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Two Approaches to the Concept of Knowledge Application: Transfer and Modeling.

Overview and Criticism

[Y. Tyumeneva, I. Shklyeva](#)

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Abstract. The patterns of knowledge application in new situations are explored from the perspectives of modeling and transfer. We provide an overview of studies to compare these two conceptions and get a comprehensive idea of which

psychological processes are involved in knowledge application, what will change in research and teaching practices if the conceptual frameworks change, and how these conceptions can contribute to each other. We show that analyzing the problem structure and comparing problem models in different representational systems are the key prerequisites for a successful knowledge application in both conceptions. Based on the data obtained, we draw conclusions about approaches to education promoting effective knowledge application and about training problem assessment criteria.

Keywords: learning, knowledge application, modeling, transfer, mathematical word problems, deep and surface structure, generalization, metacognitive skills.

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So far as education is concerned, whether school or professional, individual or mass, formal or informal, for children or adults, it is always implied that acquired knowledge and skills will be applied under conditions other than the learning environment. Otherwise speaking, the principal outcome of education should be the application of knowledge in new, unfamiliar situations. With a view to summarizing what is already known about the ability to use acquired knowledge beyond the educational context, we will consider the studies on modeling and transfer, the two psychological constructs immediately associated with the idea of knowledge application.

The modeling conception has been historically focused on applying formal, “school” mathematical knowledge to informal, “real-life”

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(as opposed to “school”) situations [Blum, Ferri, 2009; Frejd, 2013]. It was developed to solve a rather specific applied issue: school mathematical problems had nothing to do with the reality, leaving students unable to recognize the utility of mathematical construction in everyday life. Why are word problems singled out from the whole available wealth of school mathematical education in the modeling conception? The answer is: this is the only component of school mathematics designed to connect formal mathematics with real-life applications. Originally, word problems were aimed at teaching students to apply mathematical skills in real-life situations: in trade, tourism, construction, agriculture, military, etc. [Yushkevich, 1970]. As the corpus of purely mathematical knowledge developed, the connection to real life problems was fading away and became absolutely delusive in present-day school mathematics, as is often observed (see, for instance, Arnold [1998]). Word problems remain the only syllabus component that preserves the connection of mathematical concepts with real-life needs, at least nominally. However, many studies show that such a connection is of a highly doubtful quality [Boaler, 1993; Verschaffel, Corte, 1993].

Nowadays, the approach to the application of mathematical knowledge as modeling may be considered commonly widespread. In trying to connect mathematics with real life, many countries have initiated relevant changes in their mathematical education programs [Freudenthal, 1973; 1991; Krauss et al., 2008; National Council of Teachers of Mathematics, 2006; YZZ, 2003]. Moreover, the modeling conception formed the basis for the PISA (Program for International Student Assessment) mathematics literacy test [OECD, 2013]. Yet, as we will see below, the growing popularity of this conception does not take into account its being restricted to the mathematical language, which makes it impossible to expand the results of modeling research to other subject areas. Additionally, the available empirical results still provide no clear understanding of the psychological processes subject to modeling or of the efficiency of the proposed approaches to education.

Research on transfer—another construct directly related to knowledge application—was pioneered by Edward Thorndike [Thorndike, 1924; Thorndike, Woodworth, 1901]. He gave perceptual tasks to test subjects and assessed how training to solve one type of problems improved solving other types. Since the first third of the last century, when Thorndike was working, the conceptual framework of transfer has expanded greatly in terms of both transfer object (procedural or representative skills, problem-solving approach, etc.) and transfer situations (transfer from academic context to everyday life, deferred and immediate transfer, etc.). Nevertheless, the key characteristic of understanding “application” through transfer remains the same: constructing an analogy between the learnt and the new and drawing inferences from this analogy to solve the new problem.

The transfer research empirical database is huge, but the information it provides has no direct relation to schooling. Yet, the research re-

sults can be justifiably extended to school knowledge since the transfer conception presents the transfer object and application context as universal phenomena. Another issue is that, unlike modeling, transfer is often described as a one-time action, which makes it barely teachable. Here, we should construct links between the well-described transfer mechanism and the teaching strategies.

The modeling and transfer conceptions provide different explanations of how acquired knowledge is applied and which factors determine its efficiency. We will perform a detailed comparison of these two approaches to identify the changes in research and teaching practices in different conceptual frameworks of knowledge application and to find out how the two can contribute to each other. The comparison is structured: for each of the conceptions, we analyzed the object, the context (parameters of the application situation), the process and the mechanism of application, as well as conducive learning, i. e. the proposed teaching methods that will facilitate further application of knowledge.

