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Technical and Vocational Education and Training in Monotowns: Production of Mobility

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Abstract

This article looks into the relationship between education, industry and youth mobility in monotown settings. Information collected during a sociological survey in four Ural monotowns—Krasnoturyinsk, Pervouralsk, Revda (Sverdlovsk Oblast) and Dalmatovo (Kurgan Oblast)—was used as empirical data for the study.

Education can sometimes work "against" the community, as cultural and symbolic capital that young people acquire at secondary or sometimes vocational schools allows them to migrate from their hometowns to larger cities for education purposes. Therefore, better-educated youths are more likely to leave monotowns. At the same time, availability of educational institutions in a monotown provides its citizens with opportunities for personal growth as well as improvement of urban environment. A way out of this seemingly insoluble dilemma could be the policy of civic engagement, which can be implemented provided there are diverse labor market opportunities and a conducive social infrastructure. Planning the cooperation among businesses, education and municipal authorities could be part of the town development strategy, not only the result of decisions handed down by some ministries.

The article also offers an example of a cultural life script: a biography of a research participant whose desire to stay in a small town was only increased by the education she obtained.

Nearly all authors of classical social mobility studies, beginning with Pitirim Sorokin [1959], assert that education breeds vertical social mobility. Of no less importance is the ability of education to generate geographic mobility. This ability is possessed not only by renowned megalopolis universities but also by tech and trade schools in small towns. In a monotown, young people's craving for changing places may be increased by the dominant industry's specific characteristics, and the resulting mobility is often outbound: youths are not happy with the main areas of workforce application in monotowns—either because of the volume of goods that can be exchanged for their labor efforts or because of the education that they have obtained and the qualities and competencies that they have developed as a result. This article looks into the relationship between education, the dominant industry and youth mobility in monotown settings. The interplay of these three elements determines the vector and intensity of mobility flows. A strong and effective link between technical and vocational education and training (TVET) and the opportunity to apply the acquired knowledge and skills at the town-forming enterprise can become a tool for worker attraction and retention.

This research is underpinned by Urry's "new mobilities" paradigm (actually no so new nowadays, but we stick to the established terminology) and analysis of institutional interactions between industry and education [Urry 2012]. We proceed from the "new institutional" premise that norms and rules are shaped as a result of efforts applied by various actors [Fligstein 2001], putting it into the context of monotown settings. Specifically, we are interested in the mechanisms of interaction between educational and labor market institutions.

1. Sources of Empirical Data

Sociological information collected in four Ural monotowns—Krasnoturyinsk, Pervouralsk, Revda (Sverdlovsk Oblast) and Dalmatovo (Kurgan Oblast)—in 2018–2019 was used as empirical data for the present study. There were 112 go-along and sedentary interviews with local citizens, municipal administrators and other experts in all the four towns: 52 in Krasnoturyinsk, 19 in Pervouralsk, 21 in Revda, and 20 in Dalmatovo.

Group discussions with middle-, high- and tech school students were also held in each of the towns. A total of 30 discussions involved 529 participants: 113 in Pervouralsk, 200 in Krasnoturyinsk (113 in 2018 and 87 in 2019), 113 in Revda, and 103 in Dalmatovo. Visual methods were applied in the course of discussions: mental maps, life lines, traveling routes and transportation sheets. Discussions were audio- and video-recorded with the consent of participants and their legal representatives.

The list of Russia's monotowns was introduced by Governmental Resolution No. 1398-r of July 29, 2014 (repeatedly revised afterwards) and originally included 319 localities. Monotowns are divided into three

Table 1. **Population dynamics and distance from the regional center for the monotowns analyzed**

	Population in 2010	Population in 2020	Distance from regional center, km
Dalmatovo	13,911	12,248	200 (from Kurgan)
Krasnoturyinsk	59,633	56,290	425 (from Yekaterinburg)
Pervouralsk	124,528	120,778	45 (from Yekaterinburg)
Revda	61,875	61,533	47 (from Yekaterinburg)

Source: Federal State Statistics Service of the Russian Federation (Rosstat).

categories depending on the risk of socioeconomic decline. The first category, originally consisting of 94 localities, includes towns in "the most disadvantaged socioeconomic situation (due to town-forming enterprise functioning issues, among other things)". In Sverdlovsk Oblast, this category is represented by Pervouralsk and Krasnoturyinsk, which are analyzed in the present study. The second and the largest category includes 153 monotowns "at risk of socioeconomic decline". In our sample, they are represented by Dalmatovo (Kurgan Oblast). The third category covers 71 monotowns "in a stable socioeconomic situation" and is represented in this study by Revda. This way, the sample features representatives of all the three types of monotowns.

Naturally, each town is unique in terms of their socioeconomic, cultural and historical capital.

In Krasnoturyinsk, cutbacks in aluminum production in 2008–2013 reduced the number of plant workers from 12,000 to 2,000. Layoffs sparked protests. In order to solve the unemployment problem and create points of economic growth, the town launched an industrial park, one of the first ones in the region, which later served as the basis for an advanced socioeconomic development area (ASEDA). However, all those efforts have not created essentially more jobs so far.

No such drama occurred to Pervouralsk, yet its population has been steadily declining. This monotown is part of the Yekaterinburg urban agglomeration with a newly-created innovative cultural center Shayba, a recently renovated embankment and a boost in residential construction.

The monotown of Dalmatovo has a small, steadily decreasing population and boasts a rich cultural heritage. Dalmatovo Monastery, the first ASEDA resident which is currently under active reconstruction, has already become a pilgrim and tourist attraction.

Revda is situated only 47 kilometers from Yekaterinburg, the regional center. Just as Pervouralsk, it is part of the growing Big Yekaterinburg urban agglomeration. Both towns have been losing their populations in the recent years, but the trend is unstable. Town-forming

enterprises are up and running in Revda, which is 12 kilometers from Pervouralsk.

Table 1 shows the monotowns' population dynamics and distance from the regional center.

2. Monotown Labor Markets

A monotown labor market has some distinctive characteristics. On the one hand, it has a limited number of jobs to offer; on the other hand, though, it guarantees some degree of stability and predictability. In monotowns, indeed, a lot of people still have their careers and life lines predetermined and tied, this way or another, with the dominant industry [Vandyshev, Veselkova, Pryamikova 2019].

Representatives of educational institutions and town-forming enterprises unite to work toward common or overlapping goals. Tech and trade schools need to get support from the industry and assistance with apprenticeships, while the industry needs to ensure a stable supply of qualified workers. Models that emerged in the Soviet era have been evolving, giving rise to some entirely new ones, such as dual education.

The old interaction paradigms reproduce the "Soviet" type of relationship between the enterprise and the population that is based on mutual loyalty: "we care about you, and you stay loyal to us". Maintenance and promotion of those models is manifested, in particular, in the persistence of labor dynasties and sustained funding for urban development and improvement.

Maintaining a sufficient supply of adequately-qualified workforce remains key to monotown wellbeing. However, available statistics indicate a strong positive growth rate of outbound youth mobility that casts a long shadow on the future of monotowns and town-forming enterprises. In a modern society, mobility works against them: despite the joint efforts of monotown stakeholders, young people pour out of their hometowns, guided by the basic principle of "the bigger the city, the greater opportunities". It would also be unfair to ignore the fact that demand for TVET graduates in the labor market leaves much to be desired [Dudyrev, Romanova, Travkin 2019].

3. Production of Workforce: TVET Institutions in Monotowns

TVET institutions increase communities' capitalization rates by attracting youths from smaller neighboring localities. A small town will never have the same amount of resources and opportunities as a big city, e.g. in terms of average wage or labor market diversity. Yet, a small town has advantages of its own: unique social networks, good accessibility, light traffic, proximity of nature, etc. Characteristics of the education system, including TVET, also become a factor affecting young people's critical decision whether or not to leave.

Educational institutions, from secondary schools to universities, play a vital role in the life of small industrial monotowns. The past dec-

ade has seen a number of studies elaborating this topic using the example of Sverdlovsk Oblast or the Ural Region as a whole. They demonstrate that negative trends in education have especially harmful effects on the life of such localities. As recently as in the early 2010s, researchers would complain about the excess of university and tech school branch campuses in small monotowns, in particular in Krasnoturyinsk [Germaidze, Obshivalkina 2013]; today, they bitterly observe the consequences of the reduction of the number of universities and their branch campus networks (for the Ural Macroregion, see [Zborovsky, Ambarova 2018]). The special role of universities in the monotowns of Sverdlovsk Oblast has been covered in a recent study performed by Higher School of Economics (HSE) sociologists [Romanenko et al. 2018].[1]

Educational institutions could be the basis for urban transformation, and educators with their creative potential could become agents serving the community's interests. What attracts researchers' attention more than anything else is whether universities are able to enhance the attractiveness of monotowns and wean them off of their infamous "monohood" [Balyushina 2020; Stas 2018; Punina, Romashova 2015]. With regard to the town, universities perform three functions: town-forming, town-developing and town-preserving [Zborovsky, Ambarova 2018]. In a situation where provincial towns and higher education opportunities are shrinking like a skin of sorrow, the town-preserving function comes to dominate [Ibid.:917].

Most publications examining education in monotowns are focused on higher education. However, TVET appears to be a more relevant subject, at least in the context of monotowns. But do TVET institutions have the same levels of capacity as universities?

Findings from group discussions indicate that, in terms of mobility, tech and trade schools in the four monotowns analyzed serve as transit hubs for adolescents delaying their outbound mobility for whatever reason and as centers of attraction for youths from smaller towns, semi-urban and rural settlements and villages. Vocational schools cannot provide a 100% guarantee of employment by the town-forming enterprise, but they allow their graduates to move forward, thus acting as conductors of mobility rather than anchors holding young people down.

> "We recruit, again, from the nearby villages. They move here <…> and then someone will stay here in the town, and others will go to a bigger city." (DM37)[2]

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[1] https://theoryandpractice.ru/posts/17240-predpriyatie-vse-reshaet-kak-ustroeno-obrazovanie-v-monogorodakh; https://www.youtube.com/watch?v=MHN-T2O-HV9I

[2] From this point onward, the following notation system is used: town—Kr (Krasnoturyinsk), R (Revda), P (Pervouralsk), D (Dalmatovo); gender—–male (M) or female (F); and age of the interviewee.

Amidst population decline, which is particularly noticeable in small towns, the education-generated potential for mobility may seem to be leading to a stalemate. Indeed, high-quality secondary education and extracurricular activities—in which the four monotowns rightly take pride—lay the groundwork for further educational trajectories: without enough educational opportunities in their hometown, young people join the flows of outbound student migration that researchers describe as irreversible and irretrievable [Sannikova 2015; Zakharova et al. 2020].

While in the age of Pushkin, a "restless urge for change of place" was interpreted as "an attribute that's quite vexatious", today its universal though transient nature has been widely recognized. Meanwhile, a number of more substantial changes have occurred to the world since Pushkin: modernity has become liquid, societies have gotten accustomed to risks, and mobility has been turning into a fundamental category in social science research on youth and society as a whole. It seems that "adult" experts have already got used to talking about "youth drain" without alarmism, taking on a somewhat philosophical tone:

> "Now that we are adults, we are more patriotic and want to live in our hometown, but when we were 16–17 years old, we wanted to go chasing stars and millions." (KrM50)

In our view, it is not only about generational differences but also about the system of interactions between education and the dominant industry. A steady intergenerational discourse of nonreturn outbound migration has emerged in monotowns. Older generations that survived through the 1990s and have already seen the town-forming enterprise shutting down or cutting jobs are acutely sensitive of the current situation's insecurity, supporting children in their decision to move to more future-proof localities:

> "All the kids left the town, and I was all for it." (KrF60)

Even if the enterprise is running and the town is fairly well off, which we observed in Kachkanar [Veselkova, Pryamikova, Vandyshev 2016], locals tend to speculate on how much ore is left to supply the plant, trying to estimate average time to the unavoidable end of the flourishing period.

A monotown labor market is structurally limited. As the interviewees believe, the small number of attractive jobs and the lack of career growth opportunities inevitably engender "unhealthy" competition that has nothing to do with candidates' personal strengths but is conditioned by entirely different circumstances:

> "We've got <…> folks quite up in years everywhere, at all top management positions and beyond: the population is ageing. You see, young

> people have no choice but to leave <...> while the older ones kind of fit nicely where they are, but [pause] they won't go anywhere <...> We need new jobs to retain the younger generation." (DM37)

> "Most of my friends and other people I know have eventually left the town. <...> The town is small, high-paying jobs with career advancement potential are very few and extremely hard to get because everyone is trying to hire someone they know. I mean, there are basically no employment opportunities." (KrF25)

An entire system set up in the Soviet Union to train workforce for enterprises regulated the process of mobility among other things. Trade schools supplied industries with blue-collar workers, and tech schools prepared higher-qualified workers including operators and even engineers. High selectivity of Soviet universities made higher education hard to access. As a result, individuals' life strategies were aligned with the State's interests, at least when it came to education and employment.

Enterprises were used for apprenticeships, and their employees were extensively involved in training trade and tech school students. A virtually uniform institutional system was developed that supplied industrial processes with adequately-skilled workers and at the same time guaranteed jobs with a certain salary range and a set of fringe benefits to vocational graduates. This system was transformed under the pressure of the late 1980s–early 1990s' reforms. Enterprises became full actors in the capitalist economies of their towns—with all that it entailed, including the termination of partnerships with municipal authorities and TVET institutions. Slumps in demand or prices have come to determine the market behavior and success of town-forming enterprises: whether they have a growth or decline in profits, undergo mergers and acquisitions, introduce technological innovations, and so on. Their positions in the monotown arena have become "unreliable", as they are not sources of stability and certainty anymore.

Educational institutions have also adjusted to the market economy by offering new specializations that are not always related to the dominant industry's demands. The State supports trade and tech schools through public funding on an annual basis, thereby allowing young monotown dwellers to increase their starting capital and, in effect, contributing to their outbound mobility. Both enterprises and educational institutions encourage multi-skilling, i. e. learning several trades or specializations:

> "Being enrolled in one specialization, you can learn another one. Attending courses <...> some students opt for fee-based training, not necessarily at our school, and combine work and study. Our school offers supplementary courses and related majors: for example, if you

are learning to be an auto mechanic, it would be nice to have welding skills." (PF38).

As one of the experts said in an interview, "people find it easier to go to any big city for higher education than attend a local vocational school to become a tractor operator or a welder" (DM37). Paradoxically, while TVET institutions prepare workers demanded in the labor market and thereby retain them in the monotown, they at the same time provide young people with a potential for spatial mobility, pushing them out to large cities.

Nowadays, the TVET system is not solving the problem of outbound mobility in monotowns, and vocational schools are not even regarded as points of growth, unlike universities. Nevertheless, our research has revealed a number of possible solutions on how to strengthen the link between TVET and urban enterprises, the dominant industry in the first place.

4. Solution: Dual Education for Tech Schools
The model of dual education, which combines TVET programs at a vocational school with apprenticeships in an enterprise, showed particularly good results in Germany during the economic crisis of 2008–2012 and has become the major trend in TVET since then [Dudyrev, Romanova, Travkin 2019; Dudyrev, Romanova, Shabalin 2018]. In addition to combining education and apprenticeship, this model also provides an institutional framework for interactions between the TVET system and the industry [Dudyrev, Romanova, Shabalin 2018]. In monotowns, implementation of this model is specific in many ways.

Dual education has not yet become mainstream in Russia; of the four monotowns analyzed, it is only Pervouralsk that has adopted this model.

An autonomous nonprofit organization called Dual Education Development Institute was established in 2017 at the initiative of Pervouralsk New Pipe Plant and the ChelPipe (Chelyabinsk Pipe Rolling Plant) Group. Further on, "the 'Agreement on Implementing a National-Scale Experiment to Establish an Effective Managerial Mechanism: a Managing Company on the Basis of the Dual Education Development Institute (DEDI) Autonomous Nonprofit Organization' was signed at the 2018 Russian Investment Forum in Sochi as part of joint initiatives by the ChelPipe Group, the Agency for Strategic Initiatives, the Ministry of Education and the Government of Sverdlovsk Oblast".[3] Pervouralsk School of Metallurgical Engineering became the testing ground for integrating the principle of dual education in the TVET system of Sverdlovsk Oblast.

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[3] Dual Education Development Institute: https://pervouralsk.bbmprof.ru/dual-education-development-institute/

This project can be regarded as a new version of deep integration between TVET and town-forming enterprises. It is designed to prepare competent professionals who comply with the modern hi-tech manufacturing requirements and are involved in corporate culture.[4] This kind of integration looks like a corporate takeover of educational institutions with their public funding being preserved. In a configuration like that, employers get qualified workers, educational institutions get steady orders for education, and young people get a clear prospect of getting employed and, consequently, staying in the town. This model is not something entirely new to TVET. An interviewee from a vocational school in Pervouralsk said that "the system <...> of dual education <...> has always been there." (PF38)

A research participant from Pervouralsk (an employee of Pervouralsk New Pipe Plant whose husband works at the plant's education and training department) speaks positively of the company's policy:

> "This is the board administering The Future of White Metallurgy project. <...> I think all the necessary arrangements are in place to promote learning. <...> They have everything they need to become professionals. They participate in dual education programs, which means 60% is practice and 40% is theory. And all the necessary equipment is at their disposal. This is great. We didn't have arrangements like that." (PF30)

Dual education thus reconstructs the institutionally supported patterns of social and job mobility, providing young monotown dwellers with clear prospects that condition their choices. A blanket survey of 485 students and graduates from The Future of White Metallurgy program carried out in 2017 found that over two thirds of the respondents are willing to work in their field of study and are convinced that they can find a good job, which probably indicates a high level of their education, yet half of the students would like to leave Pervouralsk as soon as they graduate [Korovina 2018:55; Bannikova, Galiaskarova 2020:320]. However, employment statistics show that their ambitions are unlikely to be achieved: the unemployment rate among TVET graduates is approximately 1.5 times above the national average, about 40% being mismatched to their jobs and mostly holding "positions that require lower levels of skills and offer lower salaries than what their educational backgrounds could demand" [Dudyrev, Romanova, Travkin 2019:121–122, 131].[5]

The half of Pervouralsk students enrolled in The Future of White Metallurgy program who reported willing to stay in their hometown in

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[4] Dual Education Development Institute: https://pervouralsk.bbmprof.ru/
[5] For an unknown reason, in a verbatim quotation (although without quotation marks) from [Dudyrev, Romanova, Travkin 2019], 40% become 70% in [Zakharova et al. 2020:236–237].

the study by Korovina mentioned above is also a fairly high rate that stands in contrast with the results of school student surveys, which usually show a much lower percentage of those willing to stay. A questionnaire survey conducted in 2013–2014 by Vandyshev found that only 21% of the high-school students surveyed in Revda were going to stay in their hometown or come back after completing their postsecondary studies, the proportion being even lower in Krasnoturyinsk and Nizhny Tagil (8%) [Vandyshev 2014:121–123].

5. Solution: Employer-Sponsored Scholarships in Higher Education

Employer-sponsored scholarships in higher education suggest that training is ordered and paid for by a company or organization, which in its turn relies on the education programs offered by the university. Observed in each of the four monotowns analyzed, this form of interaction ensures a steady flow of workers to the sponsor company and at the same time prevents depopulation. Scholarships can be sponsored by municipal authorities, e.g. in case of medical education, or by town-forming enterprises in keeping with their prospective needs.

> "Today, the future of Krasnoturyinsk hinges upon Bogoslovsky Aluminum Plant, which has a development program for up to 2050. So, we have preserved the branch campus of UrFU[6] and have already enrolled 15 employer-sponsored students. That is, RUSAL[7] pays for their education so that five years later they could be hired into Bogoslovsky Aluminum Plant." (KrM47)

> "We now have a medical student who will return under the monotown development initiative, and one girl is enrolled in a choral singing program at Contemporary Art Institute in Moscow with a scholarship sponsored by our local authorities. She will come back in four years and will work at our music school for the next five years. We hope she'll get pregnant and stay here, take roots as they say." (DM37)

A municipal leader in Revda asks himself, "What are we hoping to do to retain youths who can see and compare things too?" and formulates an answer right away:

> "Those they are interested in... Take Sredneuralsky Copper-Smelting Plant: it has entire programs based on employer-sponsored scholarships for their middle-skill engineers and technicians <...> they recruit students from localities where the company operates, selecting the best candidates who will apply practical skills successfully. I mean, they train practical workers, not theoreticians. And through those

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[6] Ural Federal University (*TN*).

[7] United Company RUSAL, international public joint-stock company (*TN*).

> courses and employer-sponsored scholarship programs, enterprises get qualified workers that already know how to operate equipment at the specific plant." (RM43)

Universities benefit from this type of worker training too, as they develop relations with employers while remaining autonomous and keeping control over the learning process.

In Krasnoturyinsk, having applied an effort to preserve the university branch campus, the enterprise focused on employer-sponsored scholarships, which offer a certain guarantee of return on investment in education for the company and at the same time provide students with opportunity to work in their field of study.

> "It has been decided to commercialize the courses, meaning that the company pays for their education under guaranteed employment contracts, obliging the kids to work for the company for five years after graduation. And further on, they will decide for themselves, of course, it's a free country we live in." (KrM50)

These speculations have been supported by a number of scholars [Dudyrev, Romanova, Travkin 2019].

In the end, both the company and the university (or its branch campus) retain their independence without merging their resources on a systemic level. The enterprise as employer has only limited influence on the design of education programs. So, are employer-sponsored scholarships helpful in preventing depopulation of monotowns? *Per se*, as we have already established, they are definitely not. On the contrary, participation in postsecondary education "enhances graduates' migration potential dramatically" [Vandyshev 2014:123].

6. University and Monotown: To Leave or Not to Leave

The system of technical education, represented by tech schools and sometimes university branch campuses, is perceived positively by monotown residents, as it contributes to urban development and generates symbolic capital. For instance, the experience of Krasnoturyinsk, where there are signs of university performing the town-forming function, is regarded as highly valuable—a specific part of the urban landscape was once dubbed "UPI" after the local branch campus of former Ural Polytechnic Institute, and the name stuck firmly in ordinary people's language. Although UPI was transformed into a federal university (UrFU) in 2010 and was merged with the classical Ural State University a year later, people in Krasnoturyinsk keep referring to this neighborhood as UPI. Not only have the inert vernacular toponyms conserved the already non-existing name and type of educational institution (VTUZ, meaning "technical college"), but they are also a reminder of the significance of polytechnic education in Ural as well as the specific characteristics of local industry. Back in the day, Bogoslovsky

Aluminum Plant used to be a town-forming enterprise. It still operates, but production volume has been essentially reduced. Other enterprises in the town include some mining companies and a branch of Gazprom. The majority of male population works fly-in/fly-out rotation schedules in other regions of the country. Nevertheless, the UrFU branch campus still exists.

At the end of every interview, the participants were asked to draw their town on paper, and a representative of Krasnoturyinsk municipal government depicted his town in the following order:

> "Here we have the UPI building. Here we have the BAP [Bogoslovsky Aluminum Plant] Culture Palace. Here we have Lenina Street, the town's artery. Here is the central square. The road then goes this way, it's such a radial pattern, yeah. Here we have the embankment. Here is our Lovers' Park, I'll make a heart here, like this. And then the embankment goes this way along the river. This area right here is now under reconstruction..." (KrM47)

The interviewee does not not explain the meaning of "UPI building", choosing instead to focus on the recently built Lovers' Park, but using UPI as a starting point is very remarkable. This is because in spring 2018, the Krasnoturyinsk branch of UrFU was on the brink of shutdown, but local authorities joined their forces with the town-forming enterprise's management, "grabbed hold of the UrFU branch on their last legs", as worded by the director of the town-forming enterprise, and managed to save it. It happened just before our field study in June 2018.[8]

Such measures are quite consistent with the scientific findings about universities being vitally important for urban localities: availability of "universities or effective branch campuses is always a symbol of prestige and an opportunity to increase the town's attractiveness for youth and population in general" [Zborovsky, Ambarova 2018:922] (except that the Krasnoturyinsk branch was not effective anymore by then). The position of municipal authorities also echoes the second fundamental inference from the available literature, which is that "the main purpose of the university in a town is to train workers for the dominant industry and to retain youths" [Romanenko et al. 2018:120]. They are united in their certainty that maintaining access to higher education is vital for Krasnoturyinsk, while at the same time expectedly emphasizing the town's interests in the former case and the enterprise's needs in the latter.

For example, interviewees from the Mayor's office tend to invoke the town's legacy in the first place:

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[8] On the successful developments one year after, see: Zimens O. (2019) Uspeshnost' nachinaetsya s UrFU [Success Begins with UrFU]. *Zarya Urala*, June 26. Available at: http://smizu.ru/успешность-начинается-с-урфу/

"I believe that if higher education is taken away from a community, that community will gradually begin to die." (KrF39)

In support of this speculation, the interviewee gives the following arguments:

"Those four or five years spent at a university in another region shape the social milieu in which people feel at home. They have got friendships and communication, and they often have some job in sight by that time. It's very hard to come back to their hometown and leave behind everything they've built over those five years.

<…> that's why we find it of key importance to maintain higher education in the town. This is how we attract intellectually advanced young people and preserve the milieu that once emerged in Krasnoturyinsk. Because it was mainly highly-qualified professionals who settled here, forming the class of intelligentsia." (KrF39)

In our view, it makes no sense talking about "retention" or "holding down" in the age of mobility—at least, it would be unproductive to reduce youth and education policies to those. It is not only small towns that people migrate from. Besides, it is not *where from* but rather *where to* that matters: the town should become more attractive, and education may play a significant role in increasing its prestige. This point is articulated not only in Krasnoturyinsk but in Dalmatovo as well. An official from Dalmatovo municipal government explains:

"Say, why there is no Subway, McDonalds or Burger King in Dalmatovo? Because—who might need it and why? I mean, demand begets supply. And if there's not enough young people, there are no higher education institutions, and so on… So, then we have either school-age children or working-age people—and no golden mean. That's why we fight to keep the tech school running. <…> I've noticed so many times: the more educational institutions in a town, the more rapidly it develops." (DM37)

Interviewees compared their hometowns not only with larger localities but also with smaller ones, usually located nearby: against their background, the monotowns analyzed would most often win. TVET institutions and university branch campuses, where they have survived, work as a factor of attraction and as a potential driver of local development. Our findings show, first, that it is not only universities but also vocational schools that matter, and second, that towns with educational resources can be however small. Indeed, the only tech school[9] in Dalmatovo, a town of 12,000 residents, steadily enrolls students from

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[9] Namely the branch campus of Anfinogenov Kurgan Technology School.

Krasnoisetskoe and other neighboring villages, and TVET institutions of Revda attract candidates not only from the unprosperous and small Degtyarsk but also from the larger and more successful Pervouralsk, despite its proximity to Yekaterinburg.

7. Biographical Solutions to Systemic Contradictions

One[10] perfect example of close ties that people build with the place where they study is the life story of Alla,[11] a research participant native to Severouralsk who went to the Krasnoturyinsk branch of UrFU after high school. Severouralsk, a monotown twice as small as Krasnoturyinsk, is located in 60 kilometers from the latter—this is much closer than the main campus in Yekaterinburg. According to the established education scheme, Alla spent her first two years of study at the branch campus, renting accommodation at a rate that was fairly affordable to a student. She then moved to Yekaterinburg to do the remaining three years of her program. Working part-time in her field of study, she nevertheless dreamed of coming back to Krasnoturyinsk, which is exactly what she did as soon as she graduated.

