

# Identification of Learning Outcome Deterioration Factors Among Children, Review of Potential Mitigators The Case of Tomsk Region

Daria Mozgova<sup>1,\*</sup>, Oksana Zamyatina<sup>2</sup>

<sup>1</sup>Tomsk regional institute for advanced training and retraining of educators, Tomsk State Pedagogical University, Tomsk, Russia

<sup>2</sup>National Research Tomsk State University, National Research Tomsk Polytechnic University, Tomsk, Russia

\*Corresponding author. Email: doshtomsk@mail.ru

## ABSTRACT

**This article expounds on the definition of schools with underachievement, resilient schools, functioning within disadvantage social environment. It provides analysis of findings of the regional “evaluation of educational system on the basis of PISA 2019 model” in Tomsk region in the context of schools with underachievement and schools operating within disadvantage social environment. It also identifies and classifies factors that influence children’s learning outcomes and explores the creation and implementation of the new methodology for evaluation of a pedagogue’s professional competencies through pupil learning outcomes.**

*Keywords: quality of education, resilient schools, schools with underachievement, learning outcome deterioration factors, PISA*

## I. INTRODUCTION

The first goal of the National Project “Education” is defined as ensuring global competitiveness of the Russian educational system so that Russian Federation secures a place in the world’s top-10 leading countries in the field of comprehensive education [1].

Quality of educational system should be viewed as multi-component process where learning outcomes are one of the main effectiveness indicators. High quality of education can be measured not only through excellence of a particular educational establishment, but rather through low spread between the outcomes of “mediocre” and “good” performing schools. In fact, the lower the spread is, the more confidence can be given to the statement regarding the reduction of inequality in access to educational opportunities for children [2].

Educational establishments eligible for targeted aid in the Tomsk region were selected on the basis of “methodology for revealing comprehensive organizations with poor learning outcomes through complex data analysis, including quality of education” [3].

It should be noted that 2019 saw the first 14 constituents of the Russian Federation (including Tomsk region) participating in the regional study “evaluation of educational system on the basis of PISA

2019 model<sup>1</sup>”, the outcome of which made it possible to form a holistic view on the stance of learning outcomes in the educational establishments of Tomsk region. PISA-based evaluation is a study, that is based around application of technological solutions of the ‘PISA for Schools’ project, which is implemented by the Organization for Economic Cooperation and Development (OECD) and is conducted in compliance with the methodology and evaluation criteria for comprehensive education in the comprehensive educational establishments in line with the international studies of pupil/student quality of learning outcomes [4].

The article would present analysis of findings of the regional “evaluation of educational system on the basis of PISA 2019 model” in the context of those educational establishments of Tomsk region that were listed as schools with underachievement (SUs) and would provide recommendations for respective amendments to the educational process.

Programme for International Student Assessment is implemented by the Organization for Economic Cooperation and Development, OECD). The project documentation reads that its goal is to conduct evaluation of whether graduating students of

---

<sup>1</sup> PISA (Programme for International Student Assessment) – is an international comparative study of quality of education which is concentrated on the evaluation of knowledge and skills of 15-year old pupils.

comprehensive schools have necessary knowledge and skills to become contributing members of society (OECD, 1999).

On top of the evaluation of learning outcomes the study takes into account other factors, linked to the pupils/students, their families, schools and non-scholastic educational opportunities. Learning outcomes of 15-year old pupils/students are target of the research. Such sampling accounts for the fact that it is by the end of this age that the standard compulsory education in different countries terminates and hence educational programmes tend to have much in common. At this educational stage it is crucial to determine the actual state of the acquired knowledge and skills that may be relevant for future development of a pupil/student as well as examine the capacity for self-education and acquisition of knowledge, that would be instrumental in adapting to the contemporary environment. The study of learning outcomes is conducted within three directions: “reading literacy”, “mathematical literacy” and “literacy in natural sciences” [5].

Every pupil/student can score up to 1000 points within the international grading scale separately under each of the task groups (in the fields of reading, mathematical literacy and literacy in natural sciences). Each task is ranked in accordance with pre-set difficulty, with scale being decided subject to the outcomes shown by other pupils/students. The international scale has the following characteristics: the average is set at 500 points, standard deviation at 100 points. This implies that roughly 2/3rds of the examinees from participating countries had their score within the range of 400 and 600 points.