1. Modeling conception

1.1. Object

The modeling conception is based on the assumption that many processes and relations in physical, social, economic, personal and other spheres of life can be described with mathematical language, which allows for representing and solving a lot of problems at the abstract level. Hence, mathematical language is the object of application, i. e. what should be mastered in the learning context and then transferred to real life. The mathematical language represents a symbolic system used to describe mathematical objects and concepts, including, for example, numbers, function and conceptual symbols. The system contains both individual icons (+ or –) and complex graphic symbols. The language of mathematics should be mastered to describe and formalize what is going on in various areas, including those that are non-mathematical, like physics, economics or everyday life.

1.2. Process and mechanism

In the modeling conception, the application of the mathematical language comes down to performing subsequent actions to build an adequate mathematical model of a real-life situation: identifying the key elements of the problem and the links between them (problem structuring or situation model construction); encoding the situation model elements in mathematical terms (mathematical model construction); performing mathematical calculations and interpreting the solution in terms of the original “real-life” situation. Let us take, for instance, the following problem: *“Mrs. Stone lives in Trier, 20 km away from the border of Luxembourg. To fill up her VW Golf she drives to Luxembourg where immediately over the border there is a petrol station. There you have to pay €1.10 for one liter of petrol whereas in Trier you have to pay €1.35. Let us assume that the fuel consumption rate is 12 liters per 100 km. Is it worthwhile for Mrs. Stone to drive to Luxembourg? Give rea-*

sons for your answer." (citation from [Blum, Ferri, 2009]). In order to solve this problem, we should first of all make sense of the described situation, its conditions and requirements. It is clear that buying petrol at a cheaper station may be worthwhile or not depending on the difference in price and fuel consumption. Next, as we build a situation model, only the key links in the problems are left, for example: *if the cost of fuel (in euro) consumed to drive to the farther petrol station exceeds the saved money (the difference in petrol prices in euro), then driving to Luxembourg is not worthwhile.* At the stage of mathematization, the situation model is transformed into a mathematical model. As soon as the mathematical model has been constructed, using an inequality in this case, a calculation is performed. Next, the mathematical results should be interpreted back in the real world, ending up in a recommendation for Mrs. Stone what to do. To validate these results, the problem solver goes round the loop a second time to take into account any factors that may have been omitted.

Several scenarios of the modeling process have been suggested by now, yet all of them follow the same logic of three main steps: structuring, mathematizing and interpreting. In some cases, the first step is divided into understanding, simplifying and structuring. (For an overview of foreign studies, see, for instance, Borromeo Ferri [2006]; for an extensive description of modeling, especially at the stage of approaching the problem, by Russian researchers, see Galperin [1958]; Talyzina [2011], and Salmina [1988]; in some cases, a special focus is put on the stage of mathematical model transformation [Salmina, 1988]).

1.3. Context and application performance

Although the abstract language of mathematics is universally applicable, the modeling conception restricts application to the everyday context only, the so-called real life, rarely involving any other subject areas. In addition, the context is virtually reduced to the text of the problem, because modeling is studied and assessed using exclusively mathematical word problems as representative of real situations¹. If the context, i. e. the area of knowledge application, comes down to the text of the problem, all the investigated factors affecting modeling performance should be inevitably rooted in this text.

The basic role of the text in problem solving is determined by its complementary status relative to the formal mathematical component of the problem. As a result, solving performance will be affected by (i) the formal mathematical aspect, mathematical difficulty of a problem, and solver's mathematical skills; and (ii) the linguistic component and reading comprehension skills. It turns out, however, that integration of the text and mathematical components produces the derivative third

¹ The important issue of prerequisites for representing a real-life situation is beyond the scope of this overview, primarily because we do not raise it.

component. The latter provides the unique difficulty of a problem that cannot be explained by either mathematical or linguistic components [Daroczy et al., 2015]. This derivative component determines the efficiency of performing two specific actions—constructing a situation model and encoding it in the mathematical language—which form the backbone of modeling. Formal mathematical difficulty lies beyond the scope of this article, so we will dwell on the factors related to reading comprehension and the modeling process.

Let us begin with the details in the problem statement. It turns out that details have no decisive impact on the correctness of problem solving, the effects depending on their relation to the text composition and the problem structure. Only details providing a clearer understanding of the problem structure facilitate solving. Meanwhile, solving does not become easier due to details that help imagine the relevant real-life situation better but do not clarify the problem structure [Davis-Dorsey, Ross, Morrison, 1991; Lepik, 1990; Vicente, Orantia, Verschaffel, 2007].

