Revista Românească pentru Educație Multidimensională
ISSN: 2066-7329 | e-ISSN: 2067-9270
Covered in: Web of Science (WOS); EBSCO; ERIH+; Google Scholar; Index Copernicus; Ideas RePeC; Econpapers; Socionet; CEEOL; Ulrich ProQuest; Cabell, Journalseek; Scipio; Philpapers; SHERPA/RoMEO repositories; KVK; WorldCat; CrossRef; CrossCheck

2022, Volume 14, Issue 3, pages: 101-125 | https://doi.org/10.18662/rrem/14.3/600
Submitted: December 21st, 2021 | *Accepted for publication:* February 25th, 2022

School Education Financing in the Context of Decentralization: Cases of Ukraine

Sergiy LONDAR[1], Valentyna GAPON[2], Andrii LYTVYNCHUK[3], Hanna TERESHCHENKO[4], Lidia LONDAR[5]

[1] Dr. Sc. (Economics), Professor, SSI «Institute of Educational Analytics», Kyiv, Ukraine, londar.sergiy@gmail.com, https://orcid.org/0000-0003-1838-288X
[2] Ph. D. (Pedagogical), SSI «Institute of Educational Analytics», Kyiv, Ukraine, gapon@mon.gov.ua, https://orcid.org/0000-0001-7521-5450
[3] Ph. D. (Economics), SSI «Institute of Educational Analytics», Kyiv, Ukraine, a.litvinchuk@iea.gov.ua, https://orcid.org/0000-0002-7523-558X
[4] Ph. D. (Economics), SSI «Institute of Educational Analytics», Kyiv, Ukraine, tganna@ukr.net, https://orcid.org/0000-0002-9458-2843
[5] Ph. D. (Economics), The Ukrainian State Center for International Education of the Ministry of Education and Science of Ukraine, Kyiv, Ukraine, londarlidia@gmail.com, https://orcid.org/0000-0002-0873-5664

Abstract: The article explores the issues of school education financing in the context of decentralization in Ukraine. School education in Ukraine is funded from different sources. About a third of the total education budget consists of the education subvention for teachers' salaries, which is an inter-budget transfer from the state budget to local budgets. For the purpose of our research, we selected a network of schools in the Zaporizhia region of Ukraine and its financing for the period of 2014-2021. This region is typical, plain, and without significant geographical features (unlike, for example, areas with mountainous or inaccessible areas). To identify the framework of financing school education in Ukraine within the decentralization process, we utilized methods of empirical analysis of statistical indicators, as well simulation to assess the relationship between a number of indicators such as the number of students in the school, class size and the average costs of education per student using educational subvention. The purpose is to determine opportunities to increase the efficiency of budget expenditures on education. Our analysis of the use of educational subvention funds by the different types of local budgets shows that the schools financed from city budgets use these funds with the most efficiency. The schools funded from regional budgets and district budgets use the funds with the least efficiency. Our research is very valuable for improving theoretical and empirical aspects of the calculation of the projected amount of the educational subvention, as well as for the optimization of the school network.

Keywords: *Decentralization of education financing, budget funding of school education, educational subvention.*

How to cite: Londar, S., Gapon, V., Lytvynchuk, A., Tereshchenko, H., & Londar, L. (2022). School Education Financing in the Context of Decentralization: Cases of Ukraine. *Revista Românească pentru Educație Multidimensională, 14*(3), 101-125. https://doi.org/10.18662/rrem/14.3/600

©2022 Published by LUMEN Publishing. This is an open access article under the CC BY-NC-ND license http://creativecommons.org/licenses/by-nc-nd/4.0/

Introduction

The development of education in Ukraine has been going on for three decades and is deeply connected to the evolution of its independence. Complex work required to create a national education system that focuses on the needs of society and the Ukrainian economy is being done. The state made it its policy to deepen European integration and promote European educational standards. The key part of the education of the citizens in Ukraine, as in any other European country, is school education. It covers a long period (usually from the age of 6 until 18) and has the broad educational content that students need to learn. That period of life is dedicated to the formation of the person as an individual, besides, important socialization skills are acquired.

The transformation of the school education system in Ukraine today takes place within the framework of the decentralization reform, with the purpose to increase the participation of local communities in governance and improving their accountability to their residents. Among the public services provided by local authorities are educational services in the segment of preschool and general secondary education. An important prerequisite for the joint success of decentralization reform and educational reform is the improvement of the mechanism for financing school education.

European best practices of decentralization show a range of important patterns, including the transformation of the system of local financial support for education. As part of this process, local governments in European countries have been reformatted, their total number has decreased significantly due to increasing urbanization processes and requirements for improving the efficiency of public services at the local level. Initially, such processes began in the countries of northern Europe, where governments decided to consolidate the territorial units to the extent that local governments would be able to reliably implement government social programs. As a result, territorial communities have been significantly enlarged, and they were allocated reliable sources of income. For example, in Denmark, where the decentralization process began in 2007, 65% of all budget expenditures are currently financed from local budgets, 53% of which are from local government budgets and 12% from regional budgets (Danylyshyn & Pylypiv, 2016).

Despite the fact that Ukraine achieved important changes in the area of decentralization, local authorities do not yet have a sufficient basis for generating income for their budgets. This led to the search for new budgetary instruments. In 2010, the Budget Code of Ukraine was enacted. It

contains a number of new principles of budget financing, including the principle of subsidiarity, which is a way of allocating expenditures between the state budget and local budgets, based on the need to bring public services closer to their direct consumers. Since 2015, a new budget instrument, the education subvention, has been widely utilized to provide local authorities with the capacity to finance general secondary education in Ukraine. In accordance with Article 103-2 of the Budget Code of Ukraine, these funds are transferred from the state budget to local budgets and are directed to cover the salaries (with accruals) for those teachers who provide general secondary education in schools and other institutions, where secondary education is provided.

The purpose of this study is to identify the patterns of financing of general secondary education in Ukraine amidst the decentralization process. The authors used simulation to assess the relationship between a number of indicators such as the number of students in the school, class size and the average costs of education per student using educational subvention in order to determine opportunities to increase the efficiency of budget expenditures on education.

Literature Review

Nowadays, scientists note the crucial importance of human capital development in ensuring economic growth. Human capital is called the driving force of the national economy (Linhartová, 2020). Human capital covers human health, as well as their knowledge, talents, skills, abilities, experience, and intelligence, embodied in the training of the workforce through its education. Financial support for education is one of the frequently discussed topics of state policy (Chlebounová, 2019). Considering all this, the public interest in the efficiency of utilizing public resources is growing, and the ratio of price and quality of educational services is of particular interest (Meričková et al., 2020). Researchers are conducting studies on the possibilities of creating and implementing innovative mechanisms for financing education (Yahya & Hildayanti, 2020), which would improve the quality of education (Ito et al., 2018).

An important aspect of research is the development of education in the context of increasing decentralization. This is a global trend. Decentralization processes are taking place on all continents with varying degrees of success and with the adoption of national features. For example, Egyptian researchers have shown that decentralization has a significant impact on education reform (Allam, 2021). The role of decentralization is to

create incentives to increase the efficiency of the allocation of local financial resources for education.

American researchers also argue that decentralization can increase fiscal autonomy and improve funding for local school districts (Adams, 2020).