Key parameters of PISA for Schools:

- The study involves pupils/students whose age varies between 15 years and 3 months and 16 years and 2 months (starting from the 7th grade);
- PISA for schools survey tools include a test form and a questionnaire for students/pupils and an on-line questionnaire for the school office
- Participants of the study provide their feedback via PC;
- All tasks are based on the conceptual framework of the PISA study;
- PISA for School study provides for evaluation of outcomes in line with unified PISA study scale;
- Regional evaluations under the PISA model take place in September and October of the reference year [6].

## **II. SCHOOLS WITH UNDERACHIEVEMENT AND SCHOOLS, FUNCTIONING WITHIN DISADVANTAGED SOCIAL ENVIRONMENTS**

SU is the commonly used abbreviation for educational establishments that run the risk of underachievement, irrespective of the nature of the risks involved. As per “Methodology for identification of underachieving comprehensive educational establishments on the basis of holistic analysis of educational establishment data, including that covering quality of education” “underachievement” is defined as situation where not less than 30% of the overall number of participants of testing receive a mark “2” under the VPR or fail to reach the minimal hurdle specified in the Basic State Examination (BSE) procedure, Universal State Exam (USE) [3]. 129 comprehensive educational establishments in the Tomsk region were included in the list of SUs.

The majority of the SUs exist in clusters of schools, functioning in the disadvantaged social environment. In the 2017 study conducted by the Academy of Public Administration (Moscow) the disadvantaged social environments were defined as both the school environment and living conditions of the pupils/students, their families, peculiarities of the existing social and cultural conditions, which may have a negative impact on the educational motivation of pupils, their personal involvement with the educational process and their eagerness to learn; prevent pupils/students from gaining access to high-quality education and hindering their overall positive socialization, preventing schools from rendering high-quality educational services and fostering the youth; limit the ability of schools to gain access to adequate resources vital for their functioning and development (including legal, organizational, financial, economic, inventory and human resources); hobble cooperation of schools with local communities (including families of pupils/students) in pursuit of the pedagogical and social functions of schools“ [7].

This issue has become quite acute for the Tomsk region given the fact that a considerable part of the comprehensive educational establishments (more than 66%) is located in rural areas of which half is represented by underfilled schools located in distant and remote locations.

Findings of the regional study “evaluation of educational system on the basis of PISA 2019 model” (please see Figure 1) show that learning outcomes of pupils/students from SUs are predictably lower compared with other study participants. Comparing with the average level in the Russian Federation the highest gap lies in the reading literacy (41 point), the lowest gap is in natural sciences literacy (34 points), with spread in mathematical literacy being 40 points.

Learning outcomes of SUs in the Tomsk region are much better, compared with the average level in Russia. SUs results in the Tomsk region are by 26 points on average compared with the SU results in Russia: by 36 points on average in reading literacy, by 22 points in mathematical literacy and by 19 points by literacy in

natural sciences. The difference between schools listed as SUs and not listed as such in the Tomsk region is 20 points on average: by 16 points on average in reading literacy, by 22 points in mathematical literacy and by 20 points by literacy in natural sciences (See “Fig. 1”).

