0.24%), the New Ukrainian School (0.18%), healthy eating and fire safety (0.016%), and other expenditures [13].

In 2021, school education received more than 70% of public expenditure on education at EU level. This is a roughly equal split between, on the one hand, pre-primary and primary levels (34%) and, on the other hand, secondary level (37%), while tertiary education accounted for 16% of expenditure [20].

In the context of the impact on national security, it is important to assess and design the multiplier effect of the development of educational systems. To describe the multiplier effect in macroeconomics, the multiplier formula is used, which generally calculates the increase of the evaluated feature (indicator) by the increase of another feature or indicator according to the formula [16]:

$$M = \frac{\Delta GDP}{\Delta EI} \quad (1)$$

where, M GDP multiplier;

ΔGDP – annual GDP growth;

ΔEI – annual increase in investment in education.

To estimate the multiplier effect of investments in education systems, we calculated the multiplier on the example of Ukraine and the EU (27 countries) in Table 1.

	GDP growth, % y-o-y		Growth rate of investment in education, % compared to the previous year		Investment multiplier in education	
	Ukraine	EU (27)	Ukraine	EU (27)	Ukraine	EU (27)
2016	1,20	1,03	0,95	1,09	1,27	0,94
2017	1,25	1,04	1,20	1,02	1,04	1,02
2018	1,19	1,03	1,12	1,03	1,07	1,01
2019	1,12	1,04	1,19	1,04	0,93	1,00
2020	1,06	0,96	0,99	0,89	1,08	1,08
2021	1,29	1,09	1,24	1,23	1,04	0,88
2022	0,88	1,09	1,03	1,09	0,87	1,00
2023	1,25	1,07	0,93	1,03	1,34	1,03

Table 1. Calculation of the investment multiplier in the development of educational systems in Ukraine and the EU

Source: calculated according to [37, 38]

The calculations confirmed the impact of education on gross domestic product growth. In Ukraine, for the period 2016-2022, spending on education and science had a multiplier effect on economic development for almost the entire period except for 2019 and 2022. In 2022, due to the start of the full-scale invasion, there was a significant drop in GDP, which negatively affected the multiplier effect. In the EU, the multiplier level is higher in some periods than in Ukraine due to a more stable economy. There was no multiplier effect in 2020 due to the COVID-19 pandemic, which hurt economic development and education.

An important factor influencing national security is the quality of human capital [14]. One of the indicators of the effectiveness of educational systems is the quality of the workforce, which can be expressed in the share of highly qualified personnel employed in the economy. In this context, we can compare the dynamics and share of highly qualified personnel in the economy of Ukraine and the EU (27) (Figure 3).

