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**National Examination in Romania between 2017 and 2023 –  
A Microdata Analysis**

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**Abstract**

*The National Examination in Romania holds significant importance for students, determining high school admissions and shaping future opportunities. Analysing 2023 results, it was found that despite passing grades, many students faced admission challenges, especially rural students. Disparities persist between rural and urban students, intensified by factors such as absenteeism and limited access to educational resources. The digitalisation of the 2024 National Examination reflects a changing educational landscape, presenting both opportunities and challenges. This paper highlights the interaction of sex, residency, and online teaching experience on National Examination results from 2017 to 2023, using microdata retrieved from data.gov.ro. Rural students and those who did not experience online teaching generally obtained lower scores compared to urban students and those who had online teaching exposure. The correlation between performance in the National Evaluation Exam and school dropout rates underscores the critical importance of education in societal inequalities. It is crucial to keep investigating ways to reduce educational gaps and make education more inclusive in Romania. While this study provides valuable insights, it is not without limitations. However, limitations, such as variations in examination difficulty and disruptions due to external factors like teacher strikes, should be considered in interpreting the findings. Future research should continue to explore strategies for mitigating these disparities and promoting educational equality in Romania.*

**Keywords:** Education, National Examination, Average Score, Final Score, Secondary Educational Level.

**JEL Classification:** I200, I210.

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## **1. Introduction**

Education is fundamental to societal development, contributing to the development and wellbeing of individuals, communities, and nations. The impact of events like the SARS-CoV pandemic has highlighted the need to adapt education by integrating new methodologies and technologies in order to nurture creative and critical thinking. Portuguese-Castro (2024) states that it is crucial to prioritise experiential learning opportunities, to prepare students for the dynamic and collaborative environments they will encounter in their future careers. For example, in business education, we need to shift from traditional teaching methods to innovative approaches to better meet students' evolving needs.

The academic performance across European countries is influenced by various factors such as books at home, school type, and location (Bonacini et al. 2024). By identifying these key factors and their implications, policymakers, and educators develop specific strategies, ensuring that students receive the support they need to succeed academically.

The National Evaluation Exam in Romania is extremely important for students because, based on the final score, high school admissions are decided. Analysing the results for the 2023 examination round, Mirica et al. (2023) revealed that many students who were not admitted in a high school competed outside of their county and had a passing grade in their evolution. This underscores the need for a deeper understanding of the implications of the National Examination results, especially concerning issues of educational equity and access.

## **2. Problem Statement**

The results of the 2020 National Evaluation Exam in Romania generated a heated debate among researchers during the pandemic. Several studies pointed out the gap between rural and urban students in terms of absolute performance (Ceban et al., 2021a), relative performance (passing or failing the exam as well as absenteeism (Ceban et al., 2021b). Taking into account a larger time frame (2019- 2021), Ceban et al. (2023) concluded that the performance gap at this exam between urban and rural students deepens. These discrepancies are not only observed in education. Fina et al. (2021) point out that in counties with a high share of rural population, especially from south-east and north-east, people often do not have access to public infrastructure (like the sewage system), there is a low share of workers in knowledge-based domains and high share of workers in agriculture; moreover, such counties are characterised by high rates of school dropout and negative migration.

Achieving low results at the National Evaluation Exam or not attending the exam is directly linked to the school dropout rate (Ministry of Education, 2021). Reducing school dropout rate and thus increasing the level of education is essential, as the level of education is one of the main determinants of wage inequalities in Romania (Petcu, 2022). Moreover, increasing the educational level has a significant impact on child and maternal health: in a survey among pregnant women during

the pandemic in Romania, Sandu et al. (2023) concluded that women with a low educational level often neglect healthcare due to financial reasons.

In 2024, the simulation of the National Evaluation Exam included a strong digitalised component: students' papers were scanned, anonymised and introduced in an online platform, where evaluators could access; moreover, each teacher can discuss with the students the results in the classroom (Ministry of Education, 2024). This approach permitted an in-depth analysis by item and formulating suitable recommendations (National Centre of Policies and Evaluation in Education, 2024a, 2024b).

