Does the Support Make a Difference? Counterfactual Impact Evaluation of Education Subsidy in Slovakia

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Abstract

The European Union regional policy represents a substantial amount of support in different policy areas for less developed regions within its territory. Education support is one of the discussed issues as a key factor of economic development. However, the outcomes and impacts of the support programs are evaluated only in a limited way, mostly required by the European Union, analysed frequently from the formal point of view.

The present paper provides a counterfactual impact evaluation of the education support in Slovakia. A Difference-in-Differences method was applied for identifying the overall impact of different types of education subsidies used in programming period 2007 - 2013. Firstly, the technical type of school modernization was analyzed through a selected measure of the Regional Operational Programme. On the other hand, the "soft" support of education carried out by the Operational Programme Education was examined.

By means of the counterfactual analysis was the impact of funds investigated on the supported and not supported primary schools in Slovakia. Generally, when comparing the treated and non-treated group of schools, the support has a positive impact. However, the results of the evaluation proved differences in the impacts of individual types of support programmes. The outcomes of the analysis highlighted that the individual implementation of merely technical modernization or only innovation of education process is not sufficient. A synergy effect of hard and soft support of schools was identified.

Key words: European Union Regional Policy, Education, Structural Funds, Impact Evaluation

JEL Classification: R58, I21

1 Introduction

The main objective of the regional policy of the European Union is an all-embracing support of its territory. This support takes mainly the form of financial aid heading to the targeted areas of diverse regions. The realization of this policy involves different phases, including the creation, implementation and evaluation of support. Evaluation is an inherent part of this agenda, which is formally defined and required by the European Union. Several studies in the literature and political practice report a number of analyses (Bondonio and Greenbaum, 2014; Crescenzi, 2009; Furubo, Rist and Sandahl, 2002; Sipikal, 2010) presenting results of evaluations in different member countries. These studies are dealing with various methodological aspects of the assessment or describing the evolution of evaluation culture in the European Union. Individual

evaluations vary according to the object of their investigation as well as the level at which support is implemented. In the evaluation literature greater attention is paid to firm evaluation in comparison with public entities assessments.

Education receives a great deal of EU support. EU policy sees knowledge acquisition as one of the most important pillars of economic growth and development. However, assessment of the effects of this support is limited. The real purpose of evaluation is to increase efficiency and effectiveness of the support and ultimately to gain the quality of education. Evaluation of the impact of support on education is a complicated issue, since the results cannot be easily computed. Despite of the lack of experiences in this topic, this research is aimed at evaluating the implementation of the European Union regional policy on the case of education support in Slovakia. A contribution consists in the European aid´s analysis, earmarking its shortcomings and proposing solutions. Intention of the paper is to assist to the development of an evaluation culture and ultimately to improve the functioning of the European Union support not only in Slovakia but also in the rest of the transnational grouping.

To meet these objectives, the theoretical part of the article will focus on the assessment of the impacts of the European Union regional policy. Particularly will be the experiences in selected counterfactual analyses presented. The Difference-in-Differences technique will be for measurement of the impact of support policies applied. Then the primary education support in Slovakia will be investigated. In conclusion, the results of the European Union regional policy analysis are summarized and the possible policy measures for the improvement of the support system outlined.

2 Impact of the European Union Regional Policy

While in official evaluations dominate studies dealing with the relevance, usefulness and sustainability of aid, scientific literature often focuses on assessing the efficiency and effectiveness of the support. While efficiency is studied using the input-output relationship, the effectiveness is measured in the context of impacts of policy interventions by achieving the defined objectives (TIG, 2003). Effectiveness can be defined in different ways and analyzed through various methodological approaches. The explanation of effectiveness differs by different authors, but the majority of studies agree that the effectiveness of European Union regional policy is understood in terms of the performance of its fundamental objectives, namely to promote the development and strengthening of economic, social and territorial cohesion, reducing disparities between regions and member states. In this context, there are many studies dealing with the convergence within the European Union. Various analyses examine convergence (Basile, De Nardis and Girardi, 2001; Ferry and Mcmaster, 2005; Nagy, 2008), for example, in the least developed member countries where implementation of regional policy helped to reduce regional disparities (Leonardi, 2006). Also, extensive studies examine the so called β and σ - convergence through econometric analyses (Esposti and Bussoletti, 2008). Often is studied the effectiveness of regional policy by measuring the impact of the structural funds, however their implementation not always corresponds with the defined objectives. The effectiveness of the support can be analyzed according to time dimensions, in short-, medium- and long terms (Rodriguez-Pose and Fratesi, 2004). Improving the effectiveness is still a current topic in the

circle of researchers as well as in political practice. In recent years more emphasis is placed on the examination of effectiveness by means of the assessment of impacts of European Union regional policy through innovative methods.

