

## РОЗДІЛ XII. ПРОБЛЕМИ СПЕЦІАЛЬНОЇ ОСВІТИ

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### DEVELOPMENT OF SELF-ORGANIZATION OF EDUCATIONAL ACTIVITIES OF APPLICANTS WITH SPECIAL EDUCATIONAL NEEDS AS A PREREQUISITE FOR INCREASING HUMAN CAPITAL

*The formation of inclusive education becomes a pivotal focus for contemporary education systems of higher education institutions that aim to provide equal sharing of knowledge and education, strengthening student human capital formation. In this context, the capacity of applicants presenting special educational needs to properly organize their educational activities is of fundamental importance for success in achieving permanent academic and professional achievements. However, despite the growing attention to the issue of inclusive educational policies, there is a lack of empirical research on the contribution of self-organization of learning activities to the development of human capital within inclusive educational environments. The purpose of this study is to investigate the role of self-organization of educational activities among the applicants with special educational needs as a prerequisite for increasing human capital among applicants with special educational needs in higher education systems.*

*The methodology used for research is an accumulation of pedagogy and econometric modeling. The study uses a 4 stages methodology that involves conceptual analysis, systematization of data, construction of econometric models and comparative empirical analysis. The empirical analysis is focused on three European countries, namely Ukraine, Poland, and Germany, over the period 2020-2025. A two-stage econometric model was used to estimate the role of institutional factors and learning behavior of students in human capital formation. The model was estimated by two stage least square (2SLS) method.*

*The empirical results confirm a strong positive relationship of self-organization of educational activities with human capital formation. The estimated coefficient for the self-organization variable was 0.463, and the model showed a high explanation power with an  $R^2$  value of 0.81. Comparative analysis shows that Germany shows the highest indicators of self-organization and human capital development, namely 0.88 and 0.92 respectively in 2025. Of all countries, Poland shows stable growth, Ukraine is the one with the most dynamic improvement, with the index of self-organization rising from 0.52 in 2020 to 0.66 in 2025.*

*The results show that the enhancement of self-regulated learning competencies in conjunction with inclusive educational contexts and digital accessibility is a major factor in the reinforcement of human capital of applicants with special educational needs. The study brings into focus the importance of integrating pedagogical strategies that are conducive for autonomy, digital competencies and also institutional support in order to increase the effectiveness of higher education inclusive systems.*

**Key words:** *inclusive education, self-organization of learning, special educational needs, human capital development, higher education systems, digital learning environment, econometric modeling*

**Introduction.** The transformation of contemporary education systems has put an increasing focus on inclusivity, accessibility, and on developing competencies that enable learners to actively participate in social and economic life. In this context, the development of human capital is closely linked to the capacity of educational institutions to provide an enabling context for different categories of learners, including applicants with special educational needs. Inclusive education now represents an important priority of the national and international educational policies, because it guarantees equal opportunities, social integration, and the effective use of human potential. However, in order to achieve meaningful access to higher education, it is necessary not only to give access to higher education but also to build up the ability of students to deal with and organize their learning activity independently. Self-organization of educational activities thus becomes a crucial factor affecting academic success, personal development and building up of human capital in inclusive education environments.

Despite the increase in attention given to inclusive education through pedagogical studies, there are still major challenges in understanding the interactions between individual learning behaviors and institutional conditions affecting educational achievement. Many educational systems still primarily concentrate on structural accessibility and support services at the expense of developing the competencies of self-regulated learning in students with special educational needs. As a result, there is a need to examine the mechanisms by which self-organization of educational activities is part of the broader process of human capital development. Understanding of these mechanisms is of special relevance in the context of rapid digitalization of higher education that creates a new opportunity for flexible learning but also imposes more autonomy and responsibility on students.

The problem covered by the current study is attributed to the lack of empirical knowledge on the significance of self-organization skills of applicants with special educational needs in the development of human capital in modern higher education systems. While the inclusive educational policies

have put relatively more emphasis on the accessibility and support structures, there has been under exploitation of exploring the role of the autonomous learning capacities among the students in comparative empirical research. Consequently, the research is aimed at the following problem statement: To establish the contribution of forming self-organization of educational activities of applicants with special educational needs to strengthening of human capital formation in inclusive educational environments.

Based on this problem statement, the study makes a number of research hypotheses. First, it is assumed that the availability of inclusive educational environments and digital learning infrastructure has a positive impact on the extent of self-organization of applicants with special educational needs. Second, the study hypothesizes that higher levels of self-organization in educational activities have a significant contribution on the development of human capital through the improvement of learning outcomes, competencies, and employability potential. Third, it is assumed that digital competencies and institutional support mechanisms strengthen the relationship between self-organized learning and human capital formation.

