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School Types and Educational Outcomes in Kazakhstan

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Abstract

Kazakhstan's secondary education system encompasses a remarkably diverse array of school types, ranging from highly selective exam-based institutions to small rural schools. This study examines how school type is associated with academic performance and post-secondary destinations using administrative data on the full population of 499,150 high school graduates from 2021 to 2023. We classify schools into 19 mutually exclusive categories and estimate ordinary least squares regressions for log-transformed Unified National Test scores and logistic regressions with average marginal effects for five post-secondary outcomes: university enrollment, vocational education, study abroad, employment, and not in education, employment, or training status. Graduates of the most selective schools score 24 to 33 percent higher on the Unified National Test and are 12 to 25 percentage points more likely to enroll in university than regular urban school graduates. At the other end of the spectrum, sport school graduates score 24 percent lower and are channeled primarily into vocational education, while military school graduates are 45 percentage points more likely to be not in education, employment, or training, likely reflecting post-graduation service obligations. We argue that these large associations between school type and outcomes primarily reflect selection: families with greater resources sort their children into higher-performing school types, and the observed school type premiums capture the combined effects of student selection, peer composition, and institutional quality that cannot be disentangled in an observational framework.

Keywords: school types, educational outcomes, Kazakhstan, Unified National Test, post-secondary destinations, selection, school effects.

Introduction

A central question in the economics and sociology of education is the extent to which schools matter for student outcomes. The landmark Coleman Report (Coleman et al., 1966) challenged the prevailing assumption that differences in school resources were the primary driver of achievement gaps. Using data on nearly 650,000 students across more than 3,000 schools in the United States, Coleman and colleagues found that variations in school quality showed surprisingly modest associations with student achievement once family background was accounted for, concluding that students' socioeconomic origins were far more consequential than the characteristics of the schools they attended.

The Coleman Report ignited decades of research on the relative importance of school and family factors. Hanushek (1986, 2003) demonstrated that simple measures of school resources bear little systematic relationship to student performance, while individual teacher quality matters enormously. Meta-analytic evidence has reinforced the primacy of family background: Sirin (2005) found a medium-to-strong association between socioeconomic status and academic achievement across four decades of research. School composition has emerged as a particularly powerful channel: Rumberger and Palardy (2005) showed that the socioeconomic makeup of a school's student body had effects on achievement as large as a student's own SES, and van Ewijk and Sleegers (2010) confirmed through meta-analysis that peer socioeconomic status exerts a meaningful influence on individual achievement net of individual background. Compositional effects help explain why between-school variance is often confounded with selection. Raudenbush and Willms (1995) demonstrated that proper estimation of school effects requires multilevel models that separate compositional effects from genuine institutional effects. Cross-national analyses using PISA data have documented wide variation in the share of achievement variance lying between schools, with some highly tracked systems exceeding 50 percent (OECD, 2019). Yet even in these systems, it remains difficult to distinguish true school value-added from the sorting of students across institutions. Downey and Condron (2016) argued that schools may function more as equalizers than as engines of inequality, since achievement gaps narrow during the school year and widen over summers, complicating any simple narrative of school ineffectiveness.

This distinction between school effects and selection effects is particularly salient in systems that offer a diverse menu of school types from which families can choose. Research on selective and exam-based

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schools in the United States, the United Kingdom, and developing countries has shown that the observed performance advantages of elite schools often shrink dramatically or disappear entirely when selection is accounted for through regression discontinuity or lottery-based designs (Abdulkadiroglu et al., 2014; Barrow et al., 2020; Clark, 2010; Jackson, 2010). Evidence from China corroborates this pattern: Shi (2020) exploited admission cutoffs to elite boarding schools and found negligible effects on academic performance, and Wu et al. (2019) obtained comparable null results at selective school thresholds using similar regression-discontinuity designs. The policy implication is sobering: what appears to be an institutional effect may largely reflect the prior advantages of students who gain admission to selective schools. At the same time, even in the absence of causal school effects on test scores, school type may still shape post-secondary trajectories through peer networks, institutional reputations, and the signaling value of elite school credentials.

Kazakhstan offers a compelling setting to study this relationship. The country has developed one of the most differentiated secondary education systems in the post-Soviet region, encompassing elite exam-based schools such as Nazarbayev Intellectual Schools (NIS) and Bilim-Innovation Lyceums (BIL), Soviet-era specialized schools, a growing private sector, and a large system of regular public schools ranging from well-resourced urban institutions to small rural schools. These school types differ in curricula, resources, selectivity, and the socioeconomic composition of their student bodies, creating a landscape in which school type serves as a proxy for both institutional quality and family background.

Despite the prominence of school differentiation in Kazakhstan's education system, no study has systematically examined how these diverse school types are associated with student outcomes across the full population of graduates. Existing research on Kazakhstan's education system has focused on specific school networks, such as NIS (Shamshidinova et al., 2014), or on particular aspects of the admissions system. A comprehensive mapping of outcomes across the full spectrum of school types is missing.

This study addresses this gap by classifying every general secondary school in Kazakhstan into one of 19 mutually exclusive school types and examining how school type is associated with two sets of outcomes: performance on the Unified National Test (UNT), Kazakhstan's centralized college admissions examination, and post-secondary destinations including university enrollment, vocational education, study abroad, employment, and NEET status. Using administrative data on the full population of 499,150 graduates from 2021 to 2023, we estimate OLS regressions for log UNT scores and logistic regressions with average marginal effects for binary post-secondary outcomes, controlling for student and school characteristics with region-by-year fixed effects and school-level clustered standard errors.

We do not claim to estimate causal school effects. Our framework, following the Coleman tradition, recognizes that families sort into school types based on ability, preferences, and resources, and that the observed associations between school type and outcomes reflect the combined influence of selection, peer effects, and institutional quality. Our contribution is descriptive but policy-relevant: we provide the first comprehensive mapping of how Kazakhstan's diverse school landscape relates to both academic performance and the full set of post-secondary pathways available to graduates.