The researchers achieved several conclusions studying the results of the decentralization reform in Chile, which began in the 1980s when the management of public school education was transferred to municipalities. First, selective decentralization towards more autonomous municipalities has proven to be the best approach to public education policy; secondly, municipal governments still have varying degrees of autonomy, so it is necessary to implement a more effective system of fiscal equalization (Letelier & Ormeño, 2018).

The scholars also researched the relationship between the process of decentralization and changes in the quality of education, primarily based on the results of the international PISA assessment. In particular, Chinese researchers found that decentralization had a positive effect on the results demonstrated by students (data from the Shanghai PISA International Student Assessment Program 2012) (Xiang, 2017). At the same time, European scientists have come to the opposite conclusions. Based on PISA-2015 empirical data for many countries, they argued that decentralization has not always been effective (Kameshwara et al., 2020).

A number of studies have considered the features of the allocation of financial resources for education in the setting of decentralization. In particular, it is shown that in general a more efficient use of budget funds is ensured under these conditions. After all, inequality in the allocation of financial resources occurs more frequently within high centralization, which results in the segregation of educational institutions and the decline of the quality of educational services (Rowe & Perry, 2020).

In Ukraine, where decentralization reform is implemented, the issue of the division of authorities at the local level is also relevant, including the structure of education expenditures (Kotsovska, 2014). Decentralization in education is one of the key areas of sectoral decentralization (Kyrylenko & Marchuk, 2018). It is emphasized that the overlapping of two reforms, namely the reform of the education system and the reform of decentralization in Ukraine, can be successful, especially in ensuring significant changes of the local finances framework, and in creating conditions for more efficient use of budget funds for education (Aleksandrova, 2015).

There are similar issues in other post-Soviet republics. Kazakh researchers pointed out that insufficient funding and inefficient allocation of budget resources can lead to the weak competitiveness of national education (Aryn & Issakhova, 2018).

Ukrainian scientists attempted to identify key issues relating to improving the efficiency of allocation and utilization of the budget funds for education, finding alternative sources of attracting financial resources at the local level (Kovalenko & Koskina, 2017). It was determined that to reach this goal it is important to achieve several tasks, including the adequate division of functions and authorities between central and local executive bodies regards to education management, strengthening the institutional capacity of educational institutions, etc (Lopushinskiy & Kovnir, 2017).

European researchers determined the creation of regulatory norms for the allocation of funding as an important aspect of decentralization (Nikolai et al., 2019; Ozkok, 2017). In particular, we are talking about the legal mechanism for the allocation of budget funds considering ensuring co-financing of the education system by state and local budgets. Researchers of the best practices in Poland have shown that a significant issue is the lack of legislation that would ensure effective co-financing of education from the state budget, local government budgets and private sources (Kowalska, 2016).

In 2010, Ukraine created the legal prerequisites for the implementation of the principle of subsidiarity regarding the allocation of expenditures between state and local budgets (Verkhovna Rada of Ukraine, 2010). The abovementioned principle entails the provision of public services as close as possible to their direct consumer. Since 2015, the framework for financing general secondary education in Ukraine has been expanded to include another budgetary instrument, namely a subvention for educational needs in the form of inter-budget transfer from the state budget to local budgets. The purpose of the subvention is to cover the salaries (with accruals) of teachers. Since the quality of teaching determines the quality of the educational system, the financing of teachers' salaries is a very important factor.

The facts as described above confirm the relevance of this article while searching for successful practices of financing secondary education under decentralization processes, the usage of inter-budget transfers of funds for the development of education, improvement of the financial mechanism for allocating budget funds for education at the local level in general.

Methods

We used data from the State Statistics Service of Ukraine and the Ministry of Education and Science of Ukraine on school statistics, and the State Treasury Service of Ukraine on the amount of educational subvention for our empirical analysis. Our study used statistical and financial information on the activities of general secondary education institutions as the initial data. The information system EMIS (Education Management Information System) was utilized for the collection, processing and analysis of the data. It is designed to improve the efficiency of the authorities in the field of education at all functional levels under the conditions of decentralization and to create the public-private model of education management. The primary indicators of statistical information include data on the number of schools, number of classes, contingent of students, number of teachers in schools of the Zaporizhia region, taken from the official statistical reporting forms of the State Statistics Service of Ukraine. Financial indicators are the annual amount of the educational subvention used by general secondary education institutions for the remuneration of labor of the teachers. They are created by the bodies of the State Treasury Service of Ukraine.

For the purpose of our research, we selected a network of schools in the Zaporizhia region of Ukraine and its financing for the period of 2014-2021. The Zaporizhia region of Ukraine is a typical, plain region, without significant geographical features (unlike, for example, areas with mountainous or inaccessible areas).

Let us note that Ukraine uses the government's Formula for allocating educational subvention funds to local budgets (Cabinet of Ministers of Ukraine, 2015). The Formula is reviewed annually considering the changes in the number of students in a given area and the estimated class size. The main purpose of using the Formula is to increase the transparency of the allocation of educational subvention funds and to create incentives for local governments to optimize the network of schools at the level of separate territorial units. The point of the incentive is that in the case of underfilled schools with low class sizes or excessive numbers of teaching staff, the relevant local budgets should cover the deficit of the educational subvention for teachers' remunerations from their own income.

Table 1 shows the data on the amount of educational subvention funds allocated from the state to local budgets to finance teachers' remunerations and the balance of subvention funds for Ukraine in general during 2016-2020.

Table 1. *The amount of educational subvention funds allocated from the state to local budgets, and the balance of subvention funds during 2016-2020*

Budget year	Amount of educational subvention funds (budget program 2211190), bln hryvnia	Balance of subvention funds on the accounts of the local budgets on the January 1st of the year, following the budget year, bln hryvnia	Share of the balance of the subvention funds in the total subvention for education, %
2016	44,6	2,4	5,4
2017	51,6	4,1	7,9
2018	60,4	4,1	6,8
2019	69,6	5,3	7,6
2020	80,7	5,3	6,6
2021	99,6		Average: **6,9%**

Source: https://www.treasury.gov.ua/ua/file-storage/vikonannya-derzhavnogo-byudzhetu; https://www.treasury.gov.ua

As shown in Table 1, the annual balances of the educational subvention left in local budgets are on average 6.9% of the total. This means that the allocation of funds is not always expedient, so the Formula requires improvement for the purpose of increasing the efficiency of the budget funds utilization.

To assess the opportunities to increase the efficiency of budget expenditures on educational institutions, a number of indicators were used in our study, such as the average class size, the average number of students per teacher, and the number of teachers. These indicators were compared with financial indicators, for example, the cost of education per student using the educational subvention, etc. The research was conducted using simulation at the different levels of local budget (regional budget, city budget, district budget, budgets of united territorial communities). Besides, the administrative-territorial units of the Zaporizhia region were utilized for a given budget level.

Analytical indicators such as school occupancy, class size, average annual costs per student, average annual costs per class, average salary per teacher in schools by budget levels (regional budget, city budgets, district budgets, budgets of united territorial communities) were calculated to facilitate our research.

The relationship between the expenditures per student and the class size in schools funded from local budgets of all levels in the Zaporizhia region is described by the linear equation $y = -1042.9x + 40179$, its coefficient of determination is $R^2 = 0.4197$.