### **3. Research Questions / Aims of the Research**

This paper aims to answer the following research questions:

- Is the interaction between sex, area of residency, and whether or not the student experienced online teaching relevant for explaining differences in final scores at the National Evaluation Exam?
- Is the interaction between sex, area of residency, and whether or not the student experienced online teaching relevant for explaining differences in the Average Score for the Secondary Educational Level?
- Is there a difference Score at the National Evaluation Exam by subject and is the interaction between sex, area of residency, and whether or not the student experienced online teaching for explaining differences in these scores respectively?

### **4. Research Methods**

For the purpose of this paper, microdata comprising the results from the National Evaluation Exams were retrieved from the <https://data.gov.ro/> portal (accessed March 15<sup>th</sup>). The chosen time frame is 2017-2023 in order to cover equally the pre-pandemic and the post-pandemic period: students who took this exam in 2017, 2018, and 2019 did not experience online teaching, while students who took the same exam in 2021, 2022, and 2023 experienced at least one semester of online teaching. Students who participated in the examination in 2020 will be considered as if they have gone through a semester of online school, even if it was only for a shorter period of time.

The final database comprises several raw variables: year of the examination, sex (male/female), area of residency (urban/rural), Final score at the National Evaluation Exam, Final score at the Maths exam, Final Score for the Romanian Language Exam, Average Score for the Secondary Educational Level. Only data for those students who were present during all stages of the examination were considered. Eight categories of students were defined based on a combination of Sex, Area of residency, and whether or not the student experienced online teaching at least one semester. These categories were marked into a new variable (Combined\_category) and are as follows:

- Combined\_category\_1: female student, from rural area, who experienced at least one semester of online teaching;
- Combined\_category\_2: female student, from urban area, who experienced at least one semester of online teaching;
- Combined\_category\_3: female student, from rural area, who did not experience online teaching;
- Combined\_category\_4: female student, from urban area, who did not experience online teaching;
- Combined\_category\_5: male student, from rural area, who experienced at least one semester of online teaching;
- Combined\_category\_6: male student, from urban area, who experienced at least one semester of online teaching;
- Combined\_category\_7: male student, from urban area, who did not experience online teaching;
- Combined\_category\_8: male student, from urban area, who did not experience online teaching.

In order to answer the research questions, the One-Way ANOVA test is used as follows:

- For the first question, the null hypothesis is that there is no difference in the means for the Final Score at the National Evaluation across the defined categories;
- For the second question, the null hypothesis is that there is no difference in the means for the Average Score for the Secondary Educational Level across the defined categories;
- For the third question, the null hypothesis is that there is no difference in the means for the Score at the National Evaluation Exam by subject (Maths and Romanian Language) and by category;
- The significance level is 1%.

According to the Pennsylvania State University (2024), ANOVA assumes that series are normally distributed, that these distributions have the same variance and the observations are independent. However, according to the same source, minor violations of the first two assumptions are acceptable, as the sampling distribution of the test statistic is quite robust, especially for large sample sizes; moreover, as a general rule of thumb for equal variances, the ratio between the largest standard deviation and the smallest standard deviation should be between 0.5 and 2. Also, according to Lumley et al. (2002), the least squares linear regression (which incorporates ANOVA) does not require any assumption of normality if sample sizes are over 500 observations.

## **5. Findings**

As students are not allowed to collaborate at this exam, observations can be considered independent. The number of observations in each combined category varies as follows: in the first category fall 113960 observations; in the second category, 179513 observations; in the third category, 94957 observations; in the fourth category, 125999 observations; in the fifth

category, 111148 observations; in the sixth category, 181837 observations; in the seventh category, 85866 observations; in the eighth category, 122864 observations. Thus, no normality tests were necessary. Table 1 displays the descriptive statistics for the Final Score at the National Evaluation, the Average Score for the Secondary Educational Level, the final score in Maths and the final score in Romanian Language by category. The average score for the secondary educational level is at least 1.5 points higher compared to the final score at the National Evaluation, while the variance is at least 3 times lower. This may suggest that the final exam better reflects the differences between students' competencies compared to the evaluations performed during the secondary school cycle. Moreover, the final score in Maths is considerably lower on average compared to the final score in Romanian Language, yet the variances are similar. For each variable, the ratio between the largest standard deviation on a category and the smallest standard deviation of a category is between 0.5 and 2, therefore equal variances can be assumed.