Literature Review

School Effects and Family Background

The question of whether schools or families matter more for educational achievement has been at the center of education research since the Coleman Report (Coleman et al., 1966). Coleman's key finding, that school resources explained relatively little variation in student achievement compared to family socioeconomic status, generated a research program spanning six decades. Early work reinforced this conclusion: Jencks et al. (1972) argued that family background and individual ability dominated educational and economic outcomes to such a degree that school reform alone could not substantially reduce inequality. Together, these foundational studies established a powerful baseline expectation: when we observe large differences in outcomes across schools, the most likely explanation is that different kinds of students attend different kinds of schools, not that the schools themselves are producing the differences.

Subsequent research introduced more sophisticated methods that refined but did not overturn this basic insight. The extensive production function literature, synthesized by Hanushek (1986, 2003), concluded that there is no consistent, systematic relationship between school expenditures and student performance. What does matter at the school level is teacher quality, but even here the variation is largely within schools rather than between them: longitudinal evidence shows that between-school differences in average teacher quality are modest compared to within-school variation (Rivkin, Hanushek, & Kain, 2005). The implication is that

aggregate school-level measures, which is what school type captures, are blunt instruments for identifying the mechanisms through which schools affect learning.

Multilevel modeling approaches have formalized this distinction. Raudenbush and Willms (1995) separated "Type A" school effects, which measure the total difference in outcomes associated with attending a particular school, from "Type B" effects, which isolate the school's contribution net of student intake characteristics. A school that appears highly effective in Type A terms may simply enroll more advantaged students, with little genuine value-added. Cross-national evidence from PISA confirms that this confounding varies enormously across education systems: countries with early tracking and extensive school differentiation show between-school variance exceeding 50 percent of total variance, while comprehensive systems show between-school variance below 10 percent (OECD, 2019). Kazakhstan, with its highly differentiated school landscape, is likely to fall toward the high end of this spectrum, but the extent to which this reflects institutional quality versus student sorting remains an open empirical question.

School Choice, Selective Schools, and Student Sorting

A parallel literature on school choice has examined the mechanisms through which diverse school types create stratification. When families can choose among schools that vary in quality, selectivity, and prestige, those with more information, resources, and social capital tend to secure access to the most desirable options (Epple & Romano, 1998; Hoxby, 2003). Theoretical models predict that competitive school markets amplify stratification by ability and income, as higher-performing students are selected into better-resourced institutions while disadvantaged students are left behind. This sorting means that observed performance differences across school types inevitably confound institutional effects with the prior advantages of selected students.

Rigorous evaluations of elite and exam-based schools have confirmed this prediction across diverse contexts, consistently finding that their apparent performance advantages are substantially overstated by naive comparisons. Using regression discontinuity designs at admission cutoffs, Abdulkadiroglu, Angrist, and Pathak (2014) found negligible effects of attending exam schools in Boston and New York on test scores, despite the large observed performance gaps between exam school students and their peers. Similar results emerged in the United Kingdom, where Clark (2010) documented modest effects of attending elite grammar schools on achievement. Even in developing countries, where school quality varies more widely and one might expect larger institutional effects, the evidence is nuanced: Pop-Eleches and Urquiola (2013) reported positive effects of attending better schools in Romania, but these operated partly through peer composition rather than school resources per se. The consistent message across this literature is that the large raw performance gaps between selective and non-selective schools are driven primarily by who attends these schools, not by what the schools do.

Yet the literature on test score effects may understate the broader impact of school type on life outcomes. Even when exam schools do not raise test scores at the margin, they may shape post-secondary trajectories through peer networks, institutional reputation, and access to university counseling and international opportunities. Jackson (2010) demonstrated this distinction in Trinidad and Tobago, where attending a better school had significant effects on exam-taking behavior and university enrollment even without large test score effects. Dobbie and Fryer (2014) found that high-performing charter schools in New York, while boosting test scores, had more muted effects on longer-run outcomes, reinforcing the complexity of how school environments translate into life trajectories. This possibility is particularly relevant for our study, which examines not only UNT performance but also the full range of post-secondary destinations. Genetic evidence further complicates the picture: Smith-Woolley et al. (2018) showed that school-level differences in achievement in the United Kingdom are substantially explained by heritable student characteristics, suggesting that even peer-composition effects may partly reflect genetic sorting rather than genuine environmental influences.

Kazakhstan's Secondary School Landscape

Kazakhstan's secondary education system has evolved from a uniform Soviet-era model into one of the most differentiated school landscapes in Central Asia. Following independence in 1991, the country embarked on extensive education reforms that introduced new school types, expanded private provision, and created a multi-tiered system of selective institutions alongside the inherited network of regular public schools. We provide a brief description of each school type included in our classification.

Nazarbayev Intellectual Schools (NIS) are a national network of 21 highly selective, publicly funded STEM-focused schools established in 2008. Instruction is trilingual, in Kazakh, Russian, and English, and the curriculum integrates national standards with international frameworks, including the International Bac-

calaureate. Admission is through a competitive national examination, and the schools serve as a model for broader education reform in Kazakhstan. NIS students take Cambridge examinations rather than the standard UNT, making their test scores not directly comparable to those of other school types.

Bilim-Innovation Lyceums (BIL) are a network of 28 schools originally established in 1992 as Kazakh-Turkish Lyceums under a partnership with Turkish educational foundations. Renamed in 2016, BIL schools are highly selective boarding institutions with an in-depth focus on natural sciences. Instruction is multilingual, in Kazakh, Russian, English, and Turkish, and the schools have produced thousands of international Olympiad medalists. The student body is predominantly male, reflecting both the boarding school format and STEM orientation.