The relationship between the expenditures from all budget levels using educational subvention and the number of students in schools funded from the given local budget in the Zaporizhia region is described by the linear equation $y = 13.343x + 12173$, its coefficient of determination is $R^2 = 0.8919$.

The relationship between the expenditures per student and the class size in schools funded from district budgets in the Zaporizhia region is described by the linear equation $y = -1295.4x + 44044$, its coefficient of determination is $R^2 = 0.7679$.

The relationship between the expenditures from district budgets using educational subvention and the number of students in schools funded from district budgets in the Zaporizhia region is described by the linear equation $y = 20.022x + 5155.1$, its coefficient of determination is $R^2 = 0.9597$.

The relationship between the expenditures per student and the class size in schools funded from the budgets of united territorial communities in the Zaporizhia region is described by the linear equation $y = -1092x + 39779$, its coefficient of determination is $R^2 = 0.7607$.

The relationship between the annual expenditures from the budgets of united territorial communities using educational subvention and the number of students in schools funded from the given budgets of united territorial communities in the Zaporizhia region is described by the linear equation $y = 18.394x + 2546.5$, its coefficient of determination is $R^2 = 0.9560$.

Results

As of December 31, 2020, the administrative-territorial structure of the Zaporizhia region included 4 regionally governed cities, 16 districts, 48 united territorial communities (UTC).

The pattern of the network of day schools of all forms of ownership and governance in the Zaporizhia region for the period of 2014/2015-2020/2021 academic years indicates a gradual decrease in the total number of schools (by 71 units or 11.8%). At the same time, there was a decrease of only 6 units (2.2%) in the cities, and by 65 units (19.8%) in rural areas (Figure 1).

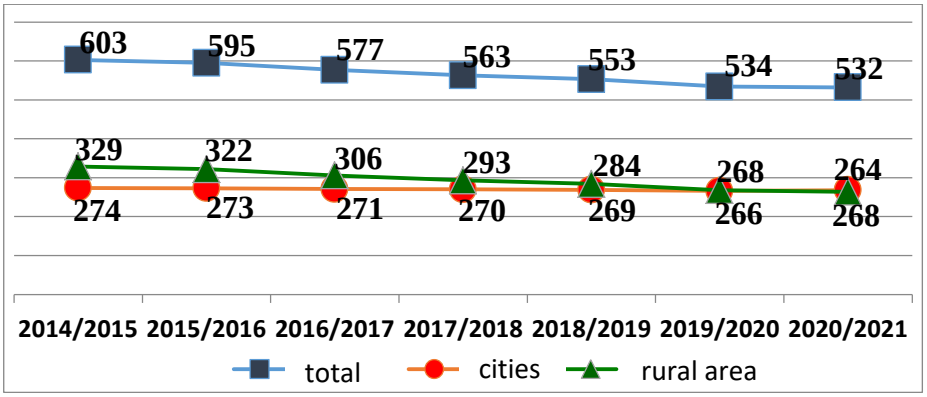


Fig. 1. *The pattern of the network of day schools in the Zaporizhia region for the period of 2014/2015-2020/2021 academic years*
Source: Authors' own conception

Such a decrease in the number of schools in the Zaporizhia region is due, in particular, to their consolidation and obtaining the status of hub schools with branches. The purpose of their creation is to ensure equal access of all children to better education, effective and efficient use of resources, streamlining the school network as a part of school education reforms and decentralization. There were 33 hub schools in the region containing 13.347 students at the beginning of the 2020/2021 academic year, 15 of them were in urban settlements (8.750 students), 18 schools were in rural areas (4.597 students). 28 branches (2.349 students) were created, 9 of them in urban settlements (1.029 students), 19 of them in rural areas (1.320 students). The number of underfilled schools in the region has significantly decreased. Currently, there are two I-level schools with 20 or fewer students, ten I-II level schools with 40 or fewer students, and one hundred I-III level schools with 100 or fewer students. All of them are mostly located in rural areas.

Figure 2 demonstrates the pattern of the number of students in day schools in the Zaporizhia region, it indicates an increase in their number compared to the 2014/2015 academic year by 14.099 students (by 9%). There was an increase of 15.459 students (by 12.7%) in urban settlements, and there was a decrease of 1.360 students (by 3.8%) in rural areas.

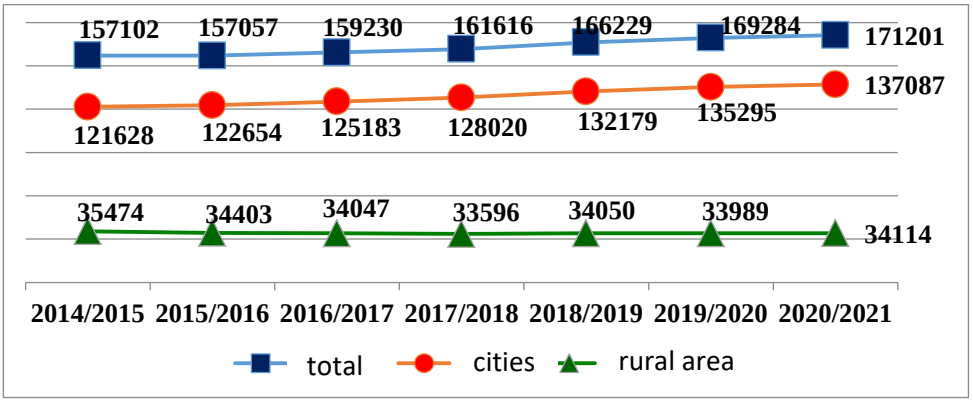


Fig. 2. *The pattern of the number of students in day schools in the Zaporizhia region for the period of 2014/2015-2020/2021 academic years*
Source: Authors' own conception

Figure 3 shows the pattern of the number of teachers in day schools, it indicates a decrease of 431 people (by 2.5%) compared to the 2014/2015 academic year in the region as a whole. In particular, there was an increase of 177 persons (by 1.5%) in urban settlements, and there was a decrease of 608 persons (by 10.4%) in rural areas.

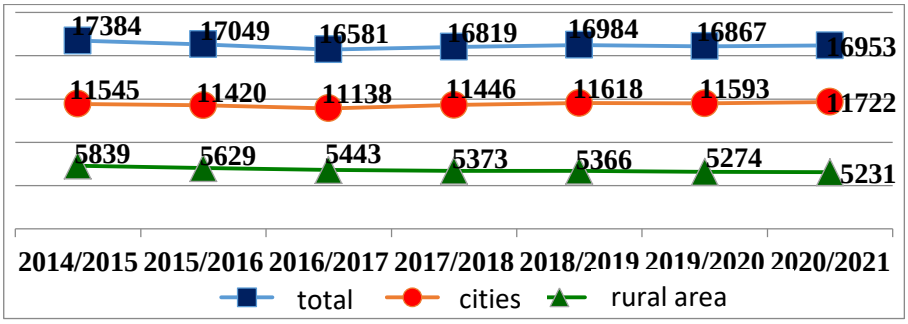


Fig. 3. *The pattern of the number of teachers in day schools in the Zaporizhia region for the period of 2014/2015-2020/2021 academic years*
Source: Authors' own conception

Figure 4 presents the pattern of educational subvention funds received by local budgets in the Zaporizhia region, it indicates that during the years 2015-2021 the amount of educational subvention for the remuneration of teachers increased by 2.31 times.