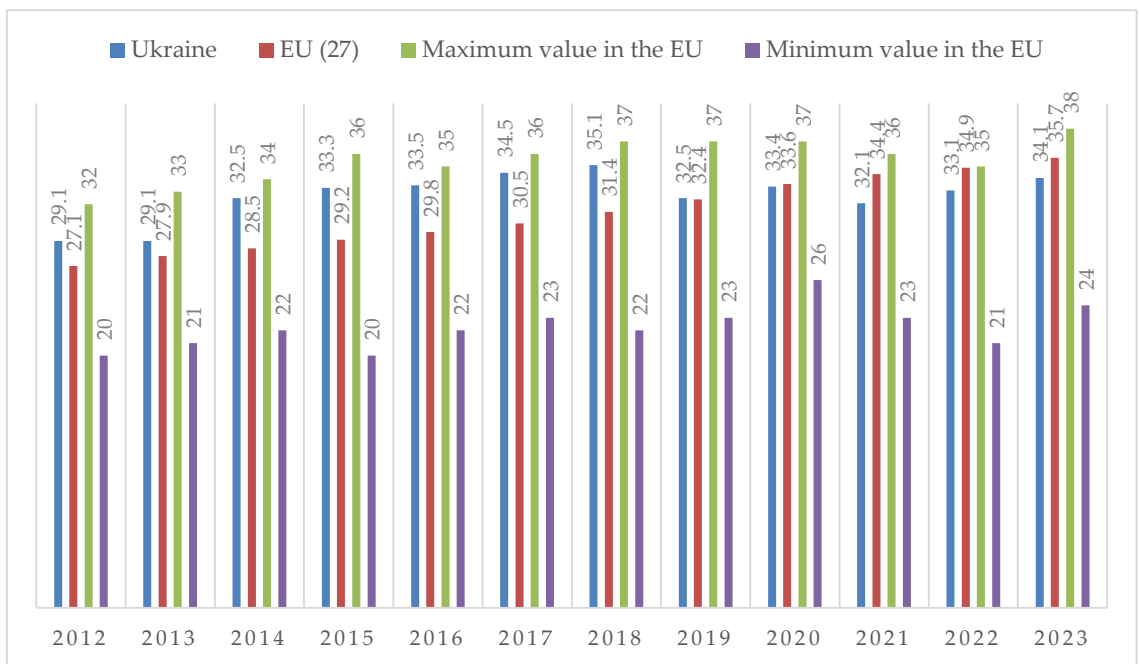


Figure 3. The share of highly qualified personnel in the structure of employment in Ukraine and the EU, %

Source: compiled by the author based on data from [14, 37, 38]

In 2023, the share of the population with higher education employed in Ukraine was 34.1%, 1.8% lower than the EU average and 10.1% higher than the country with the lowest value (Romania). Until 2018, the share of this category of employees was higher than the EU average, but since 2019 it has been declining. The analysis has shown that despite the relatively high results, there are trends towards the weakening of educational systems in Ukraine against the backdrop of new security challenges, in particular the war, which has resulted in a significant deterioration of the

economic situation in the country, requiring a reduction in spending on education, migration of educational personnel and students abroad, increased physical threats to students and educators, and the destruction of the infrastructure of educational institutions.

Efficiency of Human Resources Management in the Ukrainian Education System View of Modern Security Challenges

The war in Ukraine has created serious obstacles to managing the human resource potential of education systems. Damage to infrastructure, the forced displacement of staff and students, and security threats have greatly complicated the sector's functioning. Under these conditions, the state is faced with the task of adapting its personnel policy to new realities and ensuring the stability of the educational system [17].

Analysing the human resources potential of educational systems in Ukraine, it should be noted that over the past 10 years, the number of teaching staff in Ukraine has decreased by an average of 18% due to a decrease in the number of students due to demographic decline, optimisation of educational institutions, migration of teachers, reduction of state funding and introduction of new management standards as part of the educational reform.

According to the Ministry of Education and Science of Ukraine, as of the beginning of 2024, there are 12929 general secondary education institutions in Ukraine, of which 4475 (35%) operate full-time, 3975 (31%) - remotely, 4479 – in a mixed form (34%), and 901 institutions are located in the temporarily occupied territories. The educational process is provided by 387934 teachers, of whom 13807 (3.6%) are abroad. Schools have 3.9 million students, of whom 1.3 million study full-time, while the rest study remotely or in a mixed form. About 0.5 million Ukrainian schoolchildren are abroad [13]. The dynamics of quantitative indicators of the human resources potential of educational systems in Ukraine are shown in Table 2.

Indicators, people	2019	2020	2021	2022	2023	Growth rate 2023/ 2019
Number of full-time employees of preschool education institutions	312451	319114	311768	276016	263445	-15,7
Number of children per employee	11	11	10,5	10	9,5	-13,6
Number of teachers in general secondary education institutions	437961	437981	434755	401836	387934	-11,4
Number of students per teacher	8,9	9,6	10	9	8,5	-4,5
Number of teaching staff in vocational education and training institutions	33534	31783	31324	29957	28056	-16,3
Number of students per academic staff member	8	7,9	6	6	6	-25,0