Physics-Mathematics schools (FIZMAT) trace their origins to the Soviet network of specialized physics and mathematics academies. The flagship institution, the Zhautykov Republican Specialized Physics and Mathematics Secondary School in Almaty, was established in 1972 as the seventh such academy in the Soviet Union. FIZMAT schools maintain highly rigorous curricula developed by leading Soviet-era scholars, admit students through competitive examinations with acceptance rates as low as 4 percent, and have produced some of Kazakhstan's most influential leaders in government, business, and science.

Daryn schools are specialized schools for gifted children operated under the Republican Scientific and Practical Center "Daryn," established in 1998 under the Ministry of Education. The Daryn network coordinates over 130 specialized schools across the country and administers a system of national and international Olympiads. Between 1998 and 2020, Daryn students won over 10,000 medals at international competitions. Daryn schools are boarding institutions that recruit talented students from across the country, with a strong emphasis on academic Olympiad preparation.

Other selective schools encompass various regional and national institutions with competitive admission that do not fall into the NIS, BIL, FIZMAT, or Daryn categories. These include regional specialized schools for gifted children, specialized lyceums with advanced curricula in particular subjects, and schools associated with national centers of academic excellence.

Military schools are boarding institutions that combine general secondary education with military training to prepare cadets for service in the armed forces. The most prominent is the Zhas Ulan Republican School, established in 1999, which admits male students through competitive physical and psychological examinations. Graduates typically proceed to military higher education institutions or direct service, which explains their high NEET rate in administrative data that tracks civilian post-secondary outcomes.

Sport schools are specialized institutions that provide general secondary education alongside intensive athletic training. These schools serve student-athletes pursuing competitive careers in sports and typically feature adjusted academic schedules to accommodate training and competition. Their academic outcomes tend to be lower than those of general schools, reflecting the emphasis on athletic rather than academic development.

Music schools are specialized schools that combine general secondary education with intensive music education. These include institutions originally established during the Soviet era to identify and develop musically talented children from across the country, with curricula spanning traditional Kazakh instruments alongside Western classical training.

Gymnasiums and lyceums represent a tier of schools with enriched curricula that stands between regular public schools and the most selective institutions. In the post-Soviet tradition, gymnasiums typically emphasize humanities and foreign languages, while lyceums focus on science and mathematics. In practice, the distinction varies by institution. Both types operate selective admissions, though less competitive than NIS or BIL. They tend to be located in urban areas and attract families seeking a more rigorous academic environment than regular schools provide.

Binom schools are a new generation of large-format schools built since 2020 under a public-private partnership. Each Binom school is designed for up to 4,000 students and equipped with advanced facilities including specialized science laboratories, robotics classrooms, TV studios, and 3D printing workshops. The educational approach draws on Finnish, British, and South Korean models. As of 2024, eight Binom schools operate in major cities.

Private international schools include institutions offering international curricula such as the International Baccalaureate, British A-Levels, or American high school programs. Prominent examples include Haileybury (established 2008, the first British school affiliate in Central Asia), Miras International School (the first IB-authorized school in Kazakhstan), and QSI International Schools. These schools cater primarily to expatriate families and affluent Kazakhstani families seeking international university placement, with in-

struction predominantly in English. Their high study-abroad rates and elevated NEET rates likely reflect international pathways not fully captured in domestic administrative records.

IQanat/Burabay school is a boarding school for 200 talented students in grades 10 to 11, selected from rural areas through the IQanat national Olympiad. Founded in 2020 by a private philanthropic initiative, the school is located on the shores of Lake Burabay and employs a pedagogical model synthesizing Finnish and Japanese approaches. Despite its small size and recent establishment, IQanat graduates achieve exceptional outcomes: 84 percent win university scholarship grants, and the school has the highest average UNT scores in our sample.

Other private schools include a heterogeneous group of privately operated schools that do not fall into the international school category. These range from schools offering enhanced versions of the national curriculum to institutions catering to specific communities. Quality and resources vary widely within this group.

Boarding schools (excluding those classified in other categories) are general secondary schools with residential facilities. Kazakhstan maintains over 200 boarding schools, many located in rural areas to serve students from remote settlements that lack their own secondary schools. These institutions provide free housing and meals, making them a critical access mechanism for rural students pursuing general secondary education.

Hub schools (resource centers) are a reform initiative introduced to improve educational quality in rural areas. A hub school serves as a resource center for a cluster of 3 to 5 nearby small schools, consolidating educational resources, conducting periodic in-person sessions, and administering assessments for students who otherwise receive instruction in understaffed small schools. The model was piloted in Karaganda region and expanded nationally, with facilities receiving modernization investments including STEM laboratories and digital infrastructure.

Small-scale schools (malokomplektnye shkoly) are schools with combined multi-grade classes, typically located in rural areas with small populations. They account for nearly half of all schools in Kazakhstan and about 70 percent of rural schools. These schools face chronic challenges including teacher shortages, limited infrastructure, multi-grade instruction where a single teacher covers multiple grade levels simultaneously, and geographic isolation that limits students' access to supplementary educational resources.

Regular rural and urban schools constitute the backbone of Kazakhstan's secondary education system, enrolling about 76 percent of all graduates in our sample. Regular urban schools serve as the reference category in our analysis. Regular rural schools, while following the same national curriculum, tend to have fewer resources, lower teacher qualification ratios, and less access to supplementary educational services. The urban-rural divide is a longstanding feature of Kazakhstan's education landscape, documented across multiple international assessments (Chankseliani et al., 2020).

Data and Methods

Data

We use administrative data from the National Educational Database of Kazakhstan, maintained by the National Center for Educational Research and Evaluation “Taldau” under the Ministry of Education of the Republic of Kazakhstan. The dataset covers the full population of high school graduates in Kazakhstan and links student-level records with school characteristics, post-secondary enrollment outcomes, and labor market indicators.