In general there are two basic concepts distinguished that explore the impact of policy interventions . The first concept is called in the literature as ´Theory-based Impact Evaluation´ thus assessment based on the theory. The second concept is referred to ´Counterfactual Impact Evaluation´ based on comparing treated and non-treated entities. Fundamental differences between the two concepts lie in the methodology and different research questions when examining the impact of policy. The latter concept of Counterfactual Impact Evaluation (CIE) has in recent years become more popular in the evaluations of European Union regional policy. The basic research question of these assessments meets the magnitude of the change that the support measure caused. The roots of these methods are based on experiments in physics and chemistry, where the basic idea is comparing objects of investigation (INFOREGIO, 2010). There are two several approaches to estimate the change. An option is to compare the group of beneficiaries with a so-called control group, where no support was received. Another possibility is to examine only the group of beneficiaries before and after implementation of support. (EVALSED, 2013b). These methods help to answer the question, what would otherwise happen if the support was not implemented.

Application of CIE methods is nothing new in the scientific literature, but is innovative in terms of examining the impact of aid from structural funds. The CIE impact assessment is a comparison of cases of assistance with situation if there was no support. In reality, however, occurred only the first situation, the second situation is a simulation. Through these techniques it is possible to estimate the actual impact of support. These methods are useful not only for complex evaluations of development assistance programs, but are extremely helpful in the analysis of selected individual measures (Potluka, Bruha and Vozar, 2013). The application of CIE methods can be observed even in macroeconomic analyses. Bradley and Untiedt (2012) examined the impact of support on GDP over the period 2000-2009 from a macroeconomic perspective, though identified fundamental flaws and pitfalls of using these methods in macro-context. According to the above mentioned, the CIE methods are particularly suitable for the analysis of the support at lower levels.

Another impact assessment was on a sample of enterprises in East Germany conducted. The aim of the research was to identify the impact of regional innovation policy financed by public resources aimed at supporting private businesses to increase their innovative capacity. Results of the analysis showed that supported companies achieve better results in terms of innovation performance and patent applications as companies where no support was received (Reinkowski et al., 2010). The impact of support was evaluated also in Italian firms, where the support was in years 1995 - 2001 implemented. The results of the impact analysis showed that supported firms perform better than companies that did not receive any assistance. (Cerqua and Pellegrini, 2014). Bondonio and Greenbaum (2014) explored firm support through various policy instruments, Particularly national or regional support and also assistance from the European Regional Development Fund for the period of years 2000 and 2003. Results of the analysis showed that there is no significant difference between the impact of aid in terms of types of support. This means that companies that received national, regional or European assistance reported similar results in employment. Differences exist regarding the size categories of firms. Businesses tend

to use various forms of support, thereby proportionately is increasing the impact of support in these companies (Bondonio and Greenbaum, 2014). German experiences revealed differences between the supported enterprises and firms that did not receive any support or received a lower amount of aid. The analysis showed a positive impact of support (GEFRA, 2010). The impact of support was analyzed in the regions of Spain, too. Sources of assistance were both national resources and funds from the European Union. The impact of support was between years 1977-1981 and 1989, - 1994 examined. As an indicator of impact was the change in employment selected in different periods. This change was negative for poorer regions and only slightly positive in the case of richer territories of the country. Another indicator was also examined by means of the changes in private investments per capita, but results of the analysis were similarly negative as the change in employment (Garcia-Mila and McGuire, 2001).

Based on experiences from abroad, the effectiveness of support is mostly studied through the impact of aid in private firms. It is also important to note that these innovative methods of counterfactual evaluation are used to a limited extent, mostly in member states where there is the culture of evaluation more developed. Nevertheless, we can observe attempts to use these innovative methods also in the Czech Republic, where Potluka, Bruha and Vozar (2013) deal with the possibility of applying these methods in the Czech Republic for the analysis of support from the European Social Fund.