The semantic properties of a text act as an independent factor. We demonstrate that semantics has an unconscious influence on mathematical model construction. For example, the use of functionally related items (boxes—oranges) activates the division model, while categorically related items (oranges—lemons) activate the addition model [Martin, Bassok, 2005].

Some turns of phrase in word problems give the solver translation cues that act as a trigger, translating the problem text automatically to a mathematical operation that is generally associated with specific words. For example, “times” → multiply, “together” → add [LeBlanc, Weber-Russell, 1996]. Obviously, such associations are justified by the experience of solving similar tasks, but the same cues may be misleading and complicating if they are inconsistent with the structure. There is a classic example of the misleading cue “twice as many” in the following problem: “*There are twice as many students as professors in a university*”, which activates the wrong mathematical model: $S \times 2 = P$, where S is the number of students and P is the number of professors.

In addition, not only individual phrases but the whole problem wording pattern may be a trigger activating a specific solving model. Again, it happens because a specific type of text pattern, or the “plot” of a problem, is normally associated with a specific mathematical model due to the accumulated experience in problem solving. We demonstrate that all word problems in school mathematics may be reduced to a set of standard “plots”: distance-rate-time problems, river-rate problems, problems involving working together, and others. If the solver qualifies the text as a specific pattern, they may omit the modeling process and proceed to the final math model associated with this pattern [Blessing, Ross, 1996; Mayer, 1981].

The influence of problem-related illustrations on solving performance depends on whether they contain useful information or not.

Illustrations that do not carry unique information have no impact on the correctness of solving but increase the time spent to solve the problem. Illustrations featuring unique information required for solving, which are to be integrated with the text, complicate the task for the solver [Berends, van Lieshout, 2009]. Therefore, the distribution of information among different parts of the problem (e. g. partly in text, partly in drawing and partly in diagram) will complicate the solving process, short-term memory being busy bringing scattered information together.

Expectedly, irrelevant information purposefully included into a problem increases difficulty, but not only because it uses short-term memory resources. A qualitative analysis of problem-solving logs showed that students may be misguided by distracting information, e. g. getting them to think that they need to use all the numbers in the text or find another number if they are only given one [Muth, 1992].

The scope of research on this conception features very few empirical studies on specific modeling actions, and supporters regard it as a major hindrance [Borromeo Ferri, 2006]. The first stages of modeling, when the solver has to understand the conditions and construct a situation model of a problem, are believed to be the most challenging [De Corte, Verschaffel, Greer, 2000; Gürel, Gürses, Habibullin, 1995]. In particular, their difficulty is explained by the fact that the solver needs to be able to create short and precise mental representations, including visual ones, when constructing a situation model [Abdullah, Halim, Zakaria, 2014; Novick, Hmelo, 1994; Wertheimer, 1982; Zahner, Corter, 2010]. The solver is sometimes unable to choose or construct an effective representation of a problem. A number of studies reveal that representations may be incomplete or distorted, if indeed there are any at all, which affects the correctness of solving immediately [Tyumeneva, 2015; McGuinness, 1986; Novick, 1990; Wertheimer, 1982].

1.4. Conducive learning

Approaching the modeling process as part of a broader culture of the “conscious” teaching of mathematics, researchers attribute modeling performance to a successful realization of a whole package of teaching procedures, from teacher training to problem formulation. This package is usually described in such general terms that we can only use the same general terms to discuss the factors promoting the development of modeling skills. The whole package, sometimes referred to as *modeling discourse* [Niss, Blum, Galbraith, 2007], is designed to make both teachers and students understand the importance of modeling, to create a conducive learning environment to keep students involved, etc. [Blum, Ferri, 2009]. Due to the small amount of empirical research on the efficiency of the recommended practices and to the very general nature of such recommendations, it appears impossible to single out any specific factors contributing to the development of modeling skills. Such impossibility is sometimes considered to be fundamental [Ibid.]. This is why we can only name some specific features

of syllabus organization and the activities actually used when teaching modeling skills and “realistic mathematics”. Such activities include: providing students with a possibility to search for and establish the links between different mathematical areas as well as between mathematics and the world around on their own; treating modeling as part of the syllabus (similar to strategies, modeling skills are to be taught intentionally); teaching metacognitive skills (planning, breaking a problem into subproblems); encouraging various solution methods; minimizing teacher interference to allow for maximum independence of students in problem solving; providing metacognitive assistance (e. g. “*Imagine this situation*”, “*What is your goal?*”, “*Is your result consistent with this situation?*”) [Reusser, 1996]. Many of these instructional techniques are in line with the ideas of effective learning developed within other pedagogical approaches, primarily the so-called constructivist-based pedagogy [Noddings, 1990; OECD, 2009]. In this context, the learning principles put forward by the modeling conception show weak inherent correlation with the conception itself, rather being represented as a modern philosophy of learning.