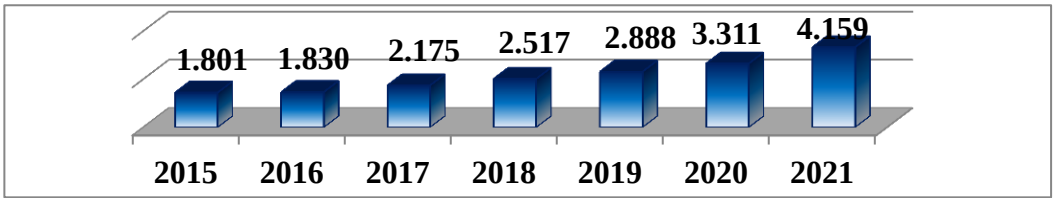


Fig. 4. *The amount of educational subvention funds allocated to the local budgets in the Zaporizhia region, bln hrywnia*
Source: Authors' own conception

The educational subvention for the remuneration of the teachers amounted to UAH 3.242 billion in 2020. The lion's share of those funds was used for public schools, namely UAH 3.130 billion, whereas only UAH 3.7 million were directed for private schools, and UAH 31.7 million were channelled to Inclusive Resource Centers (IRC). Additionally, vocational education institutions received UAH 51.8 million, and professional pre-higher education institutions were assigned UAH 24.8 million.

It is possible to measure indirectly the efficiency of the budget used by educational institutions utilizing a number of indicators, such as the cost of education per student at the expense of the educational subvention. Figure 5 shows those costs by the levels of local budgets of the Zaporizhia region, together with the average class size (number of students) in educational institutions financed from these budgets in 2020.

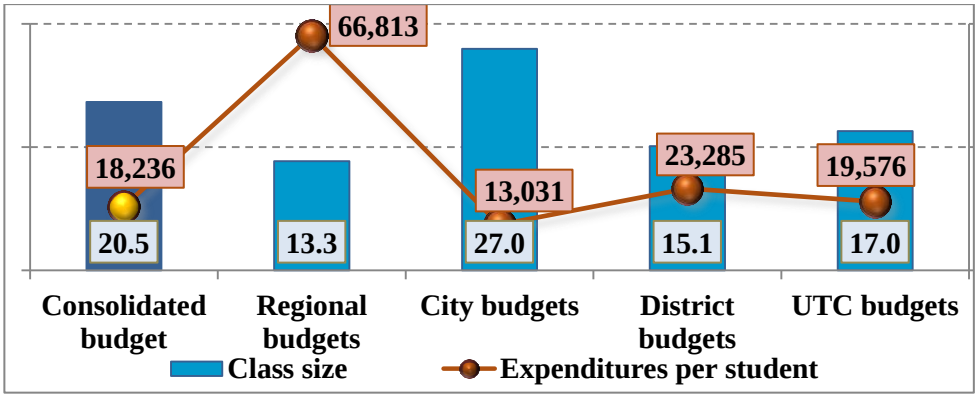


Fig. 5. *Average expenditures per student (UAH) and average class size (persons) of public schools in the Zaporizhia region by local budget levels (2020)*
Source: Authors' own conception

As can be seen from Figure 5, for educational institutions financed by regional budget the ratio of these indicators is UAH 66.813 per student, and 13.3 students in a class, for those funded by city budgets the ratio is UAH 13.031, and 27.0 students, for schools financed by district budgets the ratio is UAH 23.285, and 15.1 students, for institutions funded by the UTC budgets the ratio is UAH 19.576, and 17.0 students. These data show that the lowest average level of budget expenditures is for schools financed by city budgets, while they have the highest class size.

Our calculations demonstrate that in 2020 the average cost per student for the consolidated budget was UAH 18.236 in the Zaporizhia region as a whole, the average class size was 20.5 students.

Figure 6 offers information on the number of students per teacher (typical teacher's workload), and the average salary in public schools using educational subvention by the budget levels.

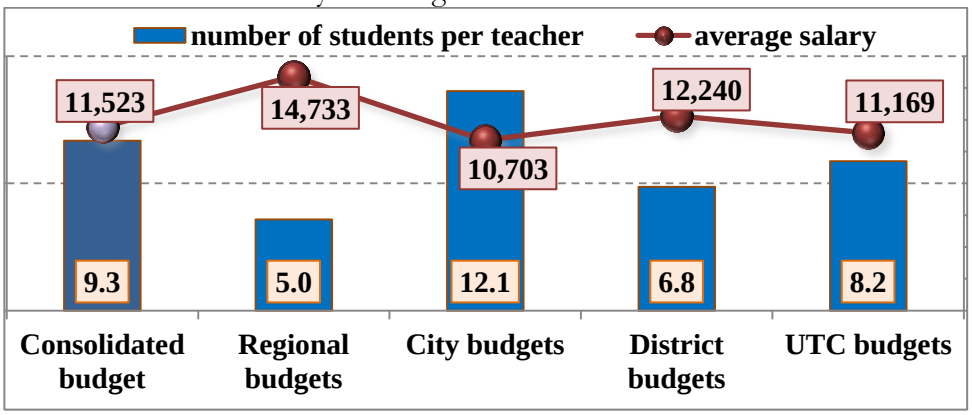


Fig. 6. *The number of students per teacher (persons) and the average monthly salary (UAH) in public schools in the Zaporizhia region by local budget levels (2020)*
Source: Authors' own conception

In public schools funded by the regional budget, the average number of students per teacher was 5 students, the average teacher's salary was UAH 14 733, which is the highest among all levels of the region's budgets. In public schools financed from the city budget of the region, the teacher taught an average of 12.1 pupils at his/her own rate, while his/her average salary was UAH 10 703. In schools funded by district budgets of the Zaporizhzhia region, the number of students per teacher was 6.8 students, average teacher's salary was UAH 12 450; in schools funded by the UTC budget the number of students per teacher was 8.2, average teacher's salary totaled UAH 11 169.

From the information given, it can be assumed that the most effective budgetary funds are spent in schools that are funded by city budgets.

The efficiency in the use of the educational subvention budget funds to cover teachers' salaries depends on many factors. Direct measurement is the best way to obtain the necessary performance evaluations. In the most general sense, efficiency is determined by the ratio of a useful result (effect) to the costs incurred to achieve it. We could consider as expenditures the amount of funds spent on the educational subvention. However, the question of what is a useful outcome of educational activities and how to measure such value is a complex one (Suntsova, 2010).

In that case, there is another way. We will consider that for the corresponding educational and methodical support, teaching methods and pedagogical approaches, the result of educational activities remains approximately constant level. In this instance, it is worth considering additional indicators (number of students, number of classes, average class size, number of students per teacher, number of teaching staff, etc.), the parameters of which could reduce the cost of educational activities.

Figure 7 presents the relationship between the amount of expenditures per student and class occupancy in schools funded by all local budget levels in the Zaporizhia region. The values of the coefficient of the determination indicate that there is the insufficient justification of the linearity of such a relationship, which has an explanation. For example, the figure shows a significant deviation from the theoretical line of the indicator corresponding to the level of the regional budget. With an average class size of 13.3 pupils, the amount of annual expenditures per student receiving general secondary education in institutions funded by the regional budget totaled UAH 66813.1. This is due to the specific nature of such educational institutions, as specialized art schools, boarding schools, including sports schools, military schools and sanatorium schools, etc. are financed, inter alia, from the regional budget.