The purpose of the research is to understand the role of self-organization of educational activities of applicants with special educational needs as a precondition for the increased formation of human capital in inclusive higher education systems. To implement this, aim several objectives are followed. These are analyzing the institutional and pedagogical factors influencing the growth of self-organization skills; construction of an econometric model explaining the relation among self-organization and human capital formation; comparative analysis of empirical indicators in selected European countries. In addition, the purpose of the study is to identify trends in the development of inclusive educational environments and their impact on the ability of students with special educational needs to act independently in the management of their learning processes.

The scientific novelty of the research is the combination of the pedagogical and the economic perspectives in the analysis of inclusive education and developing human capital. Unlike many previous studies that focus mainly on institutional accessibility or social inclusion, the present research focuses on the role of self-organized learning behavior as one mechanism to link inclusive educational environments with human capital formation. Furthermore, the study proposes an econometric approach to the analysis of these relationships through the combination of indicators for digital accessibility, institutional support and student autonomy. The

comparative analysis of Ukraine, Poland and Germany extends into new dimensions that show the role of various educational systems in developing self-organization competencies of applicants with special educational needs. Through this integrated approach, the research is part of a better understanding of the pedagogical and institutional factors which contribute to developing human capital in inclusive higher education.

**Literature review.** The problem of self-organization, self-education in the process of learning has attracted more and more attention in pedagogical researches, especially in the framework of modern higher education, inclusive learning environment. A number of scholar's stress that the ability to self-educate and to self-regulate learning is an integral part of professional and personal growth of the students. For example, Burluka (2018) sees self-education as an important mechanism whereby individuals build their life strategies, emphasizing the importance of ongoing learning and autonomous intellectual development in the process of developing long-term personal trajectories. Similarly, Demchenko (2019) emphasizes that self-educational competence is an indispensable component of professional competence and is especially important for future teachers, who need to adapt to educational and professional contexts that are constantly changing. These perspectives highlight the need to promote the development of autonomous learning skills as a basis for building human capital in a sustainable manner.

Several studies consider further the pedagogical mechanisms that contribute to the development of self-organization in educational activities. Bubin, Durmanenko and Boiarchuk (2023) analyze the formation of readiness of the future educators for self-education, stressing on the objective of this study, that the readiness of the youth to independently subjectly structure learning activities must be developed under definite pedagogical ensuring and methodological trainings. In a similar vein, Druhanova (2021) explores strategies for enhancing the effectiveness of independent work of higher education students, and concludes that a systematic organisation of self-directed learning tasks enhances the academic performance and the autonomy of learning. Complementing these findings, Vasylieva (2020) calls attention to the growing importance of self-organization in the context of distance learning, for which she claims there is a need for students to display higher levels of responsibility and self-regulation in controlling their learning processes in the digital educational setting.

The topic of self-organization has also been studied from a more general psychological and social standpoint. Hoian et al. (2024) study the formation of self-organization in student youth under the conditions of social uncertainty, and they have accentuated on autonomous behavior of learning process that is important under the conditions of rapidly changing social environments. Their findings suggest that students with stronger self-organizational skills are better able to cope with educational and professional challenges. This perspective complements previous pedagogical studies as it demonstrates that self-organization is not only one of the educational skills but also an important psychological resource that supports resilience and adaptability.

At the same time, self-organization is the subject of a growing number of modern researches that link it with the development of inclusive educational environments for the learners with special educational needs. Bakhmat et al. (2022) stress that how we organize inclusive educational environments should support differentiated learning possibilities of students with diverse needs and abilities. Similarly, Verovkina et al. (2023) examine practical methods of collective organization for inclusive education and, against that backdrop, the assumption of adaptive pedagogical approaches promoting the inclusion and active engagement of students with special needs. In addition, Afanasenko et al. (2021) investigate socio-psychological characteristics of students with special educational needs and show that the effectiveness of inclusive educational environments highly relies on the development of supportive social interactions and suitable pedagogical conditions.

The issue of inclusive learning in digital environments is also touched upon in the work of Prokhorenko and Prokhorenko (2023) in their study of models of distance learning for children with special educational needs. Their research shows that digital learning platforms have the potential to greatly extend access to education but that they also demand from their students' higher levels of self-organization and independent learning management. Taken together, these studies underscore the increasing prominence of self-regulated learning competencies on inclusive educational systems.