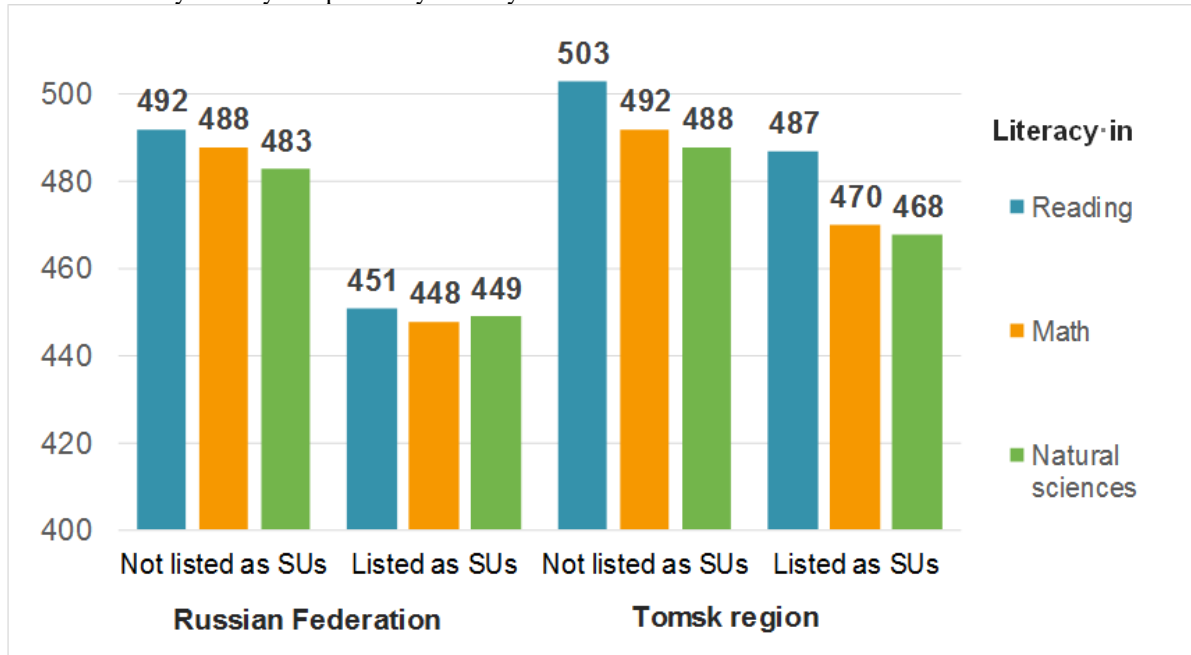


Fig. 1. Learning outcomes of pupils/students of SUs as of 2019 measured against a 1000-point scale.

### III. RESILIENT SCHOOLS

The term “resiliency” (after the English word “resilience”) reflects vitality and sustainability of an entity under considerable life obstacles and its ability to overcome the latter and emerge undaunted by their perils. As E.G. Shubnikova points out (with regard to personality level) resiliency stipulates not only the fact of achievement of success, but that such achievement should come through socially acceptable means, which coincide with the generally accepted social norms [8].

Resilient schools can therefore be defined as those that function within the disadvantaged social and economic environments but showing much higher learning outcomes compared with schools that exist under similar conditions [9].

Resilient educational establishments are those that are able to cope with adverse social and economic factors in a much better way. The “evaluation of educational system on the basis of PISA 2019 model” relegates the following schools to this category: not less than 30% of the pupils/students fall into the lower quartile of the index of economic, social and cultural

status (ESCS) (high concentration of potentially low-performing pupils) and not less than 10% of pupils/students show resiliency: notwithstanding being part of the lower quartile of ESCS they achieve level 3 and higher on PISA scale in all three types of literacy.

Respectively, the non-resilient schools are defined as those educational establishments (EEs) that have a 30%+ share of pupils in the lower quartile of ESCS however the share of resilient pupils is less than 10%. Identification and comparison of the EEs with the share of pupils falling into the lowest ESCS quartile (the boundaries of ESCS quartiles are universal for all regions and are based on the overall Russian selection) is not less than 30% (so that such EEs can be provisionally named as those with significant underperforming risk) and allows to arrive at the results, cleared of social and economical impact of factors, given that the comparison is conducted among “equal” schools with regards to social and economic environment of pupils/students [10].

Share of resilient EEs among all EEs in Russia, which took part in the regional evaluation under PISA model in 2019 is shown in “Fig. 2”.

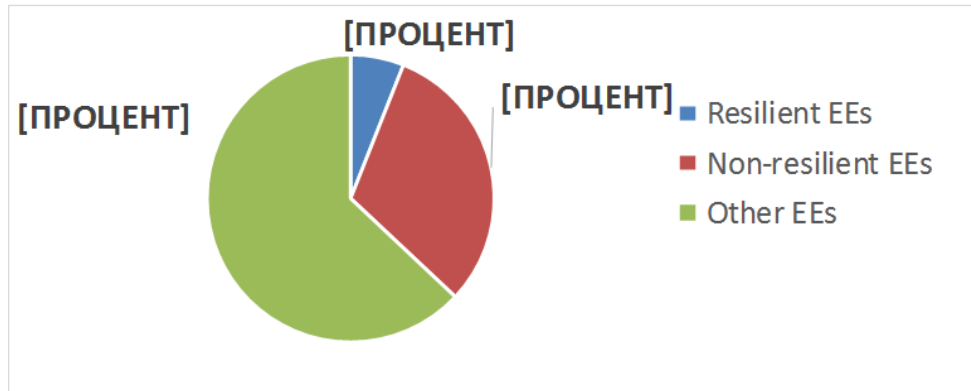


Fig. 2. Share of resilient EEs among all EEs in Russia, which took part in the regional evaluation under PISA model in 2019.