Number of lecturers in professional higher education institutions	22982	19684	31083	33895	34956	52,1
Number of students per academic staff member	13	14	13	11	11	-15,4
Number of teachers in higher education institutions	112984	111065	110944	108500	107171	-5,1
Number of applicants per academic staff member	12	13	14	13	12	-4,5
In general, education workers	919912	919627	919874	850204	821562	-10,7

Table 2. Structural and dynamic changes in the human resources potential of educational systems in Ukraine in 2019-2022

Source: compiled by the author based on data from [13, 37]

Despite the war, Ukraine has managed to preserve its human resources. Thus, from 2019 to 2023, the number of employees in the education system decreased by only 10.7% and 3.4% since the beginning of the war. Table 1 shows that the most significant reduction in the number of teaching staff was experienced by vocational (vocational and technical education) institutions, whose number decreased by 16.3%. As for higher education institutions, there was a 5.1% reduction in the number of research and teaching staff during the study period. At the same time, it should be noted that the number of employees in education is conditional, as a significant number of employees of educational institutions migrated abroad or to safe regions during the war and continue to work remotely or are on paid leave.

The growth in the share of highly qualified personnel in higher education is positive. In particular, from 2019 to 2023, the number of professors in the structure of higher education staff increased from 11 to 14%, and associate professors from 38 to 40%.

In the context of ensuring national security, the quality of the human resources of educational systems plays a key role, including the scientific potential of education, which is the basis for the country's innovative development. According to the State Statistics Service, as of the end of 2023, the number of employees involved in research and development was 58576, 10% more than in the previous year but 26% less than in 2019. Ukraine lags several times behind developed countries in terms of state incentives for science and technology. This directly affects the competitiveness of the national economy in the global market and the state of national security in all its manifestations [15].

International cooperation plays a significant role in developing the education system and human resources. Since 2005, Ukraine has been part of the Bologna Process, which aims to unify higher education standards and facilitate student academic mobility. In addition, Ukraine has joined the European Higher Education Area (EHEA), which defines the direction of reforming higher education institutions [13].

In recent years, the EU-Ukraine Association Agreement has become a guiding principle for educational reforms in Ukraine, with over 80% of the Agreement's provisions in the Education, Training and Youth section being implemented (with the average level of implementation being around 70%). The Agreement emphasises the need to strengthen the link between education and labour market needs, which Ukraine is actively working on by introducing a dual form of education

to better match graduates' skills with employers' requirements. The European Commission emphasises the importance of Ukraine's participation in the Horizon Europe and Euratom programmes, which promote the integration of EU practices in research and innovation. The sectoral integration of Ukrainian education and science has already reached a high level, confirmed by colleagues from the European Commission, mainly through Ukraine's participation in the Erasmus+, Horizon and other programmes [39].

In the context of the Association Agreement between Ukraine [15], which should result in the approximation of the parameters of educational systems in Ukraine to the European ones, including in the context of human resources management, it is relevant to benchmark specific indicators of human resources management of educational systems in Ukraine and the EU, which will allow to identify the strengths and weaknesses of human resources management at the state level and outline strategic objectives for human resources development in education. Based on the collected statistical data for Ukraine and the EU, Table 3 compares the quantitative indicators of human resource management systems in Ukraine and the EU.

Indicators (N)	2021	2022
1. Average salary in education, EUR per year		
EU 27	36900	36950
Maximum value (Luxemburg)	69000	69100
Minimum value (Bulgaria)	7731	7750
Ukraine	1990	4800
2. Ratio of salaries in education to the minimum wage		
EU 27	1,9	2
Maximum value (Germany)	2,8	2,8
Minimum value (Poland)	1,1	1,2
Ukraine	1,5	1,5
3. Number of applicants per teacher of higher education institutions		
EU 27	9	10
Maximum value (Poland)	12	12
Minimum value (Belgium)	6	8
Ukraine	13	13
4. Investment in education per employee, Euros		
EU 27	9000	9880
Maximum value (Netherlands)	22000	23000
Minimum value (Romania)	3000	3020
Ukraine	1196	2006
5. Average level of digital skills of educators, %.		
EU 27	40	42
Maximum value (Netherlands)	48	49
Minimum value (Romania)	32	35
Ukraine	42	*