How is this scheme attractive and why would someone actually choose a branch campus at all rather than going straight to Yekaterinburg? We believe that the decisive role is played here by the solid "groundedness" of small towns in their local settings, which allows their dwellers to use the accumulated local competence when they move from one small locality to another [Veselkova 2011]. A more radical mobility is fraught with adaptation challenges: small-town living skills are not suitable for life in a big city, and much of social competence has to be relearned. For Alla, Krasnoturyinsk was a comfort zone: not only was it close to her hometown but it was also very similar to it in terms of lifestyle and type of locality. Recalling the time when she came to Krasnoturyinsk for studies, Alla explains:

> "It wasn't so far as Yekaterinburg from where my parents lived. Over the two years of my studies here, I just fell in love with Krasnoturyinsk. I wanted to live and start my family here. I mean, this town had more than enough to meet my expectations and socialization needs." (KrF36)

Alla also found it essential that Krasnoturyinsk had an obvious advantage over Severouralsk in terms of labor market opportunities:

> "You can fulfill yourself in any sphere here. And, of course, I had no difficulty finding a job with a university degree." (KrF36)

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[10] A phrase by Ulrich Beck (Beck 2000), repeatedly deployed and elaborated by Zygmunt Bauman (2002).

[11] Not her real name.

The town has a developed social, cultural and residential infrastructure, including children's facilities (at the time of the interview, there were two children of preschool and school age in Alla's family):

> "We participate in sports events as a family, taking part in various competitions with my kids and other family members, and the kids really love to be engaged. One daughter attends an art school, and the other one takes dance classes." (KrF36)

It would be productive to analyze Alla's case as a model biography of a monotown dweller, or rather one type of such life stories. Model biography is a concept related to other two that have been recently introduced into the Russian literature by Nurkova: *cultural concept of biography*, offered by Bluck and Habermas [Bluck, Habermas 2000], and *cultural life script*, proposed by Berntsen and Rubin. Cultural life scripts are "culturally shared semantic knowledge about the expectations in a given culture about life events, including the order and timing of such events and the assessment of their prevalence, importance and valence" [Berntsen, Rubin 2004] (quoted after [Nurkova 2018:57]).

From a sociological perspective, cultural life scripts are important as socially shared models of life—a type of Durkheim's collective representations. Nurkova underlines the axiological-normative dimension of cultural life scripts that "regulate human behavior across extremely long periods of time" [Nurkova 2018:57]. However, we would like to give attention to the discursive aspect as well: the very metaphor of a script implies eloquently that it is not only a guide for action or, in Nurkova's words, an "instruction for use", but also an example of narrative, which embraces mental modelling, assignment of meaning, and coherent narration.

Alla's story is a good illustration of how status and geographic mobility can be influenced by the education system along with the infrastructure and potential of the urban environment as a whole. While being a student in Krasnoturyinsk, Alla met her husband who worked at the town-forming enterprise and made a good living. Her decision to stay was conditioned greatly by this encounter, but it was her "being in love" with Krasnoturyinsk that made all the difference.

At some point during the interview, however, the positive evaluations of Krasnoturyinsk in Alla's story begin to appear overly persistent—as if she had to give excuses for her choice. This "excusing" tone highlights the wide inequality gap between localities of different size. In addition to significant migration flows from smaller localities to larger ones, there are also certain discourses and ideologies (of life success and mobility) that transform this phenomenon from a statistical norm to a normative model: *this is what you do if you have at least some potential; only losers stay*.

A few times throughout her story, Alla mentions that the town "was comfortable for living, and still is". Comfort is interpreted as the ab-

sence of "heavy traffic, as in Yekaterinburg" and the opportunities for employment and family socialization mentioned above.

Therefore, the attractive power of educational institutions works together with the urban environment as a whole.

> "What young people look for in the first place… When they have just graduated from secondary school, they don't think about jobs, or kids, or family—it's not what they want. What they want is mobility, exciting events, performances, being in the thick of the crowd, and so on and so forth. And if we work on this a little more, some will probably choose to stay." (KrF39)

However, the environment is not always helpful—it can be harmful at times. This type of urban environment experience and perception is represented by students at Revda vocational schools who commute from the nearby town of Pervouralsk (20 km away). Both transportation and Revda itself receive negative feedback, and only vocational schools are plotted in Revda on students' mental maps, all their other haunts being located in Pervouralsk and other communities outside Revda.

8. Conclusion   Outbound mobility flows in monotowns are not generated by young people's life choices alone. Activities pursued by agents promoting mobility in small towns are obviously divergent [Veselkova et al. 2019]. Outbound mobility is fueled by the discourse of "the bigger the city, the greater opportunities" shared across generations. In effect, this attitude is counteracted by efforts applied by local authorities, town-forming enterprise management and educational institutions.

In the course of our study, we repeatedly came across life stories of people who came (back) to small towns to build their lives and careers, which is a good illustration of the role that educational institutions play as points of attraction. To the same extent, education promotes outbound mobility, providing youth with resources for moving forward. That is to say, education creates symbolic capital of a locality and improves its prestige, but it does not serve directly as the basis for deciding whether or not to leave.

Obviously, it makes no sense to fight outbound mobility or consider it a deviation in a mobile society. It is no use counting on secondary and vocational school graduates to become drivers of monotown development. A reconfiguration of the existing vision and of the whole managerial vocabulary is required: not *retain* but *attract*, and not only locals but everyone. In this case, education can become a center of attraction and the creative framework for designing initiatives such as the industrial park in Krasnoturyinsk.

Can there actually be a model of TVET that will not only produce outbound mobility, which seems inevitable in a modern society, but also contribute to community development? Today, the value of any

educational institution is largely determined by quantitative indicators. In the context considered in this article, it would be more productive to use qualitative characteristics, such as how the institution can benefit the community or what kinds of unique professionals it can train. Planning the cooperation among businesses, education and municipal authorities should be part of the town development strategy, not only the result of decisions handed down by some ministries.

There is currently a search for new forms of institutional interaction between business and education. Employer-sponsored scholarships ensure connections between employers and their prospective workers—university students, while dual education programs are built around the relationships between employers and tech schools, the latter getting deeply integrated in a particular company's production processes. While employer-sponsored scholarships provide a fixed mobility track to retain youths in specific jobs in a specific town, dual education programs leave young people's options open. The dual education model can be considered the most promising one, yet it is also more cost-consuming.

Institutional interactions between employers and TVET institutions of all levels can have a considerable influence on the development of monotowns, whose social structure reproduction is provided by TVET and higher technical education. Access to tech university degrees in a monotown can not only retain young people (and the lack of such, accordingly, repulse them) but also generate social and symbolic capital necessary for monotown development. Universities may help monotowns wean themselves off of their "monohood" by promoting new industries and thereby clarifying the prospects, in particular through training highly-qualified workers that are involved in the locality and interested in its development. At the same time, universities may work to preserve the town's "monohood" in a situation where the town-forming enterprise operates successfully and provided that it is beneficial for the community. Not only does collaboration between tech schools and the dominant industry outline clear prospects for the latter (though, of course, workforce resources are not enough for a successful operation), but it can also increase the town's mono-dependence. Trade schools also perform a double function, being able to work as transit hubs and at the same time to attract youths from other, usually smaller localities. The divergent effects of TVET shape a unique network of monotown mobility that connects biographies of the town and individuals.

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Personality Traits of Students in Resilient and Struggling Schools: Different Children or Different Schools?

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Abstract

One of the most important facets of educational inequality is the globally observed wide socioeconomic gap in academic outcomes across schools and individual students. However, there are resilient schools that manage to be effective in adverse circumstances. In order to find out what may stand behind resilience of disadvantaged schools, personality traits of their students are compared to those of students attending schools that perform low in equally challenging contexts. Empirical data for this study was collected in Leningrad Oblast in 2019 and includes information about schools' academic outcomes and socioeconomic status (SES) as well as students' personality traits that have been traditionally associated with psychological resilience. Personality traits are assessed using the Academic Resilience Scale (ARS-30), the Academic Motivation Subscale, the Grit Scale, and the Self-Regulation Scale. Factor structure of the questionnaires is verified using confirmatory factor analysis.

No differences are revealed in personality traits of students between resilient and non-resilient low-SES schools, which confirms the previous findings that academic resilience is built through managerial strategies of school principals, school and state educational policies, and practices to improve school effectiveness.

Studies devoted to academic resilience occupy a special niche in research on educational inequality [Crosnoe 2005]. Academic resilience is the ability of an individual or organization to show good academic performance in adverse circumstances. Two relatively autonomous approaches have emerged that use different criteria to define this phe-

nomenon. One of them uses characteristics of academic performance and socioeconomic status (SES) distributions (and/or relative and context-dependent thresholds) and obviously boasts a high level of validity: good performance in adverse circumstances is a direct indicator of academic resilience [Longobardi, Agasisti 2014]. The other approach is based on construct validity [Cronbach, Meehl 1955] and assessment of characteristics of individuals and social groups [Masten, Monn 2015], seeking to find out what can (or, rather, should) stand behind the behaviors observed.

The present article offers a comparison of the two approaches in analyzing the characteristics of students in resilient vs. non-resilient schools. Do we know why resilient schools are so effective? Two possible explanations are offered in this study:

- Resilient schools manage to select children with specific personality traits despite the social contexts that are equally challenging as those in which struggling low-SES schools operate;
- While working with the same children and families as any other low-SES school, resilient schools implement some different strategies.

Arguments supporting the idea that resilient schools apply specific policies have already been provided in Russian as well as international publications [Lupton 2004; Pinskaya et al. 2018]. The present study aims at finding out whether students' personality traits — resilience, perseverance of effort, academic motivation, and self-regulation — differ between schools with different academic performance and SES. An answer to this question will allow making more well-founded conclusions about the reasons behind the success of resilient schools. No comparative studies of this kind have been carried out on a Russian sample so far.

1. Review of Literature

In a broad sense, resilience theory emerged within the field of developmental psychology as a description of individuals' characteristics explaining the difference in how they handled difficulties in the process of development. The first studies of resilience were performed nearly concurrently by different authors and in different contexts [Cicchetti et al. 1993; Cicchetti, Garmezy 1993; Masten 1989]. An understanding of mechanisms underlying successful adaptation in adverse circumstances is absolutely indispensable for identifying the causes and ways of preventing and managing various personality development and adaptation problems. Knowing the mechanisms makes it easier to explain why, under the same stressful conditions, some individuals cope with the situation successfully and others do not [Rutter 1987; Werner 1997; Anthony, Cohler 1987; Rutter 1985]. Resilience research has had a considerable impact on theories and models of developmental psychology

and psychopathology, breaking new ground for prevention and management of developmental disorders [Rutter 2013; Panter-Brick, Leckman 2013; Masten 2014; 2011; Cicchetti 2010; 2013].

Over time, resilience research developed a specific range of methods and techniques. In addition to observations, experimental studies came into use, in particular the ones attempting to promote positive adaptation of an individual in the face of adversity [Cicchetti 2010; Luthar 2006]. The concept of resilience has become dynamic and multidimensional. Resilience theory is getting increasingly interdisciplinary, as research is enhanced by neurosciences, genetics, etc. Progressively complex models work in multicultural contexts and employ the methods of developmental systems theory [Ungar, Ghazinour, Richter 2013; Southwick et al. 2014; Ungar 2012].

In different periods of resilience theory evolution, researchers would suggest widely differing definitions of resilience. A good definition should pursue a few ends at once: consider all the (or as many as possible) recent changes in resilience research and practice while remaining invariable across different levels of analysis, and make allowance for interdisciplinary use. The following definition appears to be the most adequate given the current state of resilience research: "Resilience is the potential or manifested capacity of an individual to adapt successfully through multiple processes to challenges that threaten the function, survival, or positive development." [Masten, Cicchetti 2016] This definition can be applied not only to individuals but also to any kind of developing system. Many systems are involved in the processes leading to successful adaptation in an individual, family, or community. Moreover, systems that are interconnected across levels will influence the resilience of each other. In other words, the resilience of an individual that is manifested and observable at the level of behavior depends on the operation and interactions of many other systems, both within the individual (immune system, stress response system, etc.) and in their environments (family, social group, and other social systems).

1.1. Research on School and Student Resilience

Academic resilience is part of resilience theory. OECD's Program for International Student Assessment (PISA) has used the term "resilient" since 2009 to refer to students who display high levels of academic achievement despite coming from disadvantaged socioeconomic backgrounds [OECD2011], which is automatically regarded as a manifestation of academic resilience. In practice, resilient students are identified as follows:

- Students are considered "disadvantaged" if their economic, social, and cultural status (ESCS)[1] index ranks among the bottom 25% in their country. Therefore, all countries have an equal share of disadvantaged students;
- "Good education outcomes" by contrast are defined using international performance standards; however, the international standard applied to each student varies according to his or her SES relative to their country [Longobardi, Agasisti 2014; OECD2010; 2011]. Students ranked among the top quarter of students internationally are identified, controlling for their SES;
- Students who display high academic achievement despite being ranked among the 25% most socioeconomically disadvantaged students in their country are considered resilient.

It is not only students but also entire schools that can be resilient. Researchers believe that education policies and school practices can greatly reduce the vulnerability of disadvantaged students and enable resilience as a result [Longobardi et al. 2018]. Resilient schools are socioeconomically disadvantaged schools (the bottom quartile of SES) that show good education outcomes (the top quartile of academic performance) [Pinskaya et al. 2019].

Highly resilient schools are identified using the same principles as those that are used for identifying resilient students. However, different studies may use different methods to measure both SES and academic achievement. In Russia, for instance, measurement of SES considers schools' human and non-human resources and composition, while academic performance of schools is measured through their mean Unified State Exam (USE) or Basic State Examination (BSE) scores. Other countries may use other indicators such as percentage of students eligible for free school meals or average scores on national educational assessments.[2] Resilient schools are also referred to as "schools performing beyond expectation" [Hargreaves, Harris 2011], "high-performing, high-poverty schools", [Kannapel, Clements 2005; Parret, Budge 2020], and "high flying schools" [Harris 2007].

In effect, resilient students and resilient schools are identified in similar ways, but the mechanisms behind such statistical identification are left unattended, although there are studies showing which of the school factors and student characteristics are related to resilience [Barber, Oostveen van, Childs 2019; Agasisti, Soncin, Valenti 2016; PinskaSya et al. 2017].

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[1] The ECSC is used in a number of international student assessments. In PISA, it has traditionally included the highest level of education of the student's parents, their occupational status, family wealth, home educational resources, etc. This index is designed to reflect social, economic, and cultural capital of the student's family.

[2] See, for example, https://edopportunity.org/

1.2. Academic Resilience as a Construct

There is an ongoing debate in academia as to whether resilience can be treated as a construct, i. e. a measurable trait of an individual's personality. Several attempts have been made to create a reliable and valid instrument to measure student resilience: Resilience Scale [Wagnild, Young 1993], Connor-Davidson Resilience Scale [Connor, Davidson 2003], New Rating Scale for Adult Resilience [Friborg et al. 2003], and Brief Resilience Scale [Smith et al. 2008]. All those survey scales assess individual characteristics that are traditionally associated with resilient behavior: personal and social competence, positive self-concept, acceptance of self and life, action orientation, adaptability to change, complex problem solving skills, family cohesion, sense of humor, endurance, optimism, dispositional attributes, and external support systems [Hoge, Austin, Pollack 2007]. A number of researchers demonstrate that the existing operationalization and structure of such scales cannot be considered absolutely consistent and correct [Campbell-Sills, Stein 2007; Green et al. 2014; Lamond et al. 2008]. Additional challenges for academics and scale developers arise from the lack of consensus on the definition of "resilience". A number of authors hold that the key characteristic of resilience is the interplay of personal attributes and environmental factors [Hoge, Austin, Pollack 2007; Masten, Cicchetti 2016]. However, this characteristic is not necessarily a feature of academic resilience [Cassidy 2015].

Few studies have measured academic resilience as a psychological construct or examined predictors of academic resilience [Martin 2002; Martin et al. 2010]. The small range of standardized measures is explained by the lack of theoretical studies aimed at understanding the psychological components of student resilience [Cassidy 2015].

The present study uses an adaptation of the Academic Resilience Scale (ARS-30) [Cassidy 2016] for Russian samples. In ARS-30, academic resilience is operationalized through measurement of adaptive and non-adaptive cognitive-affective and behavioral responses of students to academic adversity. The scale is structured by analogy with similar scales measuring resilience in other spheres of life [Hardy, Concato, Gill 2004].

My research objectives include critical analysis of the nomological network in which the construct is embedded, and assessment of convergent validity of resilience [Martin, Marsh 2009]. For these purposes, other constructs potentially associated with student resilience should be analyzed as well. A few Russia-based and international studies show that constructs conceptually similar to academic resilience — such as adaptability, engagement, and self-regulation — are associated with academic achievement [Collie, Holliman, Martin 2017; Gordeeva et al. 2016]. Academic success in online learning is mediated by a few constructs at once: resilience, grit, and growth mindset [Barber, Oostveen van, Childs 2019]. In 2016, an entire issue of *Educational Psychology* was dedicated to associations between motivation, engagement, self-regulation, and other constructs, on the one hand, and academic

resilience of school students, on the other [Moore 2016]. Self-regulation and engagement were found to be related to academic resilience [Cheung 2017], and pedagogical practices for empowering momentary engagement of students were found to promote academically resilient behaviors [Torsney, Symonds 2019].

The following three scales were added to evaluate the relationship between the constructs described and the adapted version of ARS-30:

- The Cognitive Academic Motivation Subscale from the AMS-S (Academic Motivation Scale for School Students) methodology [Gordeeva et al. 2017];
- The Perseverance of Effort Subscale of the Russian version of the Grit Scale [Tyumeneva, Kardanova, Kuzmina 2019];
- The Self-Regulation Scale [Gordeeva et al. 2016].

Our research thus has a subgoal of adapting the ARS-30 for the Russian sample, testing its convergent (or construct, in Cronbach and Meehl's terminology) and structural validity in the Russian context, and constructing a nomological network of related constructs. This subgoal is required to achieve the main goal of comparing students' personality traits — resilience, perseverance of effort, academic motivation, and self-regulation — between resilient and non-resilient schools (grouped using the available statistical tools) in order to find the "roots" of differences between the two types of schools.

2. Methods
2.1. Research Design and Sample

The study was conducted in Leningrad Oblast in 2019 as part of an intervention administered by the Institute of Education (National Research University Higher School of Economics). To achieve the research goals, it was necessary to collect data on students' academic performance and biographical data so that the two sets of data would be linked at the level of schools. Simply put, the school's average academic performance had to be collated with the biographical data of its students. Additionally, information about the SES of schools was obtained to classify them [Pinskaya et al. 2019].

Data was collected in a few steps:

- Information on students' academic performance over the past three years, pegged to schools, was obtained via the Regional Center for Educational Assessments (RCEA). All the data was anonymized: students were assigned unique identification numbers, while databases with their names were only available within relevant regions;
- Students who were in high school at that time, i. e. those whose BSE scores were available in the RCEA datasets, were sent online questionnaires in which they were asked to enter their IDs. The

IDs with matching last names had been given to school coordinators so that they could communicate the information to students;
- After all the data was collected, students' academic performance was collated with their biographical data at the level of schools. The use of IDs allows identifying the students who changed schools after middle school and ascribing them to the schools which they attended before high school and which are therefore "responsible" for their BSE scores;
- To collect data on schools' SES, contextualized questionnaires with items on school's resources and student composition were sent to every school [Yastrebov, Pinskaya, Kosaretsky 2014].

At the stage of biographical data collection, the sample was comprised of 7,058 students. After removing duplicate responses, responses with incorrect IDs or with no ID at all, inappropriate and incomplete responses, the final sample that was used for analysis consisted of 4,159 high school students from 237 schools of Leningrad Oblast. Such a shrinkage of the sample occurred largely due to missing responses.

2.2. Variables Used for School Grouping

The schools were grouped using a method based on two variables, the index of academic performance and school SES, which had been adapted for Russian samples [Pinskaya et al. 2019].

To calculate the index of a school's academic performance, student scores in all BSE and USE tests (USE scores from the diploma and raw BSE scores) for 2017–2019 were standardized to the highest possible score (yielding the test success rate as a fraction) and multiplied by 100, the product being rounded to the nearest two decimal places (yielding the success rate as a percent of the highest score possible for this type of exam). After that, the school's test success rates were estimated for each year. The final indicator is the average percentage, i. e. the school's average performance on state examinations between 2017 and 2019. Using metrics from a few years makes it possible to increase stability of the indicator over time — and thus achieve a more reliable classification of schools.

The index of school SES was calculated using Principal Component Analysis (PCA) and the following variables: percentage of teachers with the highest qualifications (loading: 0.43; unexplained variation: 0.60); percentage of students in specialized classes (0.55; 0.37); percentage of students attending advanced courses (0.54; 0.39); percentage of students from academic families + percentage of students with both parents unemployed (0.47; 0.53); total explained variation (Rho): 0.52. The higher the index, the higher the school's SES and the less adverse its circumstances relative to other schools in the region. Variables describing school composition are used in the same way as in earlier studies on this topic in Russia [Pinskaya et al. 2019; Yastrebov, Pinskaya, Kosaretsky 2014].

2.3. Student-Level Variables Used in Scale Analysis

Personality traits of students in different types of schools were compared using data obtained from personality questionnaires based on four scales, of which three have already been tried out and used in Russia, and adaptation of the fourth one was part of the present study:

- An adapted version of ARS-30 for Russian samples, only 23 items being left in the final version;
- The four-item Cognitive Academic Motivation Subscale;
- The five-item Perseverance of Effort Subscale of the Russian version of the Grit Scale;
- The 12-item Self-Regulation Scale.

Analysis of these scales was performed within the framework of Confirmatory Factor Analysis (CFA) and involved testing the factor structure of ARS-30 and the convergent validity of its final version with the other three scales in the model. The process of scale adaptation and subsequent data analysis is described in detail below.

2.4. Adaptation of the Academic Resilience Scale (ARS-30)

The English version of ARS-30 [Cassidy 2016] was translated into Russian in almost full compliance with the established principles of test adaptation [Vijver van de, Hambleton 1996]. Complete translation of the scale, performed by an external expert, is available in Appendix. The introduction and the vast majority of items were translated almost literally, as there were no cultural biases that could affect the perception of items by Russian-speaking students. Only one item (item 29: "I would start to self-impose rewards and punishments depending on my performance") was basically replaced in the Russian version for a different one because we (the invited expert and the author of this article) found it barely realistic that such a statement, if translated literally, would "work" on Russian 6th-11th-graders. Response options were translated literally without sacrificing their number or order: a five-point continuum from Strongly Agree to Strongly Disagree.

After translation, a pilot validation study of the scale was conducted as part of an intervention administered by the Institute of Education in Kaliningrad Oblast.[3] The sample was comprised of 5,690 randomly selected students of grades 6–11. Upon completing the pilot study and discussing its findings with the respondents, the scale items and response options were adjusted. First, it turned out that respondents did not perceive the neutral response option as neutral but rather used it as a Don't Know option, so the latter was added in the next version of the scale as a separate column on the right, and the number of response options was reduced to four (exclusive of Don't Know). Second, items 1, 10, and 25 were removed from subsequent versions of the scale as they were perceived quite controversially by many participants of the

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[3] https://ioe.hse.ru/ds/news/283631628.html

pilot study. Item 1 was largely perceived as provocative, and items 10 and 25 invoked no associations with the situation described.

2.5. Data Analysis Methods

Data was analyzed in two stages. First, validity of the scales was tested using the methods and algorithms described, for instance, in [Sychev et al. 2018]. The factor structure of the scale was tested using CFA in R-Studio[4] and the package 'lavaan' (0.6–5) [Rosseel 2012]. Model parameters were estimated using the WLSMV algorithm, the most suitable tool for ordered categorical data [Sass, Schmitt, Marsh 2014]. CFA was performed on the complete final sample of the study. The goal of this stage was to assess the quality of the scales, test the possibility of using them in the study, and measure the levels of the described constructs for every respondent to use them at the second stage.

The second stage consisted in grouping the schools based on the index of academic performance and school SES and comparing them with one another. Schools were grouped by dividing them into quartiles and focusing on the extremes of both distributions, as in the previous similar study [Pinskaya et al. 2019]. Schools in the bottom quartile on both SES and academic performance were classified as struggling; those in the bottom quartile on SES and in the top one on academic achievement, as resilient; schools in the top quartile on SES and in the bottom quartile on test scores, as unsuccessful, and those in the top quartile on both SES and test scores, as successful. The rest of the schools are of no interest in this study as they are not "prominent" manifestations of the phenomena analyzed. Students attending schools of different types were compared by their personality traits (using all the four scales described above). The goal of this stage was to find out whether students' personal characteristics differed as a function of school type.

3. Results
3.1. Testing the Validity of ARS-30

In the course of analysis, a number of various models were tested (first-order, second-order, and bifactor models), but the best fit was obtained for the second-order model in all the variants, which is not uncommon for composite constructs in psychological testing [Byrne 2005]. This model implies that the construct of student resilience has a few subconstructs. A similar suggestion was made by Cassidy [Cassidy 2016], but his factor structure is not confirmed by my analysis. Instead, I detect a different structure of student resilience at the level of items that is supported by model validity. Item-level similarities were the main basis for attributing statements to certain subconstructs for testing. The final model is presented in Figure 1. Table 1 shows the distribution of items among the subscales that are given meaningful names to reflect the sets of statements that they capture.

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[4] https://www.r-studio.com/ru/ (R version 4.0.0 (2020–04–24) "Arbor Day")

Figure 1. **Model of the factor structure of student resilience.**
Model fit indices: CFI=0.992; TLI=0.991; RMSEA=0.051; SRMR=0.045.

and lines denote positive and negative factor loadings, respectively, thickness and strength of color of the lines being proportional to the level of factor loading — the thicker the line, the higher the item loads on the factor. Dashed lines designate the first- and second-order elements the loadings on which were registered during model assessment.
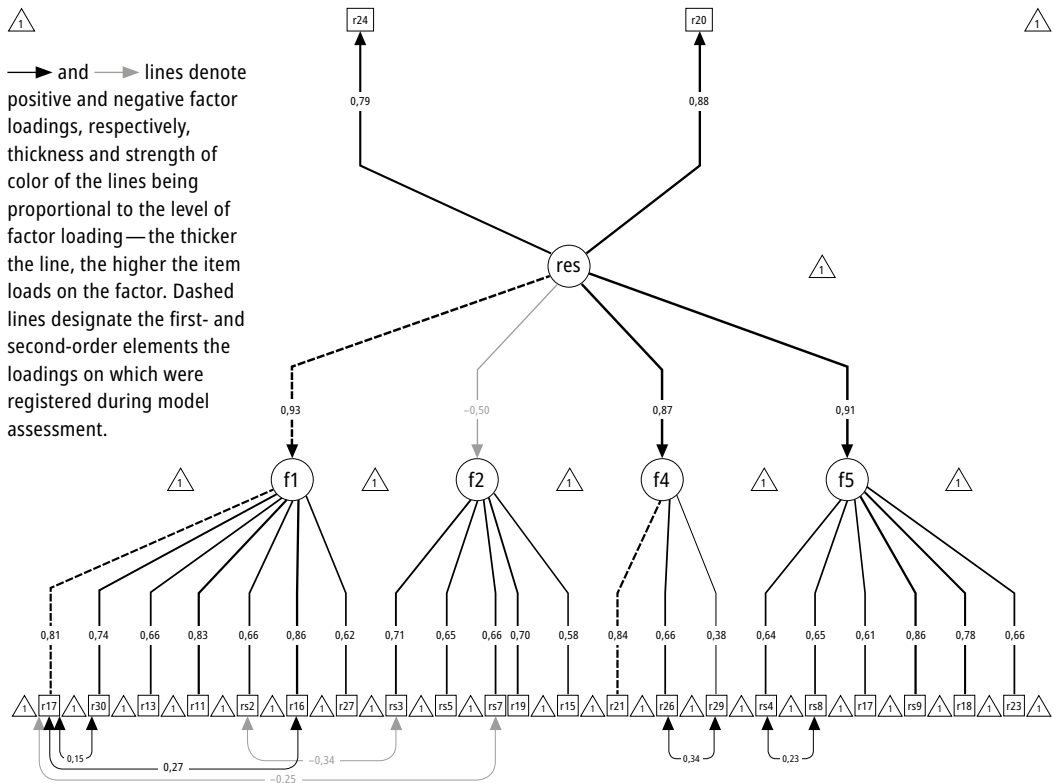
It can be seen from analysis that four more items from the original scale are missing in the final version: items 6, 12, 14, and 18. All of them pertain to negative emotional experiences, and all of them could easily make another subconstruct in any of the models tested, but that subconstruct was barely related (R= –0.24) to the construct of resilience every time. Therefore, it was decided to keep only 23 items, which are presented in Figure 1. Of them, 21 were grouped into four meaningful subconstructs, and the remaining two items, very much alike, were found to be related to overall resilience directly, without being part of any subconstruct. This model was accepted as the final version and served the basis for calculating the total scores on the resilience scale. The scale's structure was tested on two subsamples drawn randomly from the initial sample, and the model proved stable and well-fit in both cases. In addition, the model was tested with reverse-sored negatively-worded items, the factor structure remaining unchanged.