3 Methodology

Evaluation of education is one of the most important areas of assessments since the results and implications may affect next generations of the population. Various evaluations are carried out by different international institutions as OECD or PISA, where the outcomes of education in different countries are analyzed and a ranking of them executed. Similar evaluations are realized also by national institutions in Slovakia, where the quality of education is from different aspects analyzed. Such evaluations are required and in some instances also carried out by the Ministry of Education, Science, Research and Sport of the Slovak Republic and its Agency for the Structural Funds of the European Union or other special institutions as Slovak Centre of Scientific and Technical Information or National Institute for Certified Educational Measurements.

Data, annual reports and statistical summaries of these organizations are very important part of the evaluation database of education. However, these often have only a formal character and do not verify the real results and define further steps to improve the quality of education. These analyzes deal with different areas of learning in a broader aspect, having a national dimension, which does not allow for detailed examination at lower levels. The objectivity of presenting the results achieved is also another substantial problem. Only in some cases is really studied deeply the effectiveness of support on education.

Aim and object of investigation

The main aim of this article is to evaluate the implementation of regional policy of the European Union, specifically examine the effectiveness of education support. We chose education as the investigated problem, since it is one of the fundamental pillars for the development and growth of the country (Jorgenson and Fraumeni, 1992). In addition, the support represents a significant part

of public spending and substantial part of the European Union structural funds. Thus, in the empirical part we examine two types of support in primary schools implemented in the programming period 2007 - 2013. The first measure analyzed is called ´Education Infrastructure´ implemented through the Regional Operational Programme and funded by the European Regional Development Fund, which aims to modernize the technical side of education. The second type of support is called ´Transforming traditional to modern school´ which falls under the Operational Programme Education funded by the European Social Fund. This measure is aimed at upgrading the educational process itself, purchase of didactical tools, text books, etc.
Research question

Within the analyzed measures of education support we focus on one of the target groups, therefore, we examine the number of students. We assume that the technical (hard) and content(soft) reform of education influences the choice of parents when choosing a primary school, which will ultimately be reflected positively on the number of students in supported primary schools compared to the not supported. On this basis, we set the following research question: Does the support from the European Union affect the change of the number of students in supported primary schools compared to the not supported in the Slovak Republic?
Differences in the impact of aid may depend on various factors (GEFRA, 2010). These differences may lie in the level of development of the investigated area (Garcia-Mila and McGuire, 2001), the size of the research objects, and may also depend on the type of support (Bondonio and Greenbaum, 2014). Based on these experiences, we will explore the impact of these factors.

Data Collection
Effective support should be reflected in improved characteristics or behavior of target groups, for which the measures were intended. Therefore, we will examine the evolution of the number of pupils in primary schools in Slovakia in the context of education support from the European Union structural funds. Data for analysis were obtained from the Institute of Information and Prognoses of Education, Statistical Office of the Slovak Republic, Regional Operational Programme and Operational Programme Education. Through the pooling of the data obtained, we created a database with the numbers of pupils in primary school for each year from 2006 to 2012. Within three eligible NUTS 2 regions of the Slovak Republic (West, Middle and East Slovakia) we monitor along 2,070 primary schools (in year 2009). The support approved until 2010 will be evaluated. Of the total number of 2,070 primary schools 569 received support for technical modernization of education infrastructure through the Regional Operational Programme. In 232 primary schools were projects financed by the Operational Programme Education implemented to modernize the content part of the educational process. In the case of 105 primary schools were both types of education support realized.

Measuring the impact - Difference-in Differences method
The impact of education support will be by CIE method examined, i.e. by comparing the supported group with the control group of not supported subjects. Since the data we have available both before and after the implementation, for the analysis can be used the so called Difference-in-Differences (DiD) technique. In our case, we have set the number of pupils as an indicator of the impact, which is available for both supported and not supported schools. The database contains all the primary schools of the country, which significantly reduces the risk of distortion of results.

During the analysis, we use a key year of 2010, when the projects were actually implemented or their implementation was also completed. On this basis, we examine differences in the pre-period from 2007 to 2010 and the after implementation time from 2010 to 2012. The quantification of differences is based on the calculation of the cumulative values of the indicator set separately for different time periods and groups. The final DiD estimate explains the impact of aid. In the case of a positive outcome we are talking about an effective support, in the case of negative values of the ineffectiveness of support.