However, there is a general trend: the increase in the number of students in classes leads to a reduction in the necessary resources of the educational subvention per student.

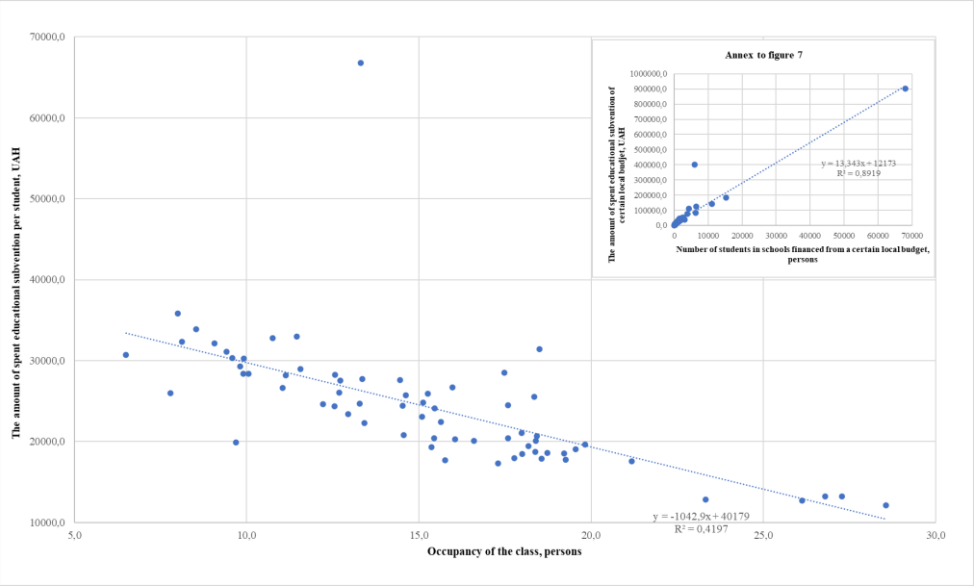


Fig. 7. *Relationship between annual expenditures per student and occupancy of classes in schools financed from all local budget levels in the Zaporizhia region in 2020 (annex to Figure 7: the relationship between annual educational subvention expenditures by all budget levels and the number of students in schools financed from a given local budget in the Zaporizhia region)*
Source: Authors' own conception

The annex to Figure 7 shows the relationship between the amount of expenditures from educational subvention allocated from all budget levels and the number of students in schools funded by a given local budget in the Zaporizhia region. The high value of the coefficient of determination indicates the importance of this dependence. According to the resulting equation, it can be assumed that the average increase in the number of students per person in these circumstances would require an increase in the annual level of educational subvention for the Zaporizhia region by an average of UAH 13.343 thousand.

The relationship between the cost per student and class occupancy in schools funded by district budgets in the Zaporizhia region is presented in Figure 8. The value of the coefficient of determination indicates a fairly close correlation between y and x indicators. The obtained result can be interpreted as follows: an increase in the number of students per class in a school funding by the district budget reduces the cost of the educational subvention for education by UAH 1295.4.

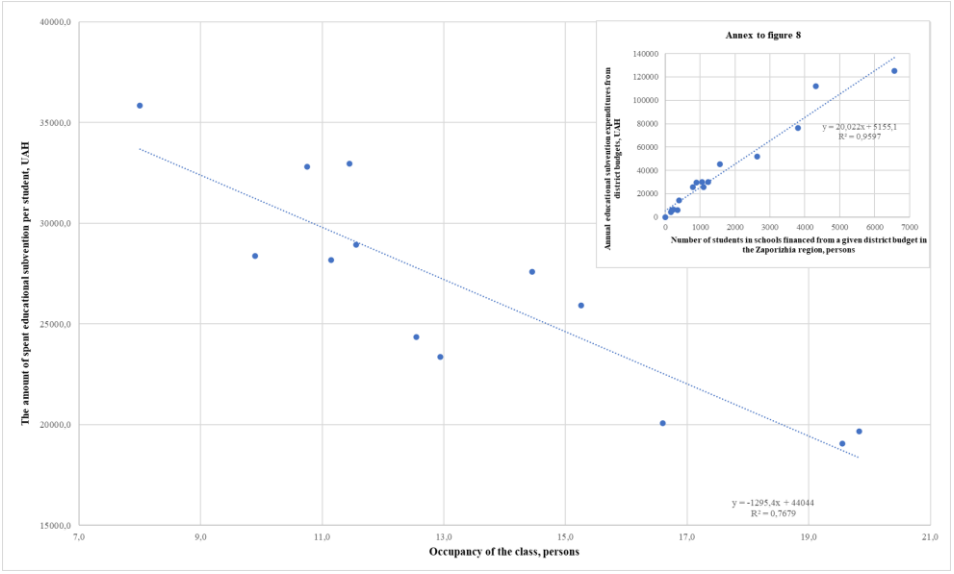


Fig. 8. *Relationship between annual expenditures per student (UAH) and class occupancy (persons) in schools financed from district budgets of the Zaporizhia region in 2020 (annex to Figure 8: the relationship between annual educational subvention expenditures from district budgets and the number of students in schools financed from a given district budget in the Zaporizhia region)*
Source: Authors' own conception

The annex to Figure 8 demonstrates the relationship between the amount of educational subvention expenditures allocated from district budgets and the number of students in the schools funded by district budgets in the Zaporizhia region. The value of the coefficient of determination is high enough to indicate the significance of the relationship. According to the obtained equation, on average, increasing the number of pupils per person in schools funded from district budgets will result in the need to increase the annual amount of educational subvention for the district budget by UAH 20.022 thousand.

The relationship between the amount of expenditures per student and class occupancy in schools financed from the UTC budgets in the Zaporizhia region is given in Figure 9. The value of the coefficient of determination shows a very close relationship between y and x indicators. The resulting values can be interpreted as follows: increasing the classroom occupancy rate per student in a school funded by the UTC budget reduces the expenditures of the educational subvention by UAH 1092.0.