Table 1. **The final content model of student resilience.**

F1: Revanchism	F2: Defeatism	F4: Help-Seeking	F5: Self-Motivation
2, 11, 13, 16, 17, 27, 30	3, 5, 7, 15, 19	21, 26, 29	4, 8, 9, 18, 22, 23

Table 2. **Descriptive statistics for the scales at the level of respondents.**

Variable	Observations	Mean	SD	Min	Max
Revanchism (F1)	4,159	0.0001	0.7817	-2.8410	1.8355
Defeatism (F2)	4,159	0.0026	0.6175	-1.3729	2.2074
Help-seeking (F4)	4,159	-0.0028	0.7683	-2.7318	1.8009
Self-motivation (F5)	4,159	-0.0012	0.6081	-2.2524	1.3948
Resilience (ARS-30)	4,159	-0.0020	0.7288	-2.7104	1.7066
Perseverance of effort	4,159	-0.0018	0.6408	-1.9323	1.3298
Academic motivation	4,159	-0.0058	0.6470	-1.6775	1.2853
Self-regulation	4,159	0.0030	0.4805	-1.8095	1.5633

Three other scales were added to the model to test convergent validity of the scale and check how the new scale behaved in the conceptually founded nomological network. It allows evaluating whether items from different scales converge on a single factor, whether the Perseverance of Effort, Academic Motivation, and Self-Regulation scales are correlated with the Academic Resilience Scale, and whether there are changes in the factor structure.

It was found that the factor structure of student resilience remained unchanged with a fairly high goodness of fit. Furthermore, despite rather high correlations with Academic Motivation (0.62), Perseverance of Effort (0.62), and Self-Regulation, resilience remains an independent construct (explaining its own part of the variation, separate from the three subconstructs) because items do not converge on consolidated factors or overlap among different constructs, which ultimately serves as evidence for convergent and discriminant validity of the scale [Campbell, Fiske 1959]. Goodness of fit of the final model embracing all the four constructs described was also found to be high enough: CFI=0.971; TLI=0.969; RMSEA=0.070; SRMR=0.061. A schematic diagram of the final model with four constructs is shown in Figure 2. The results allow asserting that student resilience is not equivalent to perseverance, motivation, or self-regulation, yet it is "correctly" correlated with conceptually related constructs and is positioned well in the nomological network, which is evidence of the scale's construct validity, using the terminology of Cronbach and Meehl [Cronbach, Mee-

Figure 2. **A CFA model for testing convergent validity of the Academic Resilience Scale.**
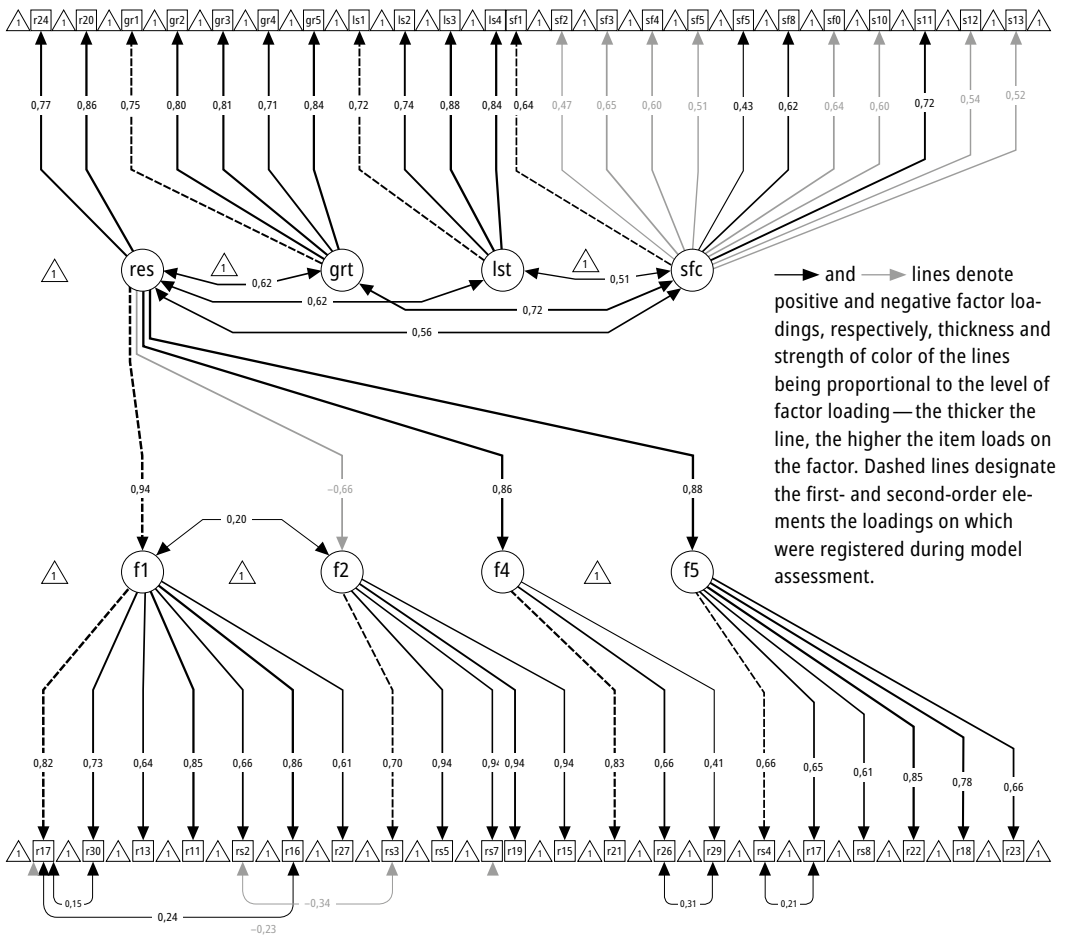
hl 1955]. Table 2 presents the descriptive statistics for all the four constructs used in analysis.

3.2. Comparing Students Attending Schools of Different Types

The second stage involved grouping the schools in the sample to identify the groups of interest. Table 3 presents the results of school grouping, specifically the number of schools and students to be compared. Naturally, the sample became essentially smaller as a result. Eventually, the groups to be compared on the scales above were represented by students attending schools of four different types, those from struggling and resilient schools being of the most significance for the purpose of this study. Instead of conventional paired comparisons, Table 4 shows mean values (95% confidence interval) for every group on

Table 3. **Number of schools and students compared.**

	Schools	Students (sample size)
Struggling	25	274
Resilient	3	48
Unsuccessful	4	104
Successful	33	1,684

Table 4. **Comparing students attending schools of different types by the characteristics analyzed.**

Variable	Struggling			Resilient			Unsuccessful			Successful		
	Mean	95% CI		Mean	95% CI		Mean	95% CI		Mean	95% CI	
Resilience (ARS-30)	−0.02	−0.15	0.11	0.06	−0.20	0.32	0.04	−0.12	0.19	0.02	−0.03	0.06
Perseverance of effort	−0.08	−0.16	−0.01	0.17	−0.03	0.36	0.00	−0.13	0.12	0.06	0.03	0.09
Academic motivation	−0.04	−0.12	0.04	−0.02	−0.22	0.17	0.06	−0.08	0.20	0.03	0.00	0.06
Self-regulation	0.01	−0.05	0.06	0.11	−0.03	0.26	−0.05	−0.13	0.04	0.01	−0.01	0.03

every scale. Presented like that, the results look more convincing and infer directly the interpretations that follow.

As seen from Table 4, there is no difference in any of the four constructs among high school students attending schools of different types. Overlapping confidence intervals for all the groups indicate the absence of statistically significant differences. It is especially important to point out that students from resilient and struggling schools do not differ on the Academic Resilience Scale or any other related construct.

4. Discussion   The following inferences can be made upon trying out the Academic Resilience Scale on a Russian sample. First, the scale changed a lot in the process of adaptation. Analysis revealed a clear, meaningfully interpretable structure of the construct and scale, which shows that resilience (ARS-30) has the components of Revanchism, Defeatism, Help-Seeking, and Self-Motivation. Therefore, the original factor structure proposed by Cassidy [Cassidy 2016] is not confirmed for Russian samples. The new model provides useful information regarding the factor structure of the construct and can be used on samples of Russian middle- and high-school students.

Second, the research performed in the present study continues Cassidy's work on "positioning" student resilience in the nomological network of related constructs. Student resilience shows "correct" cor-

relations with the other scales that are conceptually associated with it in literature. At the same time, there is evidence that the new scale is independent, not overlapping with the other scales and not correlating with them too much. The scale demonstrates pretty good psychometric characteristics, although its validity requires additional testing in future studies.

As for the main goal of this research, no differences have been revealed in any of the personality traits measured between students from resilient and struggling schools. The findings described above indicate that the phenomenon of school resilience—as long as we agree that it exists—derives more from structural rather than individual characteristics. The data obtained allows an assumption that academic resilience at the level of schools is conditioned by something associated with general school characteristics: teaching strategies, school climate, organizational culture, etc. Apparently, the founders of resilience theory had a point when they said that resilience is manifested through the interaction of many factors [Masten, Cicchetti 2016].

Obviously, as it has been shown by researchers from Texas and Stanford, there is little sense in "raising" students' resilience or perseverance; rather, educational interventions should be aimed at creating school environments that are conducive to searching for new learning strategies and seeking help from others, which will ultimately have positive effects on students' academic outcomes [Yeager, Dweck 2012]. A research team from New York also found that improvements in academic outcomes of students in low-income schools result primarily from multilevel interventions that target school climate and organizational culture [McCormick et al. 2015]. Such comprehensive interventions, like social impact bonds, are gaining popularity today, Russia being no exclusion.[5]

A large-scale study was carried out by Michigan sociologists in Michigan, who came up with a new concept of "student capital" to describe the cumulative effect of all typical yet difficult-to-measure factors associated with academic success: "A vast number of harder-to-measure student traits, skills, and resources affect educational success. We present a conceptual framework for the cumulative effect of all factors, which we call student capital." [Quarles, Budak, Resnick 2020:1]) The authors believe that, rather than removing barriers related to easily measured characteristics, interventions should be focused on building up the skills and resources needed to be successful in school (or, better, in life).

5. Limitations There are some limitations to this study. One of them is the method of school grouping, which can be subjected to traditional criticism concerning outliers and anomalies. Indeed, there is always the possibility

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[5] https://ioe.hse.ru/sakha/

that an individual struggling student or school will show high performance. This criticism sounds even more reasonable when observing that there are not many resilient students and schools. In this study, this possibility is reduced by using data on academic performance for three consecutive years. The problem of outliers and anomalies is exacerbated by data aggregation, but the latter was critically important given that analysis was performed on the level of schools, not individuals.

Another important source of limitations is the sample itself, which consists of high school students and is therefore skewed by default because such students have already been "selected". On average, about 50% of middle school graduates proceed to high school in Russia.[6] Obviously, high-school students will manifestly differ in a variety of characteristics from those who withdraw after middle school.

Finally, the most intricate issue is that of validity: what do these scales show? There is empirical evidence for associations between the constructs described and academic outcomes, yet a number of studies (including this one) have failed to find any relation. Furthermore, there could have been systematic errors as well as social desirability bias. At the extreme, it could also be assumed that no measurement of a latent construct is possible by definition [Trendler 2009].

6. Conclusion This study offers a new perspective on the phenomenon of school resilience. Its findings indirectly support previous research on academic resilience in Russia, specifically the inference that school resilience is built through managerial strategies of school principals, educational policies, and school improvement practices (an established theoretical framework, see [Teddlie, Reynolds 2000; Pinskaya et al. 2019; Pinskaya et al. 2018]). A follow-up on this work is the transition to qualitative studies and comparison of particular strategies implemented by resilient and struggling schools; some of such studies have already been published as preprints [Mikhaylova et al. 2021]. An even more important spin on this topic is the question of how school resilience research contributes to education policies: even now, we can see in some documents that the phenomenon of school resilience is used as a justification for shifting the responsibility for performance in adverse circumstances entirely on school workers—rather than bringing systemic decisions to national education policy.[7]

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[6] https://docs.edu.gov.ru/document/c38a1f764e0c77030235de22850ae531/
[7] https://fioco.ru/Media/Default/Documents/ШНОР/Анализ%20резильентности%20российских%20школ_.pdf

Appendix   The Complete Translated Version of the ARS-30

You have received your mark for a recent assignment and it is a "C". The marks for two previous assignments were also poorer than you would want. In school, you are aiming to get as good a degree as you can because you want to receive a good high school diploma and don't want to disappoint your family. The feedback from the teacher for the assignment is quite critical, including reference to "lack of understanding" and "poor writing and expression", but it also includes ways that the work could be improved. Similar comments were made by the substitute teacher who had taught the class while the regular teacher had been ill.

How would you react if you found yourself in a situation like that? Please read the statements below and check the response which best reflects your agreement with each item.

1. I would not follow the teacher's recommendations ☐
2. I would use the teacher's feedback to improve my work ☐
3. I would do nothing ☐
4. I would use the situation to motivate myself ☐
5. I would decide that this subject was not for me ☐
6. I would probably get angry ☐
7. I would begin to think that my chances of getting a high final grade were poor ☐
8. I would regard this situation as a challenge ☐
9. I would try to get negative thoughts out of my mind ☐
10. I would perceive the situation as a temporary difficulty and not a big deal ☐
11. I would begin to spend more time studying ☐
12. I would probably get upset ☐
13. I would try to figure something out ☐
14. I would be very disappointed ☐
15. I would think that the teacher was unfair ☐
16. I would try to do my assignments better ☐
17. I would keep trying to get a high final grade ☐
18. I would think of my previous successes to cheer myself up ☐
19. I would begin to think that I could not succeed in school ☐
20. I would start paying more attention to my academic achievement ☐
21. I would seek help from the teacher ☐
22. I would try to give myself encouragement ☐
23. I would try not to panic ☐
24. I would try different ways of studying ☐
25. I would focus on achieving my own goals ☐
26. I would seek help from my family and friends ☐

27. I would start to think about what I had done wrong when preparing for the assignment ☐
28. I would think that it was horrible ☐
29. I would ask my parents to check my preparedness for classes more often ☐
30. I would start looking for ways to improve my mark ☐

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Measuring Bullying in Russian Schools: Prevalence, Age and Gender Correlates, and Associations with School Climate

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Abstract   This article describes the process of developing instruments to measure school bullying and school climate characteristics as well as presents the results of their evaluation on a sample of 871 middle- and high-school students from a Russian megalopolis. It is shown that bullying prevalence depends on the type of aggressive behavior and involvement, varying from 4% (involvement in physical bullying as a victim or perpetrator) to 45% (involvement in verbal bullying as a bystander). Most often, students get involved in bullying as witnesses, but the number of victims and bullies is not significantly lower. On average, 28% of school students initiate bullying and 33% get bullied once or twice a month. Occasional bullying is more typical of girls, while boys are more likely to bully their peers frequently. Middle-school students (seventh and eighth grades) are at the highest risk of being exposed to bullying in all roles. Four aspects of school climate are also analyzed, all of them being significantly negatively related to bullying involvement (regardless of the type of bullying or respondent's role in a bullying incident).

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Math Is Not for Girl? Investigating the Impact of e-Learning Platforms on the Development of Growth Mindsets in Elementary Classrooms

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Abstract   Science, technology, engineering and mathematics (STEM) education research indicates a gender gap in how students perceive their mathematical ability. Even when there are no gender disparities in math achievement, girls tend to have lower expectations of success and lower self-reported proficiency in the subject than boys. Empirical findings show that development of growth mindset could bridge the gender gap in students' perceptions of their mathematical ability and enhance girls' interest in math. Formative feedback is one of the possible tools to foster the development of growth mindsets.

This study investigates the impact of an e-learning platform with automated feedback on the development of growth mindsets in elementary school children. Empirical data was collected during an experiment which involved 6,300 third-grade students from 343 regional schools in Russia. Statistically significant differences were revealed between students in the control group and those who used the e-learning platform (experimental group). However, the effects of using the platform were significantly lower for girls than boys.

The results obtained in this study point to the great potential of e-learning platforms with instant feedback in fostering growth mindsets in mathematics among elementary school children. Furthermore, it appears vital to integrate tailored feedback for boys and girls to mitigate gender differences in school math education.

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Measuring Teacher Students' Psychological Readiness for Professional Life

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Abstract   In this paper, psychological readiness of teacher students for professional life is understood as a set of personal characteristics such as personality traits, motivation, attitudes and values that contribute to successful teaching. This operational definition does not include teacher's subject knowledge or teaching skills.

The study explores a number of unique evaluation methods to diagnose components of students' psychological readiness for teaching. The selected methods were localized for Russia and Kazakhstan and tested on national samples from both countries. Psychometric characteristics of these methods were analyzed using classical test theo-

ry and item response theory (IRT). A procedure was developed for calculating an integrated index reflecting student's psychological readiness for starting a teaching career.

One of the challenges faced today by education systems across the globe is the flight of teachers from educational institutions of all types. Teacher burnout—caused by a variety of factors, including emotional exhaustion, intrinsic motivation crisis, lack of support from fellow teachers and administrators, and work overload to name just a few— nearly always leads to lower productivity and often results in departure from the profession.

Exodus from the teaching profession has been reported by a number of studies [Darling-Hammond 2003; Feiman-Nemser et al. 1999; Howard, Johnson 2004; Ingersoll, Smith 2003]. Many countries may face teacher shortage in the foreseeable future, while according to some researchers the shortage is already here [Flores 2001].

The problem of job burnout and quitting affects all categories of teachers, but the greatest concerns are caused by its high prevalence among new teachers. As reported by the Teaching and Learning International Survey (TALIS), only 10% of teachers in Russia are aged under 30 [OECD2014]. New teachers at risk of leaving the profession express dissatisfaction with the amount and nature of their assignments and concern about the lack of resources and support from colleagues [McIntyre 2003]. The optimism that beginning teachers have at the very start of their career may turn into pessimism already within the first year of teaching [Brock, Grady 2007; Darling-Hammond 1997; Gold, Roth 1999; Hargreaves, Fullan 1998; Moir 1999].

The flight of teachers from schools has to do with the objective conditions of education system functioning as well as the subjective characteristics of individuals in that system. Many new teachers struggle to adapt in the classroom, develop burnout, and eventually leave the profession early, but many others manage to adapt and build a successful teaching career in the same challenging circumstances. A critical difference between these two groups of beginning teachers is the level of their psychological readiness for professional life (PRPL), which becomes an important factor of career success for recent teacher education graduates [Kucheryavenko 2011; Satova 2015].

This article explores PRPL among teacher students in Russia and Kazakhstan. Although new teacher support programs have been in

place in both countries at national as well as regional levels [Pinskaya, Ponomareva, Kosaretsky 2016], researchers keep reporting problems with retaining young teachers in schools [Kovaleva, Denishcheva, Sheveleva 2011; Kroer et al. 2016]. Teacher shortages are observed today in both countries. For example, over one million job openings were posted by Kazakhstan's Public Employment Agency in 2020, the highest demand being observed for preschool, elementary school, and middle school teachers, according to the Human Resources Development Center.[1]

Psychological readiness should be shaped in the course of robust teacher preparation at the stage of teacher identity development. Studies involving teacher students in Kazakhstan colleges revealed a trend towards a decrease in their career motivation, which is a component of PRPL that embraces professionally significant needs, motives for professional work, positive attitude toward professional work, interest in it, and other quite strong motives [Satova 2015].

Another study found that low readiness for teaching is a risk factor for professional deformation of the personality in teachers. Of the 2,988 teachers surveyed in one of Kazakhstan's regions, 10% displayed various types of professional deformation [Satova, Yadgarova, Ignatenko 2000].

Empirical research on readiness for teaching is dramatically scarce. Given the high percentages of population employed as education workers in both Russia and Kazakhstan, it appears useful to examine teacher students' readiness for professional life and the ways to measure it.

Development of psychological readiness for professional life in students, especially prospective teachers, is a prerequisite for quality professional training. However, the traditional approach to education and educational assessments is largely focused on subject knowledge, often leaving the self-regulation component of professional work in the background.

The present study aims at constructing a model and an instrument for measuring teacher students' PRPL. Its findings may contribute to the development of a system to facilitate teacher induction and promote teacher commitment as well as become an important source of information for teacher education reforms.

1. Operationalizing the Concept of Psychological Readiness for Teaching

Psychological readiness for professional life is a category of Russian psychology that was actively elaborated as part of activity theory [Leontyev 1975], so it cannot be analyzed outside of its conceptual framework. The concept of PRPL was introduced to reflect the gap between professional requirements and training: there is no point in measuring

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[1] https://lsm.kz/kakie-specialisty-budut-vostrebovany-v-2020-godu

readiness if students are trained by being immersed in professional environments. The very existence of PRPL is only possible in a system where professional education and training is isolated from practice and where there is a clear transition from study to work. Therefore, analysis of psychological readiness has a particular relevance for students of colleges and vocational schools.

In the Russian literature, psychological readiness has been studied most often as a person's self-perception as being able, ready, and willing to engage in particular professional activities [Subbotina 2011], or as a quality of being determined to act on particular professional situations in specific ways, i.e. a premise for professional life [Shavir 1981]. In the present study, PRPL is approached from a somewhat broader perspective as the set of characteristics (personality traits and attitudes in the first place) of an individual who is determined and motivated to engage in professional work.

In Russian psychological and educational research, teaching and teacher requirements were brought to the focus of attention in the second half of the 20th century by Nina Kuzmina [1989] and Vitaly Slastenin [1976]. Proceeding from the understanding of teacher functions, researchers developed a teacher job profile diagram consisting of four components: personal traits and characteristics; requirements for psychological and pedagogical preparedness; level and content of specialized training; and content of teaching methodology training. Russian researchers discriminate among motivational, volitional, and organizational elements of teaching, in addition to teaching skills as such and beliefs about teaching. All together, these elements shape psychological readiness for teaching.

Western researchers do not study PRPL as an independent concept, focusing instead on such personal and professional teacher characteristics as professional development [Hofman, Dijkstra 2010], attitudes and practices [Lester 2007], collective work [Wei et al. 2009], self-efficacy and job satisfaction [Klassen, Chiu 2010], and feedback [Santiago, Benavides 2009]. Studies on beginning teachers pay particular attention to teachers' adaptation [Calderhead, Shorrock 1997; Flores 2001; Hauge 2000], personality traits [Hamman et al. 2010], and professional competencies [Pill 2005].

Based on the above, teacher students' psychological readiness for professional work is understood here as a set of personal characteristics—such as personality traits, motivation, attitudes, and values—that contribute to successful teaching. This operational definition does not include teacher's subject knowledge or teaching skills. It is the psychological aspect of readiness for teaching that is the focus of the present study.

2. Measuring Students' Psychological Readiness for Teaching

Psychological readiness is a complex, multicomponent construct that requires psychodiagnostic methods to measure its components: per-

sonality traits, motivation, and satisfaction of basic psychological needs.

Personality traits can be measured using any self-report instrument based on the Big Five traits of extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience [Fiske 1949]. A great advantage of this approach is that the Big Five traits are stable and reproducible across different linguistic and cultural contexts, which makes it indispensable in cross-country studies of personality traits [John et al. 1999].

Motivation can be measured within the framework of self-determination theory (SDT), the most popular theory in psychological research due to the large amount of accumulated evidence confirming its feasibility [Deci, Ryan 2000]. This theory discriminates among intrinsic motivation (engagement out of interest), extrinsic motivation (or external regulation, i.e. engagement driven by external rewards, whether it be high grades or financial incentives), and amotivation (lack of any motivation, where neither interest nor external incentives cannot drive engagement). Amotivation has a negative impact on readiness for professional life, so it should be analyzed with the opposite sign, meaning that lack of amotivation should be considered an indicator of readiness for teaching.

Basic psychological needs are another component of readiness. The present study examines the needs for autonomy (independent decision-making), competence (the value of experiencing confidence in one's professional performance), and relatedness (social support and interaction with others). Furthermore, we suggest measuring teacher students' perceived difficulty of job assignments and expected level of workload in their future professional life, assuming that these two factors will have negative effects on readiness for teaching.

Measuring instruments were selected based on the following principles. First, a method should be well-known, published, and widely applied. Second, it should be theoretically substantiated. Third, its psychometric quality and validity should be confirmed by publications. Finally, availability of a Russian version of an instrument is desirable. Upon analyzing a number of methods, four psychodiagnostic instruments were selected, all of which represent standardized personality questionnaires measuring respondents' agreement with various statements on a Likert scale.

Motivation was measured using the UPLOCK Inventory [Deci, Ryan 2004] based on SDT [Deci, Ryan 2012]. The instrument had already been localized into Russian and validated on a Russian sample [Sheldon et al. 2017]. The questionnaire consists of 24 statements that form six scales representing intrinsic motivation, four types of extrinsic motivation, and amotivation.

Basic psychological needs were measured using the Basic Needs Inventory [Deci, Ryan 2000]) which is also based on SDT. This study uses an adapted and validated Russian version of the instrument [Osin

et al. 2015], which includes 21 statements grouped into three scales: the need for autonomy (self-determination), i.e. the desire to feel volition and choice; the need for competence, understood as a desire to achieve certain personal and work outcomes and to be effective; and need for relatedness, i.e. the desire to establish strong relationships based on attachment and belongingness.

Personality traits of the respondents were measured using an adapted version of the Big Five Inventory-2 (BFI-2) [Shchebetenko et al. 2020]. The instrument is based on a five-factor model of personality [John et al. 1999]. The original version of BFI-2 is comprised of 61 statements that form the classical scales of the Big Five personality traits: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience.

Environmental factors were measured using the Learning Environment Demands-Resources (LEDR) Inventory consisting of 25 items and six scales: Workload, Role Clarity, Choice Availability, Adequate Job Complexity, Tutor Support, and Peer Support. This instrument was developed by a Russian researcher [Osin 2015] on the basis of the job demands-resources model [Bakker, Demerouti 2007].

The measuring instruments listed above were tried out in a pilot study to test their psychometric properties and select the scales to be included in the integrated index of psychological readiness.

3. Trying Out the Instrument for Measuring Teacher Students' Psychological Readiness for Professional Life

3.1. Sample

The empirical tryout involved 569 teacher students (3rd-4th years of Bachelor's degree and 3rd-5th years of Specialist's degree) representing colleges of Kazakhstan (Abai Kazakh National Pedagogical University, 276 respondents) and Russia (Novosibirsk State Pedagogical University, 293 respondents). The gender composition of the sample reflects the larger share of female students in teacher education programs in both countries: 57 men and 512 women. The age of the respondents varied from 18 to 47 years.

To administer the tests in the Kazakh language, all the instruments were localized from Russian into Kazakh by faculty members from the Department of General and Applied Psychology of Abai Kazakh National Pedagogical University with due regard to the International Test Commission (ITC) Guidelines [Bartram, Hambleton 2016]. The procedure involved two independent translations and a final "reconciliatory" translation by bilingual experts. As a result, 329 respondents in the sample were tested in Russian, and 240 were tested in Kazakh.

3.2. Procedure

The pilot study was carried out in the form of computerized testing using the 1KA survey tool.[2] The tests were adapted for all kinds of devices (computer, tablet, and smartphone). Respondents were given unique

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[2] https://www.1ka.si

IDs to maintain their confidentiality. Language was selected automatically as a function of user preferences.