As per results of the “evaluation of educational system on the basis of PISA 2019 model” 10.9% of schools are considered to be resilient in the Tomsk region (10 schools in selection): notwithstanding high concentration of pupils/students from the non-performance group in those schools, they were able to show better learning outcomes across all literacy directions.

“Fig. 3” shows results of resilient and non-resilient schools “evaluated on the basis of PISA 2019 model”. All three evaluation parameters (reading literacy, mathematical literacy and literacy in natural sciences) in resilient schools exceed those in non-resilient.

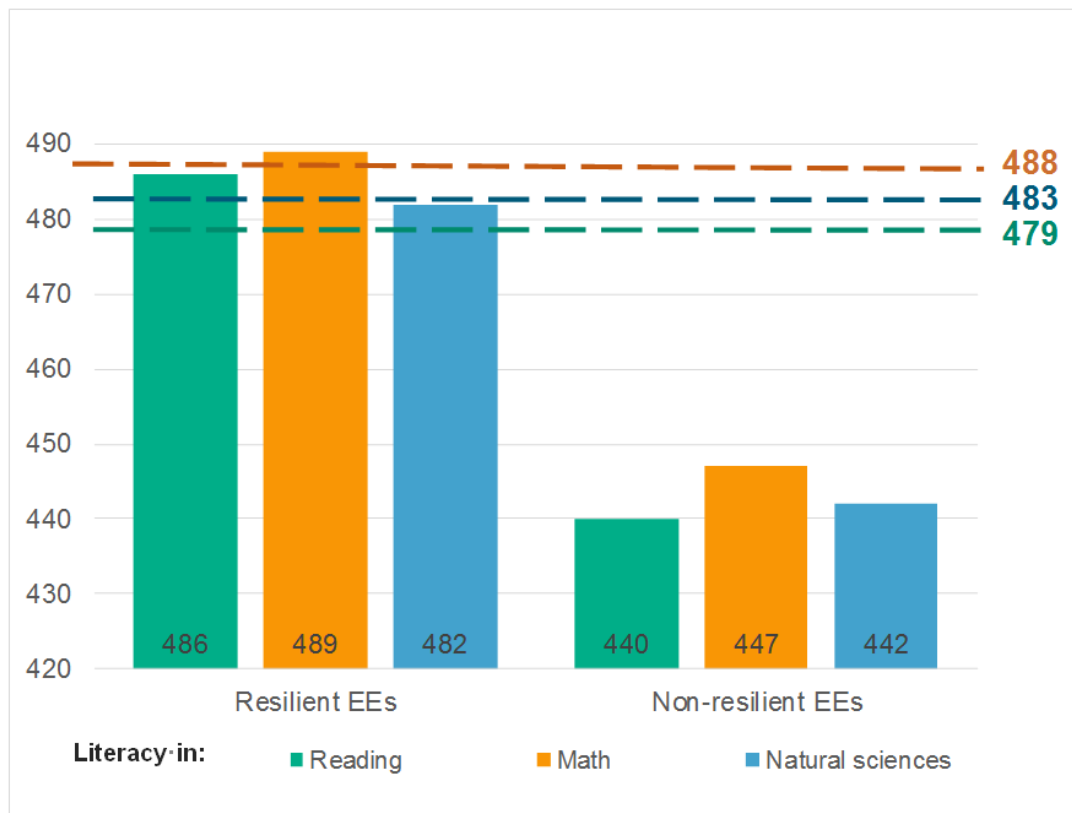


Fig. 3. Results of resilient and non-resilient schools among all Russian EEs evaluated under PISA model in 2019 against a 1000-point scale.