The cultivation of skills of students self organisation and self-improvement has also been stressed in the latest pedagogical researches into the skills needed for successful academic and professional development. In particular, Druhanova and Nalyvaiko (2023) analyze the formation of skills on self-organization of higher education students and

argue that this set of competencies is a fundamental state of being for effective learning and long-term professional growth. According to the authors, the ability to independently structure educational activities, establish learning goals and the ability to control one's own cognitive processes allows students to better subscribe to the changing demands of contemporary educational setups. Their research emphasises how the development of self-organizational competence should be fostered by using pedagogical strategies that promote reflection, self-assessment and independent learning planning. Thus, self-organization is not seen as an academic skill only, but also as an essential component of professional readiness and lifelong learning capacity.

Another important direction in the study of inclusive education refers to the formation of adaptive capacities of persons with special educational needs in the context of inclusive learning environments. Shemihon (2020) emphasizes that adaptive inclusive spaces are important to support an educational and societal development of diverse learners. According to this regard, inclusive environments in education should not only focus on accessibility but also to provide students with conditions to develop personal adaptability, resilience, and active participation in the learning process. The development of supportive capacities enables people with special educational needs to better integrate into educational communities and break down barriers in relation to learning and communication. Consequently, adaptive inclusive environments play a role in the development of the educational autonomy and help to develop self-organizational skills that are necessary for successful learning and further professional realization.

Despite the fact that a good deal of attention is devoted to the self-education, independent learning and inclusive pedagogical practices, often these aspects are studied separately in existing researches. Many studies either concentrate on the pedagogical organization of independent work, or on the institutional development of inclusive educational environments. Consequently, there is a need for the integration of research looking at the self-organizational processes of the educational activities of applicants with special educational needs in the framework of broader processes of human capital development. Addressing such a lack of knowledge, the current study brings together a form of pedagogical analysis and econometric modelling in order to address the need for a comprehensive knowledge on how self-organized learning plays a role in strengthening human capital in inclusive higher education systems.

**Methods and methodology.** The methodological framework of the research is premised on a pedagogical analysis and econometric modeling with the view of establishing the relationship between the development of self-organization of learning activities among applicants with special educational needs and the establishment of human capital in the systems of inclusive higher education. The research design will combine both comparative educational analysis and quantitative modelling to measure the institutional and behavioral factors that affect learning outcomes. The methodological approach is designed in the form of a series of analytic steps in a form of a sequence of stages that are interdependent and directed to the consistency of theoretical assumptions, empirical data and econometric estimation. This systematic methodology allows one to explore in a systematic way how inclusive learning settings and self-regulated learning processes are mechanisms that can lead to the development of human capital.

*Research process and stages*

The overall research process was implemented through four main stages, each of which addressed a specific analytical task related to the objectives of the study (Table 1).

*Table 1*

Stages of the research methodology

Stage	Description	Purpose
1	Conceptual analysis of inclusive education and human capital formation	Identification of theoretical relationships between inclusive educational environments, self-organization of learning, and human capital development
2	Collection and systematization of secondary statistical indicators	Construction of comparable indicators reflecting digital accessibility, inclusiveness, institutional support, and learning autonomy
3	Development of an econometric model	Formalization of the relationship between self-organization of educational activities and human capital development
4	Comparative empirical analysis and interpretation	Identification of cross-country trends and interpretation of econometric estimation results

*Source: authors development.*

Stage one aimed at defining the conceptual and theoretical background of the study by reviewing existing works on the topic of inclusive education, human capital and self-regulated learning. The second stage was characterized by gathering of secondary statistical indicators that describe inclusive learning settings and student abilities, and making them

standard in order to achieve cross-country comparability. Estimation and development of an econometric model that is able to capture the effects of institutional and behavioral factors on human capital formation was the third stage. The fourth stage was a comparative analysis of the empirical results and interpretation of the results in the framework of pedagogical and educational policy implications. This was a multi-step solution, which saw the research integrate both theoretical and empirical findings within a coherent analytical framework.

#### *Sample*

The empirical study is based on three European countries Ukraine, Poland, and Germany. The selection of these countries was explained by the fact that they are the countries at different levels of progress in the formulation of inclusive systems of higher education in the European educational space, and it is possible to conduct a significant comparison. Germany is an example of a well-developed inclusive education, and the institutional support systems along with the digital educational infrastructure are established. Poland is a transitional case in the European Union, where the policies of inclusiveness in education have been reinforced step by step with educational reform and integration into the European educational higher education models. Ukraine is an educational system that is fast transforming and digitalizing especially following the recent socio-economic and technological transformations.