The inculcating approach to modeling proposed within the cultural and historical approach [Galperin, 1958; Talyzina, 2011, Fridman, 1977, Shevkin, 2005] is focused on the development of modeling skills as such. The studies place an emphasis on developing the learning program implementation techniques as mass-oriented. Just like their Western colleagues, the creators of the inculcating approach to modeling did not pay enough attention to assessing the efficiency of inculcating programs or their specific teaching techniques. Hence, although the established learning system is pretty consistent with the theoretical grounds of the cultural and historical approach, there is still little proof of its efficiency.

2. Transfer

2.1. Object

Modern research on transfer investigates a very wide array of skills as the object of transfer (for a comprehensive overview, see Barnett, Ceci [2002]). Acquired knowledge or skills may be narrowly specialized, like using such formalized procedure as applying the Rule of Three to solve proportions, or very broad, such as finding solution principles, heuristics, or deducing.

Thus, while modeling is built around the school mathematical language as an object, research on transfer employs an incomparably wider range of the types of content to be applied.

2.2. Application context

Not only does the transfer conception present myriad variants of the content of transfer, but it also explores various contexts, i. e. where an acquired skill is transferred from and to. The training and transfer contexts may differ along multiple dimensions (knowledge domain, physical and social context, temporal context (the elapsed time between training and testing phases), functional context (the function for which

the skill is positioned), and modality (the final sensory dimension of transfer context)). The number of dimensions differing for the training and transfer contexts as well as the degree of similarity between the contexts determine the distance between them [Barnett, Ceci, 2002]. Near transfers have been found to be successful much more often than far transfers. In other words, transferring an acquired skill immediately to a structurally and formally similar problem in the same context will be much easier than transferring the same skill to a problem presented over time and contexts. The difficulty of far transfer is explained by its mechanism, i. e. the need to draw an analogy between the structures of two problems.

2.3. Process and mechanism

The mechanism of transfer is most often described as drawing an analogy and comparing the new case to the training one [Gentner, 1983; Gentner, Loewenstein, Thompson, 1999; Gick, Holyoak, 1980; Reed, 2012]. Transfer is normally regarded as a one-time event, but some researchers divide it into three processes: (i) remembering a prior analogous situation in long-term memory (retrieval); (ii) aligning the representations of two cases (mapping); and (iii) judging the adequacy of solution found for the new problem (evaluation) [Gentner, Smith, 2012]. The success of transfer depends mostly on the first two stages, where difficulty is determined by differences in formulation and contexts, and on how solvers encode problems.

When we encounter a new problem, we need to access a potential analogy, i. e. to retrieve a potentially known analogous problem from memory. Surface-level similarity plays the decisive role here. If there is no such similarity, it will be hard to access a previous problem even if it is stored in the long-term memory. This phenomenon is sometimes referred to as *inert knowledge* [Gentner et al., 2009], i. e. potential useful knowledge that is unavailable at the right time. “Inertness” of knowledge exists because people use context-specific ways of encoding their experience [Gentner, 1983], so the required knowledge is only activated through similar surface characteristics of problems: context details or items involved.

At the second stage of transfer, relations between elements in the training and transfer problems are compared [Christie, Gentner, 2010; Reed, 2012]. Based on the analogy with the training problem, a solver comes to an inference about solving the new case. To illustrate this, let us take the two classic problems in the research on transfer [Gentner, 1983]. The first (training) problem sets a military goal: a general wishes to capture a fortress and the only way to do it is with a full-scale direct attack, but it is impossible for a large force to pass to the fortress. The solution is to send the soldiers via different roads and converge them all simultaneously on the fortress. The new (transfer) problem describes a medical issue: a type of ray could be used to kill a cancerous tumor; however, in the dosages needed it would also kill the surrounding tissue. The approximate similarity patterns will be built as

follows: soldiers → beams; fortress → tumor; narrow access routes → tissue destruction; military power → radiation dosage [Gentner, Smith, 2012]. This comparison produces an inference: multiple low-intensity rays should be simultaneously directed toward the tumor from different directions.

At this stage, the training problem solution method should be encoded at the abstract level as a principle of converging forces coming from different sources. Thus, a structural analogy with the transfer problem can be drawn. However, if the training problem is encoded at the level of surface features (tumor, X-rays), the analogy with the correct solution method will be unavailable when solving the transfer problem.