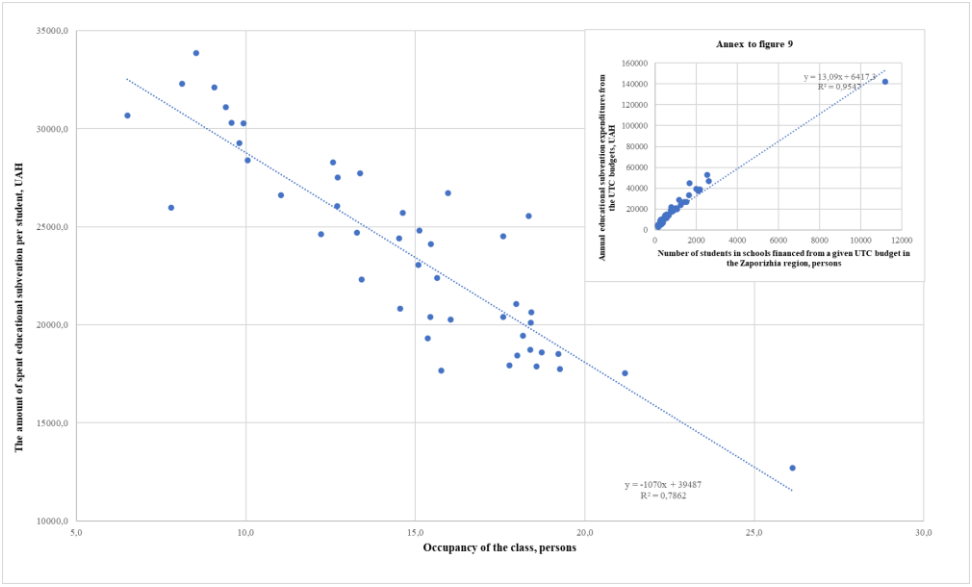


Fig. 9. *Relationship between annual expenditures per student (UAH) and class occupancy (persons) in schools financed from the UTC budgets of the Zaporizhia region in 2020 (annex to Figure 9: the relationship between annual educational subvention expenditures from the UTC budgets and the number of students in schools financed from a given UTC budget in the Zaporizhia region)*
Source: Authors' own conception

The annex to Figure 9 shows the relationship between the annual educational subvention expenditures allocated from the UTC budgets and the number of students in schools funded by the UTC budgets in the Zaporizhia region. The value of the coefficient of determination is high and points to the importance of this relationship. According to the equation, it can be assumed that on average, increasing the number of students per person in schools funded by the UTC budgets would require an increase in the annual amount of educational subvention for this budget by UAH 18.394 thousand.

We also found a close relationship between the amount of educational subvention expenditures allocated from budgets of four cities of regional subordination and the number of students enrolled in schools funded by budgets of these cities in the Zaporizhia region: $y = 13{,}281x - 5794{,}8$, $R^2 = 0{,}9996$.

Table 2. *Summary information on school system indicators in the Zaporizhia region of Ukraine in 2020 by local budgets*

Level of the budget / *Indicators*	Regional budgets	Budgets of the cities of regional subordination	District budgets	UTC budgets
Average number of students in school (persons)	211,48	582,08	171,92	221,91
Class occupancy in school (persons)	13,3	27,0	15,1	17,6
Average number of students per teacher (persons)	5,0	12,1	6,8	8,2
Expenditures of educational subvention per students (UAH thousand)	66,813	13,031	23,285	19,576
Average monthly salary of a teacher from educational subvention (UAH thousand)	14,733	10,703	12,240	11,169
Annual expenditures of educational subvention from certain budget *VS* number of students in school	-	y= 13,28x-5795 R^2=0,9996	y= 20,02x+5155 R^2=0,9597	y= 18,39x+2547 R^2=0,9560
Annual expenditures of educational subvention per student from certain budget *VS* class size	-	The relationship is not identified, R^2 very low	y= -1295,4 x +44044 R^2=0,7679	y= -1092,0 x +39779 R^2=0,7607

Source: Authors' own conception

Table 2 summarizes the indicators of the school system in the Zaporizhia region of Ukraine for 2020 by local budgets. As can be seen from the table, the largest share of the educational subvention in specific values is spent on secondary educational institution's activities that are allocated from the regional budget. These institutions have specific characteristics, such as specialized art schools, boarding schools, including sports schools, military schools, sanatorium schools, etc. Private tuition is widely used here so that

the average number of students per class is the lowest (13.3 persons on average) and the annual expenditures per student are UAH 66.813 thousand. The average monthly salary of teachers employed in such schools is UAH 14.733 thousand, the highest compared to schools funded by all local budget levels.

In the case of the other three types of budgets, the most efficient use of educational subvention funds is revealed in schools funded by the city budget. Here, the lowest specific expenditures of educational subvention (UAH 13.031 thousand per student) are achieved by the high occupancy of the classes (27 students) and the consequent high workload per teacher (12.1 students). The monthly salary of a teacher from the educational subvention is the lowest (UAH 10.703 thousand), although it should be noted that local budgets have the right to pay teachers if they have their own funds. In schools funded by the city budget, it is typical that it would cost the state to enroll another student an additional fee of UAH 13.28 thousand, which is also the lowest cost compared to other budgets.

Slightly less effective use of educational subvention funds recorded in schools funded by the UTC budget. The specific expenditures of the educational subvention (UAH 19.576 thousand per student) are higher compared to the expenditures from city budgets, and the number of students per class (17.6 students), as well as the workload per teacher (8.2 students), respectively is lower. The monthly salary of a teacher from educational subvention in such schools is UAH 11.169 thousand, and the UTC budgets usually have limited ability to pay teachers from their own resources. For schools funded by the UTC budgets, the admission of another student will cost the state an additional fee of UAH 18.394 thousand, which is 1.38 times higher than in schools funded by the city budget.

However, of the three budget types considered, schools funded by district budgets fared the worst. Here, the specific expenditures of the educational subvention (UAH 23.285 thousand per student) are the highest, and the number of students per class (15.1 students) and consequently the workload per teacher (6.8 students) are the lowest. The monthly salary of a teacher allocated from educational subvention in such schools is high and amounts to UAH 12.240 thousand. For schools financed from district budgets, the admission of another student will cost the state an additional fee of UAH 20.022 thousand, which is 1.51 times higher than in schools funded by the city budget.

The network of schools funded by district budgets, therefore, needs to be reformed as a matter of priority. It should be noted that this situation,

and not only concerning the financing of education, is common in the district budgets of many other regions of Ukraine. That is why the Resolution of the Verkhovna Rada of Ukraine of July 17, 2020 "On the establishment and liquidation of districts" (Verkhovna Rada of Ukraine, 2020) was adopted in Ukraine, and in 2021 schools were no longer funded by district budgets.

Figure 10 presents an integrated diagram of the relationship between class size, the number of students in school and the average annual cost of educational subvention per student in the public general secondary education institutions in the Zaporizhia region.