3.3. Data Analysis Psychometric properties of the selected inventories were assessed using Classical Test Theory (CTT) and Item Response Theory (IRT).[3] Within the framework of IRT, we used the Rating Scale Model (RSM) [Wright, Masters 1982] designed specifically for analysis of Likert scales. The following psychometric characteristics of the instruments were analyzed: dimensionality (empirical factor structure), individual item quality, response option functioning, and the overall quality (reliabiliyu and measurement error) of the scales. Psychometric data analysis was performed in Winsteps 3.73.

Instrument dimensionality was examined using Principal Component Analysis (PCA) on standardized model residuals, which represent standard deviations of true response from response predicted by the model [Linacre 1998; Smith 2002]. Item fit was assessed using unweighted and weighted mean-square fit statistics [Wright, Masters 1990], which are also based on PCA on standardized residuals [Wright, Masters 1990] and have an expected value of 1. The range of fit statistics from 0.7 to 1.4, which is believed to be the most productive range for measurements in RSM, were used in the present study as the tolerance interval [Wright, Masters 1982]. Response option functioning was tested for compliance with the following criteria [Linacre 2002]: (a) all categories should be selected by respondents; (b) all categories should demonstrate good model fit; (c) choice difficulty should increase monotonically from Strongly Disagree to Strongly Agree; (d) correlations between the measured construct and response options should increase monotonically from Strongly Disagree to Strongly Agree. Finally, psychometric quality of test scores was assessed by measuring the tests' reliability and measurement error.

In addition, item functioning across different groups of respondents, e. g. between Russian- and Kazakh-speaking students, was examined using Differential Item Functioning (DIF) analysis [Dorans, Holland 1992] with regard to variables that might affect item functioning by increasing or decreasing the probability of choosing a stronger-agreement response option by respondents depending on the group to which they belonged. In our study, such variables include the language of testing (Russian or Kazakh) and the country of respondent's residence (Russia of Kazakhstan). If an item functions differently, for instance, between two languages, it cannot be used as a common item for samples speaking different languages and should be either removed or treated as unique for each of the samples. DIF analysis is

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[3] Kroker L., Algina D. (2010) *Vvedenie v klassicheskuyu i sovremennuyu teoriyu testov. Uchebnik* [Introduction into Classical Test Theory and Item Response Theory. Textbook], Moscow: Logos.

indispensable for comparing students who live in different countries or speak different languages by measurable indicators.

The Mantel-Haenszel procedure [Holland, Thayer 1986] in Linacre's modification [Badia, Prieto, Linacre 2002] was applied as the most popular technique of DIF analysis to detect and measure differences in item functioning.

Development of scaling techniques and statistical analysis of the test results were carried out using mathematical statistics of Confirmatory Factor Analysis (CFA), correlation analysis, and regression analysis. Analysis was performed with the use of Microsoft Excel 2010, Mplus 8, and R statistics packages.

3.4. Psychometric Evaluation Results

3.4.1. UPLOCK Inventory

To[4] begin with, the six-factor structure of the instrument was confirmed: Intrinsic Motivation, Identification, Positive Introjection, Negative Introjection, External Regulation, and Amotivation. Next, each scale was analyzed as an independent measuring instrument. All the scales were found to be unidimensional and reliable (from 0.7 to 0.88), their psychometric characteristics being within the normal ranges, and all of their response options functioning properly.

Two statements, "I currently attend college because I decided (chose) to do so" and "I currently attend college because I find it meaningful", demonstrate differences in the functioning of the "language of testing" variable in opposite directions: the former, in favor of Russian-speaking respondents; and the latter, in favor of students who took the tests in Kazakh. Both statements belong to the Identification scale. The same statements function differently between the samples from Russia and Kazakhstan. Further on, only one scale relating to extrinsic motivation will be used in analysis: External Regulation. This type of motivation is the most contingent on external factors, basically working as the exact opposite of intrinsic motivation.

Therefore, three scales from the UPLOCK Inventory will be used in further analysis: Intrinsic Motivation, External Regulation, and Amotivation.

3.4.2. Basic Needs Inventory

A similar evaluation procedure was performed for the Basic Needs Inventory consisting of three scales: Autonomy, Competence, and Relatedness. The results confirmed the factor structure of the instrument and the good psychometric quality of all the three scales. Classical reliability of the scales is satisfactory (from 0.66 to 0.73) given the small numbers of items. No DIF for the "language of testing" or "country of residence" variable was detected in this inventory. Therefore, it can be recognized as a quality measuring instrument even for cross-cultural assessments.

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[4] A brief summary of psychometric evaluation results is presented in this section. Detailed results can be emailed upon request.

3.4.3. BFI-2 — The Big Five Inventory-2 includes five scales: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience. Analysis confirmed the factor structure of the instrument and the acceptable psychometric quality of all the scales. Classical reliability is fairly high—ranging from 0.78 to 0.84—for all the scales except Openness to Experience, which is somewhat less reliable (0.7) but still within the acceptable range. DIF analysis revealed only four statements (out of 61) that functioned differently among respondents speaking different languages or residing in different countries. Therefore, the BFI-2 also has fairly good psychometric properties and can be used in the present study.

3.4.4. Learning Environment Demands-Resources Inventory — The same procedure was applied to evaluate the LEDR Inventory. The original version included six scales: Workload, Role Clarity, Choice Availability, Adequate Job Complexity, Tutor Support, and Peer Support. Psychometric evaluation showed that not all the scales were of acceptable quality, so only three were selected for further analysis: Workload, Adequate Job Complexity, and Peer Support. Classical reliability of these scales was found to be satisfactory (from 0.65 to 0.83) given their small size. No DIF for the "language of testing" or "country of residence" variable was detected in any of the scales. On the whole, the selected scales of the LEDR Inventory proved to have good psychometric properties and therefore can be used further in the present study.

To summarize the above, psychometric evaluation established that the selected scales of the UPLOCK, Basic Needs, BFI-2, and LEDR Inventories have sound psychometric properties and can be recognized as quality and reliable instruments to measure the purported constructs. That is to say, they are suitable for constructing the index of psychological readiness.

4. Constructing the Index of Psychological Readiness

Fourteen scales from the UPLOCK, Basic Needs, BFI-2, and LEDR Inventories were selected based on theoretical assumptions and psychometric evaluation data to construct the index of teacher students' readiness for professional life (Table 1).

All respondents' scores on all the scales were standardized by dividing the basic (raw) scores by the maximum possible score for the scale. Standardization produced uniform scores on all the scales, removing dependence of test scores on the number of items in a scale or the number of response options.

The index was constructed using PCA, which involved applying real and simulated data to standardized scores. The method of PCA was chosen because it allows integrating all the scales and constructing the index instead of identifying a common factor for all the scales like, for instance, in exploratory factor analysis [Wilson & Gochyyev 2020]. Parallel factor analysis based on simulating random data with descriptive statistics yields one principal component, analysis of the

Table 1. **Scales selected to construct the index of psychological readiness.**

Inventory	Scale
UPLOCK	Intrinsic Motivation
	External Regulation
	Amotivation
Basic Needs	Autonomy
	Competence
	Relatedness
BFI-2	Extraversion
	Agreeableness
	Conscientiousness
	Neuroticism
	Openness to Experience
Learning Environment Demands-Resources	Workload
	Adequate Job Complexity
	Peer Support

Table 2. **Factor loadings on the selected scales in PCA.**

Scale	Factor loading in PCA (PC1)
Intrinsic Motivation	0.57
External Regulation	−0.23
Amotivation	−0.59
Extraversion	0.71
Agreeableness	0.70
Conscientiousness	0.72
Neuroticism	−0.63
Openness to Experience	0.46
Autonomy	0.73
Competence	0.81
Relatedness	0.65
Workload	−0.38
Adequate Job Complexity	−0.71
Peer Support	0.57

scree plot clearly showing one dominant factor (Figure 1). Total variation explained by this factor is 38%.

Table 2 shows factor loadings for all the scales determined using PCA. Five scales—External Regulation, Amotivation, Neuroticism, Workload, and Adequate Job Complexity—have predictably negative factor loadings. To include these scales in the index, they need to be reverse scored so that correlations with the dependent variable and factor loadings on these scales are all positive within the factor.

The index can be calculated as the arithmetic mean of standardized raw scores on all the selected scales weighted by factor loadings obtained by PCA. Therefore, for each individual respondent, the index will be calculated by multiplying their standardized scores on all the scales by the respective weights, adding the products together, and dividing the sum by the sum of all the weights. The resulting index takes values from 0 to 1, higher values corresponding to higher levels of psychological readiness.

Therefore, the procedure of constructing the index of teacher students' psychological readiness for professional life based on the selected self-report instruments consists of the following steps:

Figure 1. **Results of applying PCA
to real and simulated data.**

*Eigenvalues of
principal components*
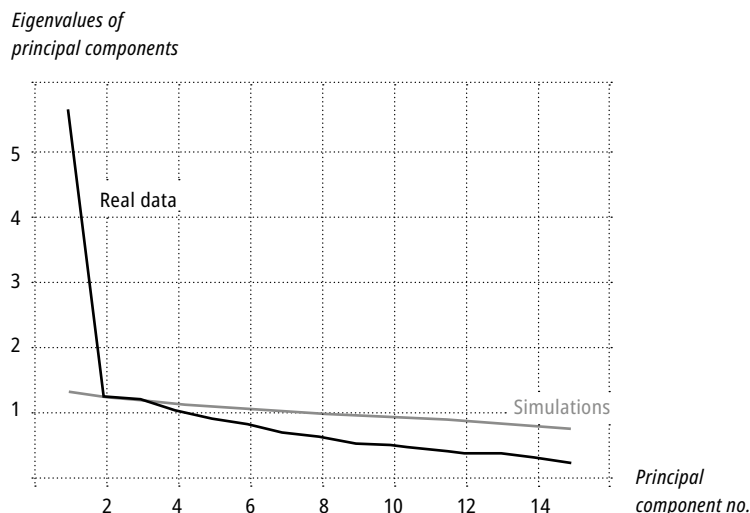
1) (1) Standardize respondents' basic (raw) scores on all the select-
    ed scales by dividing them by the maximum possible score for the
    relevant scale;
2) Reverse score the scales with negative factor loadings in PCA (Ta-
    ble 2) by multiplying the standardized scores on these scales by
    (–1) and adding 1 to the products;
3) Change the signs of negative factors loadings by multiplying them
    by (–1);
4) For every respondent, multiply the standardized scores on every
    scale by the respective factor loadings (weights) and add the prod-
    ucts together;
5) Divide the sum (4) by the sum of all factor loadings (weights).
    Distribution of the index of psychological readiness for teaching is
presented in Table 3 and Figure 2.

Therefore, the index of psychological readiness represents the stu-
dent's degree of preparedness for starting a teaching career.

5. Conclusion   Criteria for assessing the quality of teacher preparation are critically
important for building college educational processes as well as effec-
tive secondary school performance. A lot of recent teacher education
graduates do not work as teachers for social as well as economic rea-
sons referred to as job dissatisfaction. In addition, a large proportion
of new teachers leave the profession soon after they start their teach-

Figure 2. **Distribution of the index of psychological readiness for teaching.**
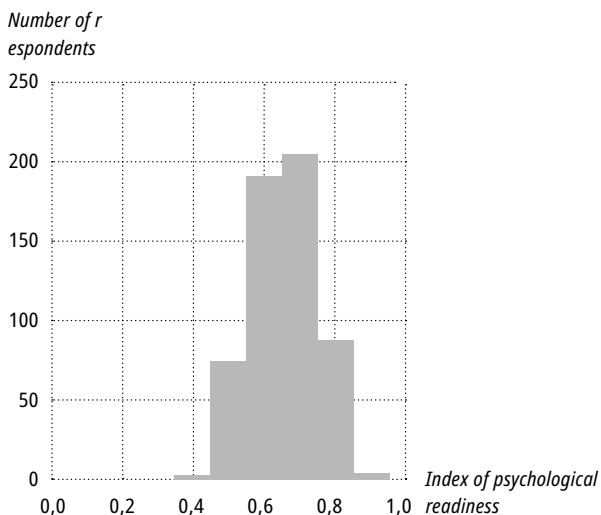
Table 3. **Descriptive statistics for the index of psychological readiness for teaching.**

	Mean	SD	Min	Max
Index of psychological readiness for teaching	0.66	0.09	0.4	0.9

ing career. Therefore, teacher education colleges and the education system as a whole would benefit from having an instrument for identifying vulnerable groups of recent graduates and beginning teachers who flee from the profession for whatever reasons. Development of such an instrument involves research on the measures of students' preparedness for teaching—not only their level of professional skills but also their psychological readiness. The present study was aimed at constructing a model and an instrument for measuring teacher students' psychological readiness for professional life.

Key personality and motivational components of teacher work served the basis for formulating the operational definition of psychological readiness for teaching. Proceeding from this definition, a set of instruments was selected to measure elements of psychological readiness. Further on, those instruments were tried out on a sample of teacher students from Russia and Kazakhstan.

The selected instruments displayed good psychometric properties in both CTT and IRT, allowing us to construct the index of psychological readiness for teaching.

Psychological readiness assessment results can be used "on both sides" of teacher preparation: in teacher education as well as in teaching practice. When preparing teachers, it appears important to pay attention not only to the knowledge component of learning but also to the development of students' personality, motivation, and positive attitudes—these qualities may become part of the universal cultural competence as an outcome of higher education. Induction of new teachers is critical to their further career trajectories, so they need support from more experienced colleagues during this period. In some countries, beginning teachers are required to engage in induction and mentoring programs [Kulikova 2018]. In Russia and Kazakhstan, some measures to support new teachers, such as mentoring, financial incentives, and professional development, are also implemented at different managerial levels [Pinskaya, Ponomareva, Kosaretsky 2016]. The set of psychological readiness measuring instruments selected and tried out in this study may also serve as a tool for examining the transition from learning to practice as well as new teachers' early adaptation in the classroom. Importantly, low psychological readiness is not a reason for repelling students from the profession but a possible springboard for choosing areas of further professional development.

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The Impact of Non-Cognitive Characteristics on the Higher Education Choice-Making: An Economist Perspective

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Abstract   The article presents a review of literature systematizing findings on the contribution of non-cognitive skills to higher education choice-making. The concept of higher education choice-making in this paper embraces the decision to embark on a college degree, the probability of successful degree completion, the choice of academic discipline, and other related aspects. A priority focus is given to publications in economics since the economic approach differs a lot from approaches in other social sciences. In addition, the article explores the methodological characteristics of non-cognitive skills research in economics. The results of literature analysis point to the relevance of non-cognitive skills in explaining individual educational choices and allow drawing some inferences for education policy.

Higher education has been on the radar of economists for a long time. This should not come as a surprise: higher education choices are decisive for further career and socioeconomic trajectories. However, this interest also has a historical background. By the middle of the 20th century, the rapid economic growth during the post-war reconstruction period, the emergence of new manufacturing technologies, and the attempts to establish national social welfare states which increased social expectations in developed countries had led to a surge in population's demand for higher education and at the same time in the labor

market's demand for skilled labor. Technological innovations enhanced the value of higher education as a driver of innovative socioeconomic development. Naturally, the growing social demand for higher education triggered a multifold increase in government expenditure on this sector, which had to be clearly substantiated. A search for substantiation promoted research on returns to education, and the human capital theory put forward in the 1960s [Becker 1964] became one of the fundamental theoretical frameworks for explaining effectiveness of investments in education.

Human capital is the stock of knowledge, skills, and competencies acquired by an individual. From the perspective of human capital theory, the value of education consists in building it up, i.e. in developing the skills that will enable an individual to enhance their job performance and earn more. A long debate led economists to a conclusion that from an individual's point of view, higher education is not a consumption good but an economic one, which implies receiving some return to it in the future [Lazear 1977]. Empirical studies at the micro-level confirm a positive rate of return to education, postsecondary education in particular (for a review, see [Psacharopoulos, Patrinos 2018]). In addition to individual rates of return, an increase in the level of educational attainment in a society promotes technological and innovative development, improves labor productivity, and reduces poverty and crime. Finally, empirical studies indicate a significant contribution of education in the long-term growth of national economies (for a review, see [Barro 2001]), which found its way into macroeconomic theories of endogenous growth [Romer 1994].

Evidence of positive returns to education at both micro- and macro- levels inspired optimism and confirmed the need for government investments in the sector, thereby strengthening the trend for mass distribution of higher education. However, as the percentage of population with college degrees was growing, economic growth was slowing down, so the optimistic expectations had to be readjusted. Ability is the main factor of bias in the assessment of returns to education, as it affects productivity, the likelihood of going to college, and wages at the same time. Proponents of the job market signaling model, which competes with human capital theory [Spence 1973], tend to absolutize ability: denying the contribution of education to productivity, they argue that a college degree sends a signal to employers about the candidate's innate capabilities and, hence, higher productive capacity. In an effort to correct the initial estimate bias, twin studies were initiated that allowed controlling for shared family environment factors and genetically predetermined abilities. This literature [Griliches 1977; 1979] as well as later publications allowed inferring with great certainty that the upward bias in the estimates of returns to education caused by differences in ability is balanced by the downward bias attributed to educational attainment measurement errors, so the initial estimates of returns to education reflected the situation quite accurately [Card 1999].

Human capital is a multilayer concept that is hard to measure. As education contributes to the development of various skills, researchers have come to pay attention not only to overall returns to educational attainment but also to returns to skills acquired in the process of learning. Originally, human capital research was focused on intelligence and intellectual competencies (ICT skills, occupational skills, knowledge of foreign languages, etc.), which came to be known as cognitive skills. Empirical studies consistently indicate positive associations between cognitive performance and educational and labor market outcomes [Lin, Lutter, Ruhm 2018]. However, skills and abilities are not restricted to intelligence. For a long time, economic analysis ignored the possible significance of other characteristics that are not directly related to intellectual abilities but affect behaviors nevertheless. As an emphasis of their distinction from cognitive abilities, these characteristics came to be referred to as non-cognitive skills — a notion that embraces a broad category of individual psychological qualities inseparable from the process of learning and working.

The growing interest in non-cognitive skills has to do with several factors. First, understanding of how non-cognitive skills work allows measuring the effectiveness of classical education programs designed to increase intelligence. Nobel Laureate James Heckman, who has become a pivotal figure in economic analysis of non-cognitive skills, underlines that the preoccupation with cognition and academic "smarts" as measured by test scores to the exclusion of social adaptability and motivation causes a serious bias in the evaluation of many human capital interventions [Heckman 2000]. In addition, it has been established that education programs fostering positive non-cognitive skills in the form of habits and behavioral patterns have longer-term positive effects on social outcomes, from higher earnings in adult life to lower crime participation, and thus can be an effective tool for breaking the intergenerational cycles of poverty. If an individual's personality determines their choice of the level, field, and quality of education to obtain, differences in non-cognitive characteristics may limit the potential of education as a mediator of social mobility, separating students from well-off families from those who grew up in less economically advantaged settings. Findings confirming the effectiveness of programs designed to promote non-cognitive skills mostly come from preschool and elementary school research (for a review, see [Heckman, Jagelka, Kautz 2019]), while effectiveness of such educational interventions at later stages of life, especially in college, remains an open research question.

Second, the growing interest in non-cognitive skills is triggered by changes in the labor market landscape. Digitalization that has reached every sector of economy is rapidly transforming the demand for skills [Edin et al. 2017]. As computerization advances, developed countries witness a decrease in the proportion of routine tasks but at the same time an increase in the percentage of jobs that require a combination

of cognitive and non-cognitive skills, including communication and adaptability [Deming 2017].

Non-cognitive skills are valuable not so much in the context of higher education per se as in the context of labor markets. Relevance of non-cognitive skills has been repeatedly demonstrated in empirical studies over the last 10–15 years. It transpires that non-cognitive characteristics, along with cognitive ability, correlate with wages [Brunello, Schlotter 2011; Gensowski 2018], (un)employment probability [Cuesta, Budria 2017], and other indicators of wellbeing [Krishnakumar, Nogales 2020]. Findings from Russia-based studies [Maksimova 2019; Rozhkova 2019; Gimpelson, Zudina, Kapelyushnikov 2020] demonstrate that non-cognitive skills play a significant role in the Russian labor market and that returns to them are comparable to returns to other components of human capital. Productivity associated with possession of specific personality traits is one of the possible ways of generating such returns [Cubel et al. 2016].

Economic publications examining the relationship between non-cognitive skills and education are comparatively few, although education is the potential mediator among psychological factors, productivity, and labor market. The costs of college attendance include so-called "psychic" costs associated with stress and deadlines, which cannot be avoided even by students with higher cognitive levels. The magnitude of psychic costs depends on an individual's personality traits which determine how easily they can navigate college life [Jacob 2002]. In particular, psychic costs explain why adolescents who would economically benefit from education decide not to pursue it [Cunha, Heckman, Navarro 2005; Heckman, Stixrud, Urzua 2006].

Research on the associations between higher education choices and non-cognitive skills is only in its nascent stage, and the Russian literature is no exception. The issue has been heavily addressed by psychologists and educators [De Raad, Schouwenberg 1996], but their approaches are different in many ways from the one used in economics. This article seeks to summarize the existing economic literature on non-cognitive skills in higher education and thereby lay the foundation for future research on Russian samples.

1. What Cognitive and Non-Cognitive Skills Are and How They Are Measured

Broadly speaking, cognitive skills are understood as intellectual abilities of an individual, including the ability to count, read, and write (basic cognitive skills) as well as to reason abstractly and solve non-routine problems (higher-order cognitive skills). In psychology, there is a generalized factor of intelligence g, divided into discrete factors of fluid and crystallized intelligence [Cattel 1963]. Fluid intelligence involves memory skills and the rates of thinking and learning. It peaks at the age of 25 and is measured by IQ and verbal reasoning tests. Crystallized intelligence encompasses cultural experiences and learned procedures and knowledge. It accumulates throughout an individual's

life and is measured by standardized tests, including achievement tests.

Non-cognitive skills in economics (same as personality traits in psychology) are defined as the relatively enduring, patterns of thoughts, feelings, and behaviors that people exhibit in similar situations across time [Roberts, Davis 2016]. According to another definition, the term non-cognitive skills describes the personal attributes not thought to be measured by IQ tests or achievement tests [Kautz et al. 2014]. Meanwhile, high cognitive test scores are explained not by intellectual abilities alone but also by motivation, effort, and the personality traits that underlie them [Borghans, ter Weel, Weinberg 2006]. For this reason, the contribution of cognitive skills in economic growth, measured by IQ tests or educational attainment, can be explained to some extent by non-cognitive factors as well [Brunello, Schlotter 2011]. Since non-cognitive characteristics can predict the acquisition and use of soft, or socioemotional, skills (leadership, teamwork, time management, etc.), these two constructs are closely interrelated, though not identical.

Empirical measurements of non-cognitive skills in economics are centered on the established psychological theories. Unlike cognitive skills that are measured by tests, non-cognitive skills are more often assessed based on self-report behavioral questionnaires. Empirical research requires an instrument that meets a number of requirements: it should be valid (i. e. actually measuring the phenomenon in question), concise, and easy to understand. The Big Five, renowned as the most influential taxonomy of personality traits [John, Srivastava 1999], has become such instrument for psychological and economic literature. The Big Five taxonomy is based on a lexical approach which posits that if a trait is significant or prevalent enough, it should have a lexical descriptor in the language [Goldberg 1990]. Repeated clustering of words denoting the entire variety of personality traits yielded five broad categories allowing to describe a person: conscientiousness, openness to experience, extraversion, agreeableness, and neuroticism. Using the Big Five trait taxonomy, researchers have found strong associations between students' psychological traits and academic performance [Poropat 2009].

Conscientiousness is recognized as the most significant personality trait for academic achievement. It reflects the propensity to follow socially prescribed norms and involves dutifulness, self-discipline, order, and other parameters affecting job performance. Psychological studies show that achievement striving and self-discipline together with dutifulness, expressed in a high level of conscientiousness, are associated with better performance in undergraduates [Gray, Watson 2002], this association being mediated by positive study habits and attitudes [Delaney, Harmon, Ryan 2013]. Openness to experience implies high inquisitiveness and measures the degree to which a person needs intellectual stimulation, change, and variety [Borghans, ter Weel, Weinberg 2008]. Openness to experience is also characterized by

high levels of intellectual curiosity, which may predict academic choices [von Stumm, Hell, Chamorro-Premuzic 2011]. Extraversion embraces interpersonal communication, sociability, talkativeness, and positive emotionality [McCrae, John 1992]. Some studies report a negative correlation between extraversion and academic outcomes in higher education [Noftle, Robins 2007]. Agreeableness measures an individual's tendency to act in a cooperative manner. A small positive association between agreeableness and academic achievement was found, which is probably mediated by lecture attendance rate [Delaney, Harmon, Ryan 2013]. In addition, more agreeable individuals are more likely to engage in altruistic behaviors [McCrae, John 1992] and can make better team players. Finally, neuroticism reflects the level of emotional instability, anxiety, and impulsivity. On the one hand, emotionally stable students can use their stress coping skills to learn more effectively [Kaiser, Ozer 1997]. On the other hand, students who are higher on neuroticism tend to spend more hours on additional study [Delaney, Harmon, Ryan 2013].

All the other personality traits are either part of the Big Five domains or correlated with them. In particular, such valuable characteristics as leadership and motivation are not included in the stated categories explicitly but overlap with them partially: achievement striving, one of the facets of motivation, is recognized as a component of agreeableness, while leadership implies a high level of extraversion [Borghans, ter Weel, Weinberg 2008]. Although the Big Five is the most popular instrument in the economic literature, the choice of measure often depends on data availability [Brunello, Schlotter 2011]. Such psychological constructs as locus of control (Rotter's scale) [Heckman, Stixrud, Urzua 2006; Cobb-Clark, Schurer 2013], self-concept, and motivation [Saltiel 2020] are used as alternatives to the Big Five taxonomy.

Estimates of the relative effects of personality on socioeconomic outcomes may be biased downwards due to the measurement errors associated to self-reporting, which remains the key way of collecting information on non-cognitive skills in large surveys [Brunello, Schlotter 2011]. To answer a psychological question, respondents need to compare their own behavior with their perception of a social norm or a cultural context, so they generally try to avoid extreme responses. However, there is experimental evidence supporting validity of self-report personality tests. Participants filled out the Big Five questionnaire twice: the first time, they were given neutral instructions, and the second time, they were asked to imagine a specific setting and adjust their answers accordingly [Ziegler et al. 2010]. Results showed validity for self-ratings of personality, and "faked" answers did not affect the predictive validity of the Big Five domains relative to academic performance.

Self-report surveys are the most widespread yet not the only way of measuring non-cognitive skills for further analysis. School grades are another measure—a rather controversial and imprecise one, as it

is affected by both cognitive and non-cognitive skills. Students that are more open to experience devote more time to study and show better academic outcomes [Brunello, Schlotter 2011; Heckman, Jagelka, Kautz 2019]. Furthermore, there have been behavioral assessments of non-cognitive skills based on teacher ratings, extracurricular activities, independent learning, and participation in school clubs [Lipnevich, MacCann, Roberts 2013].

A key concept in economic analysis is preferences underlying an individual's decisions, including educational choices. For instance, a lower value (i. e. higher discounting) of the future renders investments in education less attractive [Segal 2013]. A theoretical model has been developed in which non-cognitive traits contribute to the utility function and thus basically work as preferences [Bowles, Gintis, Osborne 2001]. Associations between some preferences and personality traits are intuitively obvious and strong. However, empirical attempts to measure the relationship between economic preferences and psychological characteristics produce dubious findings. Earlier studies found weak correlations between preferences and the Big Five domains [Becker et al. 2012; Daly, Harmon, Delaney 2009; Dohmen et al. 2010], while more recent publications show that such findings could have resulted from measurement error [Jagelka 2020]. Anyway, the question of how individual preferences relate to personality traits is yet to be answered.