We can see that transfer success factors are obviously in conflict here: whereas the first stage requires surface-level similarity to retrieve a similar problem from memory, the second stage implies element-level similarity to find structural matches. Given that surface similarity often does not entail a structural one and may be misleading, the conflict becomes twice as significant, especially in the learning context, which we will dwell upon below.

At the third stage of transfer, the solver evaluates the goal relevance of the produced solution, the analogy and its inferences [Gentner, Smith, 2012]. The role of mental representation is minimal here, giving way to metacognitive skills, such as control.

2.4. Conducive learning

The learning approaches proposed by the modeling conception correlate poorly with the postulated mechanism of applying acquired knowledge in new situations. Contrastingly, researchers of transfer seek to connect logically the learning methods with the mechanism of transfer.

2.4.1. Understanding the abstract structure and the role of concrete examples in learning

As ample research proves, understanding the deep structure of training material is absolutely vital to enable correctness of using acquired knowledge in new contexts. It means that problems should be encoded at the abstract level, i. e. surface features of specific contexts should not be included as key elements in a mental representation. With abstract-level encoding, acquired knowledge can more easily be transferred to the most diverse concrete situations of new problems than with learning from a few concrete examples and associating solutions with specific surface details of a context.

At the same time, specific surface-level similarities allow for memorizing a similar problem solved in the past as a prerequisite for spontaneous transfer. In order to detect a surface-level similarity, one should be familiar with features of specific types of training problems. Abundant context features facilitate access to training problems when dealing with new ones, which increases the chances for a successful transfer. In this theoretical perspective, learning should be based on material rich in contextual features and detailed examples that will facilitate retrieval. Besides, examples also probably fa-

cilitate understanding of the problem structure. So, should training material be abstract or associated with possible contexts of potential applications?

This dilemma inherent to transfer postulates is supported by ambivalent experiment results (for a more extensive discussion, see, e. g. Reeves, Weisberg [1993]). On the one hand, it was shown that solution methods are more easily transferred from abstractions to concrete examples than vice versa. Students who had learned arithmetic progressions (algebra, abstract level) were very likely to recognize that physics problems involving velocity and distance can be addressed using the same equations. In contrast, students who had learned the physics topic almost never exhibited any detectable transfer to the more abstract isomorphic algebra problems [Bassok, Holyoak, 1989]. Qualitative studies also prove that understanding the abstract structure of a problem plays an integral role in the mechanism of transfer [Robertson, 1990].

The so-called schema-based instructions also confirm the effectiveness of abstractions for transfer. Studies demonstrate that schematic representation, i. e. identifying the problem schema, ensures better understanding of the underlying structure of the problem [Logie, 1995; Poltrock, Agnoli, 1986] as well as effective problem-related communication [Abdullah, Halim, Zakaria, 2014]. However, schematic representations only proved to be useful for solving difficult problems, whereas in simple problems it only increased cognitive load without facilitating the process. Researchers explain this discrepancy in schema effectiveness by saying that difficult problems require a bundle of operations, so schemas come in handy, reducing the short-term memory load [Beitzel, Staley, 2015; Zahner, Corter, 2010].

On the other hand, there are findings that confirm the need for “applied”, context-rich problems and concrete examples for a good transfer. For instance, students who previously participated in the application exercise activities transferred statistical knowledge to real-life applications more successfully compared to students who did not do any application exercise [Daniel, Braasch, 2013].

More in-depth studies revealed that transfer performance is affected not by context-based training problems and examples as such but by their learning applications, their correlation with the abstraction under study and the degree of difference between them. Only instances compared to one another to derive a general schema for a class of instances facilitated forward transfer, compared to situations where instances were offered but no comparison was provided [Gick, Holyoak, 1980; Kurtz, Boukrina, Gentner, 2013]. It also turned out that a simple instruction to solving method is not enough, and neither are simple example-based illustrations. Only searching for similarities across instances or between an instance and the general schema increases the likelihood of forward transfer substantially [Gentner, Loevenstein, Thompson, 1999].

Examples that revealed links between the abstraction under study and required calculations facilitated application of the abstraction in new contexts, while examples and training problems designed to enhance calculation or procedural skills showed no positive effect on transfer [Catrambone, Merrill, 2003].

The extent to which contexts in training problems are different has contradictory effects on the learning process and forward transfer. Close similarity between contexts allows students to derive the problem structure but has no great impact on forward transfer. When contexts differ in a number of features, deriving the common structure consumes a lot of time and effort, but forward transfer is considerably enhanced [Didierjean, Nogry, 2004; Gick, McGarry, 1992].