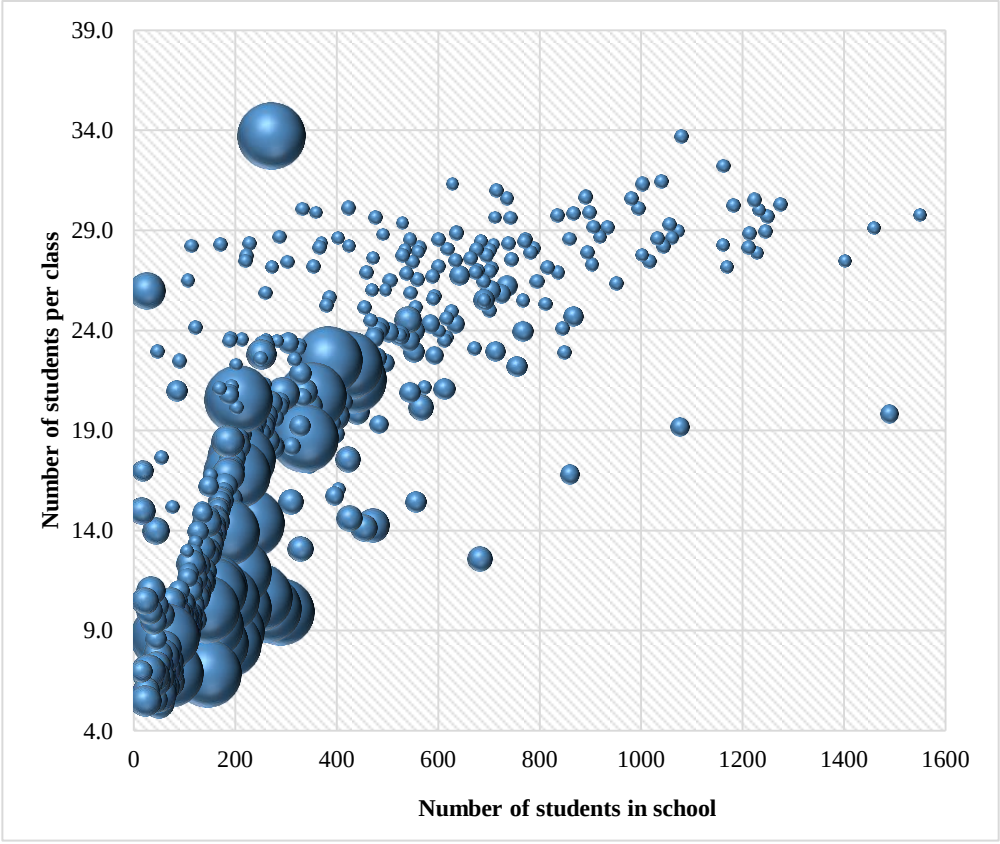


Fig. 10. *The relationship between the number of students per class, the number of students in school, the average annual expenditures of educational subvention per student in public general secondary education institutions in the Zaporizhia region (the larger the ball size, the higher the cost)*

Source: Authors' own conception

As can be seen, public schools with up to 400 students and with class occupancy of up to 22.5 students are the most problematic in terms of the efficiency of budgetary funding. This is the type of school that should be the primary focus of education managers in order to improve the average annual expenditures of educational subventions per student.

Discussion

As a result of the study, a number of patterns were identified that are inherent in the current state of development of decentralization in Ukraine: firstly, inequality in terms of the financial solvency of the regions of Ukraine, which leads to the use of interbudgetary transfers; secondly, the presence of certain problems in the information support of the subvention distribution process, which leads to an uneven distribution of state budget funds. These problems prove that the implementation of such calculations by educational managers, carried out by the authors on the example of the Zaporizhia region of Ukraine, will ensure transparent and fair distribution of funds from the state and local budgets.

Further development of the use of inter-budget transfer instruments in the school education financing within the framework of decentralization will lead to a more efficient allocation of public financial resources. In addition, the results of the study contained in this publication, and the experience of Ukraine in using co-financing through inter-budget transfers may prove useful for European countries in the context of improving the financial mechanism for allocating budgetary resources for the development of education.

But there are still unresolved issues faced by such studies. In particular, Ukraine does not centrally collect information on the funding of certain secondary schools, which makes it difficult to analyze in detail the efficiency of educational subventions at the level of individual schools. Although today information technologies provide a technical solution to this problem, only cooperation between the Ministry of Education and Science of Ukraine and the Ministry of Finance of Ukraine on this issue is needed.

Another problem in Ukraine is the lack of possibility of identifying each institution of general secondary education according to its unique code. This makes it particularly difficult to integrate the information databases created by different government departments.

The issue of funding for small schools also requires in-depth analysis. As a rule, small schools are located in rural areas with 5 to 10 students, which is the highest budgetary allocation for such schools per student (Londar, 2019). Similar problems with small schools in rural areas

exist in European countries, especially in Poland (Pęczkowski, 2016). Primary education in Poland has undergone many changes over the years – also from the moment of transferring educational responsibilities to communal self-government units as part of the decentralization reform in the 1990s. Despite difficulties in the determination of a fair system of division of the educational grant, the introduced changes reflect the authorities' efforts aimed at equalling educational opportunities of all children regardless of their home environment (Hybka & Kacznska, 2016).

Conclusion

In Ukraine, as part of the decentralization reform, districts were reformatted in 2020 and the funding mechanism for schools was changed in 2021. In this case, it can be said that there is a synergy between educational reforms and decentralization processes, as well as the possibility of administrative measures to improve budgetary efficiency.

The funds of the educational subvention, which is channelled as a transfer from the state budget to local budgets and distributed through the government's formula for teachers' salaries, is the most powerful financial resource for education. The share of the educational subvention funds is approximately one-third of the total educational budget spent in Ukraine. Analysis of the use of educational subvention by types of local budgets shows that the most effective use of these funds is in schools funded from the city budget. The least effective – in schools funded from regional and district budgets. While schools funded from the regional budget have many private tuitions and higher budget expenditures, there are no such factors in schools funded from the district budget. In addition, the Ministry of Education and Science of Ukraine is currently taking steps to provide information on teachers and students based on depersonalized data. This will revise the government's formula and improve the allocation of educational subvention funds, significantly reducing the unutilized subvention balance.

As can be seen from the results obtained, the indicators of the school network financed from different levels of local budgets are quite different. Schools funded from the city budget have the best specific indicators (per student) and the worst – schools funded by the district budget. It can be assumed that this was one of the reasons for the government's decision to transform the districts in Ukraine as part of decentralization reform. It shows that decentralization reform is closely linked to other reforms, such as education reform, and the search for synergetic solutions is very effective.

Simulation of the relationships between financial and statistical indicators that characterize the school network will enable education managers to make a more reasonable calculation of the projected need for educational subvention from the state budget based on the projected number of students in schools. In addition, the results of the research will provide a scientific basis for optimizing the school network (establishment of hub schools and their branches), as well as increasing the number of students in classes.

The data obtained as a result of the study are of scientific and practical value for improving the budget process in Ukraine in the conditions of decentralization. In particular, as a result of such calculations and comparisons in all regions of Ukraine, a transparent and fair distribution of budget funds could be ensured in accordance with the needs of local communities to improve the efficiency of financing educational institutions, as well as an optimization the network of schools (primarily small ones that lack pedagogical personnel to ensure a quality level of education).

Acknowledgement

Sergiy Londar – identified methodological approaches to this study, in particular of the econometric modeling using educational indicators data, such as the number of students in the school, class size and the average cost of training per student using the educational subvention; Valentyna Gapon – provided collection and processing of statistical data on indicators of the state of development of school education in the Zaporizhzhia region; Andrii Lytvynchuk – provided modeling and assessed the level of correlations between educational indicators in the Zaporizhzhia region and was involved in the data mining/analysis; Hanna Tereshchenko – analyzed the scientific literature on the subject of the article; identified approaches to the mechanism of financing school education in the context of decentralization; carried out an analysis of the amount of educational subvention for the years under study; Lidia Londar – carried out the selection of empirical material and analysis of legislative acts on the decentralization process in Ukraine, as well as the process of budget financing of schools.

Conflicts of Interest: the authors declare no conflict of interest.