4 Empirical Results of the Education Support Analysis in Slovakia

Education and its support are an important part of development strategies at all policy levels, not only in Slovakia but also in the whole European Union. In Slovakia, from a financial point of view the most essential part of education support comes from the European Union. This support is directed to tertiary education as well as regional school system. For the programming period 2007- 2013 was the education support primarily financed through three programmes, i.e. Operational Programme Education, Regional Operational Programme and Operational Programme Research and Development. As the current research is focused on evaluating the support of primary education, thus further we will deal with the Regional Operational Programme (ROP) and Operational Programme Education (OPE). Within the ROP, under Measure 1.1 Education infrastructure, were until year 2010 approved non-repayable financial resources of nearly more than 480 million euros in 487 municipalities of Slovakia. Regarding the second measure OPE called Transforming traditional to modern school, for primary schools was approved an amount of 23 million euros implemented in 151 villages and towns of the Slovak Republic to modernize the content part of educational process. The impact of these two measures will be further analyzed. The empirical part of the article presents the results of a European Union regional policy evaluation, particularly an analysis of education support in primary schools of Slovakia. A comparison of the number of students in two groups of primary schools is presented. The first group consists of schools that were supported - specifically, the above mentioned both European Union resources - ROP and OPE. The second group consists of primary schools that have none of these forms of assistance until year 2010 received.

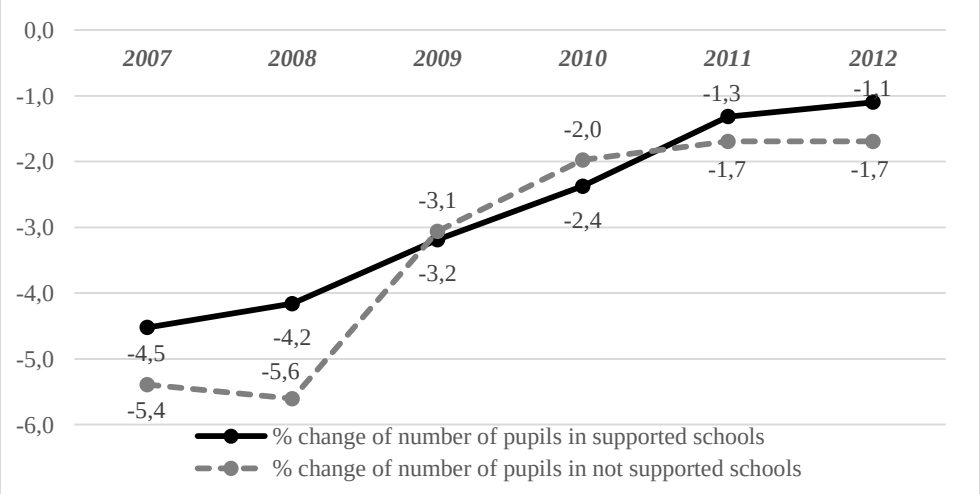

Fig. 1 Annual percentage change in the number of pupils in the (not) supported primary schools in Slovakia
Source: Own elaboration.

Fig. 1 above shows the percentage change in the number of students in supported and not supported elementary schools between years of the investigated period. Based on the Figure 1 we can see negative changes in the number of students in all years of the period, both for supported and not supported primary schools. It means a constantly decreasing number of students[1]. Relative changes, however, suggest that this decline is smaller over time. Important in this context are years 2009 and 2010, when the support from the European Union was approved and implemented. We evaluated the impact of education support implemented through measures of ROP and OPE. Under the rules of European Union must be the obtained resources used over two resp. three years after their approval. This may mean that the real impact of the aid can be seen after several years of the implementation. It is also important to monitor long-term impact of support measures, which should reflect the sustainability of investments.

Comparing changes on the basis of individual years is not sufficient to measure the impact of support policy. Therefore, in the following part are the results of a counterfactual impact evaluation presented, conducted by Difference-in-Differences technique. Based on the counterfactual analysis of supported and not supported primary schools in the period before year 2010 and after 2010 we observed positive DiD estimation (Table 1). This means that supported primary schools have achieved a greater positive difference between the two periods compared with schools that did not received any aid from the European Union for education. Since we defined the effectiveness of support under positive or negative values in the DiD analysis, in this case it was noticed an effective support, however a very low with a DiD estimate 0.08%.

Tab. 1 DiD Estimate of the Effect of Overall Support

DiD Estimate	Change in the Number of Pupils		Differences between periods
	2007-2010	2010-2012	
Supported schools	-9,42%	-2,40%	*7,02%*
Not supported schools	-10,30%	-3,36%	*6,94%*
Differences between groups	*0,88%*	*0,96%*	***0,08%***

Source: Own elaboration.