Table 3. Comparative indicators of human resource management in Ukraine and the EU educational systems

* No data available

Source: compiled by the author based on data from [37, 38, 40, 41]

Benchmarking is comparing the methods, processes, procedures, products and services of organisations (programmes) with the methods, processes, procedures, products and services of organisations (programmes) that are regularly involved in the same categories. This helps to identify opportunities to improve the organisation's economy, efficiency, effectiveness and productivity [42]. To conduct benchmarking, we propose a formula, the application of which will allow us to identify the strengths and weaknesses of Ukraine in managing the human resources of educational systems:

$$P = \left(\frac{N_i}{N_{imax} - N_{imin}} \right) \times 100 \quad (2)$$

P is the object's potential under comparison according to the i-th indicator.

N_i - is the i-th indicator of the object being compared;

N_{imax}, N_{imin} - maximum and minimum values of the indicator in the comparative sample.

Using formula two and the data in Table 2, we calculated the indicators of Ukraine's potential in terms of the defined indicators. We built a profile of Ukraine's human resources management system compared to the European one. The results of the calculations are shown in Figure 4.

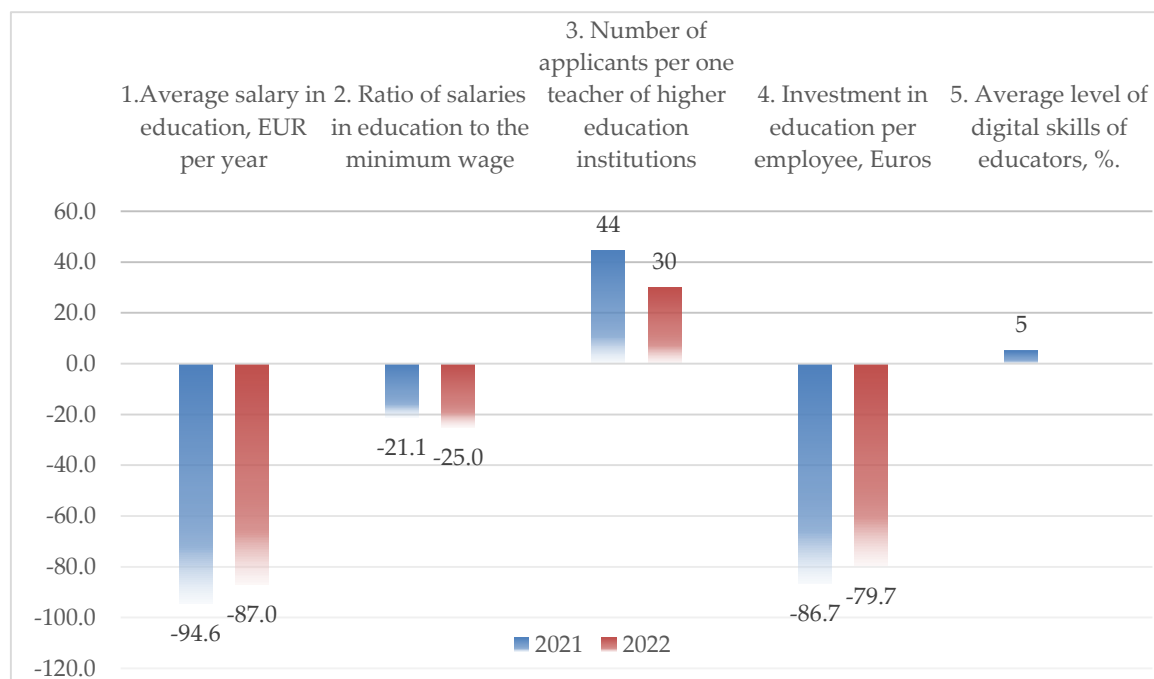


Figure 4. Comparative profile of the efficiency of human resources management in Ukraine