References

Adams, B. E. (2020). Decentralization and Policy Experimentation in Education: the Consequences of Enhancing Local Autonomy in California. *Publius: The Journal of Federalism*, *50*(1), 30-54. https://doi.org/10.1093/publius/pjz006

Aleksandrova, H.M. (2015). Problemy finansuvannya osvity na mistsevomu rivni [Issues of financing education at the local level]. *Intelekt* [Intellect] *XXI*, (3), 56-69. http://www.intellect21.nuft.org.ua/journal/2015/2015_3/8.pdf

Allam, D. (2021). Explaining the persistence of "decentralisation" of education in Egypt. *International Journal of Educational Development*, *82*, 102357. https://doi.org/10.1016/j.ijedudev.2021.102357

Aryn, A. A., & Issakhova, P. B. (2018). Education financing in the Republic of Kazakhstan : problems of ensuring efficiency and effectiveness. *European Research Studies Journal, 21*(2), 83-94. https://www.um.edu.mt/library/oar//handle/123456789/33343

Cabinet of Ministers of Ukraine. (2015, January 14). Resolution № 6 of the Cabinet of Ministers of Ukraine "Some issues of providing an educational subvention from the state budget to local budgets" of 14.01.2015. Cabinet of Ministers of Ukraine. https://zakon.rada.gov.ua/laws/show/6-2015-%D0%BF?lang=en#Text

Chlebounová, D. (2019). Determination the efficiency of secondary schools in the Pardubice region. *Scientific papers of the University of Pardubice. Series D, Faculty of Economics and Administration, 27*(1), 976. https://editorial.upce.cz/1804-8048/27/1/976

Danylyshyn, B. M., & Pylypiv, V. V. (2016). Detsentralizatsiya u krayinakh YES: uroky dlya Ukrayiny [Decentralization in the EU countries: lessons for Ukraine]. *Rehional'na ekonomika* [Regional Economics], (1), 5-11. http://ird.gov.ua/pe/re201601/re201601_005_DanylyshynBM,PylypivVV.pdf

Hybka, M. M., & Kacznska, A. (2016). Financing Primary Education in Poland-Challenges and controversies. *The Business & Management Review, 8*(2), 24-35. https://cberuk.com/cdn/conference_proceedings/2019-07-20-11-45-10-AM.pdf

Ito, H., Sekiguchi, R., & Yamawake, T. (2018). Debt swaps for financing education: Exploration of new funding resources. *Cogent Economics & Finance, 6*(1), 1563025. https://doi.org/10.1080/23322039.2018.1563025

Kameshwara, K. K., Sandoval-Hernandez, A., Shields, R., & Dhanda, K. R. (2020). A false promise? Decentralization in education systems across the globe. *International Journal of Educational Research, 104*, 101669. https://doi.org/10.1016/j.ijer.2020.101669

Kotsovska, O. S. (2014). Mechanism of financial support of education: legislative basis of power distribution. *Public Administration Aspects, 2*(9-10), 72-79. https://doi.org/10.15421/151470

Kovalenko, S. O., & Koskina, Yu. O. (2017). Finansuvannya vydatkiv na osvitu v umovakh detsentralizatsiyi [The Financing of the Costs of Education under

Decentralization]. Biznes Inform [Business-Inform], *8*, 105-109. http://nbuv.gov.ua/UJRN/binf_2017_8_16

Kowalska, I. (2016). Sources of financing knowledge-based economy: the case of formal, non-formal and informal education in Poland. *Oeconomia Copernicana, 7*(1), 75-90. https://doi.org/10.12775/OeC.2016.006

Kyrylenko, O., & Marchuk, A. (2018). Modernization of budget providing of education in the process of sectoral decentralization. *Fìnansi Ukr., 6*, 75–90. http://finukr.org.ua/docs/FU_18_06_075_uk.pdf

Letelier S, L., & Ormeño C, H. (2018). Education and fiscal decentralization. The case of municipal education in Chile. *Environment and Planning C: Politics and Space, 36*(8), 1499-1521. https://doi.org/10.1177/2399654418761888

Linhartová, V. (2020). The Effect of Government Expenditure on Human Capital in the Czech Republic. *Scientific Papers of the University of Pardubice. Series D, Faculty of Economics & Administration, 28*(2), 1056. https://doi.org/10.46585/sp28021056

Londar, S. (2019). Ways to Improve the Network of General Secondary Education Institutions. *Educational Analytics of Ukraine, 3*, 5-17. https://doi.org/10.32987/2617-8532-2019-3-5-17

Lopushinskiy, I. P., & Kovnir, E. I. (2017). Stan ta perspektyvy reformuvannya osvity v umovakh detsentralizatsiyi vlady v Ukrayini [State and prospects of reforming education in the decentralization of power in Ukraine]. *Teoriya ta praktyka derzhavnoho upravlinnya i mistsevoho samovryaduvannya* [Theory and Practice of Public Governance and Local Self-Governance], *1*, 1-14. http://el-zbirn-du.at.ua/2017_1/27.pdf

Meričková, B. M., Štrangfeldová, J., Muthová, N. J., & Štefanišinová, N. (2020). Performance Measurement in Education Public Services Based on the Value for Money Concept. *Scientific Papers of the University of Pardubice. Series D, Faculty of Economics & Administration, 28*(3), 1099. https://doi.org/10.46585/sp28031099

Nikolai, R., Wrase, M., Kann, C., & Criblez, L. (2019). The impact of regulations in education- A comparison: The legal framework and financing of private schools in Germany, Austria and Switzerland [Wirkungen von Bildungsregulierung im Vergleich: Rahmenbedingungen und Finanzierung von Privatschulen in Deutschland, Österreich und der Schweiz]. *Zeitschrift fur Rechtssoziologie* [Journal of Sociology of Law], *38*(2), 272-303. https://doi.org/10.1515/zfrs-2018-0019

Ozkok, Z. (2017). Financing Education in Europe: The Globalization Perspective. *Economics & Politics, 29*(1), 69-90. https://doi.org/10.1111/ecpo.12085

Pęczkowski, R. (2016). Małe szkoły–duże problemy finansowe. Zeszyty Naukowe Wyższej Szkoły Humanitas. *Pedagogika,* (12), 13-19.

https://www.humanitas.edu.pl/resources/upload/dokumenty/Wydawnictwo/Pedagogika/Pedagogika_12_2016_sklad.pdf#page=13

Rowe, E., & Perry, L. B. (2020). Private financing in urban public schools: Inequalities in a stratified education marketplace. *The Australian Educational Researcher, 47*(1), 19-37. https://doi.org/10.1007/s13384-019-00328-0

Suntsova, O. (2010). *Local Finances* (3d ed.). Kyiv, Center of science literature. https://dspace.nau.edu.ua/bitstream/NAU/32687/1/Miscevi_finansy_Suncova_2010_3_vydannya.pdf

Verkhovna Rada of Ukraine. (2010). *Budget Code of Ukraine*. https://zakon.rada.gov.ua/laws/show/2456-17#Text

Verkhovna Rada of Ukraine. (2020, July 17). Resolution of the Verkhovna Rada of Ukraine "On the formation and liquidation of districts". https://zakon.rada.gov.ua/laws/show/807-20#Text

Xiang, Q. I. (2017). Policy and Practice of the Decentralization of Basic Education in China: The Shanghai Case. *Frontiers of Education in China, 12*(4), 445-467. https://doi.org/10. 1007/s11516-017-0033-2

Yahya, Y., & Hildayanti, H. (2020). Education financing model in vocational school (A model study in West Sumatera). *Journal of Advanced Research in Dynamical and Control Systems, 12*(6), 2057-2064. https://doi.org/10.5373/JARDCS/V12I6/S20201166