Our analytic sample includes all students who graduated from general secondary education between 2021 and 2023. Unlike studies that restrict the sample to Unified National Test (UNT) takers, we retain the full population of graduates to examine both UNT performance and post-secondary destinations. The full sample for binary outcome analyses comprises 499,150 students. For analyses of UNT performance, we restrict the sample to 373,649 graduates who sat for the UNT, excluding students from Nazarbayev Intellectual Schools (NIS) whose UNT-equivalent scores are transferred from Cambridge examinations and are therefore not directly comparable.

Variables

Dependent variables. We examine two sets of outcomes. The first set consists of log-transformed UNT scores: total score, history of Kazakhstan, reading literacy, and math literacy. Log transformation facilitates the interpretation of coefficients as approximate percentage differences. The second set consists of five mutually exclusive post-secondary destinations, constructed by imposing a priority ordering on overlapping administrative records: (1) university enrollment, (2) vocational education, (3) study abroad, (4) employment,

and (5) not in education, employment, or training (NEET). Students are assigned to the highest-priority category for which they qualify, ensuring that every graduate falls into exactly one destination.

Independent variables. The main independent variable is school type, classified into 19 mutually exclusive categories using a hierarchical coding scheme applied to administrative school identifiers. The hierarchy assigns each school to a single category based on the following priority ordering: Nazarbayev Intellectual Schools (NIS), Bilim-Innovation Lyceums (BIL), Physics-Mathematics schools (FIZMAT), Daryn schools for gifted children, other selective schools, military schools, sport schools, music schools, gymnasiums, lyceums, Binom schools, private international schools, IQanat/Burabay schools, other private schools, boarding schools, hub/resource center schools, small-scale schools, regular rural schools, and regular urban schools. The reference category is regular urban schools.

Student-level covariates include an indicator for general secondary education completed with honors, an indicator for the Altyn Belgi gold medal, gender, language of instruction at the student's school (Kazakh, Russian, or other, with Russian as the reference), receipt of government support by the student's family, household internet access, and orphan status.

School-level covariates include the ratio of highest-category teachers in the school-year, class size measured as the number of students in the student's class (school-year-grade-letter combination), total number of students, and total number of staff.

Methodology

To examine the association between school types and UNT performance, we estimate the following ordinary least squares (OLS) specification:

$$\text{Log}(\text{UNTis}) = \alpha 0 + \text{SchoolTypes}\beta + \text{Xis}\gamma + \delta\text{ry} + \varepsilon\text{is}$$

where Log(UNTis) is the log-transformed UNT score of student i from school s; SchoolTypes is a vector of 18 school type indicators (with regular urban schools as the omitted category); Xis is a vector of student- and school-level covariates; δry denotes region-by-year fixed effects that absorb time-invariant regional differences and region-specific trends; and εis is the error term. We estimate this model separately for total score, history of Kazakhstan, reading literacy, and math literacy. NIS students are excluded from the OLS sample because their UNT-equivalent scores are Cambridge examination transfers.

To examine post-secondary destinations, we estimate logistic regressions for each of the five binary outcomes and report average marginal effects (AME). The specification mirrors the OLS model, with the binary destination indicator replacing the log UNT score as the dependent variable. All 19 school types, including NIS, enter the logistic models, as post-secondary outcomes are observed for the full sample of graduates.

In all models, standard errors are clustered at the school level to account for within-school correlation in unobserved factors. Region-by-year fixed effects are included throughout to control for geographic differences in educational infrastructure, labor markets, and time-varying regional shocks.

Results

Descriptive Statistics

Table 1 presents descriptive statistics for the full sample of 499,150 graduates from 2021 to 2023. The sample is dominated by regular school graduates: regular urban and regular rural schools together account for about 76 percent of students, with regular rural schools alone contributing 35 percent. Among selective and specialized institutions, gymnasiums are the most common (3.4 percent), followed by other private schools (2.8 percent), other selective schools (2.4 percent), and boarding schools (3.4 percent). The most elite school types are relatively rare: NIS accounts for 1.3 percent, BIL for 1.0 percent, and Daryn for just 0.2 percent of the sample.

Student characteristics show meaningful variation. Approximately 10 percent of graduates earned honors diplomas and 1 percent received the Altyn Belgi gold medal. Female students constitute 53 percent of the sample. The majority of students (70 percent) attended Kazakh-language schools, about 27 percent attended Russian-language schools, and a small share attended schools with other languages of instruction. Socioeconomic indicators suggest that the population is relatively disadvantaged in some dimensions: only about 88 percent report internet access at home, 2 percent of families receive government support, and 0.2 percent of students are orphans.

The post-secondary destination distribution reveals that 56 percent of graduates enrolled in university, 13 percent entered vocational education, 5 percent studied abroad, 9 percent were employed, and 17 percent

were in the NEET category. These shares vary substantially across school types. University enrollment rates range from 31 percent among private international school graduates to 84 percent for Daryn school graduates. The NEET rate is particularly high among military school graduates (63 percent) and private international school graduates (43 percent), and lowest among Daryn (11 percent) and other selective school graduates (13 percent).