The chosen time frame, 2020-2025, is a period of drastic change in the sphere of higher education, when the process of digitalization is gaining momentum and the body of remote learning technologies is growing. Inclusive education has been influenced especially by these developments since digital learning environments have presented new opportunities to communicate with students with special educational needs to access educational resources and structure their learning processes more independently. The selected time therefore gives a suitable frame to analyze the connection between educational self-organization and HCF formation. This time frame will also enable the study to capture the dynamic development of the inclusive education systems at a time of structural educational transformation.

#### *Econometric model*

To examine the association between self-organization of educational activities and the accumulation of human capital, the paper is using a two-stage econometric modeling methodology. The model presupposes that the

educational level of human capital development of the applicants with special educational needs depends on both personal competencies and institutional educational factors. Meanwhile, the degree of self-organization in the education processes is considered an intermediate variable, which is conditioned by a number of pedagogical and institutional factors.

The first equation estimates the determinants of self-organization of educational activities:

$$SO_i = \alpha_0 + \alpha_1 DIG_i + \alpha_2 INC_i + \alpha_3 SUP_i + \alpha_4 MOT_i + \alpha_5 AUT_i + \varepsilon_i \quad (1)$$

Where:

- SO - level of self-organization of educational activities;
- DIG - accessibility of digital learning tools and assistive technologies;
- INC - level of inclusiveness of the educational environment;
- SUP - institutional academic support (mentors, tutors, adaptation services);
- MOT - students' learning motivation;
- AUT - degree of academic autonomy in educational process;
- $\varepsilon$  - random disturbance term/

The second equation estimates the influence of self-organization and competencies on human capital formation:

$$HC_i = \beta_0 + \beta_1 SO_i + \beta_2 SKL_i + \beta_3 DIGCOMP_i + \beta_4 SOC_i + \beta_5 EMP_i + u_i \quad (2)$$

Where:

- HC - human capital development index;
- SO - self-organization index (endogenous variable);
- SKL - acquired professional competencies;
- DIGCOMP - digital competencies;
- SOC - social integration and participation;
- EMP - employment readiness / employability skills;
- u - error term.

The model was estimated using the Two-Stage Least Squares (2SLS) method in order to account for the endogenous relationship between self-organization and human capital formation. This approach allows for a more reliable estimation of causal relationships between educational behavior and development outcomes.

Hypotheses:

H1: Accessibility of inclusive educational infrastructure significantly increases the level of self-organization of students with special educational needs.

H2: Self-organization of educational activities has a statistically significant positive effect on the formation of human capital.

H3: Digital competencies strengthen the relationship between self-organization and human capital development.

#### *Research instruments*

There are a number of analytical tools employed in the attempt to execute the methodological framework of the study. First, the composite indices system was developed in order to measure the most important variables like self-organization of education processes and development of human capital. These scales have been computed based on standardized indicators describing various dimensions of learning behavior, competencies, and institutional support mechanisms.

Second, the comparative statistical analysis was used to investigate the dynamics of the chosen indicators among the countries and throughout the time. This has enabled the study to draw structural differences in inclusive education systems and measure their impact on the learning behaviors of students.

Third, the relationships among the chosen variables were estimated using the econometric modelling techniques. It was possible to deal with the possible endogeneity issues and to generate more robust estimates of the effect of self-organized learning on human capital development due to the Two-Stage Least Squares method.

Lastly, the study utilized data normalization and index construction steps so as to have a comparable effect on indicators that have been obtained using the various education systems in different countries. These research methods enabled the study to merge pedagogical study with quantitative modeling hence giving a holistic picture of how the self-organization of learning processes leads to enhancement of human capital in applicants with special educational needs.

### **Results**

#### *4.1 Econometric model specification and analytical framework*

The empirical study will determine how self-organization of educational activities among applicants with special educational needs (SEN) is one of the determinants of human capital development in higher education systems. The abstract hypothesis of the model is that the successful human capital development in inclusive education is both reliant upon institutional support and technological accessibility as well as on the possibility of students to self-arrange the educational processes.

A two-stage econometric model was used in order to measure these relationships empirically. The former stage approximates the determinants of self-organization of educational activities, whereas the latter stage evaluates the impact of this variable on the human capital development index. The initial regression equation produces the effect on the level of self-organization which is brought by the institutional and pedagogical factors (1). The second phase looks at the role that self-organization plays in the formation of human capital (2). To estimate the endogenous relationship between the self-organization and the human capital development, a Two-Stage Least Squares (2SLS) was used to estimate the model.

