

2. METHODOLOGY: DATA AND VISUALIZATION

Our analysis is fundamentally quantitative in nature and is therefore based on available statistical data. All data related to public education (including the number of institutions, the number of students by educational level and ethnic affiliation, and students' commuting routes) originate from the Slovak Republic's Centre of Scientific and Technical Information (*Centrum vedecko-technických informácií SR*; hereafter CVTI). The figures, which reflect the situation as of September 15 of each academic year, are provided by individual educational institutions. The temporal scope of the dataset covers 15 academic years, from 2010/2011 to 2024/2025.

Our research focuses on public education and examines ISCED levels 0 and 3: from kindergartens to secondary schools. However, the terminology used in Slovak public education differs from international categorization. Primary (ISCED1) and lower-secondary (ISCED2) education in Slovakia takes place at primary schools (*základné školy*), where children start to fulfil their compulsory school attendance at the age of six. Primary schools in Slovakia are typically a 9-year-long single structure system (primary education lasts for 4 years, lower secondary education lasts for 5 years), although there are some grammar schools that include

both lower and upper secondary education. Therefore, in this volume, the term “primary” education/school refers to both grades 1–4 and 1–9. However, where grades 5–9 (ISCED2) are mentioned explicitly, we use the term lower-secondary in accordance with international terminology. Upper-secondary is simply called as secondary education/school. Overall, we structure the data analysis according to the three main education levels in Slovakia: kindergarten (ISCED0), primary school (ISCED1 and 2) and secondary school (ISCED3). For all three educational levels, our data include enrollment figures for special institutions or classes attended

by children with special educational needs. However, we analyze these in greater detail only at the primary school level, where the number of students in special classes allows for meaningful examination. In the case of secondary education, the dataset includes grammar schools, vocational secondary schools, conservatories, sports schools and special secondary schools. By Hungarian-medium kindergartens and schools, we refer to independent institutions or Hungarian-medium groups and classes within jointly administered institutions, where education and care are conducted in Hungarian language.

For demographic analysis and educational attainment, we used data from the 2011 and 2021 population censuses, as well as annually published population movement statistics disaggregated by (self-reported) ethnic affiliation. Whenever we refer to the proportion of Hungarians, we always relate the data to the population with known ethnic affiliation or mother tongue, rather than to the total population.

Our quantitative approach naturally entails several limitations, which we indicate where relevant. These limitations primarily stem from the fact that causal correlations and underlying factors often cannot be identified from the data alone, nor can local specificities that may significantly mediate the effects of structural

factors. In favorable cases, the scholarly literature provides guidance in this regard. Additional limitations arise from incoherent data and data collection methodologies, most notably in relation to the size and categorization of the Roma population, an area in which official statistics provide relatively limited support.

Recognizing the constraints of quantitative methods, we sought to broaden the scope of our analysis by incorporating qualitative approaches. In the spring of 2025, we conducted mixed-methods fieldwork in the Revúca District in southeastern Slovakia, which included mapping the situation of Hungarian-medium education through both primary data collection and expert interviews. The resulting material has been incorporated into the present volume as a case study, with the intention of shedding light on specific phenomena and their possible interpretations.

Data collected from the CVTI database were aggregated at the settlement⁷ and district levels, and visualized primarily at these two scales for kindergarten and primary school figures. In the case of secondary school students (since their spatial distribution is fragmented and typically concentrated in urban areas) data were presented only at the district level. A similar approach was adopted where sample sizes were so small that representation at the settlement level

would have produced extreme values (e.g., the number of first-grade students).

To assess changes in the number of kindergarten children and school students, we applied two methods. The simpler approach involved comparing the first and last years of the available data, yielding an easily interpretable percentage change. This method was used, for example, in maps illustrating differences between villages and towns. Its drawback, however, is its sensitivity, particularly in cases of small sample sizes and especially at the settlement level, to fluctuations in the data. Outlier values or sharp declines in either the base year (2010/2011) or the final year (2024/2025) can substantially distort the resulting figures for a given administrative unit. For this reason, actual trends are more accurately reflected by values derived from a logarithmic (LOG.ILL) function fitted to the 15-year time series. Although these values are less intuitive than simple percentages, the maps primarily present their textual interpretation in the legends, with numerical values indicated in parentheses. In interpreting these figures, it is essential to note that values above 1 indicate growth, while values below 1 indicate decline.