Table 1. Descriptive statistics

Variable	Mean (SD)
Panel A: School type distribution	
NIS	0.01 (0.11)
BIL	0.01 (0.10)
FIZMAT	0.002 (0.04)
Daryn	0.002 (0.05)
Other Selective	0.02 (0.15)
Military	0.004 (0.06)
Sport	0.01 (0.07)
Music	0.001 (0.03)
Gymnasium	0.03 (0.18)
Lyceum	0.01 (0.12)
Binom	0.002 (0.04)
Private International	0.002 (0.05)
IQanat Burabay	0.001 (0.03)
Other Private	0.03 (0.17)
Boarding	0.03 (0.18)
Hub/Resource Center	0.02 (0.13)
Small-Scale	0.05 (0.21)
Regular Rural	0.35 (0.48)
Regular Urban	0.41 (0.49)
Panel B: Student characteristics	
Honors diploma	0.10 (0.30)
General diploma	0.90 (0.30)
Altyn Belgi	0.01 (0.12)
Female	0.53 (0.50)
Male	0.47 (0.50)
Kazakh language	0.70 (0.46)
Russian language	0.27 (0.44)
Other language	0.04 (0.19)
Panel C: Family SES	
Government support (ASP)	0.02 (0.15)
No government support	0.98 (0.15)
Internet at home	0.88 (0.33)
No internet at home	0.12 (0.33)
Orphan	0.002 (0.04)
Panel D: School characteristics	
Highest category teacher ratio	0.04 (0.06)

Class size	20.20 (16.60)
School size (students)	1177.34 (894.85)
Staff count	145.71 (77.09)
Panel E: Region	
Astana/Almaty	0.14 (0.35)
North	0.16 (0.37)
West	0.16 (0.37)
South	0.48 (0.50)
East	0.05 (0.23)
Panel F: Year	
2021	0.32 (0.47)
2022	0.34 (0.47)
2023	0.34 (0.47)
Panel G: Post-secondary outcomes (all graduates, N = 499,150)	
University enrolled	0.56 (0.50)
Vocational education	0.13 (0.34)
Studies abroad	0.05 (0.22)
Employed	0.09 (0.28)
NEET	0.17 (0.38)
Panel H: UNT score outcomes (UNT takers, N = 373,649)	
Total UNT score	73.74 (23.42)
History of Kazakhstan	11.59 (3.72)
Reading literacy	16.37 (3.18)
Mathematical literacy	9.67 (3.34)

Notes: Sample restricted to 2021–2023 graduates with non-missing values on all regression covariates (listwise deletion). Panel A shows school type indicators as proportions with standard deviations. Panels B–C report mean (SD) for binary variables including reference categories. Panel D reports school-level continuous variables. Panels E–F show region and year distributions. Panel G reports mutually exclusive post-secondary destinations (priority: university > vocational > abroad > employed > NEET). Panel H reports raw UNT scores for the OLS subsample of UNT takers.

Figure 1 presents mean UNT total scores by school type for the 2023 cohort. The variation is substantial: FIZMAT schools achieve the highest average scores, followed by IQanat/Burabay, Daryn, and other selective schools. At the other end, sport schools and small-scale schools have the lowest average scores. Regular urban schools, the reference category, fall in the middle of the distribution.

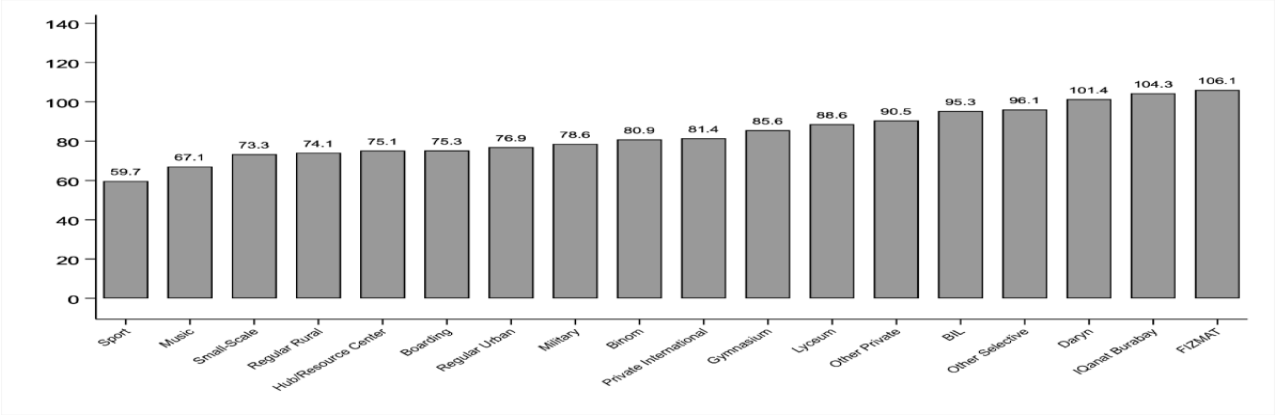


Figure 1. Average Total UNT Scores by School Type, 2023

Regression Estimates

School Types and UNT Performance

Table 2 presents OLS estimates of the association between school type and log-transformed UNT scores, controlling for student and school characteristics with region-by-year fixed effects. The reference category is regular urban schools. The R-squared values range from 0.15 for math literacy to 0.42 for reading literacy, with total scores at 0.22, indicating that the model explains a meaningful but not exhaustive share of the variation in UNT performance.

The most selective school types show large and statistically significant advantages in UNT performance. IQanat/Burabay school graduates score approximately 33 percent higher on the total UNT than their regular urban peers, the largest premium observed across all school types. BIL graduates score about 24 percent higher, FIZMAT graduates 29 percent higher, and Daryn graduates 26 percent higher. Other selective schools show a premium of 21 percent. These advantages are broadly consistent across subjects, though math literacy tends to show the largest differentials: BIL graduates score 29 percent higher in math, FIZMAT graduates 34 percent higher, and IQanat/Burabay graduates 32 percent higher.

Gymnasiums and lyceums, which represent a tier below the most selective schools, also show significant positive associations with UNT performance. Gymnasium graduates score about 10 percent higher in total scores and 12 percent higher in math, while lyceum graduates score 16 percent higher overall and 17 percent higher in math. Other private schools show an advantage of about 16 percent in total scores.