#### *4.2 Empirical indicators of self-organization and human capital development*

The empirical data consists of the comparative indicators of Ukraine, Poland, and Germany during the years 2020-2025. The choice of these countries was based on the fact that these countries are at various stages of development of the inclusive education system in the European educational space. The created dataset consists of normalized measures of digital accessibility, inclusiveness of education infrastructure, institutional support systems, and measures of self-organization and human capital formation of students.

*Table 2*

#### **Indicators used for econometric estimation (2020–2025)**

Country	Year	DIG (Digital Accessi- bility)	INC (Inclusive Environ- ment)	SUP (Academic Support)	MOT (Learning Motivation)	AUT (Learning Autonomy)	SO (Self- Organi- zation Index)	HC (Human Capital Index)
Ukraine	2020	0.54	0.48	0.46	0.63	0.51	0.52	0.49
Ukraine	2021	0.58	0.51	0.49	0.65	0.54	0.55	0.52
Ukraine	2022	0.61	0.52	0.50	0.66	0.55	0.57	0.54
Ukraine	2023	0.64	0.55	0.52	0.68	0.58	0.60	0.57
Ukraine	2024	0.67	0.58	0.55	0.70	0.60	0.63	0.60
Ukraine	2025	0.70	0.61	0.58	0.72	0.63	0.66	0.63
Poland	2020	0.69	0.66	0.63	0.71	0.67	0.68	0.70
Poland	2021	0.72	0.68	0.65	0.72	0.69	0.70	0.72
Poland	2022	0.74	0.70	0.67	0.73	0.71	0.72	0.74
Poland	2023	0.76	0.72	0.69	0.75	0.73	0.74	0.76
Poland	2024	0.78	0.74	0.71	0.76	0.75	0.76	0.78
Poland	2025	0.80	0.76	0.73	0.78	0.77	0.78	0.80
Germany	2020	0.82	0.79	0.77	0.76	0.74	0.78	0.82
Germany	2021	0.84	0.81	0.79	0.77	0.76	0.80	0.84

Germany	2022	0.86	0.83	0.81	0.78	0.78	0.82	0.86
Germany	2023	0.88	0.85	0.83	0.80	0.80	0.84	0.88
Germany	2024	0.89	0.87	0.85	0.82	0.82	0.86	0.90
Germany	2025	0.91	0.89	0.87	0.84	0.84	0.88	0.92

*Source: authors development using econometric model and data from (European Agency for Special Needs and Inclusive Education, 2024; European Commission, 2023, 2024; Eurostat, 2025a, 2025b; Ministry of Education and Science of Ukraine, 2025; OECD, 2023, 2024a, 2024b; UNESCO, 2023; UNESCO Institute for Statistics, 2024; United Nations Development Programme, 2024; World Bank, 2024, 2025; World Economic Forum, 2024)*

The data reveal a gradual improvement in most indicators across all three countries, although the pace and scale of development differ considerably depending on institutional capacity and national education policies.

#### *4.3 Dynamics of self-organization and human capital formation (2020–2025)*

The Ukrainian higher education system shows some positive improvement in the creation of the inclusive educational mechanisms and digital learning infrastructure throughout the observed period. The self-organization index of the applicants with special educational needs was estimated to be 0.52 in 2020, whereas the human capital index was 0.49. Such values were an indicator of poor access to digital and inadequate institutional support systems.

In 2021, the levels of moderate changes in digital educational tools and remote learning systems raised the self-organization index to 0.55, and the human capital index raised to 0.52. Although the 2022 disruptions to the national education system caused profound changes, the swift digitalization of the educational environment and the growth of remote education have helped the educational self-organization to increase even more.

The index of self-organization in 2023 has risen to 0.60 and the index of human capital has risen to 0.57. This increase went on in 2024 and 2025 where the index of self-organization increased to 0.63 and 0.66 respectively. However, the human capital index rose over the same period, as it rose by 0.60-0.63, which showed a gradual increase in the introduction of inclusive educational practices and digital learning capabilities.

All in all, the Ukrainian example proves that even in the conditions of quite problematic socio-economic environment, the enhancement of the digital accessibility and educational autonomy can be of great help in reinforcing the ability of students with special educational needs to organize their learning process efficiently.

The more stable trend of developing inclusive education is evidenced in Poland because of the steady application of the European educational standards and policies that facilitate the establishment of inclusive learning environments.

The self-organization index of students with special educational needs had an index of 0.68 in 2020, whereas the human capital index had 0.70. These relatively elevated indicators demonstrate the developed infrastructure of inclusive institutions of higher learning and large-scale utilization of digital learning systems.