Thus, Ukraine lags far behind EU countries in almost all indicators, except for the workload of teachers (44) and the relatively higher average level of digital skills in 2021 (5). The higher

education system in Ukraine is significantly underfunded, which creates obstacles to the development and improvement of human resources. The indicators discussed above only indirectly reflect the strengths and weaknesses of the educational systems in Ukraine. Additional analysis will be required to assess qualitative indicators and the effectiveness of human resource management in education, including the relevance of educational standards, regulatory frameworks, organisation of educational institutions, qualification requirements, and relevance of education to economic and security needs.

In addition, in times of war, the educational system faces numerous restrictions and threats, including migration of specialists travelling abroad due to danger or search for better working conditions; constant physical threat to teachers and students in combat zones, which complicates the educational process; psychological burden caused by stress and fatigue; disruptions in the educational process due to evacuation or forced transition to a remote format; the state of the energy sector, which the invaders destroy, significantly complicates both the educational process and opportunities for self-development of educational personnel [15]. Comprehensive solutions are needed to optimise educational systems, considering the challenges of war, the latest human resources management trends and national defence and security needs.

Conclusion

Education, as the primary source of knowledge, is an important factor in developing human capital, which, in turn, is a key factor in forming any state and ensuring its security. The key trends in the development of the human resources potential of educational systems in developed economies today are focused on the use of big data analytics to make strategic decisions on staffing needs and their professional qualifications, integration of sustainable development principles into the educational process, ensuring the well-being of educational staff, digital transformation of educational processes, development of digital competences of employees, adaptation of HRM to new challenges, support for an inclusive culture, and diversification of funding sources through crowdfunding. This increases the efficiency of HR management in educational institutions, ensures their sustainability, and expands access to quality education.

Using the example of Ukraine and the EU, the study, based on the investment in education multiplier, proves that educational systems play an important role in ensuring national security, particularly by creating the basis for economic and social development. In the context of the war in Ukraine, educational systems contribute to the formation of a patriotic and conscious society, training qualified personnel for the defence and economic sectors, countering information threats and strengthening the psychological resilience of the population.

The current security, social and economic challenges, and new opportunities caused by digital transformations facing society require reforming educational systems and, accordingly, updating approaches to the formation and development of human resources in the direction of qualitative changes in teacher training systems, development of new competences, development of curricula and tools for the professions of the future, optimisation of retraining systems, and formation of close relationships with the real and security sectors of the economy.

References

OECD (2022). Adding the human dimension to the OECD fragility framework.
https://www.oecd.org/en/publications/adding-the-human-dimension-to-the-oecd-fragility-framework_a12f8ffc-en.html