At the lower end, sport schools show a substantial negative association: their graduates score approximately 24 percent lower in total UNT scores and 31 percent lower in math literacy, consistent with the specialized, non-academic orientation of these institutions. Music school graduates also score lower, by about 8 percent in total scores and 11 percent in math. Regular rural schools show a modest but significant disadvantage of about 4 percent in total scores and 6 percent in math relative to regular urban schools. Small-scale schools, hub/resource center schools, and boarding schools show small negative associations with total scores that are close to zero and generally not substantively large.

Military school graduates show no statistically significant difference in total UNT scores relative to regular urban school peers, despite the large NEET rate observed in descriptive statistics. Binom school graduates show a modest positive association of about 4 percent in total scores, driven primarily by a 7 percent math advantage.

Among control variables, the strongest predictors of UNT performance are prior achievement indicators. Graduates with honors diplomas score about 30 percent higher and Altyn Belgi recipients about 35 percent higher than graduates with general diplomas. Female students score about 8 percent higher in total scores but 3 percent lower in math. Students from families receiving government support and orphans score 3 to 5 percent lower across subjects. Internet access at home is associated with a modest 2 percent advantage.

Table 2. School types and UNT scores (OLS)

	(1)	**(2)**	**(3)**	**(4)**
	Log Total	**Log History**	**Log Reading**	**Log Math**
School type (ref: Regular Urban)				
BIL	0.24***	0.12***	0.06***	0.29***
	(0.018)	*(0.015)*	*(0.006)*	*(0.015)*
FIZMAT	0.29***	0.00	0.05***	0.34***
	(0.021)	*(0.028)*	*(0.006)*	*(0.017)*
Daryn	0.26***	0.18***	0.06***	0.26***
	(0.026)	*(0.026)*	*(0.009)*	*(0.027)*
Other Selective	0.21***	0.13***	0.05***	0.23***
	(0.012)	*(0.010)*	*(0.004)*	*(0.012)*
Military	0.02	0.08*	0.02*	0.03
	(0.047)	*(0.038)*	*(0.011)*	*(0.048)*
Sport	-0.24***	-0.23***	-0.09***	-0.31***
	(0.017)	*(0.022)*	*(0.010)*	*(0.027)*
Music	-0.08***	-0.02	-0.03	-0.11***

	(0.011)	*(0.013)*	*(0.017)*	*(0.015)*
Gymnasium	0.10***	0.06***	0.04***	0.12***
	(0.010)	*(0.008)*	*(0.003)*	*(0.011)*
Lyceum	0.16***	0.09***	0.04***	0.17***
	(0.022)	*(0.014)*	*(0.006)*	*(0.025)*
Binom	0.04**	0.00	0.01	0.07***
	(0.015)	*(0.013)*	*(0.009)*	*(0.013)*
Private International	0.07**	-0.08**	0.01	0.12***
	(0.024)	*(0.027)*	*(0.012)*	*(0.026)*
IQanat Burabay	0.33***	0.23***	0.07***	0.32***
	(0.005)	*(0.005)*	*(0.002)*	*(0.006)*
Other Private	0.16***	0.10***	0.04***	0.17***
	(0.019)	*(0.017)*	*(0.005)*	*(0.019)*
Boarding	-0.02	0.00	0.00	-0.03*
	(0.010)	*(0.009)*	*(0.004)*	*(0.011)*
Hub/Resource Center	-0.02**	0.02	-0.01	-0.04***
	(0.009)	*(0.009)*	*(0.004)*	*(0.011)*
Small-Scale	-0.02***	0.01	0.00	-0.04***
	(0.006)	*(0.006)*	*(0.003)*	*(0.007)*
Regular Rural	-0.04***	-0.02***	-0.02***	-0.06***
	(0.005)	*(0.004)*	*(0.002)*	*(0.006)*
Student characteristics	Yes	Yes	Yes	Yes
Family SES	Yes	Yes	Yes	Yes
School characteristics	Yes	Yes	Yes	Yes
Region × Year FE	Yes	Yes	Yes	Yes
Clustered SE	School	School	School	School
Observations	373,649	373,649	373,649	373,649
R-squared	0.22	0.33	0.42	0.15

Notes: OLS estimates. Dependent variables are log-transformed UNT scores (total, history, reading, mathematics). Reference category: Regular Urban schools. Student characteristics include honors diploma, Altyn Belgi, female, language of instruction. Family SES includes government support (ASP), internet at home, orphan status. School characteristics include highest category teacher ratio, class size, school size, staff count. Standard errors clustered at the school level in parentheses.

** $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

School Types and Post-Secondary Destinations

Table 3 reports average marginal effects from logistic regressions predicting five mutually exclusive post-secondary destinations. Coefficients represent percentage-point differences in the probability of each outcome relative to regular urban school graduates, holding other factors constant.

University enrollment. Most selective school types are associated with significantly higher university enrollment. NIS graduates are 12 percentage points more likely to enroll in university, BIL graduates 13 percentage points, Daryn graduates 25 percentage points, and other selective school graduates 17 percentage points more likely than regular urban school graduates. IQanat/Burabay graduates show an 18 percentage-point advantage. Gymnasium and lyceum graduates are 8 and 10 percentage points more likely to enroll, respectively. Other private school graduates show a 17 percentage-point advantage. In contrast, military school graduates are 19 percentage points less likely to enroll in university, and private international school graduates are 15 percentage points less likely.

Vocational education. The vocational education pathway shows a striking pattern. Most selective and private school types are associated with lower vocational enrollment, often showing near-zero rates. BIL, NIS, and other selective school graduates are approximately 10–12 percentage points less likely to enter vo-

cational education than regular urban peers. In contrast, sport school graduates are 21 percentage points more likely to enter vocational education, and boarding school graduates 6 percentage points more likely. Small-scale schools and regular rural schools also show positive associations of 6 and 4 percentage points, respectively.