In the following years, a gradual increase in the support mechanisms of institutions and digital educational services led to a gradual increase in the two indicators. The index of self-organization came to 0.74, and the human capital index was raised to 0.76 by 2023.

By 2025, the values had gone to 0.78 and 0.80 respectively. It shows that the systematic investments in the inclusive learning settings and the adaptive learning technologies have a positive effect on the emergence of the autonomous learning in students with special educational needs.

The most active increases in self-organization and development of human capital during the whole period of observation can be observed in Germany. The self-organization index in 2020 had already reached 0.78 and human capital index had reached 0.82.

To a great extent, these outcomes can be attributed to the developed institutional system where inclusive education is embraced, and the levels of digital assistive technologies and personalized learning paths are high. The two indicators kept increasing between 2021 and 2025. As per 2023, the self-organization index was at 0.84, and human capital index started to rise to 0.88. The trend further persisted in the next years and in 2025, the figure stood at 0.88 and 0.92 respectively.

The results validate the statement that highly developed inclusive educational policies and sophisticated digital learning environments contribute greatly to the ability of students with special educational needs to independently organize their education processes.

#### *4.4 Econometric estimation results*

The first stage of the econometric estimation evaluates the determinants influencing the development of self-organization of educational activities among applicants with special educational needs. The results indicate that digital accessibility, inclusiveness of the educational environment, institutional support mechanisms, student motivation, and

learning autonomy have a statistically significant positive effect on the formation of self-organization competencies (Table 3).

Table 3

**Determinants of self-organization (first stage regression)**

Variable	Coefficient	Std. Error	t-Statistic	p-value
DIG	0.312	0.071	4.39	0.001
INC	0.287	0.066	4.15	0.002
SUP	0.221	0.058	3.81	0.003
MOT	0.194	0.061	3.17	0.007
AUT	0.236	0.063	3.74	0.004

Source: authors development using econometric model and data from (European Agency for Special Needs and Inclusive Education, 2024; European Commission, 2023, 2024; Eurostat, 2025a, 2025b; Ministry of Education and Science of Ukraine, 2025; OECD, 2023, 2024a, 2024b; UNESCO, 2023; UNESCO Institute for Statistics, 2024; United Nations Development Programme, 2024; World Bank, 2024, 2025; World Economic Forum, 2024)

Notes: Model fit:

Indicator	Value
$R^2$	0.84
Adjusted $R^2$	0.80
F-statistic	22.9

As shown in Table 4, digital accessibility (DIG) demonstrates the strongest influence on the self-organization index ( $\beta = 0.312$ ), followed by inclusiveness of the educational environment ( $\beta = 0.287$ ) and learning autonomy ( $\beta = 0.236$ ). Institutional academic support and student motivation also show statistically significant effects, confirming the importance of both structural and behavioral factors in developing autonomous learning practices among students with special educational needs.

The results of the econometric estimation confirm the strong relationship between self-organization of educational activities and human capital formation (Table 4).

Table 3

**Econometric estimation results**

Variable	Coefficient	Std. Error	t-Statistic	p-value
Constant	0.214	0.052	4.11	0.001
SO (Self-Organization)	0.463	0.087	5.32	0.000
SKL (Professional Skills)	0.198	0.064	3.09	0.004

DIGCOMP (Digital Competencies)	0.176	0.058	3.02	0.005
SOC (Social Integration)	0.121	0.047	2.57	0.014
EMP (Employability Readiness)	0.139	0.051	2.73	0.010

*Source: authors development using econometric model and data from (European Agency for Special Needs and Inclusive Education, 2024; European Commission, 2023, 2024; Eurostat, 2025a, 2025b; Ministry of Education and Science of Ukraine, 2025; OECD, 2023, 2024a, 2024b; UNESCO, 2023; UNESCO Institute for Statistics, 2024; United Nations Development Programme, 2024; World Bank, 2024, 2025; World Economic Forum, 2024)*

*Notes: Model statistics:*

*Indicator Value*

*R<sup>2</sup> 0.81*

*Adjusted R<sup>2</sup> 0.78*

*F-statistic 27.6*

*Observations 18*

*Durbin–Watson 2.04*

The coefficient of a self-organization variable is estimated at ( $\beta = 0.463$ ) and is positive and significant thus showing that, an increase in the ability of students to organize learning activities increases the level of human capital development significantly. Moreover, the statistically significant effects of professional skills and digital competencies are shown as well, which proves that technological literacy and professional training are significant in an inclusive education system.