1.1. Formation and Stability of Non-Cognitive Skills

Implementation of education policies to promote non-cognitive skills requires understanding how such skills are shaped. One of the theoretical models of skill formation [Cunha, Heckman 2007; 2008] assigns a pivotal role to family investment in children: childhood is conventionally divided into several stages, and the output of skill at each stage is determined by the skill and family input from earlier stages. Model evaluation reveals complementarity of skill investments and shows that non-cognitive skills promote the development of cognitive competencies, but cognitive ability does not affect the formation of non-cognitive characteristics.

Everything that economists know about the process of non-cognitive skill formation and development mostly pertains to childhood and adolescence, i. e. the early educational stages of preschool and secondary school education. Findings from the relatively few publications exploring the effects of higher education on non-cognitive skills indicate that very few skills can still be shaped at later stages of development, such as extraversion and agreeableness. Upward trends exhibited by these domains during the college years is conditioned by an increase in social engagement and cooperation [Kassenboehmer, Leung, Schurer 2018]. However, empirical studies show that these traits are correlated less with academic and job performance than the other Big Five categories [Braakmann 2009].

How skills are shaped has a lot to do with their stability. Non-cognitive skills have to be stable to allow measuring their impact on ac-

ademic and job performance, otherwise the use of personality traits as explanatory variables will cause endogeneity bias. Economists believe that, once formed in adolescence, non-cognitive skills remain stable throughout adulthood [Elkins, Kassenboehmer, Schurer 2017]. Furthermore, a number of empirical studies proceed from an even stronger premise that non-cognitive skills remain stable over a certain period regardless of important life events [Cobb-Clark, Schurer 2012; 2013]. Not only does such a premise take the issue of endogeneity off the table but it also solves the problem of limited data: in the majority of household surveys, non-cognitive characteristics can only be assessed at a particular point in time, which occurs either long before (as with measuring children's non-cognitive characteristics to predict their participation in postsecondary education) or after the dependent variable is measured. Psychologists, on the other hand, are less unanimous in their views on personality stability. Traditionally, personality has been thought to be relatively stable over long periods of time and change essentially little after the age of 30 [Costa, McCrae 1980]. More recent longitudinal studies suggest that change does occur, as respondents provided different answers at different times and under different circumstances [Lucas, Donnellan 2011]. It remains unclear, however, whether the observed change was real or resulted from measurement error.

2. Associations between Non-Cognitive Skills and Higher Education Choice-Making

Higher education choice-making involves at least two consecutive steps: first, decide whether to pursue a college degree or, for example, embark on a vocational track right after secondary school; and second, choose a field of study.

Individuals decide whether or not to pursue higher education based on their own cognitive and non-cognitive characteristics [Heckman, Stixrud, Urzua 2006; Borghans, ter Weel, Weinberg 2008]. Although cognitive factors are extremely powerful predictors of academic outcomes, higher levels of education are associated with lower correlation between intelligence and achievement [Richardson, Abraham, Bond 2012]. Some students struggle despite scoring high on standardized tests, while motivation and effective study strategies can compensate for a lack of cognitive ability in less capable undergraduates [Komarraju, Ramsey, Rinella 2013].

The Big Five domains of conscientiousness and openness to experience are correlated significantly positively—nearly as strongly as intelligence—with going to college. Of all the Big Five categories, conscientiousness is the best predictor of grades, and openness to experience is the most strongly associated with the years of schooling [Borghans, ter Weel, Weinberg 2006]. Conversely, neuroticism is correlated negatively with the intention to go to college [Peter, Storck 2014]. The same is true for extraversion: being associated with greater social activity, it affects negatively the probability of going to college [Humburg 2017].

A non-linear relationship is observed between non-cognitive skills and the level of education [Polemis 2018].

Non-cognitive skills predict not only going to college but also the level of undergraduates' ambitions. The only available economic publication on the correlation between non-cognitive skills and academic ambitions, which are measured by college selectivity, shows that students with lower non-cognitive skills (locus of control and self-concept) are more likely to enroll in less selective colleges given their academic credentials [Saltiel 2020].

The impact of non-cognitive skills on higher education choice-making depends on the socioeconomic environment in which an individual was raised. Evaluating the associations among personality traits, high-school completion, and applying to college, U.S. economist Shelly Lundberg concludes that the effects of the Big Five vary as a function of family characteristics. Openness to experience turns out to be the most important quality in the context of learning as it can compensate for less advantaged backgrounds [Lundberg 2013]. Similar findings were obtained in Germany, where the probability of taking up higher education increases among high-school leavers when they are more emotionally stable and open to experience, the latter being a particularly significant factor for students from non-academic parental homes [Peter, Storck 2014]. First-generation college students tend to perform lower than average at the beginning of their study; high levels of conscientiousness usually compensate for this performance penalty, while very low levels exacerbate it [Edwards et al. 2020].

While cognitive skills are a strong predictor of engagement in post-secondary education, the choice of major is largely influenced by psychological parameters that shape personal interests and aptitudes for specific careers. Choosing a field of study that matches one's interests and aptitudes is associated with better academic outcomes as well as better job performance in the future [Borghans, ter Weel, Weinberg 2008].

The Big Five domains of extraversion, conscientiousness and emotional stability are related to major choice almost as strongly as cognitive skills. Highly conscientious individuals are sorted into the most demanding fields such as Science, Technology, Engineering and Mathematics (STEM) and Medical Sciences [Humburg 2017; Berkes, Peter 2019]. Emotional stability is positively related to the probability of choosing STEM fields and Law as a major, and negatively related with choosing Humanities. Less emotionally stable individuals exhibit higher career indecision. As Humanities have weaker links to particular occupations and careers than STEM fields and Law, the associations found may be the result of individuals' postponing their career decision by choosing Humanities. Higher extraversion is associated with a higher probability of choosing Law and Business and Economics, and a lower probability of choosing a STEM field of study. All other things being equal, Law and Business and Economics seem to fit extroverts

better in terms of the opportunity for social interaction, for persuading others, and for being the focus of attention. Agreeable individuals often enjoy helping others; one might therefore expect that they would have a preference for Medical Sciences, Education, or other fields of study concerned with the functioning of societies. However, this association is not supported by the findings available, although agreeableness decreases the probability of studying Business or Economics. Finally, openness to experience is positively related with choosing Humanities and Law, and negatively related with enrolling in Social Sciences [Humburg 2017; Vedel 2016].

2.1. Gender Gaps in Education: Is It About Psychology?

Men and women demonstrate consistent differences in non-cognitive skills and preferences, which is explicitly manifested in their economic behaviors and is extensively covered in psychological, sociological, and economic literature. Women tend to avoid competition, wage bargaining, risky investment decisions, and competitive compensation schemes [Croson, Gneezy 2009]. Negotiating, risk-taking and choosing competitive environments are associated with a high level of emotional stability and low propensity to cooperate. Women, meanwhile, tend to score high on neuroticism and agreeableness [Bouchard, Loehlin 2001], this trend being robust across countries [Schmitt et al. 2008].

Gender differences in non-cognitive skills begin at preschool age and increase over time [DiPrete, Jennings 2012]. In early childhood, they result to some extent from external influences, including parenting styles, family patterns, environment, society, and cultural beliefs. Later on, the gap widens under the influence of gender-stereotypical expectations bolstered by schools. Already in elementary school, girls are more disciplined and attentive in class than boys [Frenette, Zeman 2007]. At the same time, boys display higher self-esteem, are more prone to risk-taking, and perform better in competitive situations than girls. Differences in the observed non-cognitive skills translate into gender differences in grades, girls showing better academic performance than boys [Jacob 2002].

The higher education choices dimension of gender differences in non-cognitive skills has been little studied. It is known that the majority of college students in developed countries are women. Reasons for this include better school performance and higher school graduation rate among women, which are associated with differences in the level of conscientiousness [Jacob 2002]. A wide gender gap is observed in college major composition [Gemici, Wiswall 2014], men being more likely to major in mathematics, engineering and business fields, and women opting for humanities, teaching and social sciences. Admission test scores explain little to no gender differences in the choice of major. Therefore, the gender gap is mainly due to gender differences in preferences and tastes, and not to differences in academic ability [Zafar 2013]. Neuroticism and self-concept may play an essential role, too. Math self-efficacy raises both men's and women's probability of

enrolling in a STEM major. However, math self-efficacy also plays a critical role in explaining decisions to drop out of STEM majors for women, but not for men [Saltiel 2019].

Since typically "male" majors are mostly associated with higher wages, differences in the field of study account for a significant part of the male-female wage gap [Brown, Corcoran 1997]. By various estimates, the role of non-cognitive skills in the wage gap in Germany varies from 3% [Mueller, Plug 2006] to 13% [Braakmann 2009]. The impact of personality traits on gender wage gaps increases across the wage distribution, yet making allowance for personality does not reduce the unexplained share of wage gaps [Collischon 2018]. That is to say, according to Collischon, effects of non-cognitive characteristics may be ruled out, or "captured", by other control variables like industry and occupation, i.e. the parameters predetermined by the choice of college major.

3. Relevance of Non-Cognitive Skills for Higher Education Policies

Changes in human capital research priorities reflect changes in the political discourse on investments in education. Experts are concerned about the decreasing ability of higher education to meet labor market demands, while employers actively search for general behavioral skills, sometimes rating them above cognitive abilities. There is a legitimate question to be asked, therefore: if non-cognitive skills are so important for social and career outcomes, why not allocate some of the education funding to foster such skills within the framework of formal secondary and higher education? Moreover, standalone experimental projects involving elementary and middle school students indicate effectiveness of educational interventions that target personality skills [Heckman, Jagelka, Kautz 2019]. Along with schools, responsibility for non-cognitive skill formation is also imposed on universities, which have to adjust to the changing economic landscape and teach skills that are in high demand in the labor market. However, while development of non-cognitive skills is justified in school, focusing on them in college makes much less sense. At least three factors casting doubt on the feasibility of investments in non-cognitive skills at the level of higher education have been discussed in economic and psychological literature.

First, a young adult's personality tends to change autonomously. According to psychologists, college years coincide with the developmental stage at which personality is the most susceptible to external influences; however, it is also when positive changes naturally occur: maturation, adoption of adult roles, and experience of responsibility for one's own life increase the levels of conscientiousness, agreeableness, and emotional stability [Roberts, Hill, Davis 2017]. For this reason, researchers believe that it may be more cost-effective to let normative change take its course rather than to intervene in most cases [Bleidorn et al. 2019].

Second, non-cognitive skills have long-term accumulative effects from a socioeconomic perspective. Freshmen's personalities and behaviors, at which educational interventions are targeted, are already a product of school education and social influences. The most vulnerable groups with low non-cognitive skills that need educational interventions in the first place simply never get to universities: if a child was low on conscientiousness throughout their life, the academic implication for them would be choosing a non-selective college or not going to college at all. Therefore, despite prolonged malleability of non-cognitive skills, educational interventions should be implemented as early in life as possible to achieve the best results [Kautz et al. 2014]. Focus should be placed on the Big Five traits that are positively associated with productivity in adult life, such as conscientiousness. Importance of early childhood interventions is also confirmed by studies that reveal stability of conscientiousness all the way through college years [Kassenboehmer, Leung, Schurer 2018].

Finally, changes in personality traits to not occur instantaneously. It takes time to achieve consistent outcomes that will translate into positive social effects—but higher education programs do not have that time. College degrees are much shorter in duration than secondary school programs and involve a regular change of courses and professors that makes it harder to implement a comprehensive intervention to promote non-cognitive skills. Despite all the limitations, it is critical that higher education foster the development of soft skills, which are not identical to non-cognitive characteristics but are related to them. Soft skills are largely about being able to work in a team, interact with others, and adapt to technological change. Although the significance of soft, or general, skills is widely recognized by educational institutions and employers, they rarely or, at the very best, inconsistently happen to be a component of the learning process in higher education. Meanwhile, soft skills are crucial for implementing a competency-based approach to education and transitioning from highly-specialized training to teaching a broad spectrum of skills. College environment is the best for promoting soft skills, which can be taught within short timeframes—unlike non-cognitive skills. Furthermore, a more personalized teacher-student dialogue in higher education, in comparison with other educational stages, allows tailoring teaching styles to students' personality traits. While "reconfiguring" personalities of young adults in the course of college studies would be challenging at the very least, any undergraduate regardless of their personality is able to learn some leadership, workflow management, or negotiation skills. During the period of moving into adulthood, which falls on college years, individuals learn to adjust to the requirements of the outside world. This adjustment does not involve a radical personality change, yet it implies development of skills that allow maintaining adequate job performance irrespective of personality traits. The mission of higher education is to facilitate this process of adaptation.

4. Conclusion Non-cognitive skills affect economic outcomes through complex mechanisms and are inseparable from other forms of human capital: cognitive skills and educational attainment. This review summarizes findings, mostly from economic studies, on associations between non-cognitive skills and higher education. The results indicate that non-cognitive skills have a significant influence on the probability of going to college, the choice of major, and academic achievement. The observed gender differences in non-cognitive ability predict to some extent self-selection of men and women into different careers, thereby exacerbating the gender wage gap.

Findings obtained in the publications reviewed can have practical implications for education policy, particularly in the context of early childhood development. Although higher education is assigned an important role in promoting skills for future job performance, the present review of literature shows that many of the competencies essential for academic and economic success—those that reflect an individual's capacity for hard work and emotional stability—are shaped long before college.

Empirical analysis of non-cognitive skills is complicated by a number of methodological difficulties, from uncertainty about which instruments should be used for measurement to controversial data on stability of personality traits over time. Nevertheless, non-cognitive skills attract more and more interest from researchers every year. However, because this topic is still a novelty for the Russian-speaking research community, empirical studies have been rather sporadic. The Russian literature still lacks evaluations of how non-cognitive characteristics affect the choice of educational track and academic outcomes in school as well as at later stages of development. A critically important avenue of further research would be to document the process of how non-cognitive skills are formed and remain stable over the course of college years. The impact of non-cognitive characteristics on socioeconomic behavior is a cross-disciplinary problem at the interface of personality psychology, labor economics, and education economics. An effective solution therefore requires integrating the efforts of various social scientists, economists and psychologists in the first place.

Appendix. Table 1. Summary table of empirical economic studies addressing non-cognitive skills in higher education

Authors, year	Country	Subject of research	Non-cognitive traits measured	Data sources and sample size	Findings
Baron, Cobb-Clark 2010	Australia	Probability of going to college	Locus of control	2,065 observations, 18-year-olds	Young people with a more internal locus of control have a higher probability of finishing secondary school and meeting the requirements to obtain a university entrance rank. There is a negative relationship between growing up in disadvantage and educational outcomes, but this effect is not mediated by locus of control
Berkes, Peter 2019	Germany	Higher education choices	The Big Five	Longitudinal survey of 3,615 high school graduates, 2014–2015	High openness to experience is associated with choosing Humanities. Conscientiousness is positively associated with choosing Medical Sciences or Economics as a major. Extraverts are more likely to choose Law, Social Sciences, and Economics, and less likely to enroll in STEM majors
Blázquez, Budría 2012	Germany	Probability of over-education	The Big Five; Locus of control	71,321 observations, 2000–2008	The probability of being overeducated is significantly influenced by personality. Conscientiousness, extraversion, and having an external locus of control decrease the probability of remaining overeducated, while neuroticism, agreeableness, and especially openness increase it
Corazzini et al. 2020	Italy	Influence of personality traits on academic performance	The Big Five	3,242 freshmen students aged 18–24 at a public university, 2016–2017	Higher levels of conscientiousness and openness to experience positively affect student score. No gender-dependent effects of the Big Five on Grade Point Average is found
Delaney, Harmon, Ryan 2013	Ireland	Lecture attendance and additional study hours	The Big Five; Economic preferences (future-orientation, attitude towards risk)	4,770 and 2,867 respondents, 2009	Conscientiousness and future-orientation are important determinants of lecture attendance and additional study hours. Openness to experience is positively associated to additional study hours. Neuroticism and agreeableness are positively related to lecture attendance
Edwards et al. 2020	Australia	Influence of personality traits on academic performance	The Big Five; Locus of control	1,000 students who started their degree in 2015	Conscientiousness and extraversion are strong predictors of academic performance. High levels of conscientiousness over-compensate for the performance penalty experienced by first-in-family students, while very low levels exacerbate it
Humburg 2017	Netherlands	Probability of going to college; Higher education choices	The Big Five	Longitudinal survey of 19,391 individuals who entered secondary education in 1999, drawn from a random selection of 126 schools	Extraverts tend to choose Business, Economics, and law. Agreeableness decreases the probability of studying Business or Economics. Emotional stability is positively related to the probability of choosing STEM fields and Law as a major, and negatively related with choosing Humanities. Conscientiousness is positively related to academic performance and the probability of choosing Medical Sciences. Openness to experience is positively related with choosing Humanities and Law, and negatively related with enrolling in Social Sciences
Kassenboehmer, Leung, Schurer 2018	Australia	Changes in non-cognitive skills during college years	The Big Five	Longitudinal survey of 575 teenagers aged between 15 and 19, 2005–2013	Every additional year at college increases extraversion and agreeableness for students from disadvantaged backgrounds, the effect being the most pronounced in STEM majors
Lenton 2014	UK	Probability of going to college	Locus of control, The Big Five	Longitudinal survey of children born in 1970 1986: 11,622 observations at age 16 2004: 2,483 observations at age 33	Locus of control, conscientiousness, and extraversion have significant influence on the acquisition of educational qualifications. Males with extrovert personalities have a significantly reduced probability of gaining degree level education

Authors, year	Country	Subject of research	Non-cognitive traits measured	Data sources and sample size	Findings
Lundberg 2013	U.S.	Probability of going to college	The Big Five (measured after graduation)	Nationally representative sample of school students surveyed in 1994–1995 and then in 2007–2008, when the respondents were between 24 and 32 years of age. 13,465 observations	The effects of cognitive ability and personality traits on college graduation vary by family background. Conscientiousness has no significant impact on the probability of going to college, while openness to experience is an important correlate of college graduation only for less-advantaged men and women
Peter, Storck 2014	Germany	Probability of deciding to go to college	The Big Five (measured at the moment of decision-making)	1,000 observations, young people aged 17	Intention to study in college is associated positively with openness to experience and emotional stability, and negatively with agreeableness. Openness plays a greater role for high-school students who may be the first in their family to go to college
Piatek, Pinger 2016	Germany	Probability of going to college	Locus of control	2001: 1,901 individuals aged 17–27 2011: 1,606 individuals aged 25–35	Higher locus of control is related to higher probability of obtaining a college degree for men and women
Polemis 2018	U.S.	Level of study	The Big Five	1,660,638 individuals aged between 16 and 60. Cross-sectional data for 2009–2015	A non-linear relationship is observed between non-cognitive skills and the level of education. Individuals with high emotional stability and agreeableness are more eager to invest in human capital. Associations between openness and agreeableness are described by an N-shaped curve; and those between agreeableness and extraversion, by an inverted-U-shaped curve
Saltiel 2020	U.S.	Probability of going to college; College choice	Locus of control; Self-concept; Motivation	1980–1986: 3,167 observations 2002–2012: 4,576 observations	Students with lower non-cognitive skills are more likely to undermatch (enrolling in less selective colleges given their academic credentials). Non-cognitive skills are strong predictors of Bachelor's degree completion

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The Concept of Talent Management and Organizational Commitment of Teachers

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Abstract

A sample of 295 teachers from six educational institutions in the town of Kolpino (Kolpino District, St. Petersburg) is used to explore school teachers' perception of talent management policies and practices as elements of the school's organizational culture and to analyze linkages between such practices and teachers' organizational commitment.

The study relied on the Organizational Commitment Questionnaire (OCQ) developed by Lyman W. Porter and the new Talent Management in Education questionnaire by Brent Davies and Barbara J. Davies. The latter was adapted for the Russian sample, evidence of the method's reliability and construct validity being provided in the article.

Results show that organizational commitment of teachers is higher in schools where leaders foster professional development, collaboration and collegial decision making. Years of teaching experience do not affect organizational commitment, but younger teachers are more committed to their schools than their older colleagues. Teacher commitment to educational institutions was also found to be predicted by whether teachers perceive talent management practices as elements of the school's organizational culture.

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The USE Test in History and Its Validity: Experts of Regional Subject-Specific Committees Speculating on Free-Response Items

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Abstract

The Unified State Exam (USE) in Russia is both an achievement and admission test, yet its validity has not been looked into on a large scale. The evolution of USE tests is distinctly marked by a growing number of constructed-response items, which might be affecting the validity of test results in many ways.

In-depth semi-structured interviews with 36 USE experts in History allow identifying three major threats to USE validity: assessment criteria for items 24 and 25, item content, and expert bias. Interview transcripts were analyzed using content analysis, the results of which are presented along with recommendations on how to further improve the processes of item design and evaluation.

It took about a decade to design and try out the Unified State Exam (USE) before it was approved as the only form of school exit examinations and the main form of preliminary college entrance examinations in 2009.

The USE test in history is not obligatory, yet over 100,000 school leavers take it every year to apply for college programs in humanities, such as law, international relations, history, management, teaching, cultural studies, arts, etc.

Because the USE is a high-stakes exam, its validity should also be very high. Test validity is understood as the extent to which test score interpretations hold across settings [Messick 1995].

According to the USE History Test specifications, the test's items "measure school graduates' knowledge and skills in history in compliance with the requirements of the Federal Component of State Standards for Secondary Education". To measure USE validity, it is necessary to find out whether the test's form and content contribute to such measurement: if USE scores do reflect the level of course achievement, test validity can be regarded as high.

No additional validation studies were carried out after the USE try-out phase. However, the history test's content and form have changed a lot since it was formally introduced ten years ago. The recent years have seen an increase in the role of constructed-response (free-response) items, i.e. items which ask students to provide detailed written answers in free form and which are evaluated by over 5,000 raters of regional subject-specific committees.

The present article explores the validity of constructed-response items in the USE History Test.

1. Evolution of USE History Test Items and the Problem of Validity

After the USE had been introduced, history test items underwent major transformations, which were extensively described by researchers from the Federal Institute of Educational Measurements (FIEM) [Artasov, Melnikova 2018]. Within the scope of the present study, the following changes appear to be of the most importance.

First, the 2015 abolishment of the so-called Part A, which consisted of multiple-choice items with four answer options, dramatically increased test difficulty as well as the weight of constructed-response items in the total score.

Second, a history essay was introduced and a number of other constructed-response items were modified in 2016. In the current specifications (2020), 5 of the 25 items are free-response items, which account for 40% of the raw score.

Third, the USE evolved by gradually increasing the proportion of constructed-response items at the expense of multiple-choice items.

Multiple-choice items become less prevalent and more difficult, as they largely ask about historical nuances and details. This type of items is not equivalent to what is considered the basic level in the USE. Item's form gives no exact idea of its difficulty: it can be a "classical" item with four options, as in Section A before 2015, or a "hidden" multiple-choice task, as in B10-type items of the 2010 specification (Figures 1 and 2). Items 18 and 19 in the 2016–2019 USE specifications, which involve visual processing, are also examples of multiple-choice items.

Table 1 shows changes in the number of multiple-choice items over ten years, including percentages in the total number of items. However, the most important indicator is the contribution of these items

Figure 1. **A sample multiple-choice item from the 2009 USE demo test.**

A6 — Which of the monuments listed below dates back to the 18th century?

1) Dormition Cathedral of the Moscow Kremlin;
2) Church of the Intercession on the Nerl River;
3) Peter and Paul Cathedral in Saint Petersburg;
4) Palace of Tsar Aleksey Mikhaylovich in Kolomenskoye.

Figure 2. **A sample multiple-choice item from the 2010 USE demo test.**

B10 — Which three of the events listed below took place during Perestroika?
Please circle the figures corresponding to the right answers and write them down in the *table.*

1) Creation of the post of the President of the Soviet Union;
2) Repudiation of foreign and domestic debts (sovereign default);
3) Adoption of a new Constitution;
4) Proclamation of Russia's sovereignty;
5) Privatization;
6) GKChP's Declaration.

to the raw total score, which used to hover around 44% until the dramatic USE modification of 2016 brought it down to 17%. The most recent versions of the test offer only six multiple-choice items, and they are not those simple tasks that used to be part of Section A. Today, students are asked to select more than one correct answer options (Figure 3).

Moving away from multiple-choice items is easy to explain. Examinees may pick answers randomly. In a "classical" multiple-choice item above, the probability of guessing right is 25% (when choosing one out of four options). In Section A of the 2009–2014 specification or Section 1 of the 2015–2019 specification, chances of guessing are lower as multiple responses have to be selected. Being interested in minimizing the effects of guessing, test designers chose to reduce the number of multiple-choice items and increase their difficulty.

Figure 3. **A sample multiple-choice item from the 2017 USE demo test.**

| 3 | All the terms below except *two* refer to events (phenomena) from the 19th century.

1) Free ploughmen;   2) Ministries;   3) The Decembrists;
4) Coup of June 3rd;   5) Magistrates' courts;
6) The Octobrist Party.

Please identify and write down the figures corresponding to the terms that refer to a different historical period..

Answer:

Table 1. **The number of multiple-choice and constructed-response items in the USE History Test.**

	2009	2011	2013	2014	2015	Since 2016
Total items	50	49	37	40	40	25
Multiple-choice items						
Number of items	28 (A1–A27, B10)	30 (A1–A27, B2, B6, B12)	24 (A1–A21, B2, B4, B7)	24 (A1–A21, B2, B4, B7)	27 (1–21, 23, 25, 28, 32, 33–34)	6 (3, 7, 12, 16, 18–19)
Percent of total items	56%	61%	64%	64%	67%	24%
Maximum weight in the maximum total score	43%	44%	44%	44%	44%	17%
Constructed-response items						
Number of items	6 (C2–C7)	6 (C2–C7)	5 (C2–C6)	5 (C2–C6)	5 (36–40)	5 (21–25)
Percent of total items	12%	12%	12.50%	12.50%	20%	20%
Maximum weight in the maximum total score	28%	28%	28%	28%	28%	41%

Eliminating items of this type completely would hardly be reasonable—simple, easy-to-score tasks should also be present in the test. This is especially critical for the subject of history, where processes can barely be understood without knowing the fundamental facts. Situated at the beginning of the test, such items also have psychological effects, increasing students' self-efficacy and allowing low-performers to score at least the required minimum score.

1.1. Evolution of Constructed-Response Items over Ten Years

Some items in the USE History Test—items C1–C3 in the 2009–2014 versions, same as items 20–22 in the 2016–2019 versions—have not changed essentially. Those items imply analysis of a historical source

Figure 4. **Item 24 from the 2019 USE demo test.**

24 | There are diverse and often controversial alternative views on historical events. One of such controversial views is presented below..

Alexander III's domestic policy contributed to progress in social and economic development.

Using your historical knowledge, give two arguments to support this standpoint and two arguments to oppose it. While providing your arguments, make sure to use historical facts.
Please write down your response as follows:.

Supporting arguments:
1) …
2) …

Opposing arguments:
1) …
2) …

with the use of one's own historical knowledge, each of them yielding a maximum of two points.

Item C4, transformed into item 38 in 2015 and then into item 23 in 2016, underwent a number of modifications due to changes in the skill codifier. In 2009, this item measured "the set of knowledge and skills necessary to summarize and systematize historical materials" and was worth four points. In 2017, it assessed the "ability to apply the principles of structural functionalism and spatiotemporal analysis when examining facts, phenomena, and processes (problem-solving test item)", yielding three points. Structurally, the item has basically remained the same, asking students to write down three elements, e. g. three axes of foreign policy, three reasons to build a town on the bank of a river, etc.

Similar changes occurred to item C5, same as item 39 in the 2015 version and item 24 in the 2016–2020 versions. In any of its forms, this is a reasoning item. In the original version (2009–2012), examinees were asked to select one of the two standpoints and provide three arguments to defend it. Since 2013, the item has offered only one standpoint, asking students to give two arguments to support it and two arguments to oppose it (Figure 4). In that more complicated configuration, the item could yield a maximum of four points instead of three. According to FIEM reports, this item remains the most difficult one— year after year, regardless of the form.