**Table 1. Descriptive statistics for the Final Score at the National Evaluation, the Average Score for the Secondary Educational Level, Final Score for Maths National Evaluation Exam, Final Score for the Romanian Language Exam by category**

	Final Score at the National Evaluation		Average Score for the Secondary Educational Level		Final Score for Maths National Evaluation Exam		Final Score for the Romanian Language Exam	
	Average	Variance	Average	Variance	Average	Variance	Average	Variance
Combined_category_1	6.17	3.52	8.79	0.81	5.56	4.20	6.69	4.11
Combined_category_2	7.55	3.15	9.21	0.52	7.11	4.21	7.94	3.09
Combined_category_3	5.95	3.60	8.72	0.81	5.03	4.22	6.78	4.24
Combined_category_4	7.40	3.34	9.11	0.58	6.67	4.77	8.06	3.06
Combined_category_5	5.42	3.60	8.28	1.03	5.23	3.97	5.54	4.46
Combined_category_6	7.07	3.63	8.88	0.75	6.93	4.32	7.16	3.89
Combined_category_7	5.16	3.75	8.22	0.99	4.61	3.87	5.62	4.82
Combined_category_8	6.86	3.90	8.74	0.81	6.39	4.91	7.28	3.99

Source: designed by the authors using data from data.gov.ro.

Table 2 contains the results of the ANOVA test for the Final Score at the National Evaluation by category, the Average Score for the Secondary Educational Level by category and the Score at the National Evaluation Exam by subject (Maths and Romanian Language) and category. All the tests show significant results at 1%, resulting in the rejection of the null hypothesis. Thus, there are significant differences in these scores by the selected categories.

**Table 2. Results of the ANOVA Test**

Tested series	ANOVA F value
Final Score at the National Evaluation by category	27611.47*
Average Score for the Secondary Educational Level by category	19783.75*
Score at the National Evaluation Exam by subject (Maths and Romanian Language) and category	30865.52*

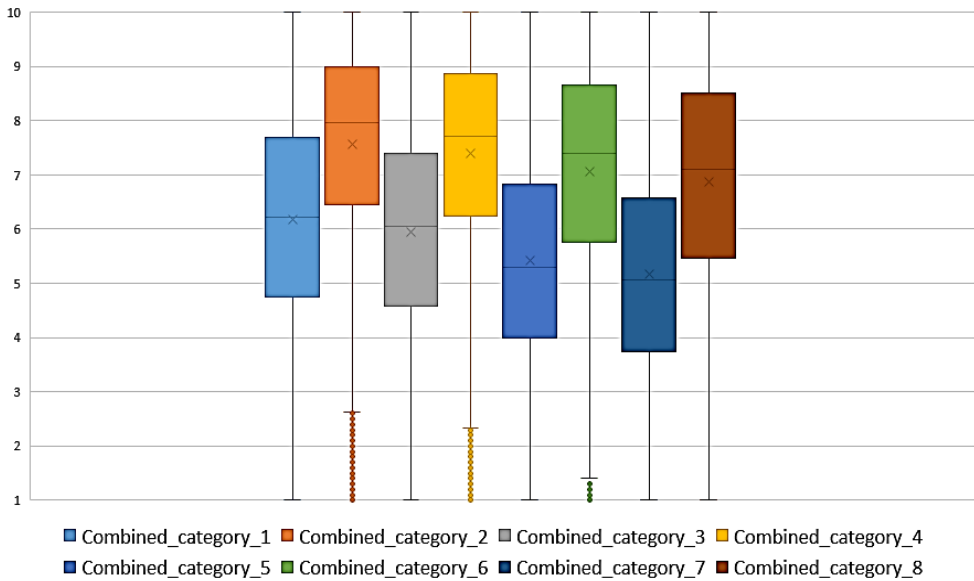
Source: designed by the authors using data from data.gov.ro.