As reflected in international experiences, it is important to distinguish the i. Therefore mpact of aid on the basis of various forms of support, we explored the impact of education support in specific groups of primary schools. The first group is represented by schools, where only the ROP support was realized (only technical modernization). The second group contains the schools that were supported only form OPE (soft modernization). Finally, we investigated schools, which were also by the ROP as well as from OPE supported, so where was the technical and also soft modernization of education through both European Union structural funds implemented.

When comparing schools supported only by ROP with elementary schools where no aid has been implemented, we can also talk about slightly effective support of education (Table 2). The final estimate of the difference in differences is positive, i.e. 0.2%. This means that in schools where

[1] However, it is important to note that the number of pupils is in the investigated period consistently declining due to the demographic trends in the country. The result of declining proportion of children under 14 years of age on the total population is a constantly decreasing number of pupils in primary schools.

came just to technical modernization of education, the number of pupils declined by 0.2 percentage points less than in not supported primary schools.

Tab. 2 DiD Estimate of the Effect of Support through ROP

DiD Estimate	Change in the Number of Pupils		Differences between periods
	2007-2010	2010-2012	
Supported schools (ROP)	-9,56%	-2,42%	*7,15%*
Not supported schools	-10,30%	-3,36%	*6,94%*
Differences between groups	*0,74%*	*0,94%*	***0,20%***

Source: Own elaboration.

The following DiD estimate, however, point to significant differences between the hard (technical) and soft reform of education in terms of changes in the number of pupils in the investigated period (Table 3). The soft modernization of education such as innovative learning methods in terms of change in the number of pupils appeared to be an ineffective form of support. The DiD estimate is - 1.14%, therefore unsupported schools achieved in this respect better results than primary schools supported by the OPE.

Tab. 3 DiD Estimate of the Effect of Support through OPE

DiD Estimate	Change in the Number of Pupils		Differences between periods
	2007-2010	2010-2012	
Supported schools (OPE)	-9,33%	-3,52%	*5,81%*
Not supported schools	-10,30%	-3,36%	*6,94%*
Differences between groups	*0,97%*	*-0,16%*	***-1,14%***

Source: Own elaboration.

Deeper investigation in this direction refers to other important findings. When comparing unsupported with the supported schools, where were carried out both forms of assistance (hard and soft reform), we can see so far the most effective form of support compared to previous. The DiD estimate is nearly 1%, confirming a synergy effect of combining modernization of the technical and contentual part of the learning process in terms of attracting more students to the particular primary school.

Tab. 4 DiD Estimate of the Effect of Support through ROP and OPE

DiD Estimate	Change in the Number of Pupils		Differences between periods
	2007-2010	2010-2012	
Supported schools (ROP and OPE)	-9,02%	-1,11%	*7,91%*
Not supported schools	-10,30%	-3,36%	*6,94%*
Differences between groups	*1,29%*	*2,25%*	***0,96%***

Source: Own elaboration.

A complementary part of this evaluation study was an analysis of investigated education support on the basis of other criteria. According to various size categories of municipalities (by population) and territories of Slovakia (NUTS 3 and NUTS 2 levels) were observed different results. When comparing results on the number of pupils regarding to the municipality size categories were in several cases positive results obtained. In other words, when comparing period before and after year 2010 in some categories was noticed a growth in the number of pupils.