Figure 5. **Item 25 from the 2020 USE demo test.**

25 | Please write a history essay on ONE of the following periods in Russian history:

(1) 1019–1054; (2) March 1801—May 1812;
(3) October 1917—October 1922.

Please make sure to:

– Name at least two significant events (phenomena, processes) relevant to this historical period;
– Name two historical figures related to such events (phenomena, processes) and describe their roles in such events (phenomena, processes) using your knowledge of historical facts;

> *Note:*
> *When describing the role of each historical figure you have named, you should specify exactly which of their actions essentially affected the course and/or outcome of the named events (phenomena, processes).*

– Specify at least two causal relations that describe what caused the events (phenomena, processes) during that period;
– Evaluate the effects of the events (phenomena, processes) from that period on further historical developments in Russia using your knowledge of historical facts and/or historians' opinions.

It is essential to ensure adequate use of the historical terms and concepts relevant to the period.

Item C6 has changed the most radically of all. In the 2009–2011 test versions, it represented analysis of a historical situation with a maximum raw score of four points. In 2012–2015, students were asked to analyze the contributions of one of the three historical figures proposed (five points maximum). Since 2016, the item requires writing a history essay on one of the three historical periods (Figure 5). Detailed scoring criteria were developed for this new item format, allowing a maximum raw score of 11 points. The introduction of history essay and detailed scoring criteria became the key factor of change. As a result, item 25 in the current version has the highest weight in the test.

Item C7, which existed in the test specifications up to 2013, implied comparing two historical situations and filling out a table with common features and differences. This item was worth a maximum of four points. It explicitly measured students' ability to compare and under-

stand historical contexts, but for some reason it was removed from the test. As a result, the USE History Test became essentially less effective as a measure of competencies, as item C7 had involved identifying dimensions for comparison and performing the comparison. No similar task has been introduced in the more recent versions, which means that the USE has become a more knowledge-based assessment.

Therefore, the role of constructed-response items has changed considerably following the introduction of history essay on a particular period of Russian history. Items of this type are often used to achieve deeper measurements in educational assessment, as they allow capturing a broader scope of the construct measured. In this case, we can see attempts of test developers to define the scope of construct measurement through detailed assessment criteria for item 25, which were introduced in 2016, got extended in 2017, and have been elaborated yearly ever since.

All the items in Section II are scored independently by two raters. In case of essential rater disagreement (two or more points for items 20–24 and on some specific criteria for item 25), a third rater is called to take one of the sides or give a verdict of their own. In our study, the main focus is placed on items 24 and 25 in the current USE specification (2020): first, they account for the highest proportion of the raw score, largely predicting the scaled score, and second, only these two items demand writing an essay. Items 20–23 of Section II also imply free responses, yet shorter ones than in items 24 and 25.

1.2. Possible Effects of Item Change on Test Validity

Ample research has revealed considerable differences between multiple-choice and constructed-response items in how they measure the same construct [Traub, Fisher 1977; Ward, Frederiksen, Carlson 1980; Thissen, Wainer, Wang 1994; Lissitz, Hou, Slater 2012], especially in disciplines (such as history) where writing skills of the examinee matter [Traub 1993].

Those differences mostly derive from the specific characteristics of free-response items. First of all, they make guesswork nearly impossible, often happen to be more difficult than multiple-choice items, and are normally scored by raters based on specifically developed criteria [Haladyna, Rodriguez 2013]. Second, they are believed to allow deeper and more comprehensive measurements and thus increase content validity [Dennis, Newstead 1994], i. e. they can measure complex, multicomponent skills and competencies. Because of these qualities, constructed-response items are used in educational assessment despite the prevalence of multiple-choice items [Maris, Bechger 2006]. At the same time, almost all free-response items require using specific, clearly defined scoring criteria that are rather laborious to design, and should be scored by raters trained to apply such criteria. With such an assessment method, bias and ambiguity are inevitable, potentially increasing the costs of measurement [Arffman 2015]. Problems with scoring constructed-response items are particularly acute for the USE

History Test: historical events often receive diametrically opposed interpretations from different schools of thought, and raters may have divergent opinions on the test content. Under such circumstances, free-response item scoring criteria should be indisputable and unambiguous, yet guidelines for raters allow giving points for other meaningful responses on almost every item. These factors exacerbate the problem of item validity essentially.

A high degree of test validity suggests that advantages of various task formats are used in the most efficient way to minimize "construct-irrelevant variance" [Messick 1993]. It means that items should be selected and organized to measure the construct in the most comprehensive way by eliminating "noise".

For free-response items to be effective and contribute to test validity, it is necessary not only to pay attention to content validity of items as such but also to avoid three major types of mistakes when working with them [Popham 1990]:

- Problems associated with scoring criteria (too general, too specific, ambiguous, etc.);
- Problems associated with assessment procedures (raters reviewing tests for dozens of hours without rest, trying to consider too many criteria at the same time, etc.);
- Rater effects (raters not using the scoring criteria, being too stringent or too lenient).

Researchers distinguish between two major threats to construct validity: construct underrepresentation and construct-irrelevant variance [Messick 1995]. The latter arises from systematic error and makes the test measure not exactly (or anything but) what it was designed to measure (for a detailed taxonomy of such systematic errors in high-stakes testing, see [Haladyna, Downing 2005]).

The present article seeks to answer the following questions:

1. How did the USE History Test items transform, and how does their transformation affect test validity?
2. How is validity of the USE History Test related to constructed-response items?
3. What threats to validity are there in the test?
4. How does the test, in its current specification, deal with those threats?

Since 2016, when the current USE specification was introduced, no data on test validity has been published, and functioning of items has only been evaluated in part. Relevant literature is limited to test manuals and a few articles on the evolution of USE specifications published in *Pedagogicheskie Izmereniya/Educational Measurements* and describing the test content without providing a critical analysis of specific items or

scoring criteria. Given that transition to a new model of the USE is projected for 2022 to meet the new education standards, it would make sense to investigate validity of the existing items and give recommendations on how the test format could be improved.

2. Research Data and Methods

Any attempt to evaluate the USE History Test from a psychometric perspective is challenged by the lack of open data. Only some of the USE results are published in a very limited format, while previous versions and technical reports are not published at all. However, the FIEM website provides documents that allow looking through the test content. Available materials can be divided into the following categories: USE History Test specifications, USE demo tests in history, codifiers for the USE History Test, methodological recommendations for history teachers, and manuals for chairs and raters of regional subject-specific committees.

Specifications are reviewed on a yearly basis and provide the most valuable information on the current version of the test. This document provides information about the purpose and content of the test, the number of items and their difficulty, the scoring schemes, the duration of testing, and some other aspects.

A demo test is a sample test in its current version with responses. It is reviewed every year and gives an idea of how the actual test presented to examinees will look like and what kinds of tasks it will contain.

A codifier is a highly generalized list of topics that may be addressed in test items. In case of the history test, the codifier represents a chronological list of historical events, figures, periods, and phenomena covered by school history curriculum, basically a distilled summary of history curriculum guidelines from the previous generation.

Methodological recommendations for history teachers, issued by FIEM yearly after getting the test results, contain some information on item difficulty and test reliability (Cronbach's alpha) as well as a detailed analysis of the test results: how exactly students performed on specific items, which topics they stumbled upon, what mistakes prevailed this year, and other facts to which the test developers find it important to draw teachers' attention.

Manuals for chairs and raters of regional subject-specific committees are developed by FIEM counselors to guide raters on how to make a more effective use of the scoring criteria. In addition, manuals provide definitions of concepts involved in assessment (e. g. "historical event").

The great variety of test validity evaluation methods makes it hard to stick to any single standardized validation procedure—nearly any information about the test can be used for that purpose [Messick 1995]. Meanwhile, the type of arguments that can be given by researchers depends primarily on the type of the test evaluated [Haladyna 2006]. The USE History Test, in effect, combines two types of tests, being

used as a school exit examination and a college entrance examination at the same time.

Data on threats to test validity can be collected by scrutinizing the procedures of item scoring. Raters' scoring performance can be assessed through rater agreement indexes, participation in rater training, and third-party assessment of compliance with item scoring criteria.

We found it reasonable to interview the experts who have actually scored the USE History Test. Experts often play an important role in validation studies. As a rule, they are invited to judge item content and scoring criteria [Kane 2006]. It is especially important to involve experts who did not participate directly in item development, as their judgments will be much more objective than the opinions of test designers.

Experts taking part in scoring the USE History Test (raters) possess deep subject-specific and procedural knowledge and can be an important and reliable source of information about threats to validity. Their assistance is especially valuable in the absence of many other sources traditionally used in validation studies such as rater agreement indexes, test scores, and technical reports describing the stages of test content development.

Within the 2019/20 academic year, 36 interviews were carried out with experts (11 men and 25 women) who had participated in the activities of regional subject-specific committees in eight regions of Russia: Moscow, Saint Petersburg, Moscow Oblast, Kostroma Oblast, Novosibirsk Oblast, Chelyabinsk Oblast, Belgorod Oblast, and Kemerovo Oblast. The raters were on average 48 years of age, ranging from 28- to 68-year-olds, and had from six to 40 years of teaching experience. Only seven of the 36 raters had participated in USE scoring for less than five years. Many had been involved in scoring since the tryout phase, and eight were chairs of subject-specific committees in their regions.

Most raters were school history teachers, many of them were instructional designers and faculty members, and only five exclusively taught university courses on history teaching methodology. Of the 36 experts, 32 had a degree in teaching, 12 were candidates and doctors of sciences in education, and five were candidates and doctors of sciences in history.

Every year, raters should take a short qualification course and pass a test to be able to participate in USE scoring. Apart from that, raters attend webinars and offline meetings with test developers, in which they discuss different aspects of rating. The goal of such events is to reach agreement in rating approaches, but in practice rater disagreement remains at the same level year after year.

As part of our study, every rater completed a short online questionnaire about their age, education, and years of teaching, and then took part in a 30-minute audio-recorded Skype interview. Interviews were semi-structured and based on a guide of 15 questions. All the interview transcripts were analyzed using thematic content analysis which

involved coding every single mention of threats to validity. Taking cue from the available literature, five categories of threats to validity were defined, depending on whether they arise from inadequate scoring criteria, inadequate scoring procedures, rater effects, problematic responses, or item content.

3. Results and Discussion

Thematic content analysis of interview transcripts revealed 217 mentions of threats to validity. Threats associated with inadequate scoring criteria prevailed (97 mentions, or 44.7% of all mentions), being followed by threats arising from item content (62 mentions, or 28.5%). Threats related to rater effects were third by the frequency of mention (58 mentions, or 26.7%). Scoring procedures and problematic responses were mentioned rarely and did not play a significant role in this analysis.

3.1. Threats to Validity Arising from Scoring Criteria

Every rater complained about problematic scoring criteria for items 24 or 25, and most of them referred to scoring criteria as the main challenge in their work.

The scoring criteria for item 25 appear to be the most disputable, accounting for 61 of all the 97 mentions of inadequate criteria. All in all, there are seven item scoring criteria:

- Naming events from the historical period;
- The role of a historical figure in the period's events;
- Causal relations between events in the period;
- The impact of events on further historical developments;
- Adequate use of historical terms;
- No factual errors;
- Narrative style.

The latter two criteria are only evaluated if at least four points are given for the previous five. Only two criteria, "naming events from the historical period" and "narrative style", were reported by raters as unproblematic and easy to score.

Problems reported by raters are not always associated with how specific scoring criteria are formulated. Many raters pointed out that the criteria had been reviewed every year since the introduction of history essay, and not always in good time. As one of the interviewees said, "one of the problems is that the criteria are extended every year. <...> It would be great to work for at least three years without any additions or modifications." However, another modification was applied to the scoring criteria as well as to the format of this item in 2021.

Raters are unanimous in their negative attitude toward the "role of a historical figure in the period's events" criterion, which requires not just describing the role of a figure but specifying the figure's particular actions and how they changed the course of history. Item 25's requirements are regarded by raters as extremely stringent: "If a child

writes that Marshal Georgy Zhukov commanded the Assault on Berlin, they won't get a point for that, as they do not specify what his contribution was exactly. You don't know what he actually did there—maybe he just sat there sipping his tea. What should be written is that he designed a combat operation, issued an order to assault Berlin, and so on and so forth." This criterion is described in a number of interviews as overly specific, artificial, and absurd: "It requires too much details. If a student writes that Kutuzov commanded the Russian corps in the Battle of Borodino, does it mean they have a bad knowledge of history? No historian would ever apply criteria like that."

Obviously, when scoring item 25, raters need to examine the role of a historical figure and events in a very specific dimension, which they believe makes it impossible to assess a student's level of subject knowledge objectively. According to one of the raters, "a student can be drilled on that, but it will not reflect their knowledge of history, rather their ability to cut corners by using the clichés built in the criterion".

The way historical figures and their impact on events are interpreted within this item features "too many restrictions that make no allowance for intentional causality, being based exclusively on Soviet practices and objective causes, even though we all know that there's always the subjective factor in history and an individual's desire to do something is a cause, too".

Therefore, excessive fragmentation and stringency of the "role of a historic figure in the period's events" criterion leads to rater disagreement and the target construct being measured only partially.

Raters also complain a lot about the "causal relations between events in the period" criterion. The main problem with using it, as they claim, is that causal relations should be evaluated independently of the role of historical figures and any other events, which makes it difficult to decide on which criterion to give points. "Causal relations should be used to describe the role of a historical figure, but they are also used when analyzing historical events. There is no clear differentiation among these three criteria." Raters are required to strictly follow the order of criteria when scoring the items, which means that they have to reread responses over and over. This is how one of the raters puts it: "We have to raise this issue at our seminars again and again. There is always the question of whether these causal relations should be scored on the first, second, or third criterion." Therefore, the same sentence written by a student can serve as the grounds for giving a point on each of the three criteria at the same time, and the choice of methods to solve this problem is left to raters.

Another rater gives a real-life example: "Most often, students tend to associate the role of a historical figure with events that had some effects—and that makes causal relations. 'Olga carried out a tax reform <...> introduced *uroki* and *pogosti* to regularize the taxation system.' Where should this sentence be attributed? To the role of a historical fig-

ure or to causal relations?" Therefore, in raters' opinion, the insufficient differentiation of these three criteria poses serious threats to validity.

A different situation can be observed with the "adequate use of historical terms" and "no factual errors" criteria, on which there is no consensus among the raters: while some refer to them as problematic, others either consider them easy to evaluate or never mention them at all. The problem with these two is related to disagreement about how historical term and historical error should be understood.

Item 24 is judged by the majority of raters as difficult to score, accounting for 47 of the 97 mentions of inadequate scoring criteria. Scoring criteria for this item involve exact response formulations. First thing, the committee examines item 24 and scoring criteria in every test variant. Next, the committee works on "extending" the criteria in accordance with the instruction "other arguments are allowed" by suggesting various responses that students could provide as correct. Because item 24 may have no detailed meaningful scoring criteria in some variants, elaboration of those criteria is left to the discretion of regional committees, which may have a negative impact on rating outcomes, when identical scores in different regions indicate different levels of knowledge.

Raters also find it somewhat difficult to distinguish between facts and arguments provided by examinees: in compliance with the scoring criteria, facts alone are not enough for giving points. The lack of agreement about what should be regarded as a fact or an argument leads to divergences in scoring. According to one of the raters, "some facts are considered self-explanatory and don't have to be confirmed, while others should be linked to a theory that needs to be supported by evidence. This is also a game in a sense. If we build an argument, then we need arguments, and if we need facts, then we ask for facts."

A number of interviewees raised the question of inconsistency between the number of arguments required by item 24 and the number of points to be given for them. This item can yield a maximum of four points, but in case only two supporting or only two opposing arguments are provided, the student will be given only one point. Some raters, however, agree with this scoring scheme and argue that it serves well the purpose of the task, which is to measure the ability to see both sides of an issue. Others, meanwhile, find the scheme illogical and believe that each of the four arguments that the item asks for should be scored one point.

3.2. Threats to Validity Arising from Item Content

Nearly half of the raters pointed out that the title of item 25—History Essay—is inconsistent with the task formulation. As one of the raters said, "any essay is subjective, but this item is not a history essay. It's a description of a historical period, or an overview of a period—anything but an essay." Some of the raters believe that a history essay should demonstrate a student's personal attitude, opinion, and reasoning, which are not included in the scoring criteria for the current

version of item 25, so the genre of this item could rather be defined as description that follows a list of specific criteria.

Inconsistencies between instructional content and test content was mentioned by the majority of raters in some form or other. In particular, they maintain that the scoring criteria for item 25—the "role of a historical figure in the period's events" and "causal relations between events in the period"—are excessively specific. For instance, one of the raters said, with regard to the "role of a historical figure in the period's events" criterion: "Children read books, encyclopedias, and textbooks that describe roles of historical figures in a different manner. So, we get a double standard here: textbooks describe a historical figure in one way, but the test asks them to do it differently."

Many of the raters complain that hours allocated for teaching history are not enough to cover the whole history course comprehensively: "The historical-cultural standard provides for a huge number of didactic units. Way too many, to be honest. A lot of them just can't be crammed into the number of lessons—this is a basic exam, so only two lessons a week."

The revised Federal State Education Standard (FSES) for middle and high school education places a special focus on students' skills and competencies, including the ones in history. However, 29 of the 36 raters believe that the USE History Test only measures knowledge: "memory", "facts", "factual knowledge", etc. A lot of raters are concerned about the test being focused on measuring examinees' knowledge of historical facts instead of their competencies (universal learning activities and skills), for example in working with historical sources.

Overly specific USE requirements for knowledge about some historical periods leave a number of raters asking questions: "Which criteria are used for selection? Some periods are described in broad strokes, like Kievan Rus' before the 16th century, while the 1881–1893 events should be memorized nearly minute by minute. So, my questions are, why is that, and what's the purpose?"

Despite criticism of USE content, all the raters perceived positively the 2008–2020 changes to the specifications, first of all changes in the types of items and test materials: the introduction of visual sources, the elaboration of items and scoring criteria, and the abolishment of simple multiple-choice items.

3.3. Threats to Validity Arising from Rater Effects

Raters recognize subjectivity of their judgments and often report disagreement with colleagues as well as differences in rating approaches. All the raters agree that the same criteria can be interpreted in different ways, which leads to divergent scoring. Rater effects have several typical manifestations in USE scoring: stringency, lack of subject knowledge, leniency, and rater bias caused by the desire to avoid third-party scoring.

Some raters approach scoring too stringently. This is how one of the raters describes the use of the "no factual errors" criterion in item

25: "Some pay attention to inaccuracies, while others blame them on age and just write them off. I mean first of all stylistic mistakes, inaccuracies that may affect meaning." Similar difficulties are experienced when applying the "role of a historical figure in the period's events" criterion: "One rater will say the topic is covered well enough, and some other rater will not agree that two sentences suffice to describe Suvorov's personality."

Every rater being an expert in their own field, they cannot always work effectively with some topics: "It [item 24] allows other formulations, which means that every rater will decide for themselves whether or not to give a point based on their knowledge and outlook." Raters often cannot remember all the nuances and details of historical material when scoring the tests—that is when students happen to be informed better than raters.

Most raters mentioned that they "have to score what they [students] wrote, but in an objective manner", without "overinterpreting" the responses. However, some raters explicitly admit that they find it difficult to maintain such an attitude when working with test materials. Of the 36 raters, 30 repeatedly said in the interview that assessment should be learner-centered. They openly expressed concern for students and agreed that the latter should be given support in spite of the objectivity requirement. Raters involved in appeal processes were worried about the tacit ban on changing scores to the benefit of students.

The number of third-party scorings performed in case of essential rater disagreement on an item is regarded as an indicator of committee performance. If third-party experts are invited too often, requirements for the committee are toughened while its suggestions for improving the scoring criteria are not taken into consideration. Two thirds of the raters consider trying to avoid third-party scoring to be a barrier on the way toward objective evaluation: "Such concentration on third-party scoring leads to rater bias. In an effort to reach more agreement, one may either underscore or overscore."

4. Conclusions and Recommendations

Thematic content analysis of interviews with USE raters revealed important threats to validity of the USE test in history.

In the first place, such threats arise from poorly formulated scoring criteria for free-response items. For example, the "role of a historic figure in the period's events" and "causal relations between events in the period" criteria for item 25 were judged negatively by almost every rater. These criteria are often elaborated to minimize the probability of third-party scoring, but it only makes them overly stringent or formalized. "Attempts to increase rater agreement by using more objective scoring criteria will often lead to a narrowing of the factors included in the scoring, thereby increasing the risk posed by this threat to validity" [Crooks, Kane, Cohen 1996]. In our view, this is exactly what is happening to the "role of a historical figure in the period's events" and "caus-

al relations between events in the period" criteria. Excessively detailed scoring criteria for item 25 and specifically worded criteria for item 24 result in non-objective evaluation of many students.

Raters are also highly critical of the test's content validity. In spite of the requirements set out in the Federal State Education Standard for high school education, history test items are still largely focused on measuring knowledge of historical facts, not competencies. The content and expected learning outcomes of school education have undergone substantial changes over the past five years, including the adoption of a new FSES version and the introduction of a historical-cultural standard. The USE History Test in its 2020 specification has not been adapted yet to meet all the new requirements. Test developers promise that this issue will be solved in the next specification that will focus more on competencies. However, even a brief analysis of the 2021 documents shows that threats to validity are still there.

Interviews also allowed identifying the main threats to validity arising from rater effects: excessive stringency or leniency, lack of subject knowledge, interpretation in favor of students, and bias caused by the desire to avoid third-party scoring. Such rater effects have been extensively studied in literature (for a detailed review of publications on rater effects, see, for instance, [Myford, Wolfe 2003]).

To summarize, the analysis performed in this study revealed some essential threats to validity of the USE test in history. To minimize those threats, it is necessary to improve the scoring criteria for certain items and pay attention to correspondence between test content and instructional content. How effectively these threats will be reduced in the new USE specification remains a question to be answered in the future.

5. Limitations   This study attempts to analyze threats to validity of test scores using thematic content analysis of interviews with test raters. Naturally, there is a number of limitations to this method.

First, all inferences are based exclusively on opinions expressed by raters, and the development of criteria for thematic analysis of interview transcripts, although based on relevant literature, essentially constituted a researchers' subjective action. The small size of the sample does not allow making large-scale inferences. At the same time, respondents' qualifications and experience support validity and reliability of the conclusions made.

Second, a few short interviews with raters are not enough to make strong inferences about test validity. A full-scale validation study of the USE test would require much more resources and a much broader range of methods including psychometric analysis of test items, factor analysis of USE scores in history, and probably an analysis of rater objectivity. It would make a lot of sense if test developers addressed this challenging responsibility in the future.

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Russian School Principals' Beliefs about Digital Competences of Educational Process' Participants

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Abstract   This study investigates into Russian school principals' beliefs about the requirements that digital transformation of schools imposes on students, parents, educators and administrators. Answers to an open-ended questionnaire obtained from 7,189 schools representing all administrative districts of the Russian Federation were analyzed using natural language processing technology. Responses were categorized according to the European Framework for the Digital Competence of Educators (DigCompEdu).

In general, responses reflect the use of information technology by the relevant groups of participants in the educational process, educators assigning the greatest significance to selection and distribution of educational content, students to information search and communication, parents to communication, control and safety,

and administrators to digital interactions. However, the spectrum of digital competences attributed by respondents to every group of participants in the educational process is rather narrow. Low occurrence of most DigCompEdu framework categories in questionnaire responses allows to conclude that school principals have a poor understanding of many important dimensions of digital competences.

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Provisions Supporting Dialectical Thinking and Emotion Comprehension in Kindergarten Settings

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Abstract   This paper explores the correlations between provisions created by teachers to support dialectical thinking and emotion comprehension in the learning environment of preschool institutions. Particularly, it describes the instruments designed by researchers at Moscow City University's Laboratory of Child Development to assess the characteristics of preschool learning environment that promote dialectical thinking and emotion comprehension of children. Assessment scales were constructed using the principles underlying the Early Childhood Environment Rating Scale (ECERS-3). This article presents the results of validation of the developed assessment tools, which involved the contrasting groups method, analysis of expert scores consistency, and calculation of internal consistency (Cronbach's alpha).

Than the validated tools were used to test the hypothesis that preschool teachers who create provisions to support emotion comprehension in children are significantly more likely to also support provisions for dialectical thinking. The sample consisted of 31 preschool student groups from 23 educational institutions representing nine administrative districts of Moscow, with both low- and high-quality learning environments. Correlation analysis was used to demonstrate a strong relationship between

preschool settings necessary to develop emotion comprehension and dialectical thinking of children. The findings of this study allow recommending the designed tools to be used for assessment of kindergarten learning environments and can serve as the basis for reconceptualizing the pedagogical framework of supporting emotional and cognitive development of children to make it more coherent and consistently embracing the psychological characteristics of preschoolers.

Classroom organization in kindergarten is critical to success in adult life [Diaz et al. 2017; Voltmer, von Salisch 2017; Curby et al. 2015; Denham et al. 2014]. Such crucial components of cognitive development as creativity, innovative thinking, and ability to understand the dynamics of a changing world begin to shape at preschool age, which makes it a good idea to study the development of dialectical thinking in children starting with the age of 3–4 [Veraksa 1981; Veraksa, Dyachenko 1991; Shiyan et al. 2017].

In Russian psychology, the construct of dialectical thinking has been developed within the framework of the structural-dialectical approach. In the present article, we regard dialectical thinking as a particular type of thinking that allows individuals to find an effective balance between opposites, i.e. to detect qualitative transformation processes in the world around and solve paradoxical and controversial situations, thereby generating new content within problems that require creative solutions [Shiyan 2016; 2014].

Home environment determines the baseline level of creative thinking that children bring to the education system, while their further development is conditioned by the learning environment [Jankowska, Karwowski 2019]. That is why it is so important to develop and try out learning environment assessment methods that would allow evaluating the provisions created by preschool teachers to support dialectical thinking in kindergarten settings.

The key indicators of children's emotional development include the ability to recognize and name the basic feelings, realize the effects of environmental factors on one's psychological state, understand that there can be essential differences between feelings and their manifestations, and analyze the dual nature of emotions (e.g. a combination of joy and sadness, excitement and fear, etc.) [Pons et al. 2019; Pons, Harris 2019; Tenenbaum et al. 2004; Albanese et al. 2010; Molina et al. 2014; Rocha et al. 2015; Tang et al. 2018].

As children grow up and their emotional experiences become increasingly complex, they inevitably face the need to make sense of intricate, ambivalent, and controversial situations, which activates their dialectical thinking structures, in particular in such activities vital for early childhood development as play, storytelling, and image creation.

Assessment of learning environments, in particular of children's interactions with teachers and peers, allows identifying the factors of cognitive and emotional development and examining the interplay between them [Kashapov, Ogorodova, Pavlova 2016; Hun Ping Cheung 2013; Sheridan et al. 2016; Smith, Mathur 2009; Bijvoet-van den Berg, Hoicka 2014; Chan, Yuen 2014; Craft, McConnon, Matthews 2012; Garaigordobil, Berrueco 2011]. Kindergarten settings have been actively evaluated all over the world thanks to the active development, tryout, and wide application of reliable and valid expert assessment instruments in the recent years, such as the ECERS, CLASS, and SSTEW rating scales and Germany's National Criteria Catalogue. Expert judgment results usually provide opportunities for deep professional self-reflection and substantial reformation of learning processes.

The recent years have seen different countries initiating pilot studies to assess effectiveness of learning environments in unlocking children's creative potential. For example, a kindergarten initiative was launched in Hong Kong to support preschool teachers in fostering children's creativity in their classrooms [Hun Ping Cheung 2013]. Hun Ping Cheung identifies the following significant characteristics of the learning environment: (a) creativity is integrated into various learning activities; (b) creative tasks are meaningful for children; (c) children are given sufficient time to think and explore (time constraints can be a factor hindering creativity development; (d) teachers are allowed freedom and self-determination in carrying out creative practices; (e) teachers often use open-ended questions and provide children with opportunities to share their ideas; (f) teachers encourage children to think differently, act differently, and see things from different perspectives; (g) teachers shift from teaching the whole class to teaching in small groups; (h) teachers give children the criteria they require to judge the different qualities of their creative efforts and engage them in the development of feedback parameters.