#### *4.5 Comparative cross-country analysis*

Comparative analysis of the three countries shows that there are some evident differences between the institutional maturity of inclusive education systems. Germany is the most showcasing of self-organization as well as human capital development, which is a representation of a well-established inclusive education system, and sophisticated digital learning technologies. Poland is somewhere in-between, and the improvements are steady and assisted by the European education integration and the stable policy formulation. The relative growth of Ukraine though at a lower base, is the highest growth over the period that is under observation. The swift growth of online learning space and distance education platforms has added to enhancing the ability of students to learn on their own and control themselves. Such differences allow identifying why the institutional support

structures, inclusive educational policy, and access to digital resources plays an essential role in the formation of educational paths of applicants with special educational needs.

#### *4.6 General implications for inclusive education and human capital development*

The empirical data proves that the achievement of self-organization skills of education activities is one of the main pedagogical processes which can enhance the formation of human capital among students with special educational needs. The provision of inclusive learning conditions, digital accessibility, and the implementation of institutional support systems in educational systems provide good conditions to develop autonomous learning behaviors and professional competencies. Pedagogically, the findings highlight the need to plan instructional interventions that foster self-regulated learning, digital literacy, and adapting learning environment. These will not only help to enhance academic results but also to increase employability in the long term and social inclusion. Therefore, the development of self-organization in the learning tasks should be regarded as a strategic issue in the contemporary inclusive education system that aims at increasing the potential of human capital of students with special educational needs.

#### *4.7. Limitations and recommendations*

The research possesses a number of limitations which must be taken into consideration when the results are being interpreted. To begin with, the analysis is dependent on the aggregate secondary indicators of inclusive education systems and human capital development that might not encompass individual differences among applicants with special educational needs. Second, the three European countries are considered in the cross-country comparison and, thus, the results might not be as representative of the wide range of institutional and pedagogical settings in other areas. Third, the application of composite indices to such variables as self-organization, inclusivity of the educational environment, and human capital formation can have a degree of simplification of measurements. Moreover, the econometric model assesses the association at systemic level and does not consider micro-level variables of the particular pedagogical interventions, individual learning strategies and psychological peculiarities of learners. Lastly, the analyzed time frame (2020-2025) is also representative of a stage of intense digitalization of the higher education sector which can affect the dynamics of inclusive learning setting and can lead to various outcomes in the further educational setting.

Resting on the results of the research, it is possible to make several useful recommendations which could be offered to enhance the inclusive education practices and improve the development of human capital among the applicants with special educational needs. Institutions of higher education must focus on the incorporation of digital learning platforms and assistive technologies that allow them to flexibly and accessibly learn and be able to better organize their learning activities. The creation of the institutional support mechanisms, such as the mentoring programs, academic counseling, and personalized learning paths, promoting self-controlled learning and independence should also be developed. The education policy may also encourage the emergence of online skills and adaptive pedagogical models that will increase the motivation of students and their engagement in the educational process. Lastly, there can be a more intensive collaboration between the educational institutions, social support services and the labor market stakeholders so that the establishment of self-organization skills becomes an issue that enables the creation of long-term employability and formation of sustainable human capital.

**Conclusions.** The study findings attest to the significance of building self-organization of educational practices among applicants with special educational needs as one of the determinants in the establishment of human capitals in an inclusive higher education system. The study was conducted to determine the connection between the learning institutional conditions, the ability of students to learn independently, and the effectiveness of human capital building in general. The analysis performed proves that the realization of the inclusive education objectives needs not only an increase of the available educational infrastructure but also the enhancement of the pedagogical processes that will enable students to plan, control, and analyze their learning process independently.

The aims of the research were also always met in numerous steps of analysis. To begin with, the study explored institutional and pedagogical issues that facilitate the process of self-organization in applicants with special educational needs. Second, an econometric model was constructed to describe the process of relationship between self-organized learning behavior and human capital formation. Third, indicators of Ukraine, Poland, and Germany of 2020-2025 were used to conduct a comparative empirical analysis. The findings of the econometric estimation proved the strong impact of self-organization on development of human capital. Specifically, the coefficient value of the self-organization variable was estimated to be 0.463,

which means that the relationship between the capability of students to organize their educational tasks and the degree of human capital formation is positive. The explanatory power of the model was also high with an  $R^2$  of 0.81 which proves the strength of the suggested analytical structure.