Changes were generally visualized using area shading. In several maps where the district served as the basic unit of analysis, we employed combined methods,

supplementing area shading with cartograms (e.g., bar charts illustrating changes in enrollment in urban versus rural institutions).

The administrative divisions displayed on the maps reflect the status in effect at the time of the 2021 census. Exceptions were made for Bratislava and Košice, where (prioritizing visual clarity, ease of interpretation, and logical considerations) we departed from the current district divisions and treated each city as a single unit, despite their official division into five and four districts, respectively.

The category “closed/established school or kindergarten” shown on the maps does not necessarily indicate the closure of specific institutions. It rather denotes the disappearance or emergence of Hungarian-medium education within a given administrative unit (settlement or district), i.e. an education site, since a single settlement may host multiple institutions.

The use of geographical names is an important issue both in the maps and in the text, and it is a particularly sensitive matter in multiethnic contexts. Since one of the aims of this volume is to draw attention to the state of mother-tongue education within

a minority community, our language use likewise seeks to promote linguistic rights, multilingualism and diversity. For this reason, in addition to the official Slovak names, we also strive to present the relevant Hungarian names in some form.

On the one hand, a table at the end of the publication facilitates the identification of settlements with a Hungarian population by listing their Slovak and Hungarian names simultaneously. In the case of the maps, we followed a strategy whereby the names of settlements and districts in southern Slovakia that are home to significant Hungarian communities are indicated in Hungarian as well, alongside the Slovak names. However, in northern Slovakia, although Hungarian names do exist, these are primarily historical names and are not linked to issues of linguistic rights; therefore, in those areas we use only the official names.

In some cases, visualization options were constrained by the size and quality of the database. For the three maps depicting educational commuting routes, two limiting factors applied. First, the structure of the database: students’ permanent residence is recorded rather than their actual place of residence. In practice, this means that in some cases a child’s registered

residence may be hundreds of kilometers from the kindergarten or school, clearly indicating that daily commuting does not occur along that route and that the child’s actual place of residence is elsewhere (presumably in or near the settlement of the kindergarten or the school). Consequently, commuting distances exceeding 30 kilometers were excluded from the maps, as their inclusion would have reduced both the informational and visual utility of the representations. Distances over 30 kilometers accounted for nearly 10% of all relations in the case of kindergartens. Of course, there is no guarantee that similar issues do not exist for distances under 30 kilometers, but these could not be filtered out based on the available data. The second characteristic of the commuting maps is that relations involving the commuting of only one child were not displayed. This decision was made purely for reasons of readability: including these relations would have doubled the number of arrows on the kindergarten maps, despite involving fewer than 900 children, or 9% of all kindergarten children. Given that the two excluded categories (routes longer than 30 kilometers and routes involving a single child) overlap substantially, the combined information loss does not exceed 10%, which we considered an acceptable compromise.

Patrik Tátrai, Balázs Kapitány, Ildikó Nagy, Krisztián Rákóczi

THE CHANGING FACE OF HUNGARIAN MINORITY EDUCATION IN SLOVAKIA



an Atlas of Student Enrollment, Demography and Social Trends

Horizontum Civil Association; Geographical Institute HUN-REN CSFK; VEKTOR Social Research Association

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Authors

Patrik Tátrai
Balázs Kapitány
Ildikó Nagy
Krisztián Rákóczi

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Krisztián Rákóczi, 2026
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László Szarka

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vektor-kutatas.hu

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Cartography

Fanni Koczó
Gáspár Mezei

Design

Gáspár Mezei
András Somodi

Typography

András Somodi