On the whole, it appears that teaching abstractions and the abundance of instances in training material alone play no important role. Rather, what matters is student's activities aiming to derive the common principle from concrete context-abundant problems or to detect the worked abstraction in various detailed contexts.

The methods of deriving the problem structure, or the common principle, may be different. Apart from working with training examples, direct structure-deriving orientation and activities are also effective, like marking explicitly the subgoals of a complex math procedure [Atkinson, Catrambone, Merrill, 2003].

2.4.2. Learning attitudes

Many researchers agree that transfer performance depends heavily on the learning attitudes of teachers and students. This follows from the studies comparing the effects of constructivist and traditional classroom learning [Engle et al., 2012; Serafino, Cicchelli, 2003]; the studies where students are encouraged to identify conditions relevant for knowledge application on their own and to explain their ideas not only to their teacher or class but also to other people; the studies where potential extracurricular applications of what is learned are demonstrated and students have to deal with these "extended applications" on a permanent basis; the studies where students are allowed to correct their mistakes on their own, etc.

Another collection of studies have to do with developing an attitude to a specific type of cognitive work, i. e. establishing the habit of analyzing the structure of a problem before trying to solve it. One of the few studies in this line shows that students who previously solved a problem requiring analysis of interrelations are likely to interpret new problems from the same perspective [Bliznashki, Kokinov, 2010]. Ann L. Braun and Mary Jo Kane succeeded in developing the skill of searching for structural analogies between examples as a habitual thinking pattern in preschool children [Brown, Kane, 1988].

Transfer is also enhanced when students change their orientation from *performance* goals to *mastery* goals. *Performance* means succeeding in training tasks and demonstrating one's skills as compared to the rest of the class, while *mastery* implies achieving per-

sonal learning and self-development goals associated with long-term success. The change from *performance* to *mastery* goals in the motivational profile of students has a positive effect on various aspects of the quality of learning, including transfer. In a recent study on learning of negotiation strategies, two teams were given different instructions: for one, immediate achievement and error minimization were emphasized, while the other was instructed to master the material [Bereby-Meyer, Moran, Unger-Aviram, 2004]. No differences were found in near transfer. However, in problems with modified scenarios and new condition features (far transfer), the team primed with mastery goals performed better than the team primed with performance goals. Similar results were obtained in a study where students were given different goals: immediate goal achievement vs. free exploration of a problem in the absence of a specific goal [Vollmeyer, Burns, Holyoak, 1996].

2.4.3. Metacognitive skills

The skill of analyzing a problem to derive its underlying structure, which is so useful for transfer, is very close to a set of skills that are considered indispensable for solving any types of problems: critical thinking, self-reflection, control, planning, and introspection—usually referred to as metacognitive skills. There is every reason to expect that purposeful development of these skills will contribute to a successful transfer of acquired knowledge to new situations. Surprisingly, very few studies address metacognitive skills as a predictor of effective transfer. Yet, there is empirical evidence that the development of metacognitive skills actually enhances transfer, for instance, by encouraging reciprocal learning that promotes introspection and self-monitoring [Bransford, Schwartz, 1999].

The role of metacognitive skills is also confirmed by research on the effects of the learning programs involving self-explanation, i. e. explaining to oneself specific steps in the solution, discussing with oneself the goals, the results and the relations between consecutive actions. This research revealed that students with well-developed self-explanation skills elaborate a strategy to solve a problem instead of chaotically trying different ways to find a solution and that transfer skills are enhanced by using strategies. Michelene T.H. Chi and her colleagues [Chi et al., 1989] found out that students who used self-explanation in learning performed much better in transfer-related problems. Self-explanation represents a two-fold mechanism, integrating new information with relevant inferences and helping students detect and repair any inconsistencies between the constructed mental model and the proposed problem situation [Chi, 2000]. (For similar studies providing a more in-depth analysis of the effects of different self-explanation techniques under different problem conditions, see Renkl et al. [1998]; Atkinson, Catrambone, Merrill [2003].)