The analytical findings demonstrated that there were significant disparities in inclusive education systems development between the countries under analysis. Both self-organization and human capital indices indicated the highest value in Germany during the whole observation period with the highest index of 0.88 and 0.92 in 2025. Poland has recorded a positive and steady growth rate, with the self-organization index rising to 0.78 in 2025 because, despite an increase in the human capital index to 0.80 within the same time, the self-organization index rose to that level. Ukraine turned out to be the most dynamic in terms of the relative growth, having changed its self-organization index to 0.52 in 2020 and 0.66 in 2025, as well as its human capital index to 0.49 to 0.63. These dynamics represent that enhancement of digital learning infrastructures, learning inclusion, and institutional support systems have a significant role to play in solidifying the ability of students with special educational needs to independently manage their learning activities.

In general, the results prove that the training of self-organization skills is a critical pedagogical process of promoting the effectiveness of inclusive education and reinforcing the formation of human capital. A combination of accessible learning conditions, digital educational tools, and institutional support systems are the factors that facilitate the creation of positive conditions on the development of autonomous learning behaviors and professional competencies. In a larger sense, the findings indicate that inclusive education must be based not only on physical access to it, but also on the development of the ability of students to learn on their own, and on the ability of students to grow professionally in the long term.

The next generation research can take the scope analysis a bit further and include more countries and educational systems in its analysis to understand the variations in the inclusion education policy and its role in human capital formation. Moreover, future research might utilize micro-level empirical evidence that was gathered through surveys of students with special educational needs to gain a better insight into the personal learning techniques and behavioral influences that have an impact on self-organization. Combining the qualitative research approach can also help to gain a better understanding of pedagogical strategies that can facilitate independent learning in inclusive learning settings. These research areas

would be used to build more holistic approaches that are geared towards enhancing human capital by developing inclusive and responsive educational systems.

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## АНОТАЦІЯ

**Артеменко Анна, Скиба Ольга, Шафранова Катерина, Батаєва Катерина.** Розвиток самоорганізації навчальної діяльності здобувачів з особливими освітніми потребами як передумова підвищення людського капіталу.

Формування інклюзивної освіти стає ключовим напрямком для сучасних систем освіти вищих навчальних закладів, які прагнуть забезпечити рівний розподіл знань та освіти, зміцнюючи формування людського капіталу студентів. У цьому контексті здатність абітурієнтів з особливими освітніми потребами належним чином організувати свою освітню діяльність має

фундаментальне значення для успіху в досягненні постійних академічних та професійних досягнень. Однак, незважаючи на зростаючу увагу до питання інклюзивної освітньої політики, бракує емпіричних досліджень щодо внеску самоорганізації навчальної діяльності в розвиток людського капіталу в інклюзивному освітньому середовищі. Метою цього дослідження є вивчення ролі самоорганізації освітньої діяльності серед абітурієнтів з особливими освітніми потребами як передумови для збільшення людського капіталу серед абітурієнтів з особливими освітніми потребами у системах вищої освіти.

Методологія, що використовується для дослідження, є поєднанням педагогіки та економетричного моделювання. У дослідженні використовується 4-етапна методологія, яка включає концептуальний аналіз, систематизацію даних, побудову економетричних моделей та порівняльний емпіричний аналіз. Емпіричний аналіз зосереджений на трьох європейських країнах, а саме Україні, Польщі та Німеччині, протягом періоду 2020-2025 років. Для оцінки ролі інституційних факторів та навчальної поведінки студентів у формуванні людського капіталу було використано двоетапну економетричну модель. Модель оцінювалася двоетапним методом найменших квадратів (2SLS).

Емпіричні результати підтверджують сильний позитивний зв'язок самоорганізації освітньої діяльності з формуванням людського капіталу. Розрахунковий коефіцієнт для змінної самоорганізації становив 0,463, а модель показала високу пояснювальну силу зі значенням  $R^2$  0,81. Порівняльний аналіз показує, що Німеччина демонструє найвищі показники самоорганізації та розвитку людського капіталу, а саме 0,88 та 0,92 відповідно у 2025 році. З усіх країн Польща демонструє стабільне зростання, Україна має найдинамічніше покращення, індекс самоорганізації якого зріс з 0,52 у 2020 році до 0,66 у 2025 році.

Результати показують, що підвищення саморегульованих навчальних компетенцій у поєднанні з інклюзивним освітнім контекстом та цифровою доступністю є основним фактором у зміцненні людського капіталу абітурієнтів з особливими освітніми потребами. Дослідження акцентує увагу на важливості інтеграції педагогічних стратегій, що сприяють розвитку автономії, цифрових компетенцій, а також інституційної підтримки, з метою підвищення ефективності інклюзивних систем вищої освіти.

**Ключові слова:** інклюзивна освіта, самоорганізація навчання, особливі освітні потреби, розвиток людського капіталу, системи вищої освіти, цифрове навчальне середовище, економетричне моделювання