- The White House (2023). G7 Hiroshima Leaders' Communiqué. <https://www.whitehouse.gov/briefing-room/statements-releases/2023/05/20/g7-hiroshima-leaders-communique/>
- World Economic Forum (2022). Catalysing Education 4.0: Investing in the future of learning for a human-centred recovery. https://www3.weforum.org/docs/WEF_Catalysing_Education_4.0_2022.pdf
- CSIS (2024). Investing in quality education for economic development, peace, and stability. <https://www.csis.org/analysis/investing-quality-education-economic-development-peace-and-stability>
- UNESCO (2021). The hidden crisis: Armed conflict and education; EFA global monitoring report. <https://www.unesco.org/gem-report/en/hidden-crisis-armed-conflict-and-education>
- Stoykov, S., Dimitrova, S., & Marinov, R. (2018). The development of educational capacity of human resources in the field of security – Main priority of national security. In 2019 Creative Business and Social Innovation Conference Proceedings, pp. 1–6. <https://doi.org/10.1109/CREBUS.2019.8840062>
- Ivanenko, N., Paska, T., Irkha, A., Rud, A., & Bohuslavska, L. (2024). The Role of Higher Education for Ensuring National Security in Ukraine. *Future Education*, 4(1), 210–237. <https://doi.org/10.57125/FED.2024.03.25.11>
- Ozturk, I. (2008). The Role of Education in Economic Development: A Theoretical Perspective. *ERP*: Economic Development & Technological Change (Topic).
- Ningsih, A. R., Mentari, S., Julyanto, R., & Safrudin, S. (2022). The development of educational human resources through Indonesia's education system. *Interdisciplinary Social Studies*, 1(4), 334–345. <https://doi.org/10.55324/iss.v1i4.70>
- World Bank Group (2023). Collapse & recovery: How COVID-19 eroded human capital and what to do about it. <https://www.worldbank.org/en/publication/human-capital/publication/collapse-recovery-how-covid-19-eroded-human-capital-and-what-to-do-about-it>
- Endrawati, T., Sabirin, S., Deluma, R., Imelda, D., & Suluh, S. (2023). Human resources for the development of higher education and academic culture of achievement and continuous learning. *International Research Journal of Management, IT, and Social Sciences*, 10(1), 25–34. <https://doi.org/10.21744/irjmis.v10n1.2265>
- Sung, Y.-T., Lin, A.-P., Chi, M.-C., & Cheng, M.-H. (2024). The personnel system for talent development in higher education. Singapore: Springer. <https://doi.org/10.1007/978-981-97-6278-1>
- Ministry of Education and Science of Ukraine (n.d.). <https://mon.gov.ua>
- Education in Independent Ukraine: Development and Competitiveness (2021). https://iea.gov.ua/wp-content/uploads/2021/08/Osvita-v-nezalezhnij-Ukraini-19.08.2021_FINAL-1.pdf?fbclid=IwAR0O0OpAo2vbURL63J7rR8eLmOCw9HggzNzmpbxYM4gWs0s6dX_ftP-nAkg
- Ministry of Education and Science of Ukraine (2022). Education under martial law: Information and analytical collection. <https://mon.gov.ua/static-objects/mon/sites/1/zagalna%20serednya/serpneva-konferencia/2022/Mizhn.serpnp.ped.nauk-prakt.konferentsiya/Inform-analityc.zbirn-Osvita.Ukrayiny.v.umovakh.voyennoho.stanu.22.08.2022.pdf>
- Trushlyakova, A. (2020). Investments and development of human capital in the conditions of digitalisation of economy. *Economic analysis*, 30(1), Part 2, 173–179. <https://doi.org/10.35774/econa2020.01.02.173>
- Venger, O., Fursin, O., & Horodetska, M. (2024). Governance of human resources as a factor of sustainable development for economic entities. *Humanities Studies: Collection of Scientific Papers*, 19(96), 158–167. <https://doi.org/10.32782/hst-2024-19-96-18>
- European Commission. (n.d.). European Education Area explained. <https://education.ec.europa.eu/about-eea/the-eea-explained>
- European University Association (n.d.). New project starts work on staff development for learning and teaching. <https://www.eua.eu/news/eua-news/new-project-starts-work-on-staff-development-for-learning-and-teaching.html>