The results of the ANOVA test should be interpreted together with the boxplots for the Final Score at the National Evaluation by category (Figure 1), the Average Score for the Secondary Educational Level by category (Figure 2) and the Score at the National Evaluation Exam by subject (Maths and Romanian Language) and category (Figure 3).

The Final Score at the National Evaluation is considerably lower for students from rural areas compared to urban areas and lower for male students compared to female students. However, the median for this variable computed for students who did not experience online teaching is a little lower compared to students who experienced at least one semester of online teaching.

This may be explained by the fact that during the pandemic years (2020, 2021, and 2022) the exercises had lower difficulty and only in 2023 they were of increased complexity (see the declaration of the Secretary of State in the Ministry of Education Sorin Lixandru, 2023). Also, in 2021, the subjects were restructured so that they are similar to the PISA tests, while in 2020 the exam curriculum was significantly reduced, both measures having a considerable impact on high school classifications (Firescu et al., 2022).

**Figure 1. Boxplot for the Final Score at the National Evaluation by category**

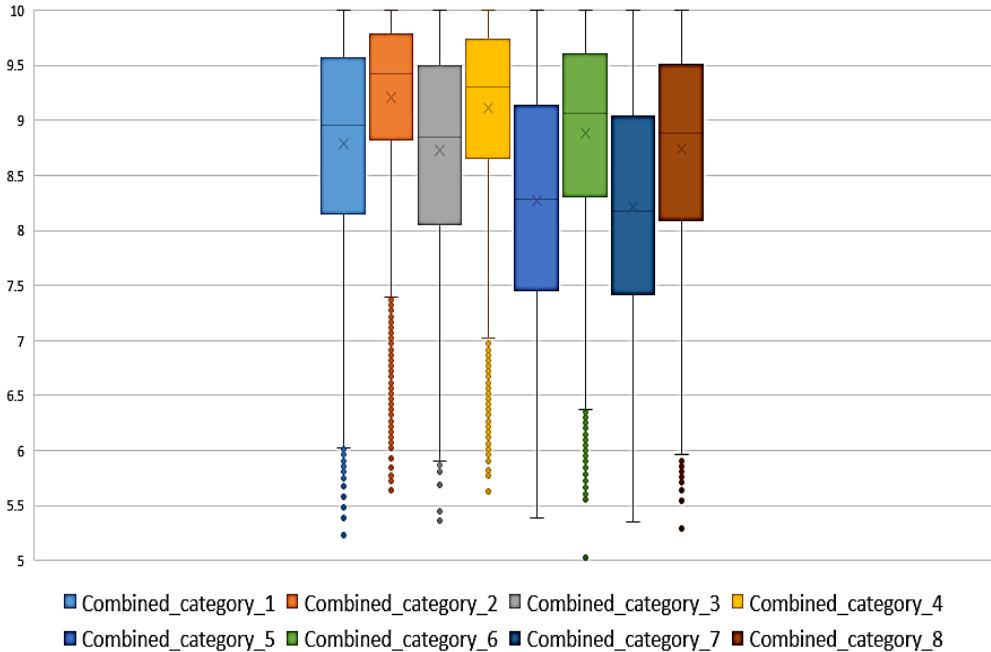


Source: designed by the authors using data from data.gov.ro.

Considering the average score during the secondary educational level, the median was lower for the students in rural areas compared to urban areas and higher for female students compared to male students. However, the scores are lower for those students who did not experience online teaching compared to those who did. This may be due to the lack of adequate assessment methods and the increased prevalence of cheating.

For example, Malik et al. (2023) concluded that during the pandemic, approximately 60% of the Pakistani students admitted that they cheated in online assessments. Moreover, the research of Comas-Forgas et al. (2021) suggests that there was a significant increase in the Google searches related to exams cheat sheets during the lockdown period.