Table 1. The structure of knowledge application in modeling and transfer

Object (what is applied)	Modeling	Transfer
	Mathematical language	Varies greatly
Context (where it is applied)	In theory: real-life situations. In practice: mathematical word problems	Varies greatly
Mechanism/Process (how it is applied)	The procedure: 1) structuring (constructing a situation model); 2) mathematizing (encoding the situation model in the mathematical language and transforming it into a mathematical model); 3) model manipulations, calculations; 4) interpreting (judging) the result	The procedure: 1) retrieving a similar problem from long-term memory; 2) drawing a structural analogy, comparing, aligning, drawing inferences; 3) judging the constructed analogy
Conducive learning	Learning conditions favoring effective modeling are only described in general terms because modeling as such is considered part of a broader culture of “conscious” teaching of mathematics. Such conditions, in particular, include: understanding the importance of modeling by both teachers and students; creating a “modeling discourse”; teaching the modeling strategy directly to students; allowing students to establish correlations among different mathematical topics as well as between mathematics and real life on their own; metacognitive skills; a constructivist framework in learning	<ul style="list-style-type: none"> • comparing concrete examples so as to derive the underlying structure shared by problems; • developing transfer orientation; • developing problem analysis focused thinking; • metacognitive skills of analysis, reasoning, self-assessment, self-explanation, etc.

3. Conception convergence: the key cognitive steps toward knowledge application

To summarize what we have said about the nature of transfer and modeling and about the methods of providing conducive learning environments, we reduced the above discussion to a table (Table 1). The first fundamental difference between modeling and transfer is the relative narrowness of the former and wideness of the latter. The modeling construct has to do with mathematical language application as a school subject and its only educational outcome. The scope of application is said to embrace all sorts of real-life situations, but in fact, modeling skills are learned from mathematical word problems representative of real-life situations. Transfer is described as the result of any type of learning, and the scope of application is also unlimited in theory. From this perspective, the transfer conception looks more promising for achieving the learning goals than the modeling conception. However, there have been few studies on the process of transfer, so additional effort is required to develop the relevant learning technology.

There is a certain similarity between the two conceptions in terms of describing the mechanism of knowledge application. Both modeling and transfer imply constructing a situation model for the new problem. In both conceptions, the situation model serves to structure a specific situation in more general, abstract terms. In fact, it represents a common description of all isomorphic problems, as it includes no surface features specific to each individual problem. Both concep-

tions approach this step as crucial for providing successful knowledge application.

However, the rest of the process differs: in transfer, the solver compares situation models of the training and transfer problems and decides on the possibility of solving the latter one; in modeling, the modeled relations become even more abstracted and the general terms describing the situation model are re-encoded into even more abstract mathematical symbols.

Mathematical models are only used in the modeling conception, while there is no such element in transfer. A mathematical model allows for establishing precisely the quantitative relations in the situation model. In addition, a constructed mathematical model makes it possible to express one problem structure element through another, to assess how changes in one value affect the dynamics of another, and to perform other mathematical operations. Not only mathematical model manipulations allow for solving a new problem, but they are also used to make predictions and find boundary conditions for all isomorphic problems.

Both modeling and transfer place paramount importance on the possibility of making representations, different in the degree of abstractness but still synonymic. "Synonymic" means that all the key elements of the source concrete problem can always be found in the statement, whatever the level of generalization. In modeling, we have a problem (a real-life situation) and several steps of translating it into an ultimate abstraction to construct a mathematical model and back to interpret the mathematical solution into the real-life context. In transfer, there are two conventional levels of statement, concrete and generalized, and one transformation, i. e. construction of a situation model. At the same time, each transformation in any of the conceptions suggests that structural consistence between the levels of statement should be maintained (provided).

Differentiating between the levels of abstractness/generalization is purely conventional, just as the levels themselves are. It only serves to show that a situation model is described in more abstract terms than a concrete situation, and a mathematical model is more abstract than a situation model. In fact, we would prefer addressing them as an uninterrupted transition in the *concrete—abstract* continuum than as discrete levels.

Our analysis shows that constructing a structural statement of a problem (situation model) is a crucial knowledge application step in both modeling and transfer. Another indispensable procedure in both conceptions is structural comparison, i. e. establishing consistencies between situation statements of different degrees of generalization. Based on this idea of prerequisites for adequate knowledge application, we can reevaluate the conducive learning practices proposed by each of the conceptions. First, everything associated with developing the right motivation and attitude may be interpreted as nonspecif-

ic assistance to activate cognitive activities as such, structuring being an isolated case of these activities. Second, the greatest importance among metacognitive skills belongs to analyzing, comparing and generalizing, which form the basis for structuring and structure comparing. Third, the key role is played by direct instructions to compare superficial differences through isomorphic problems and then abstract the structure they share.

Structuring and comparing as the fundamental prerequisites for transfer may be used as training problem assessment criteria. If students engage in comparing processes or situations represented at different levels of generalization or in different symbolic systems (text—diagram—function), or if they transform one representation into another maintaining the structural consistency, such work is expected to promote the formation of highly transferable knowledge.