- European Commission (2023). Investing in education 2023. <https://education.ec.europa.eu/sites/default/files/2023-05/investing%20in%20education%202023-NC0423415ENN.pdf>
- Rafiei, N., & Davari, F. (2015). The role of human resources management on enhancing the teaching skills of faculty members. *Materia Socio-Medica*, 27(1), 35–38. <https://doi.org/10.5455/msm.2014.27.35-38>
- Pausits, A. (2015). Human resource management in higher education: Case studies and future scenarios. Edition Donau-Universität Krems. <http://donau.booktype.pro/human-resource-management-in-higher-education-cases-studies-and-future-scenarios>
- Runhaar, P. (2016). How can schools and teachers benefit from human resource management? Conceptualising HRM from content and process perspectives. *Educational Management Administration & Leadership*, 45(1), 1–15. <https://doi.org/10.1177/1741143215623786>
- Kapoor, B. (2020). Ram Charan, Dominic Barton and Dennis Carey, Talent Wins: The New Playbook for Putting People First. *South Asian Journal of Human Resources Management*, 7(2), 320–324. <https://doi.org/10.1177/2322093720932084>
- Pandey, P., & Sharma, N. (2021). Role of human resource management in education. *Quest Journal of Management and Social Sciences*, 9(2), 27–31.
- Li, J., & Pilz, M. (2021). International transfer of vocational education and training: a literature review. *Journal of Vocational Education & Training*, 75(2), 185–218. <https://doi.org/10.1080/13636820.2020.1847566>
- McKinsey & Company (2022). Transforming HR to better support higher education institutions. <https://www.mckinsey.com/industries/education/our-insights/transforming-hr-to-better-support-higher-education-institutions#>
- Jagdish, M., Mishra, K., Girish, K., & Painoli, G. (2023). Human resources management in higher education: A review. *Tuijin Jishu/Journal of Propulsion Technology*, 44(4). <https://doi.org/10.52783/tjjpt.v44.i4.1751>
- European Education Area (n.d.). The European Education Area explained. <https://education.ec.europa.eu/about-eea/the-eea-explained>
- Publications Office of the European Union. (2022). European Commission: Directorate-General for Education, Youth, Sport and Culture, Investing in our future – Quality investment in education and training. <https://data.europa.eu/doi/10.2766/45896>
- Elpisah, Hasan, M., Yahya, M., Sulolipu, A. A., & Suarlin. (2023). Education as a strategic investment for national human resource development. *Proceedings of the International Conference on Education and Technology (ICET)*, 28, 1–10. https://doi.org/10.2991/978-2-38476-084-8_28
- Qayyum, A. (2023). Assessing the digital transformation of education systems. In *Handbook of Open, Distance and Digital Education*. (pp. 249–266). Springer.
- HR Future. (n.d.). The role of HR in strengthening higher education institutions. <https://www.hrfuture.net/talent-management/training-development/the-role-of-hr-in-strengthening-higher-education-institutions/>
- Esterman, T., & Průvot, B. I. (2011). Diversifying income streams of European universities. *Association of European Universities*. https://www.eua.eu/images/site1/ATHENA/diversifying-income-streams_ukrainian.pdf
- Gearon, L. (2015). Editorial: education, security and intelligence studies. *British Journal of Educational Studies*, 63(3), 263–279. <http://www.jstor.org/stable/43896287>
- Catherine Grant (2017). The contribution of education to economic growth. *Institute of Development Studies*. https://assets.publishing.service.gov.uk/media/5b9b87f340f0b67896977bae/K4D_HDR_The_Contrib

- ution_of_Education_to_Economic_Growth_Final.pdf
- State Statistics Service of Ukraine (n.d.). <https://stat.gov.ua/uk/topics/osvita>
- Eurostat (n.d.). <https://ec.europa.eu/eurostat/databrowser>
- Mission of Ukraine to the EU (n.d.). Cooperation in education: The EU Erasmus+ programme. <https://ukraine-eu.mfa.gov.ua/posolstvo/galuzeve-spivrobitnictvo/klyuchovi-tendenciyi-politiki-yes-u-sferi-osviti-ta-kulturi-programa-yes-erazmus>
- European Trade Union Committee for Education (2023). Teachers' and school heads' salaries and allowances in Europe. <https://op.europa.eu/en/publication-detail/-/publication/4b900c13-6977-11ee-9220-01aa75ed71a1/language-en>
- Comparative Reports (2023). Structural indicators for monitoring education and training systems in Europe – 2023: Digital competence at school. <https://eurydice.eacea.ec.europa.eu/publications/structural-indicators-monitoring-education-and-training-systems-europe-2023-digital>
- Aware Public (2021). Benchmarking is a tool allowing to promote good practice and identify opportunities for improving efficiency and reducing costs by comparing audited entities' performance with good practice elsewhere. <https://methodology.eca.europa.eu/aware/PA/Pages/Examination/Benchmarking.aspx>