**Figure 2. Boxplot for the Average Score for the Secondary Educational Level by category**

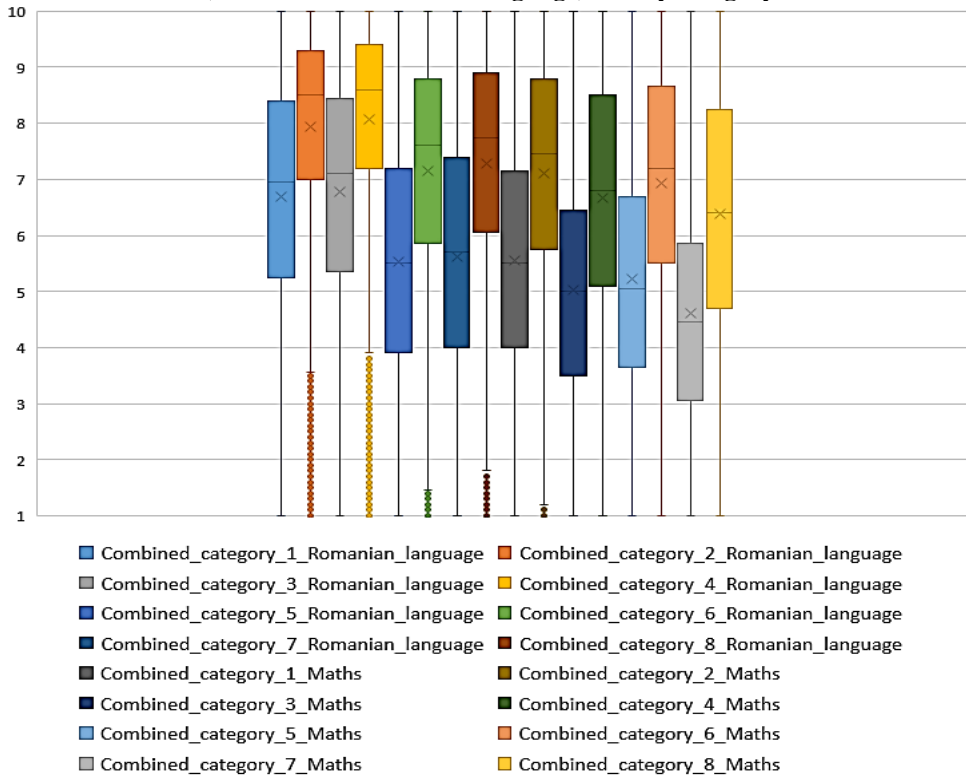


Source: designed by the authors using data from data.gov.ro.

The results in Figure 3 reveal that the score in Maths is lower compared to the score in Romanian Language and especially for pupils who experienced online teaching.

This result is not surprising because even in the higher education area in very advanced countries like Norway “advanced technology and the Internet were not entirely successful in supporting many students and lecturers to adjust to the lockdown environment” while “some mathematics lecturers were not aware of several challenges that students experienced following the switch” (Radmehr & Goodchild, 2022, p. 581).

**Figure 3. Boxplot for Score at the National Evaluation Exam by subject (Maths and Romanian Language) and by category**



Source: designed by the authors using data from data.gov.ro.

## 6. Conclusions

This paper analysed the results at the National Evaluation Exam as well as the results obtained during the secondary educational level on the six-year time frame from different perspectives: area of residency, sex, and the experience of online teaching. The results are generally in accordance with previous literature.

There are some limitations to this research. First, the difficulty level of the subjects in the evaluation is adapted to the students' cohort level of competency (see for example the declaration of the Minister of Education, Ligia Deca, 2024), which is not necessarily comparable across years. Second, the number of semesters on online teaching varies for the 2020-2023, yet, in order to have approximately comparable categories in terms of number of observations, we decided to merge this time frame and consider it a period when students experience at least one semester of online teaching. Moreover, in 2023 a general strike among the teachers occurred so that the lost classes were generally reduced to 25 minutes in order to be recovered, generating low quality lessons (see the declarations of Bodea, 2023). This strike was not accounted for in this paper.



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