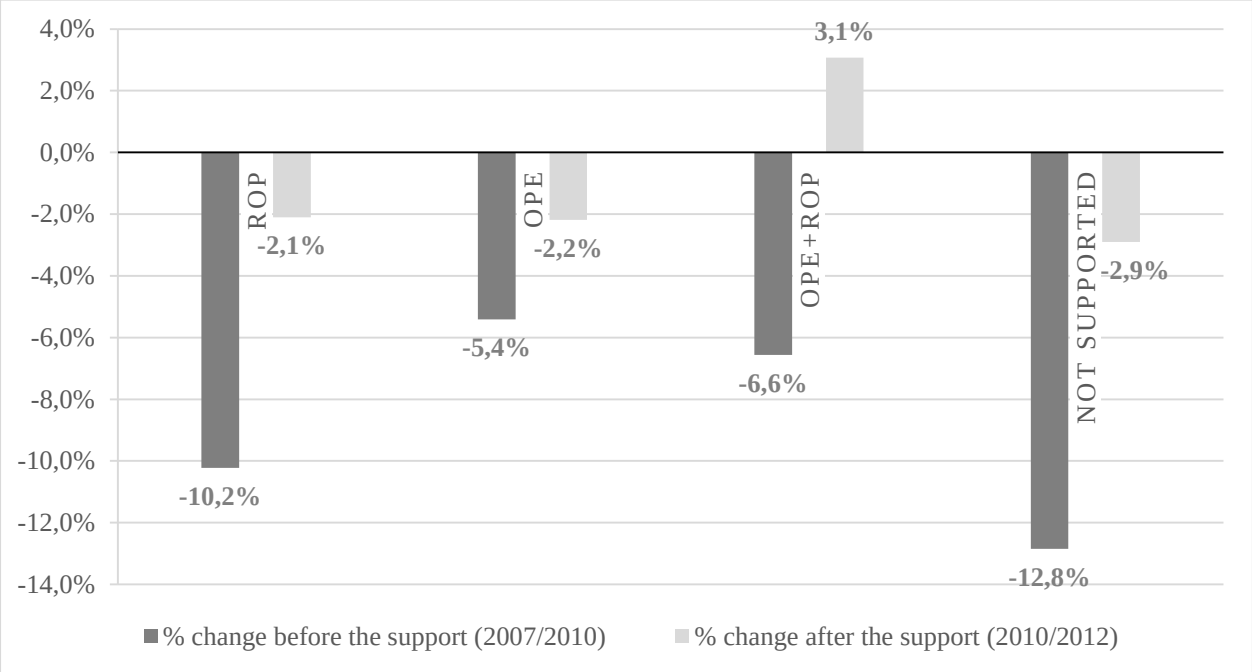

Fig. 2 Percentage change in the number of pupils by type of support between 2007/2010/2012 in the size category of over 50 000 inhabitants
Source: Own elaboration.

Special attention should be paid to the size category of over 50 000 inhabitants. In these cities occurred in the period after the implementation of European Union assistance the highest increase of students worth 3.1 percentage points in the case of schools supported from both sources of OPE and ROP (Figure 2). In terms of monitored NUTS 2 and also NUTS 3 areas of Slovakia we can talk about a positive trend, thus generally about a decrease of the number of students in supported and not supported elementary schools to a lesser extent compared to the period before the implementation of support.

3 Conclusions

The main objective of the current paper was to carry out an evaluation of the European Union regional policy on the case of education support in Slovakia. This analysis was performed by measuring the impacts through Difference-in-Differences methodology. In conclusion, only a slight positive impact of support policies on education was observed. Though, detailed analysis showed differences in the impact of various forms of support. The worst results were achieved by the support of the ´soft´ reform of the learning process implemented through the Operational Programme Education. In this context, the technical modernization of buildings of schools

financed by the Regional Operational Programme reported better results. This may be because the technical modernization is immediately visible compared to the impact of new text books or didactical tools. Probably, the introduction of innovative methods of education manifests itself after a longer period of time than the technical modernization in terms of the change of the number of pupils in primary schools. The most effective seemed to be the combination of support from the Regional Operational Programme and Operational Programme Education, so a combination of technical modernization as well as reform of the content of education. According to the evaluation we propose a combined approach to the support of education. It means particularly creation and planning of measures financed by European Union funds, which should provide both ´hard´ and ´soft´ modernization of education.

The analysis reflected on different impact of the support based on size categories of municipalities, in which the supported schools are located. It is therefore not possible to say definitely that the development of the number of students depends only on the support of the European Union. Individual primary schools are located in different areas of the country, which are characterized by various levels of socio - economic development. Their status may also be affected by other factors, such as demographics, attraction territory of the school, quality of teachers or decisions of parents on the choice of primary school for their children, etc. Because of this diversity of individual regions is so difficult to objectively measure the overall impact of European Union support.

Comprehensive assessment of the impact of education support, however, in addition to quantitative terms (change in the number of pupils) should include also the evaluation of qualitative aspects of support. Therefore, future research will focus on exploring the learning outcomes of students of primary schools in the Slovak Republic.

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National Strategic Reference Framework for the Slovak Republic for the period 2007 – 2013

Operational Program Education

Regional Policy – Inforegio

Regional Operational Program

Slovak Centre of Scientific and Technical Information

Statistical Office of the Slovak Republic - http://slovak.statistics.sk