The main drivers of children's socio-emotional outcomes include the following: activities that train children's language and motor skills, stimulate their curiosity and concentration through educational games, and encourage them to explore new aspects of their personality and to embark on new activities independently [Jensen, Jensen, Rasmussen 2017; Cadima et al. 2019], scaffolding techniques (activities to support children as they are led through the zone of proximal development based on the appropriation of cultural practices), small group classroom activities, make-believe play and dramatization [Blair, McKinnon, Daneri 2018], and emotion co-regulation strategies [Silkenbeumer, Schiller, Kärtner 2018]. Development of the ability to understand emo-

tions, including hidden and complex ones, can be greatly promoted by supporting pretend play [Goldstein, Lerner 2018; Hoffmann, Russ 2012; Galyer, Evans 2001; Slot et al. 2017] as well as conversational interventions [Harris 1999; Thompson 2006; de Rosnay, Hughes 2006; Aznar, Tenenbaum 2013; Grazzani, Ornaghi, Crugnola 2015; Pons et al. 2019].

The sets of provisions that should be created to foster emotional competence and dialectical thinking are similar but not identical. As both sets of provisions have some significant specific features, instruments to measure the relevant constructs should also be independent—but still interrelated.

General Principles of Constructing Scales to Measure the Provisions Fostering Dialectical Thinking and Emotion Comprehension in Children

This study presents the results of an empirical tryout of two learning environment assessment tools: the Dialectical Thinking Support Rating Scale (DTSRS) and the Emotion Comprehension Support Rating Scale (ECSRS). These two scales were developed by researchers at Moscow City University (Laboratory of Child Development, Research Institute of Urban Studies and Global Education) using the principles underlying the Early Childhood Environment Rating Scale (ECERS-3) [Harms, Clifford, Cryer 2019]:

(a) Assessment is focused on the opportunities that are accessible to children every day in their preschool learning environment;
(b) The scales are based on the sociocultural theory of cognitive development [Vygotsky 2000];
(c) Assessment is holistic in nature (object-spatial environment fosters child development only when teachers make use of it and children have sufficient time to make action choices);
(d) For objectivity purposes, assessment is based on observed facts.

The scales have seven points, where 1–2 score points correspond to low-quality provisions; 3–4 points, to the minimum acceptable quality of learning environment; 5–6 points, to good quality (all children in the group have sufficient opportunities for development); and 7 points, to excellent provisions (development of every child in the group is amplified with due regard to their zone of proximal development).

Dialectical Thinking Support Rating Scale

The first version of the DTSRS was developed in 2018 by Nikolay Veraksa and Ekaterina Sviridova [Veraksa et al. 2019] to evaluate the provisions for dialectical thinking development. The need for such a scale was substantiated in a theoretical analysis that showed that the existing instruments assessing preschool learning environments did not differentiate between provisions for the development of different types of thinking structures. The empirical tryout of the DTSRS revealed a number of significant correlations between the scores on this scale and ECERS-R scores, but this data was not consistent enough. Statis-

tical analysis allowed assuming that divergences are caused by structural differences between the two scales. A new version of the DTSRS was developed (DTSRS-2) to ensure data comparability. DTSRWS-2 has a structure typical of ECERS scales: it has two subscales, Understanding Growth Processes (UGP) and Controversy Management/Innovative Thinking (CMIT); each subscale measures quality by levels; and each level corresponds to a system of indicators. All the DTSRS-2 indicators represent observed facts, e. g. Indicator 5.1 of the CMIT Subscale: "During the period of observation, the teacher has created at least three problematic situations where children could formulate suggestions and tentative solutions to the problem".

The DTSRS-2 is unique in that it is based on the cultural-historical approach, in particular on the works by Lev Vygotsky, Leonid Venger, and Nikolay Veraksa. Dialectical thinking is defined as a basic ability underlying the understanding of growth processes as well as constructive controversy management and innovative thinking.

Seventeen indicators designed to measure the understanding of growth processes allow to find out the following:

- How often the teacher draws children's attention to situations involving change and novelty;
- Whether the teacher discusses the history of familiar objects with children;
- Whether the teacher analyzes cyclic processes (diurnal and annual cycles, developmental processes of plants, insects, and animals);
- Whether the teacher draws children's attention to the interplay of opposites and contradictions in the content analyzed.

Thirteen indicators designed to assess controversy management and innovative thinking consider three aspects of the learning environment:

- Controversy management, i. e. whether (and how often) the teacher creates situations in the learning process where children can notice, analyze, and try to handle controversies;
- Encouragement of children's ideas, i. e. whether the teacher initiates discussions over problematic situations, whether expression of children's ideas is welcomed, and how children's mistakes are perceived by the teacher (as a reason for ridicule and punishment or as a resource for development);
- Children's access to examples of significant global cultural accomplishments (pictures, models, artifacts) and ways of treating them as possible references and sources of their own inspiration.

Emotion Comprehension Support Rating Scale

The ECSRS includes 52 indicators organized into three subscales: (1) promotion of emotion comprehension development (PECD) (teacher's

activities to encourage children's emotional development); (2) use of materials for emotional development (UMED) (physical and temporal availability of specific components of the object-spatial environment that contribute to children's emotion comprehension); and (3) classroom organization conducive to emotional competence development (COCE) (physical and temporal availability of an emotionally safe environment where children can experience and express various emotions).

All the indicators are formulated in terms of the situations observed, e.g. Indicator 3.2 of Subscale 2: "There are at least three different examples of emotionally charged images in the classroom (including at least one in classroom interior design)".

The indicators allow to find out the following:

- How the teacher responds to emotions (positive and negative) expressed by children;
- Whether the teacher demonstrates their emotional accessibility to children;
- Whether some of children's feelings are imposed by adults;
- Whether emotions are discussed in contexts that are meaningful for children;
- Whether children have access to materials for emotional development and whether such materials are used by the teacher;
- Whether a child has the opportunity to spend some time on their own and relax in the classroom.

DTSRS-2 and ECSRS Empirical Tryout Results

Empirical tryout (testing of an instrument's validity and reliability) of the scales was carried out in January–March 2020 by certified ECERS experts using the contrasting groups method, measurement of inter-rater reliability, and calculation of internal consistency (Cronbach's alpha). The sample consisted of 31 preschool student groups from 23 educational institutions (19 public schools, one public educational center, two private institutions, and one nonprofit organization offering half- and full-day preschool education programs) representing nine of the 12 administrative districts of Moscow.

Standardized Cronbach's alpha for the ECSRS is 0.75, indicating a sufficient level of internal consistency. The same coefficient for the DTSRS-2 is 0.9, which corresponds to a very high level of internal consistency.

The mean ECSRS score for all the groups in the sample is 2.62 (SD=1.09; Med=2.33), with the lowest of 1.00 and the highest of 5.33. The mean DTSRS-2 score is 2.06 (SD=1.35, Med=1.75), with the lowest of 1.00 and the highest of 7.00.

Descriptive statistics are visualized in box and whisker plots (Figures 1 and 2), where x is the mean of the data, the bold horizontal line is the median, the lower edge of the box is the first quartile, the upper edge of the box is the third quartile, and whiskers show the minimum

Figure 1. **Descriptive statistics for the ECSRS.**

Method El
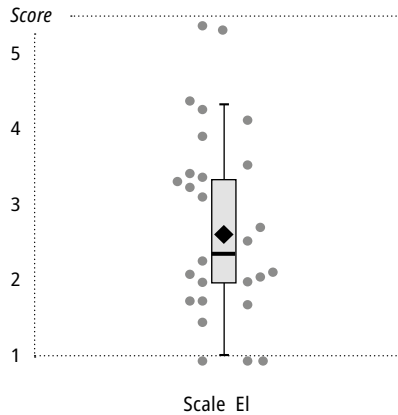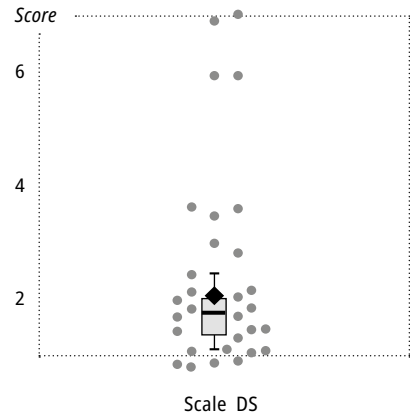med — 2.33; mean — 2.62; sd — 1.09
n = 31

Figure 2. **Descriptive statistics for the DTSRS-2.**

Method DS
med — 1.75; mean — 2.06; sd — 1.35
n = 32

and maximum of all of the data in a normal distribution. For illustration purposes, all the points are slightly shifted apart from one another.

The normal distribution hypothesis is impossible to test because of the small sample size, yet both scales show a tendency toward normal distribution.

To test validity of the scales, we analyzed the significance of differences in the total scores and scores on individual indicators between the contrasting groups (Welch's *t*-test and the Mann–Whitney *U* test). Differences in the mean total scores on the ECSRS were found to have a significance level of $\alpha=0.01$ (*p*-value = 2.06e-05 and 6.9e-05 for the Welch's *t*-test and the Mann–Whitney *U* test, respectively). Differences on the DTSRS-2 show a significance level of 0.05 for the Welch's *t*-test (*p*-value=0.017) and 0.01 for the Mann–Whitney *U* test (*p*-value=2e-04). Significant differences were detected for all the ECSRS indicators at $\alpha=0.01$, for the CMIT Subscale of the DTSRS-2 at $\alpha=0.01$, and for the UGP Scale of the DTSRS-2 at $\alpha=0.05$.

Reliability of the scales was tested based on percentage agreement among raters within one score point. For the ECSRS, complete inter-rater agreement was observed in 23% of the cases, and disagreement within one score point was observed in 92% of the cases. Average absolute deviation (AAD) is 0.46 score points, which is essentially lower than the standard deviation of the mean total score, indicating sufficient reliability of the ECSRS. Individual indicators of the ECSRS also demonstrated high internal consistency: disagreement within

one score point was at the level of either 85 or 100% for all the indicators except one (69%).

Complete agreement on the total DTSRS-2 score and absolute SD for this scale were not analyzed as the scale consists of only two subscales. Instead, each subscale was tested independently. Complete inter-rater agreement and disagreement within one score point were 62 and 85% for the UGP Subscale and 77 and 92% for the CMIT Subscale, respectively (AAD = 0.69 and 0.31 score points, respectively).

Correlations between Provisions Supporting the Development of Dialectical Thinking and Emotion Comprehension: The Research Hypothesis

The interplay of affect and cognition is one of the key problems in modern education. "Separation of the cognitive part of our mind from its affective part is a major and deeply ingrained flaw of the entire traditional psychology." [Vygotsky 1984:361] The same could be said about traditional pedagogy: research on the quality of preschool education in Russia shows that kindergarten classrooms are explicitly focused on cognitive development without caring too much about children's emotional comfort. For example, adults do not always set a positive tone when greeting and saying goodbye to children; meal times and bedtime routines rarely take place in a relaxed and friendly atmosphere; and children hardly ever have a corner in the classroom where they can spend some time on their own [Remorenko et al. 2017, Shiyan et al. 2021].

The assessment tools used in the present study, unlike the ECERS scales, are focused on specific aspects of the learning environment: provisions that help children learn to understand their own emotions and those of others, and provisions that support the development of dialectical thinking which allows children to see growth processes and be creative. Development of two separate instruments appears to be reasonable because each of them enables the teacher to identify their strengths and weaknesses and build their own "step in the development". Both assessment tools were developed based on the methodological premise about the interplay of affect and cognition. In particular, we assumed that emotion comprehension involves discussion of emotions with the use of cognitive tools, while cognitive tasks should be perceived by children as interesting, meaningful, and engaging.

It is essential to test empirically the hypothesis that provisions supporting the development of emotion comprehension do not hinder cognitive stimulation, complex problem solving, or creative effort.

The present study seeks to explore the relationship between kindergarten settings promoting dialectical thinking and those promoting emotion comprehension and to identify the key characteristics of the provisions for emotional development that have positive effects on the development of dialectical thinking.

We hypothesize that preschool teachers creating provisions to encourage emotion comprehension in children are also significantly more likely to organize classrooms conducive to dialectical thinking.

Research Design

The study involved 31 preschool student groups from 23 educational institutions of Moscow. Each group was observed once by an expert who spent three hours with children during the most active time of the day (usually from 8.30 a. m. to 11.30 a. m.) without interfering into the learning process or asking questions. Experts documented availability and accessibility of classroom supplies, teachers' methods of interacting with children, and characteristics of spatio-temporal classroom organization. Assessment was performed on both scales simultaneously. The sample included groups with both low and high levels of learning environment quality. Calculations were performed in *RStudio* 1.2.1335 using the programming language R3.6.1 (2019–07–05) and basic statistics libraries.

Initial data analysis was followed by a correlation analysis of total scores on both scales (Pearson's correlation coefficient and Spearman's rank correlation coefficient were measured for all paired comparisons). In addition, correlations between the total ECSRS score and every indicator of the DTSRS-2 were analyzed.

Results of Learning Environment Assessment Based on the DTSRS-2, by Indicators

The majority of preschool learning environments in the sample meet all or some of the Minimum Acceptable Quality Level (MAQL) criteria in fostering children's understanding of growth processes. For instance, most classrooms dispose of illustrative models reflecting transformations; teachers draw children's attention to changes in the world around, mention opposites when discussing phenomena or situations, and tell children about object and action transformations, possible developments of situations, and consequences of events. However, such activities are mostly sporadic and are not used by teachers consciously and consistently as a resource for promoting the development of dialectical thinking in children. Meanwhile, it cannot be said that these indicators are not differentiating: their means (in a binary scoring system) vary between 0.84 and 0.97, meaning that in some preschool learning environments even the Low Quality Level (LQL) indicators are rejected.

Contrariwise, characteristics of high-quality learning environments on the UGP Subscale are not typical for the absolute majority of the groups. Such characteristics include frequency of addressing the interplay of opposites in the content delivered, discussion of growth processes and situation transformations with children with a focus on the structure of change and encouragement of children's independent discovery of changes and cycles. The means of these indicators—showing whether "0" or "1" values prevail in raters' judgments—vary from 0.03 at the Excellent Quality Level (EQL), indicators of which are accepted by raters only in few isolated cases, to 0.09 at the Good Quality Level (GQL), which means that indicators at this level are accepted more often but still rarely.

The strongest differentiators of learning environment quality (percentages of accepted and rejected indicators are approximately equal in this sample) include parameters reflecting ad-hoc mentions of opposites and changes related to diurnal, weekly, or annual cycles by the teacher, parameters describing the teacher's response to expectations vs. reality gaps, and elements of the object-spatial environment (access to specific materials like toys, books, and models that help children see and understand the dynamics of change). All these indicators correspond to the MAQL, which became the cut-off for this subscale (the mean score on the UGP Subscale is 2.13, with the lowest of 1 and the highest of 7 score points).

Indicators of high-quality learning environments are also extremely rarely observed on the CMIT Subscale, but differences among the groups at the MAQL are more prominent than on the UGP Subscale (the mean score on the CMIT Subscale is only 2.00). In nearly all the groups, preschool teachers do not ignore children's ideas: every child has the opportunity to give an answer of their own that reflects their attitude toward or opinion on particular matters, and children's art is displayed in the classroom environment (the proportion of accepted LQL indicators varies from 0.87 to 0.91). At the next (MAQL) level of quality, however, the sample becomes highly heterogeneous, all the indicators showing considerable variations among the groups (means ranging from 0.41 to 0.63 in a binary scoring system). At the upper two levels of quality, GQL and EQL, the sample is relatively homogeneous again, but in this case with regard to rejected indicators (means ranging from 0.09 to 0.22).

Therefore, it must be admitted that situations where children's ideas and suggestions, creative ones in particular, are heard and the teacher creates controversial situations, asks children to solve them with due regard to opposites, and helps them analyze diverging perspectives and understand the differences between them are rather untypical for the preschool learning environments in the sample.

Results of Learning Environment Assessment Based on the ECSRS, by Indicators

The ECSRS subscales demonstrate relative homogeneity of scores on the indicators within each level of quality. As a rule, all the indicators are accepted at the lower two levels (LQL and MAQL) in most of the groups.[1] The mean values of binary scores range from 0 to 0.13 on the PECD Subscale, from 0 to 0.16 on the UMED Subscale, and from 0.10 to 0.16 on the COCE Subscale. Consequently, the following is observed in a significant (for our analysis) number of sample groups: (1) emotion-

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[1] The Minimum Accepted Quality Level is considered to be achieved only if all the indicators of the LQL and MAQL are accepted. That is to say, "low quality" does not mean that there are no provisions at all, but it means that the existing provisions are not sufficient to consider the quality of the given preschool learning environment acceptable.

al expressions are not prohibited, teachers paying attention to children's emotional manifestations and responding to them neutrally or positively and mostly consistently; (2) the classroom environment is relaxed; (3) children have access to some materials for emotional development, including visual aids, which are also used by teachers at least sometimes; emotion pictures match the relevant emotion words and do not depict anything scary or violent; and (4) children have the opportunity to spend dome time on their own in the classroom or go to a cozy corner.

Absolutely unanimous scores were given on some indicators (e. g. the ones related to scary and violent content or to the order in which teachers should respond to emotions of more than one child). These indicators are not differentiating for the sample of our study, yet there may be cases in practice where they could be rejected.

Higher levels of quality (MAQL and above) maintain the same homogeneity to some extent (the mean score values on the PECD Subscale at the MAQL are mostly above 0.7; on the COCE Subscale, they vary from 0.77 to 0.90; on the UMED Subscale, however, the indicator related to children's access to materials for emotional development has a mean of 0.84, while the other indicators within this level are rather differentiating, their mean values ranging from 0.58 to 0.65). Indicators of the higher levels tend to be rejected much more often than accepted on all the subscales.

Therefore, the sampled preschool learning environments have the following provisions that support emotion comprehension in children:

- The learning environment features some materials with emotionally charged visual content (toys, books, banners, games, etc.), which demonstrate at least a minimum level of diversity and are sometimes used by teachers in their interactions with children;
- Children are given freedom to express their emotions, including negative ones;
- Teachers sometimes use words describing emotions in appropriate situations with children, or even role-play emotions in imaginary situations, e.g. as part of a game, reading lesson, or drama play;
- Children have the opportunity to spend some time on their own or relax within the classroom environment, but places for expression of emotions of different polarities are rarely organized in a specific way, equipped with necessary furniture, materials, and how-to-use instructions, or accessible to children at all times.

On the whole, analysis of the ECSRS scores shows that children's emotions seem to be a rather low priority for preschool teachers; no focus on support for the development of emotion comprehension is observed; materials and activities related to this aspect of development are designed and used largely as envisioned by teachers; and teaching supplies and approaches are largely stereotypical and of minimum acceptable quality.

Table 1. **Coefficients of correlations between the total ECSRS score and DTSRS-2 subscale scores.**

DTSRS-2 Subscale	Total ECSRS score	
	Pearson's correlation coefficient	Spearman's rank correlation coefficient
1. Understanding of Growth Processes	0.594**	0.557**
2. Controversy Management/Innovative Thinking	0.565**	0.531**

** Significance level α = 0.01.

Correlation Analysis Results

A stable significant correlation at the level of $α=0.01$ was revealed between the ECSRS and DTSRS-2 total scores, i.e. between the total indexes of support for emotion comprehension and dialectical thinking in children. Pearson's correlation coefficient is 0.61 (p-value=3e-04), and Spearman's rank correlation coefficient is 0.6 (p-value=3e-04).

Significant correlation is also observed between the total ECSRS score and each of the two DTSRS-2 subscales. All the coefficients are moderate and significant (Table 1).

Discussion

Our study confirms the hypothesis that preschool teachers who create provisions to support emotion comprehension in children are significantly more likely to also support provisions for dialectical thinking.

It is therefore fair to say that a learning environment promoting children's emotional and cognitive development has a strong holistic effect on both affect and cognition. Our findings confirm the idea of interplay between these two aspects of development [Vygotsky 1984].

Based on the study results, the following characteristics of learning environments can be regarded as significantly negative with regard to the development of emotion comprehension and dialectical thinking in children:

• Stringent discipline, "tension in the air"; negative value judgments; yelling;
• A ban on free expression of emotions, both positive and negative;
• Discrepancies between what adults say and how they say it;
• Emotional disengagement and remoteness of teachers;
• Teachers manipulate children via shaming and guilt-tripping;
• Children are imposed emotions that they do not feel;
• Children's questions are ignored and their curiosity is not fostered by encouraging them to ask questions;
• Children's ideas or lack of knowledge are ridiculed;
• Predominance of choral responses;

- Children's creative work is organized in strict compliance with examples and patterns, not in accordance with the child's intention.
- Positive characteristics of the learning environment include the following:
- Consistence of adults' responses to children's emotional expressions;
- Focus on identifying and discussing emotional states, especially complex and controversial ones;
- Encouragement of emotional support among children;
- Children are taught civilized methods of conflict resolution;
- Children have the opportunity to spend some time on their own, relax, and play in a cozy corner as well as to regulate strong emotions through active movement;
- Teachers' interest in children's questions and problems; encouragement of curiosity;
- Teachers draw children's attention to diverging perspectives on a regular basis, which results in children getting an idea of the productive potential of conflicts and controversies;
- Children's ideas are noticed, supported, and discussed in a positive manner;
- Teachers promote response diversity, e. g. by expressing surprise and joy when children fantasize and make up stories or drawing other children's attention to a new response;
- Children are given at least one hour before midday—the most productive period for early childhood development—when they can do whatever they want;
- Teachers encourage children to make up stories (fairy tales, game characters) and invent things.

Data obtained from the empirical tryout and correlation analysis demonstrates the great potential of applying the developed instruments in preschool learning environment assessment. At the same time, it provides ground for reconceptualizing the pedagogical framework of supporting emotional and cognitive development of children to make it more coherent and consistently embracing the psychological characteristics of preschoolers.

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Participatory Design of New School Learning Environments

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Abstract

This article looks into the legal and psychological aspects of child and youth participation in discussions and decision-making on issues relating to their lives and gives an overview of the current trends in participatory development.

Participatory design is interpreted within this study as activities that result in participatory action of children in the educational process. Participatory action is characterized in its intentional component and its persistence (reflected in searching for ways of bringing the intention to life) by initiative, consciousness, autonomy and responsibility. Participatory design is regarded as a tool for creating conditions to develop adolescents' subject position.

A new method of engaging children in participatory design of learning environments is offered and implemented in the study. The article describes successively the steps of method implementation and its testing within the framework of Pedagogical Design Studio's activities.

> "The distinctions I am making among three different kinds of culture—postfigurative, in which children learn primarily from their forebears, cofigurative, in which both children and adults learn from their peers, and prefigurative, in which adults learn also from their children—are a reflection of the period in which we live."
> — *Margaret Mead, Culture and the World of Childhood, 1988*

How do we reorganize the school to meet the demands of human beings preparing for life in a rapidly-changing world? In the context of searching for new ways of secondary education development, we suggest changing the approach to design of learning environments by adjusting it to the fundamental principles of cultural-historical psychology and activity-based learning. Specifically, we are talking about the role of children in the design of learning environments that will contribute to their development. Should a child take active participation in instructional design, and will this participation help them develop a conscious and responsible attitude toward their learning? In our view, society is now facing an urgent need to give a positive response to this question and redefine the boundaries of young people's responsibility for their education by providing them with more decision-making opportunities. The widespread occurrence of children's participation in social projects dictates the need for exploring a new approach to participatory design of educational institutions and processes.

This article looks into the possibility of participatory design of learning environments that would promote subject positioning in adolescents. The concept of participatory design is elaborated, on the one hand, through the legal aspect of minors' participation in social processes, and on the other hand, through the psychological patterns of adolescent development.

1. Legal Aspects of Participatory Design

The legal aspect of participation implies deciding whether or not children and adolescents have the right to discuss and make decisions on vital issues affecting their lives. It was already at the beginning of the 20th century that a new understanding of childhood and a new attitude toward children as full members of society began to emerge. Publication of Ellen Key's book *The Century of the Child* in 1909 is recognized by Western childhood researchers as a tipping point in society's views on children's rights [Key 1909]. Initially, the children's rights movement began as an effort to protect and enhance the life of children who were disadvantaged or exposed to pressure, abuse or exploitation by adults. Gradually, however, the adult world's attitude to children and childhood began to change, in particular as a result of works and efforts produced by Janusz Korczak, Maria Montessori, Eglantyne Jebb, Astrid Lindgren and many other researchers, educators and social and cultural activists. Eventually, the idea that children and

their opinions should be respected and that children can decide for themselves what is in their own best interest was consolidated in the 1989 Convention on the Rights of the Child (CRC).[1] The CRC reflects the shared position of researchers, international organizations and States with regard to children's rights and States' obligations to respect those rights. Attitudes toward the implementation of such rights and obligations are not homogeneous across the world. The global community is particularly disunited and wary about Article 12, which establishes the child's right to participation and the State's obligation to "assure to the child who is capable of forming his or her own views the right to express those views freely in all matters affecting the child, the views of the child being given due weight in accordance with the age and maturity of the child."

Most often, debates erupt over children's unpreparedness for discussing serious matters due to their lack of competence, vulnerability and exposure to adult influences. Recognition of the concept of children's right to participation would bring about "a dramatic change in the manner in which most families, communities and societies are used to functioning. In general, most of us were not, and are still not, prepared to face the immense implications of accepting children as co-actors in our world." [van Oudenhoven, Wazir 2010:108]

Promotion of participatory design in education requires, on the one hand, proceeding from the child's right to participation and society's obligation to accept and organize such participation, while on the other hand making allowance for challenges associated with society's relative readiness to implement the said right. As the legal framework of children's participation in discussions and decision-making on issues affecting their lives is being developed, theories and practices of such participation emerge, including methodologies, designs, taxonomies, practical tools, scientific research and case studies. In 1992, Roger Hart proposed a "ladder of participation", in which he made a distinction between tokenism (the three bottom rungs) and genuine, or true, participation. Tokenism is when children's participation is performative and staged by adults, while the "child initiated, shared decisions with adults" type of participation is placed by Hart at the highest rung of the ladder [Hart 1992:8]. Hart's Ladder of Participation received a lot of criticism, and there have been more recent approaches to structuring and classifying types of children's participation. For our purposes, however, it should be emphasized that Hart focused on the value component of adults' attitude toward youth participation, which was found to be the most powerful inhibiting factor in the present study.

International organizations play an essential role in the distribution and promotion of participation practices. The movement has been ac-

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[1] http://www.un.org/ru/documents/decl_conv/conventions/childcon.shtml In Russia, the Convention on the Rights of the Child was ratified on June 13, 1990 by Resolution of the Supreme Soviet of the USSR No. 1559-I.

tively supported by the United Nations Children's Fund (UNICEF), particularly in situations relating to child safety, exploitation and neglect. In developing countries, children are engaged in political processes and declare their rights and interests at the national level, making governments "listen to children's voices". "The most positive outcome of these multiple initiatives, from every region in the world, is that they do provide powerful testimony as to the capacities and desire of children to be more involved. There is now significantly greater recognition of the expertise and wisdom that children contribute to policy making." [Lansdown 2010:22] The Western world has also been making great progress in participatory development by paying a lot of attention to analysis of children's involvement in community governance, education, social welfare and healthcare [Percy-Smith, Thomas 2010], the results being reflected in analytical reports published by the European Commission.[2] Not only practical but also methodological experience has been accumulated by the global community: research has been pursued to identify the key principles and elements of children's participation in social life and to analyze the most successful practices and technologies as well as participation assessment instruments.[3] Advances have been made in Russia as well, including the involvement of children in non-governmental organizations' research and practice [Podushkina, Tikhomirova, Shamrova 2016], the development of guidelines on promoting child participation in community policy-making in 2014,[4] and the upcoming publication of a textbook on child participation.