Study abroad. Private international school graduates are 11 percentage points more likely to study abroad, the largest effect in this category, consistent with their international orientation. Gymnasium graduates are 4 percentage points more likely and other selective school graduates 3 percentage points more likely to study abroad. Most other school types show either no significant difference or a small negative association. NIS and military school graduates are each about 5 percentage points less likely to study abroad, possibly reflecting the strong domestic pipeline of NIS into local universities and the specific career trajectories of military school graduates.

Employment. Almost all school types are associated with lower employment rates relative to regular urban schools, consistent with the fact that post-secondary education channels students away from immediate labor market entry. The negative effect is approximately 10 percentage points for NIS, BIL, Daryn, other selective, sport, Binom, and private international school graduates.

NEET. The NEET category, which captures graduates not observed in any education, employment, or training pathway, shows the most dramatic variation across school types. Military school graduates are 45 percentage points more likely to be in the NEET category, a striking finding that likely reflects the specific post-graduation service requirements or delayed transitions characteristic of military school graduates rather than genuine economic inactivity. NIS graduates are 13 percentage points more likely to be NEET, and private international school graduates 20 percentage points more likely, which may reflect gap years, unobserved international placements, or delayed university enrollment not captured in the administrative data. Regular rural school graduates are 3 percentage points more likely to be NEET than regular urban peers.

Among control variables, prior academic achievement strongly predicts post-secondary outcomes. Graduates with honors diplomas are 26 percentage points more likely to enroll in university and 22 percentage points less likely to enter vocational education. Altyn Belgi recipients show even larger effects: 32 percentage points more likely to attend university and 40 percentage points less likely to enter vocational education. Female students are modestly more likely to enroll in university (2 percentage points) and vocational education (3 percentage points). Kazakh-language students are 22 percentage points more likely to enroll in university but 9 percentage points less likely to study abroad, reflecting language-specific pathways. Students from families receiving government support are 4 percentage points less likely to study abroad and 3 percentage points more likely to be employed.

Table 3. School types and post-secondary outcomes (average marginal effects)

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
	University	**Vocational**	**Abroad**	**Employed**	**NEET**
School type (ref: Regular Urban)					
NIS	0.12***	-0.12***	-0.05***	-0.10***	0.13***
	(0.035)	*(0.003)*	*(0.004)*	*(0.015)*	*(0.032)*
BIL	0.13***	-0.12***	0.03	-0.11***	0.06***
	(0.018)	*(0.003)*	*(0.014)*	*(0.011)*	*(0.018)*
FIZMAT	0.05	0.00	-0.01	0.00	0.07
	(0.030)	*(.)*	*(0.027)*	*(.)*	*(0.054)*
Daryn	0.25***	0.00	0.00	-0.11***	-0.05*
	(0.041)	*(.)*	*(0.022)*	*(0.014)*	*(0.019)*
Other Selective	0.17***	-0.11***	0.03**	-0.11***	-0.03**
	(0.020)	*(0.004)*	*(0.012)*	*(0.010)*	*(0.009)*
Military	-0.19***	-0.09***	-0.05***	-0.09***	0.45***
	(0.020)	*(0.020)*	*(0.009)*	*(0.019)*	*(0.029)*
Sport	-0.08	0.21***	-0.04***	-0.10***	0.02
	(0.040)	*(0.054)*	*(0.005)*	*(0.010)*	*(0.029)*
Music	0.14	-0.08***	-0.02	-0.05**	0.01

	(0.077)	*(0.021)*	*(0.009)*	*(0.017)*	*(0.064)*
Gymnasium	0.08***	-0.07***	0.04***	-0.08***	-0.02*
	(0.011)	*(0.007)*	*(0.007)*	*(0.009)*	*(0.008)*
Lyceum	0.10***	-0.09***	0.02	-0.09***	0.03
	(0.017)	*(0.008)*	*(0.012)*	*(0.012)*	*(0.024)*
Binom	0.04*	-0.11***	-0.04**	-0.11***	0.04
	(0.019)	*(0.009)*	*(0.015)*	*(0.011)*	*(0.029)*
Private International	-0.15***	0.00	0.11***	-0.11***	0.20*
	(0.026)	*(.)*	*(0.032)*	*(0.010)*	*(0.093)*
IQanat Burabay	0.18***	0.00	-0.02***	0.00	0.09***
	(0.008)	*(.)*	*(0.002)*	*(.)*	*(0.008)*
Other Private	0.17***	-0.10***	0.02*	-0.10***	0.02
	(0.022)	*(0.006)*	*(0.009)*	*(0.013)*	*(0.013)*
Boarding	0.00	0.06***	-0.03***	-0.06***	-0.01
	(0.013)	*(0.009)*	*(0.004)*	*(0.013)*	*(0.008)*
Hub/Resource Center	0.04**	0.02**	-0.03***	-0.06***	0.00
	(0.013)	*(0.009)*	*(0.006)*	*(0.012)*	*(0.010)*
Small-Scale	0.00	0.06***	-0.04***	-0.07***	0.00
	(0.011)	*(0.007)*	*(0.002)*	*(0.012)*	*(0.007)*
Regular Rural	-0.04***	0.04***	-0.03***	-0.02	0.03***
	(0.010)	*(0.005)*	*(0.003)*	*(0.012)*	*(0.006)*
Student characteristics	Yes	Yes	Yes	Yes	Yes
Family SES	Yes	Yes	Yes	Yes	Yes
School characteristics	Yes	Yes	Yes	Yes	Yes
Region × Year FE	Yes	Yes	Yes	Yes	Yes
Clustered SE	School	School	School	School	School
Observations	499,150	495,466	499,150	497,842	499,150

Notes: Average marginal effects from logit regressions. Outcomes are mutually exclusive post-secondary destinations (priority: university > vocational > abroad > employed > NEET). Reference category: Regular Urban schools. Student characteristics include honors diploma, Altyn Belgi, female, language of instruction. Family SES includes government support (ASP), internet at home, orphan status. School characteristics include highest category teacher ratio, class size, school size, staff count. Standard errors clustered at the school level in parentheses.