Under evaluation of educational system on the basis of PISA 2019 model, principals of the participating schools provided comments regarding the impact a particular issue may have on the ability of the EE to

deliver on high quality of education. 10 issues were identified: lack of qualified and/or effective pedagogues/teachers, insufficient number of pedagogues/teachers, capable of educating disabled

pupils/students, lack of educational materials (textbooks) or their inconsistency, lack of or insufficiency of digital technologies for education (IT infrastructure, computers, tablet computers, smartboards), limited access to Internet, limited library stock, lack of auxiliary staff, lack or insufficiency of infrastructure (furniture, premises, ventilation/heating, illumination), space (size

of classrooms) or its inadequacy, lack of time for tutoring.

Results of the issues “Lack or insufficiency of qualified and/or highly effective pedagogues/teachers” and “Lack of pedagogues/teachers, capable of educating disabled pupils/students” are shown in "Table I".

TABLE I. ISSUES, LIMITING THE ABILITY OF EES IN RENDERING HIGH-QUALITY EDUCATION (AS % OF EES)

Issue	Does not limit	Limits to a certain extent	Significantly limits
Lack or insufficiency of qualified and/or highly effective pedagogues/teachers	13%	60%	27%
Lack of pedagogues/teachers, capable of educating disabled pupils/students	22%	52%	26%

More than half of the respondents pointed out that the above issues limit EE’s potential to render high-quality education, while 27% and 26% respectively stressed that this presents a major obstacle for fulfilling EE’s potential.

**IV. DESCRIPTION OF THE CURRENT DEVELOPMENTS IN STAFF TRAINING OF EDUCATIONAL ESTABLISHMENTS OF THE TOMSK REGION: UNDERPERFORMING RISK FACTORS**

Currently schools lack pedagogue personalized development trajectories and corporate pedagogical team development programme.

As a general rule a teacher is sent to advanced training by the administration with the latter defining the contents and the provider. Upon finalization of the vocational training course (VTC) a teacher has 2-3 weeks for implementation of new knowledge and transformation of the theoretical skill into the new competence. In reality the administration rarely monitors the implementation of new methods and approaches and does not conduct evaluation of the efficiency of skills, acquired during VTC studies.

There is no system for identification of professional pedagogue deficits. Professional deficits of teachers are evaluated on the federal level (Tomsk region participated in 4 approbations of new teacher competency evaluation models) and through testing during the VTC (which is fragmented and does not occur across all VTCs).

Having worked with SUs for 6 months we can state that support should be targeted due to inherent differences between schools. The following alterations to the current management approaches towards education are crucial to change the existing trend:

- New modules should be introduced during a pedagogue’s initial education at higher educational establishment: “interaction with

underperforming pupils”, “interaction with pupils with low learning motivation, deviant behaviour”, “interaction with disabled children”, “interaction with children in adverse social environment”.

- It is of paramount importance to have professional deficits (content-driven, methodological, professional) of pedagogues identified in a systematic and timely manner via VTCs.
- Further analysis of expertise of resilient schools and partial implementation of their methodology to increase the quality of education at SUs;
- Implementation of the new methodology for evaluation of professional competencies of pedagogues through pupil/student performance. This would not only contribute to a much deeper analysis of a pedagogue’s results, but would reveal subjects, topics, directions in pupil education that should be addressed through new educational technologies for better learning patterns.

The following underperforming factors were identified on the basis of [3] and expertise derived from the Tomsk region:

- Enhancement of object and methodological competence of pedagogues
- Elimination of pedagogue staff shortage
- Raising the inventory level of schools
- Decrease in underperformance level
- Boosting of educational motivation of pupils
- Boosting of classroom discipline
- Interaction between schools and parents
- Increase of school welfare

- Switch to inclusive education
- Integration of children of migrants

The factors were subdivided into 5 broader groups:

Group “Pedagogue staffing” would include factors relating to enhancement of object and methodological competence of pedagogues and increase of school welfare.

Group “interaction with children” would include factors relating to decrease in underperformance level, boosting of educational motivation of pupils, boosting of classroom discipline, switch to inclusive education, increase of school welfare.

Group “Raising inventory level of schools” would include factors relating to raising the inventory level of schools.

Group “Interaction with parents” would include factors relating to interaction between schools and parents.