For the purposes of our study, of utmost interest are participation practices that are directly associated with education and instructional design. There are multiple examples of involving children in school decision-making in Russia as well as in other countries.[5] As a rule, these include participation in school councils, reconciliation services, mass media, school interior design, etc.[6] All of these practices constitute

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[2] Evaluation of Legislation, Policy and Practice on Child Participation in the European Union (EU). Research Summary. Available at: https://op.europa.eu/en/publication-detail/-/publication/f425176f-cc2c-46bd-8a3a-65d958fff780

[3] Council of Europe Child Participation Assessment Tool 2016. https://rm.coe.int/CoERMPublicCommonSearchServices/DisplayDCTMContent?documentId=09000016806482d9

[4] Kalabikhina I., Kuchmaeva O., Lukovitskaya E. et al. (2014) *Metodicheskie rekomendatsii po razvitiyu uchastiya detey v prinyatii resheniy, zatragivayushchikh ikh interesy, v munitsipal'nykh obrazovaniyakh* [Methodological Recommendations on Promoting Children's Participation in Community Policy-Making Around Issues Affecting Their Interests]. Available at: https://istina.msu.ru/publications/book/7660992/

[5] Evaluation of Legislation, Policy and Practice on Child Participation in the European Union (EU). Research Summary. Available at: https://op.europa.eu/en/publication-detail/-/publication/f425176f-cc2c-46bd-8a3a-65d958fff780

[6] Semya G., Kalabikhina I., Shvedovskaya A. (eds.) (2018) *Doklad po itogam monitoringa effektivnosti realizatsii Natsional'noy strategii deystviy v interesakh detey na 2012–2017 gg.* [Report on Monitoring the Effectiveness of Implementing the Na-

an important experience, but they are instituted within the existing schools conceived and set up by adults. We wanted to find instances of children or adolescents being involved in the design of school and learning processes. Studies of this kind do exist in architecture, specifically school design. Henry Sanoff—American researcher, professor of architecture, co-founder and developer of participatory approach—authored a number of design projects for cultural centers, public spaces, schools and universities. Sanoff considers user participation in design to be a critical factor affecting success of the whole project because co-participation is what makes people co-authors and co-owners of the project as well as of the prospective space [Kiyanenko 2010]. In his book *School Design*, Sanoff analyzes examples of student and parental involvement in design of learning environments across different countries, describing the technology of participation. He believes that involvement of students in school design is a promise of their future responsible attitude toward school as a physical space and an institution, participation "has a didactic effect leading to increased social awareness, and a generally higher intellectual level of school community" [Sanoff 2017:418]. Analyzing participatory school design practices, Sanoff shows that they benefit not only the designers—by rendering the project more successful, and not only the society—by increasing its levels of democracy and consciousness, but students as well—by raising their levels of responsibility and involvement in school life. One of the most significant effects of participation is the sense of ownership, which students develop when they can contribute to design of their learning environment and which, in its turn, has an impact on their learning engagement [Walden 2009]. Involvement in the process of creating their own learning environment becomes the foundation for subject positioning, when a student comes to perceive themselves as an actor who has set up a place for their own learning process. This self-perception as an actor has positive effects on the quality of learning. Youth participation in design of school as a physical space, described by Sanoff, is a major step toward participatory design of learning processes.

2. Psychological Rationale and Psychological Significance of Participatory Design

Educational design is becoming the foundation for new forms of adult-child interaction and thus requires the introduction of new methods and tools in education that will foster the development of children's subject position at specific stages of development [Gromyko 2018; Rubtsov 1998; 2008; Slobodchikov 2010].

tional Action Strategy in the Interests of Children for 2012–2017], Moscow: Federation Council, Vol. 2; Karonozova L. (ed.) (2014) *Shkol'naya sluzhba primireniya i vosstanovitel'naya kul'tura vzaimootnosheniy: prakticheskoe rukovodstvo* [Reconciliation in Schools and the Restorative Culture of Relationships: A Practical Guide], Moscow: MOO Tsentr Sudebno-Pravovaya Reforma.

Participatory design provides opportunity for discovery and generation of a new semantic field of action, a new space for one's own development. The words "participation" and "own" are key to this concept; "unlike with classical mediation, it is not the teacher but the learner who must initiate, or at least co-initiate, trying of a new field of action" [Elkonin 2010a:120]. Boris Elkonin [2010b:222] describes students' autonomy and initiative as a measure of their subject positioning, specifically their "participation in the learning process". In this case, participation is about devising one's own modes of action in situations requiring such action.

Participatory design plays an especially important role in adolescence, the period characterized by human being's growing interest in themselves and their external and internal characteristics as well as a rapid development of self-awareness. Unfortunately, the processes of growing up and learning are not correlated in modern school, and progress in learning does not serve as a measure of adulting [Froumin, Elkonin 2010]. The school does not provide children with "places" for growing up, which results in a protracted crisis of adolescence [Polivanova 1998]. A hypothesis put forth by Polivanova suggests that design is the leading type of activity in adolescence as it leads to a new developmental accomplishment: participatory action as a self-initiated and autonomous action. "By design activity, I understand that interconnection of intention and realization in which the actor, modelling and experimenting with reality in a holistic, artistic form, discovers the connection between the situation of action and their own states and experiences. The center of this interconnection is the sphere of human relations" [Ibid.:16]. When adolescents in school settings can produce their own participatory actions, i.e. generate projects and bring them to life, conditions are created for turning performance into trying and therefore for a comprehensive development in adolescence [Rubtsov, Ivoshina 2002]. In participatory design, adolescents can generate projects and persist in completing them: articulation of ideas, sympathy, empathy, acceptance or rejection are forms of intimate interpersonal communication in which adolescents discover the relation between their own state and the possibility of action. By participating in design, adolescents show initiative for changing the situation, i.e. they adopt an active and deliberate stance which is an indicator of subject position [Zaretsky 2014]. In our view, subject position is primarily characterized by autonomy and responsibility, which manifest themselves as adolescents' purposeful persistence in their idea throughout its implementation—and this sort of experience is provided in participatory design.

Therefore, we suggest that participatory design is an activity that leads to adolescents' participatory action in the learning process. Participatory action is characterized in its intentional component and its persistence (reflected in searching for ways of bringing the intention to life) by initiative, consciousness, autonomy and responsibility. As

mediators in participatory action, adults make the idea and the implementation "meet", thereby creating conditions for the development of subject position in adolescents.

Participation in practice has moved far ahead of participatory action research and its interpretation recently. Researchers, practitioners and policy-makers believe that it is still a long way to go to elaborating a well-grounded scientific approach to participatory design [Percy-Smith, Thomas 2010]. Promotion of participation practices will allow looking deeper into the participatory approach in education, describing it from a psychotechnical perspective, substantiating its psychological significance, and evaluating its possible contribution to the development of subject position in children and adolescents.

A new method of engaging children in participatory design of learning environments (PDLE) is offered and implemented in the present study. The PDLE method can be used for designing a real learning environment as well as for promoting subject position and participatory action in youth. Two outcomes are achieved as a result of participatory design of a learning environment of the "ideal" new school. On the one hand, adolescents generate ideas, bring their initiatives to life and feel responsible for school functioning; on the other hand, they contribute to changes in the school environment.

Modern schools offer few forms of adult-child interactions fostering adolescents' conscious attitude to learning. The participatory design method developed in this study is aimed at alleviating this shortage and can be used for involving young people aged 11–17 in design of learning environments and processes. Since construction of an effective learning environment requires participation of all stakeholders, parents and teachers are invited to participate, too.

3. The PDLE Method

The method proposed here uses a step-by-step algorithm based on the steps design procedure [Zaretsky 2002]. When explaining the concept of design to adolescents, we describe this activity metaphorically as planning a route from A to B. In route planning, we need to understand:

- What A is and why we want to leave it;
- Where we want to arrive (description of B);
- The terms and requirements that should be satisfied and applied to the route.

That is, design activities can be represented as "description and preparation of a route from A to B while meeting specific requirements".

Student work is structured in the following order:

1. Self-determination. Discussion of students' personal interest in participation: the value of taking part in design of a learning envi-

ronment, the reasons for wanting to participate, and the aspects of the design project that are of most interest.

2. Analysis of the existing situation (description of A). At this stage, it is vital that the group remain on a constructive track to prevent the discussion of what is wrong with the school today from transforming into a stream of negative emotions. What should be done is to state specific facts, which can be used as a trampoline for working out the necessary changes. This stage can also be used for pre-design research, which includes media content analysis, surveys, project resource analysis, etc.

3. Description of the desired situation: what the new learning environment should be like (description of B). This stage involves talking about specific, tangible characteristics and success criteria to assess whether the desired outcome has been achieved. Adolescents should be involved in research at this stage as a way to answer the question about the target audience's vision of an ideal school.

4. Problematization as a point of entry to the researcher and author position is the most challenging stage of design which requires critical thinking. As soon as the key concepts have been defined, it is time for setting the problem question and finding associations among the concepts. The problem question here is, "How to get from A to B without losing anything that is valuable and important to us?" The challenge of problematization consists in drawing from situation analysis not only the facts describing the situation but also the underpinning values. And this problem question is key to the project as it implies searching for new ways of solving the problem without losing meaning or value. The lack of such problem question always leads to choosing familiar but often irrelevant modes of action. In "adult" design practice, one comprehensive problem question is formulated for the whole project, embracing every tiny detail from situation analysis. With youth, a simpler version may be to build the problem question around the A-B dyad which matters the most to them.

5. Search for ways and methods of solving the problem. This stage involves describing what exactly can be done and which steps can lead to the desired changes. For this purpose, it may be useful to go back to stage one and run the self-determination phase again to understand how one's interest has changed and what new ideas have emerged after analytical work. This stage also includes project resource analysis and project sizing.

Progressive execution of the steps described above allows adolescents to come up with a well-founded, well-considered project idea and proceed to planning specific activities associated with project implementation.

The role of an adult in participatory design is that of a mediator who helps young people generate ideas and discuss ways and meth-

ods of bringing them to life, thereby contributing to the development of adolescents' subject position, meaning a conscious and responsible attitude toward what they do.

4. Testing the PDLE Method within the Framework of Pedagogical Design Studio's Activities

The PDLE method proposed in this study was used in participatory design of a new learning environment within a studio based on the ProP-SY Professional Orientation Center (Moscow State University of Psychology and Education). Design activities were carried out between December 2019 and April 2020 and involved training sessions, gameplay, discussions and practical research. All in all, there were 12 meetings with adolescents and two group discussions with their parents. Each meeting was attended by 4–15 school and college students aged from 12 to 17, of whom seven were present at all times. A friendly and respectful climate was maintained at the meetings: the 12-year-old and 13-year-olds engaged actively in discussion and had their opinions considered, while senior students tried to make their messages clearer and explained their ideas patiently. Responsibilities in the group came to be divided: it became clear who was concerned more about what, who was ready to speak and tell parents and other adults about the group work results, and who preferred taking responsibility for other aspects of work.

At the first two meetings, we wanted to understand the value and motivation behind young people's participation in school design, find out what they think makes an ideal school and how they understand the main school processes, and discuss the possible prospects of participatory design.

We told the youth about our plans and our desire to design and create a new type of school and shared our doubts about adults' ability to design a school for children without child participation. We also discussed with students what we did not currently like about the school, what the school of the future should be like, and what we could do to make it a reality. After that, everyone interested was invited to take part in school design, and rules and procedures of further work were agreed upon.

Every subsequent meeting started with reflections on emotional states and discussion of items on the agenda and ended with another portion of self-reflection and a summary of group work results.

Cooperative work with adolescents gave rise to a metaphor of a ship being led by a crew which is unhappy with their life at "A" (each member may have their own reason for being unhappy) and is trying to get a sense of where and how they should sail. We agreed upon discussing first of all what was wrong with "A", i. e. the school at its current state. Next, we would figure what B should look like, mostly by describing expectations from the school. Finally, we would work out the rules, principles and terms that should be observed in order to achieve the desired outcome.

The metaphor of sailing on a ship turned out to be highly understandable and was internalized smoothly by the group; it was easy to go back to this metaphor in group work self-reflection sessions to understand where we were and where we should go next.

4.1. Analyzing the Existing Situation: Description of "A"

At this stage, the task discussed with the participants was to describe specific phenomena characteristic of the current situation at school without lapsing into negative emotions. In our view, adolescents did an excellent work and produced a highly specific list of problem areas.

The brainstorming session set up to elaborate and generalize the selected characteristics involved only school and college students (seven participants). The process was facilitated by an adult who did not contribute to the content of discussion.

The most important problems identified by young people were as follows:

- Lack of focus on children's individual needs and attention to their personal values;
- Pressure and coercion in student-teacher relationships. Adults perceiving themselves as superior to children as if they were "carriers of truth" and treating students "as objects";
- Formalized learning processes, tedious and dishonest practices;
- Overall system rigidity;
- Human needs being unmet by the school environment.

4.2. Articulating Expectations from School: Description of "B"

The group discussion of what makes an ideal school was conducted using the brainstorming technique, resulting in the following list of criteria:

- Physical space (cozy; nice; fancy; tasty);
- Climate and values (non-authoritarian; non-violent; freedom; intercommunication and dialogue among students, teachers and administrators; cooperation; a place one would want to return to; participation; boundaries; an environment for self-expression; my own decisions about my own life; rules; all students may decide what school life should be like; free entry and exit; diversity and mutual understanding; easy communication; toleration; accept one another);
- Content (the school teaches independent thinking; the school teaches consciousness; responsibility as a goal; individualized approach and focus on personality and personal needs; self-reflection skills and a place for reflection; balance among knowledge, ability to apply it (competencies) and personality traits; the school teaches critical thinking; soft skills; giving the joy of learning; not occupying the largest part of one's life; a lot of things should be outside of school; grades are not the goal);

• Workers (teachers should be people from the real world, researchers and practitioners).

4.3. The Good School Performance Study

During situation analysis, adolescents acted proactively and suggested conducting a study to find out what good school performance was about. In the course of discussion, they came to a conclusion that the proposed list of school performance outcomes reflected the opinion of only one small project group and wondered what a broader audience would say. Eight people took part in the design and execution of the study: two adults and six adolescents aged 12–17, participating jointly. The study consisted of four stages: (1) identifying the "school performance outcomes" categories for discussion (brainstorming, generalization, categorization); (2) ranking the categories and discussing the results; (3) extending the sample: it was decided that students would ask their academic peers and friends to choose the six most significant categories of school performance outcomes from the list; (4) conducting a survey and discussing the results.

In the extended survey of 70 adolescents, results on one category were different from those obtained for the initial sample: "I can think", the category associated with cognitive competencies, moved up to the very top.[7] Data obtained in the extended survey generated a strong emotional response in the initiators, obviously indicating that the findings were significant and valuable to them—which we believe is a critical component of research activity. As researchers, the initiators found it meaningful that no extended survey respondent used the "Other (specify)" response option, which means their list of school performance outcomes was sufficient and good.

Since the study was aimed at finding categories to describe expectations from a good school, joint discussion with students was continued. Having generalized some of the categories, we selected the five most important performance indicators that schools should take as their targets and three additional educational outcomes that we considered important but yet unclear. The joint decision was made that the latter should be discussed and clarified before being included in the expected outcomes of our school project.

Main outcomes:

• I can think (analyze, reflect, process information, etc.);
• I have a sense of who I am, I know what I'm interested in, and I have a sustained interest in something;
• I can learn;
• I can communicate and interact, and I have friends/I am part of a team;

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[7] Similar results were produced when the same survey was conducted on an even larger sample of students from Moscow State University of Psychology and Education (450).

- I feel ready to change the world.
- Additional outcomes:
- I have self-regulation skills;
- I have a sense of the world;
- I have the basic knowledge.

The three additional categories were lobbied by the elder part of the group. Most adolescents tend to ignore things associated with self-regulation, basic knowledge and basic worldviews. It turned out that the self-regulation category proposed by adults was new to young people, and they needed a separate discussion to make sense of it. They also suggested bringing up the question "What is basic knowledge?" for an open group discussion with the participation of adults—experts, teachers and parents. As a motivation behind this initiative, they explained that they did not quite understand what "basic knowledge" meant; furthermore, basic knowledge is inescapable at any school, so students possess it "by default".

During the group work self-reflection and result analysis phase, students pointed out that it had been interesting to conduct surveys and analyze the results; they had become more interested in mathematics; and they wanted to make sense of basic knowledge and conduct more surveys themselves—but discussing the same things over and over again had been a bore.

4.4. Problematization

To initiate the process of problematization, we put the description of "A"—the list of the group's current concerns about the school—on the left side of the whiteboard. The original detailed list of problems was used, without generalizations or categories. On the right side of the whiteboard, we put the description of "B", which consisted of three lists: a list of good performance outcomes, a description of ideal school characteristics, and a description of an ideal teacher that had been produced at one of the meetings.

The middle part of the whiteboard was left empty to be used for working on questions that describe the journey from "A" to "B". As we decided jointly with the youth, the more specific the questions were, the more adequate methods of travel we would find.

Adolescents formulated their questions individually and then put them down onto the whiteboard, explaining and refining their formulations.

This exercise yielded the following list of problem questions (wording left unedited).

What should be done so that the school…

- becomes an open system?
- does not kill the child inside the human being?
- makes children want to learn?

- transforms from a close-minded rigid system into a self-improving neural network?
- combines freedom and learning?
- has benches and tangerines?
- helps children learn to structure themselves and make sense of the world as well as provides them with fertile ground for creative inquiry?
- gives me the opportunity to choose how I develop?
- offers a comprehensive picture of the world?
- can be transformed from a "buggy program" into an organism capable of thinking and evolving?

In our view, these are great problem questions, and each of them may give a start for designing a new type of school. For the project group members, these formulations became a new informative step toward conception of the new school. While reflecting on the work done, they said that it had been interesting to articulate the questions and they could now see that "the words written down are filled with meaning". One of the participants pointed out that he could have asked a question like that without preliminary analysis, but now it had a different meaning to him. At the stage of discussing good school performance outcomes, building a picture of the world was not considered as a significant outcome; however, during the problematization stage that followed, one of the school students said that his attitude toward the value of systemic knowledge had changed. Upon discussion, the group members decided that it was worth organizing open talks not only on basic knowledge and worldviews but also on the problem of freedom and responsibility for learning because they found it absolutely insoluble: "Even if we design the best possible school in the world, there will be people who won't want to learn but will fool around instead." As we can see, adolescents made their own way to recognizing the need to solve one of the most difficult philosophical problems: the one of balancing freedom and responsibility.

4.5. Discussing the Design Results with Parents

While working as a project group, adolescents would often ask themselves, "What our parents or teachers would say if they heard us talking about it?" Since parents are as important stakeholders in the educational process as children and teachers, they were involved in similar discussions, but in a briefer format. At the two meetings with parents of elementary- and middle-school students, the same project steps were performed: self-determination, situation analysis, description of desired outcomes, and problematization.

As the preliminary work was done, the two groups were brought together for a joint discussion, analysis and generalization of results. The final discussion involved 20 participants: five school students, three college students, seven parents, four experts, and one moderator. It lasted about two hours and was followed by a round of self-reflection.

Adolescents presented the results of their work to the group, answered the questions asked, and explained the meaning of the metaphor of sailing from "A" to "B". Adults, in their turn, shared their own results and outlined questions that they were most concerned about. It turned out that the school's most significant problems identified by young people and parents were identical: lack of attention to actual human needs, lack of understanding what knowledge and competencies students possess as a result of learning, and the need to return the responsibility for learning to students. In the process of self-reflection, it was pointed out that adults and children had reached a consensus and mutual understanding in terms of the current school problems and had come to a common metaphor of today's school as a meat grinder (turning heterogeneous and individual things into a homogeneous mass). Perceptions of "good outcomes" were different between parents and students: parents experienced high levels of anxiety and confusion about what should be taken as targets, while students felt much more confident and cool-headed. Joint discussion of the school problems articulated by adolescents and parents allowed determining the key questions that should be solved in the process of design:

- How to make school experiences enriching for everyone?
- How to make school processes open, clear and transparent for everyone?
- How to make everyone cooperate and partner?
- How to make school processes effective and observe that effectiveness?
- How to make the school environment safe and cozy?
- How to turn children, teachers and parents from objects into fully-fledged participants?
- How to make the needs and interests of all students considered?

The most challenging part of joint discussion was to overcome the adults' urge to explain "what's right" to the youth and their unwillingness to actually listen to the younger participants. The moderator had to draw the participants' attention to such cases: when the debate got particularly heated on the side of parents, students would simply "drop out" and lose their motivation for involvement. On the whole, however, the meeting was constructive, and what the participants referred to as their main achievement were "jointness and equality", the pleasure of having the opportunity to discuss such complex issues together. Many adults were surprised at how much adolescents could be involved in discussion, concerned about the quality of school education and constructive in their reasoning. Everyone agreed that subsequent group discussions should cover the concept of basic knowledge, the balance between freedom and responsibility in learning, and the problem of teacher–student cooperation.

The activities described above gave rise to a community of adolescents, parents and teachers willing to find solutions to problems in practice. This experience was used as a foundation for the educational projects Virtual Own School and SUrok ("Own Lesson") Open Educational Environment and served as the basis for making the first steps toward solving the problems articulated in the process of participatory design.

4.6. Results of Applying the PDLE Method

A self-reflection session was carried out to wrap up the design project, where the participants gave their feedback on the whole process. Analysis of the feedback received allowed drawing some inferences about adolescents' position in participatory design of learning environments:

- Adolescents are willing to engage in education research and design activities as they are concerned about the education system's functioning and attach a lot of importance and value to this topic.
- The fact that adolescents pay attention to systemic issues of modern school education and can see and formulate the problems lying not on the surface but at the heart of the school crisis indicates that they have developed a conscious attitude toward school business.
- Adolescents see the main problems of education in the paradigm of "how" rather than "what". Social interactions emerging inside and around the learning process are much more important to them than curricula. "In this case, it is not only the problem of what to teach that comes to the foreground but also the problem of how to teach, i.e. the problem of organizing effective cooperative forms of learning." [Rubtsov 2005:17]
- Cooperation and partnership inherent to participatory design are significant to adolescents and constitute critical prerequisites for the development of participatory action in learning.
- Participation in design changes the attitudes of school and college students toward their own learning. All the participants of the project group reported having developed a more conscious approach to how they learn and a more responsible learner position. Of course, only tentative conclusions can be made upon such a short-term, narrow-focused project. The impact of the development of subject position through participatory design on young people's motivation for learning constitutes an important avenue of further research.
- Involvement in real research improves the learning motivation of adolescents. In the group participants' opinion, research gives the feeling of pleasure from "gaining" information, spurs the urge to substantiate the information obtained, and brings meaning to the acquisition of specific knowledge and skills. Some of the participants perceived the results of the study as personally significant. During the study preparation stage, some students "suddenly" realized the practical value of knowing mathematical formulas. At the

same stage, discussing the balance of freedom and responsibility became for some participants the point of departure for reflections on their own life philosophy. The influence of research as a process on the adolescent participants is one of the significant effects of participatory action research [Shamrova, Cummings 2017].

5. Advantages and Limitations of Participatory Design

Analysis of the results of using the PDLE method allows concluding that not only can adolescents participate in design activities together with adults but they also make a unique and valuable contribution to the content component of design process as they have their own vision of what a good school should be like. Design participants create a specific product that should be taken into account when designing educational processes. There are elements that are not prioritized by adults but are highly important to adolescents, such as the balance of freedom and responsibility, the undermining of learning processes by unmotivated children, the significance of life outside of school, and many others.

The use of the PDLE method allowed detecting both the advantages and limitation of this approach.

- One of the barriers faced by adolescents in projects like this is the small amount of free time which they cannot allocate at their discretion.
- The greatest challenge in participatory design is the attitude of adults that are not ready to take adolescents' design outcomes seriously. Elements of such attitude could be observed at group meetings and at project presentations in a public space. In our view, such dismissal of students' design efforts underlies the problem with design activities in today's school, when design projects are formalized and real outcomes are of no importance.
- Meetings with adults and joint discussions were an essential element of the participatory design project. Parental meetings were supposed to be held separately from adolescents, but it became obvious in the process that feedback from adults was important to youth. Organization of discussion and dialogue are a critical stage of participatory design. Adolescents could see the value of their contribution to the settlement of a problem that was parents' concern as well as theirs. In addition, they received support and found out that cooperation and partnership with adults were possible and real. Dialogue of this kind is equally important to experts attending the joint meeting, whose skepticism about youth participation in design gave way to recognition of the value and relevance of such work not only for adolescents themselves but also for experts' deeper understanding of the subject of design.
- In the process of design, participants gradually adopted the subject position, internalizing their accomplishments, coming to re-

fer to their school as "our school", showing initiative, and working out further steps for project improvement, such as virtual summer school. This position of participants is what is crucially important for designing learning environments as environments for development.

- The described example of participatory design represents the "adult-initiated, shared decisions with children" (sixth) rung of Hart's Participation Ladder [Hart 1992:8]. Further development of participatory design practices implies assigning more and more responsibility for the process to children and adolescents.
- As any form of child or adolescent involvement in real-life, "grown-up" projects, participatory design is a novel kind of activity that requires a high level of expertise. If we want to become professionals in this field, we need to scrutinize our own activities, reflect on every single step, and rely on methodological practices of Russian and international organizations.

Method testing as one of the very first steps in participatory design opens up a wide range of application possibilities. The work done as part of the present study matters a lot for curriculum design as well as for the participants' development. Changes in how students position themselves in learning and how adults perceive the value of adolescents' contribution confirm the fundamental premise of the cultural-historical and activity-based approaches that co-participation is imperative for promoting subject position in youth. Development and testing of the PDLE method is a step toward creating a school centered around the idea of each student being a subject in the learning process. Therefore, the participatory design method can be used in school life practices focused on cultural "adulting" of adolescents, meaning that they engage in participatory action as self-initiated, autonomous and responsible action in the learning process.

Involvement of young people in decision-making on issues relating to their lives—specifically their learning, leisure and health—provides them with an opportunity to become the agents and designers of their own lives. This is exactly how we should apply the Convention on the Rights of the Child and create conditions for actualizing the idea of respecting childhood and valuing youth's contribution to social development.

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Mikhail Bakhtin's Legacy and the Challenges of Modern Education: A 2010s' Perspective

Review of the book: Brandist C. et al. (eds) (2020) Bakhtin in the Fullness of Time

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Abstract   A detailed analysis of the collective monograph Bakhtin in the Fullness of Time: Bakhtinian Theory and the Process of Social Education is performed in this article, involving reflections on the place and meaning of the ideas of Mikhail Bakhtin (1895–1975) for theory and practice of Western education in the recent decades. Three major topics are covered in the book. The first one has to do with identifying the philosophical and sociocultural sources that preceded the formation of Bakhtin's early views and largely predetermined his response to challenges of the time in his early philosophical texts and in his books about Dostoevsky and the genre of Bildungsroman. Another topic is Bakhtin's dialogue with his contemporaries. Sometimes, this dialogue was open and active, sharply polemical, as in the situation with the latest aesthetic and literary trends of the early 1920s in Russia; at other times, however, it was "inaudible", so researchers can only attempt to reconstruct it based on the consonance between the ideas of Bakhtin and those of Lev Vygotsky or Paulo Freire. The third topic is the transformation of Bakhtinian theory into teaching practice, whether it is about using dialogue and its potential in teaching foreign students, providing educational opportunities for the most economically vulnerable social groups in South Africa, or communicating with preschoolers in a kindergarten.
    The authors of the book managed to create a convincing picture of how Bakhtinian theory is becoming a key element of today's educational research and practice. Importantly, it is not only Bakhtin's ideas as such—the concepts of dialogue, polyphony, carnival and chronotope in the first place—that matter: there is also the unrestrained polyvocality which is indispensable for any creative practice.

Keywords   carnival, chronotope, dialogic pedagogy, dialogue, Mikhail Bakhtin, polyphony.

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