** $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$*

Discussion

This study provides the first comprehensive mapping of how school type is associated with academic performance and post-secondary destinations across the full population of high school graduates in Kazakhstan. The findings reveal striking variation: graduates of the most selective schools score 24 to 33 percent higher on the UNT than regular urban school peers, and are 12 to 25 percentage points more likely to enroll in university. At the other end, sport school graduates score 24 percent lower, and military school graduates show a 45 percentage-point elevation in NEET status. These patterns demonstrate that school type is among the strongest correlates of educational outcomes in Kazakhstan, rivaling or exceeding the predictive power of individual-level characteristics such as gender, language, or family socioeconomic indicators.

How should these large associations be interpreted? The Coleman Report (Coleman et al., 1966) established that observed school-level differences primarily reflect student composition rather than institutional effectiveness. The elite illusion literature reinforces this: performance advantages of selective schools largely disappear at admission cutoffs (Abdulkadiroglu et al., 2014; Clark, 2010; Pop-Eleches & Urquiola, 2013; Shi, 2020; Wu et al., 2019), suggesting that selection rather than school quality drives the observed gaps.

Our results are consistent with this interpretation. The school types that show the largest performance advantages, BIL, FIZMAT, Daryn, and IQanat/Burabay, all employ competitive entrance examinations that select students on the basis of prior achievement. These schools also serve student populations with distinc-

tive socioeconomic profiles: higher rates of internet access, lower rates of government welfare receipt, and higher concentrations of honors diploma holders. The performance premiums we estimate therefore reflect the combined effects of ability-based selection, family socioeconomic sorting, peer composition, and whatever genuine institutional value-added these schools provide. Our observational design cannot disentangle these mechanisms.

The post-secondary destination patterns add a dimension beyond test scores. Even if selective schools do not causally raise achievement at the margin (Abdulkadiroglu et al., 2014; Barrow et al., 2020), they may shape life trajectories through peer networks, institutional reputations, and university counseling. The high university enrollment rates of Daryn (84 percent) and NIS (69 percent) graduates, and the high study-abroad rates of private international school graduates (24 percent), likely reflect both selection and institutional channels.

The findings on specialized non-academic schools are particularly informative. The high NEET rate among military school graduates (63 percent) almost certainly reflects post-graduation military service obligations not captured in civilian records. Similarly, the channeling of sport school graduates into vocational education (35 percent) reflects these institutions' orientation toward athletic career pathways. These patterns underscore that school type shapes not only academic achievement but also the institutional pipeline through which graduates transition into adult life.

The modest but consistent disadvantages of rural, small-scale, and hub/resource center schools relative to regular urban schools point to persistent geographic inequalities. While these gaps are smaller than those between selective and regular schools, they affect a far larger share of the student population: rural and small-scale schools together account for nearly 40 percent of all graduates.

Policy Implications

These findings carry important policy implications. If school type associations reflect selection more than institutional effectiveness, the most impactful policy lever is not expanding access to selective schools but strengthening the regular schools that serve the majority of students. Regular urban, rural, and small-scale schools collectively educate approximately 80 percent of graduates, so even modest quality improvements in these institutions would affect far more students than further investments in the selective sector.

The persistent disadvantages of rural and small-scale schools are a particular concern. Small-scale schools, which account for nearly half of all schools in Kazakhstan, face teacher shortages, multi-grade instruction, and geographic isolation. Hub/resource center schools represent a promising reform, but our results suggest their effects remain modest. Targeted investments in teacher quality and digital infrastructure for rural and small-scale schools should be a priority. Equal per-student financing with supplementary allocations for remote and low-density settings would help ensure that the quality of a student's education does not depend on the accident of where they were born.

Second, the strong associations between prior academic achievement indicators (honors diplomas, Altyn Belgi) and outcomes suggest that the school system creates cumulative advantages: students who perform well in secondary school gain access to selective institutions and subsequently achieve better post-secondary outcomes. Policies that support academic achievement in the early years of schooling, particularly in underserved communities, could help mitigate the sorting mechanisms that drive the observed school-type gaps.

Limitations and Future Research

Several limitations should be acknowledged. Our analysis is observational, and the estimated associations between school type and outcomes cannot be interpreted as causal effects. We lack detailed measures of family income, parental education, and other socioeconomic variables that would allow more precise control for selection. The NEET category is a residual that likely conflates genuine economic inactivity with unobserved pathways such as military service, international education, or informal employment not captured in administrative records.

Future research could exploit admission cutoffs at selective schools to estimate causal effects using regression discontinuity designs. Longitudinal studies tracking students from primary school through post-secondary education would illuminate how early sorting into different school types compounds over time. Finally, qualitative research on the mechanisms through which school type shapes post-secondary transitions, whether through academic preparation, peer networks, institutional reputation, or counseling, would complement the quantitative patterns documented here.

Conclusion

This study has documented associations between 19 school types and educational outcomes for the full population of Kazakhstan's high school graduates from 2021 to 2023. The results reveal a highly stratified system in which school type is strongly correlated with both UNT performance and post-secondary destinations.

We emphasize that these findings are descriptive rather than causal. The large performance premiums associated with selective schools likely reflect student selection and family sorting at least as much as institutional effectiveness, consistent with the international evidence on elite schools (Abdulkadiroglu et al., 2014; Clark, 2010; Smith-Woolley et al., 2018) and the broader Coleman tradition attributing school-level differences primarily to student intake.

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