Such factor as integration of children of migrants is insignificant in the Tomsk region and was not therefore included into any of the groups. Factor “increase of school welfare” was included simultaneously into two Groups.

Further studies would propose criteria for evaluation of the impact that these groups make on the quality of education at school and learning outcomes of children in the Tomsk region.

## V. CONCLUSION

Material enhancement of the educational system and notable breakthrough in learning outcomes of children can only be achieved through systematic approach, however the first step should be analysis of insufficiency of schools and pedagogues within the specific context of an educational establishment with an aim to have this context fulfilled.

The following terms were defined in the article: schools with underachievement (SUs), resilient schools and schools, functioning within disadvantaged social environments.

The article tackled the current state of schools in the Tomsk region on the basis of the results of the regional “evaluation of educational system on the basis of PISA 2019 model”, USE, BSE, VPR<sup>2</sup>. It was revealed that 10 schools in the Tomsk region can be classified as resilient and their expertise can be translated to SUs, with principals of schools in Tomsk emphasizing that it is lack of qualified professional that hinders the potential of educational establishments, with most of

the SUs being part of clusters of schools that function in disadvantaged social environments.

The analysis made it possible to determine and classify factors that have an impact on the learning outcomes of children.

We propose creation and implementation of the new methodology for evaluation of professional competencies of pedagogues through pupil/student performance.

Further studies will be dedicated to identification of factors that have a more profound impact on each of the SU school in the Tomsk region, that would be the first step towards implementation of the target support and enhancement of learning outcomes.

## References

- [1] Passport of the National project “Education” minutes as of 24.12.2018 №16// Approved by the presidium of the Strategic development and national projects under the President of the Russian Federation.
- [2] “Methodology for target methodological support for underperforming comprehensive educational establishments” FBSI Federal Institute for Evaluation of Quality of Education // [Electronic source] – Access regime: [https://fioco.ru/Media/Default/Documents/ИИНОП/Методреком\\_ендации%20по%20ИИНОП.pdf](https://fioco.ru/Media/Default/Documents/ИИНОП/Методреком_ендации%20по%20ИИНОП.pdf)
- [3] “Methodology for revealing comprehensive organizations with low learning outcomes through complex data analysis, including quality of education» FBSI Federal Institute for Evaluation of Quality of Education // [Electronic source] – Access regime: [https://fioco.ru/Media/Default/Documents/ИИНОП/Методика%20выявления%20ИИНОП\\_.pdf](https://fioco.ru/Media/Default/Documents/ИИНОП/Методика%20выявления%20ИИНОП_.pdf)
- [4] Administrative order on “Approval of methodology and criteria for evaluation of quality of comprehensive education in educational establishments on the basis of internationally accepted standards” dd 6.05.2019 № 590/219, with adjustments dd 24.12.2019 № 1718/716// Approved by joint administrative order of Ministry of Education of Russia and Federal Service For Supervision In Education And Science.
- [5] Outcome of the international comparative studies by PISA in Russia // G.S. Kovaleva, E.A. Krasnovskiy, L.P. Krasnoutsкая, K.A. Krasnyanskaya // *Voprosy Obrazovaniya*. – 2004 г.
- [6] Information regarding the PISA for Schools studies FSBI Federal Institute for Evaluation of Quality of Education // [Electronic source] – Access regime: <https://fioco.ru/pisa-for-schools>
- [7] Theory and practice of support of schools that function within the social disadvantaged environments: research monograph // edited by: G. B. Kornetova, A. I. Salova. M., 2017.
- [8] Theoretical approaches towards investigation of structural vitality of a person as foundation for prevention of dependence behaviour // Shubnikova E.G. // *Liberal arts in Russia*. – 2013 г.
- [9] Beyond barriers: investigating resilient schools // M. A. Pinskaya, T.E. Khavenson, S. G. Kosaretskiy, R. S. Zvyagintsev, A. M. Mikhailova, T. A. Chirkina // *Voprosy Obrazovaniya*. – 2018 г.
- [10] Analysis of resiliency of Russian schools FSBI Federal Institute for Evaluation of Quality of Education // [Electronic source] – Access regime: <https://fioco.ru/Media/Default/Documents/ИИНОП/Анализ%20резильентности%20российских%20школ.pdf>

<sup>2</sup> VPR – all-Russian test