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Leading Online Education from Participation to Success

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Abstract. Online education has grown exponentially over the last few decades, churning through a swarm of acronyms, ambiguities and potentialities. Substantial energy has been invested in producing technology, building academic capability, and understanding learners and markets. Though it feels pervasive, online educa-

tion is comparatively new in the scheme of higher education, and key education and business models remain in formation. To spur advancement, this paper argues that as online education matures increasing energy must shift from admissions and provision to ensuring each learner's success. We argue that online education presents new opportunities not just for the mechanics of higher education, but for improving each student's experience and outcomes. Central to such advancement is a clear picture of study success, cogent perspectives for understanding students, effective strategies for analysing and interpreting huge volumes of data, and more evidence-based academic leadership. The paper investigates each of these areas, provoking what institutions could seek to achieve.

Keywords: higher education, online education, quality of education, student's experience, evidence-based academic leadership.

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Introduction

Effectively leading the student experience is essential to the success of higher education [Bryman, 2007]. Such leadership must be responsive to changing contexts and technologies. To that end, this paper outlines a strategy that optimises opportunities presented by the maturation of online education. The strategy is grounded in a picture of what we're seeking to achieve, and the paper begins by advancing a model of study success. From there, it proposes new approaches for understanding and measuring the student experience, and examines the leadership required to spur change.

Online education has grown exponentially over the last few decades, churning through a swarm of acronyms, practices and poten-

tialities. The term ‘online education’ encompasses many things, and in this paper is used to refer to formal education that involves the use of computing technologies, irrespective of where the education takes place. This plays out in varying ways, from fully-online education, myriad hybrid forms of teaching and learning, to education which is wholly online. Online education has been advanced as a key means for re-configuring higher education to supply, and in certain cases create, new forms of demand [Beetham, Sharpe, 2013; Laurillard, 2013]. It conveys intrinsic advantages, offering people an alternative means for interacting with teaching resources, delivering myriad forms of media, and supporting a plethora of communication and decision-making options. Substantial energy has been invested in producing technology, building academic capability, and understanding learners and markets. Though it feels pervasive, online education is comparatively new in the scheme of higher education, and key education and business models remain in formation [Laurillard, 2013].

In essence, this paper argues that as online education matures, energy must shift from quantity to quality—from seeing online education mostly as a means of getting more people into higher education, to focusing instead on ensuring quality. Just like learners, as systems and institutions and technologies develop, focuses should shift from ‘access’ to ‘success’. This means moving beyond behavioural preoccupations with access and retention, to instead explore a broader suite of qualitative considerations regarding success. To achieve this, we advance a strategy that incorporates a broader conceptualisation of student success, new ways of thinking about students, and more expansive forms of evidence.

As noted, much discourse and practice surrounding online education frames the idea of success around input-side considerations such as admission, basic behavioural transactions, and retention. As argued in earlier analyses [Coates, 2006], there are other conceptions that could productively be used, which would lead to a richer understanding of education success. In particular, we assert the value of shifting focus from input-side considerations of access and participation, to outcome-based conceptualisations of success. The concept of study success is complex and has not been subjected to sufficient conceptual analysis, so we offer a model below.

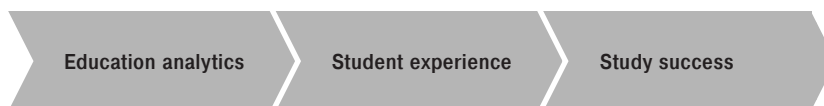
The strategy we present is underpinned by a new means for understanding students. ‘Going to uni’ is no longer what it once was— a seminal life event or stage, a coming of age almost, for the relative few. Massive increases in the demand for higher education have disrupted traditional notions of student identity [Naylor, Baik, James, 2013]. Students today source identity-building experiences from a broad range of study, lifestyle and employment opportunities. Such change drives a need to revisit basic assumptions about who students are, what they seek from higher education, the expectations that shape their experience, and how institutions can best help each student. Most

of the entrenched conceptualisations of students were formed many years ago in far-away places, and rest on crude group-level sociological generalisations [Astin, 1993; Hu, Li, 2011; Kuh, Hu, Vesper, 2000; Stage, 1988; Zhao, Gonyea, Kuh, 2003]. So, we assert the need to instead look through different prisms that give life to the experiences of people. In essence, we need to shift from analysing the experiences of groups, to instead analysing the successes of people. By blending earlier work on students with more contemporary perspectives the paper asserts the need for a suite of new intersectional constructs relating to student identity, expectations, wellbeing, engagement, values, opinions, attitudes, interests, commitments and lifestyles.

Built into our proposed strategy is the realisation that the techniques we use to study students' experiences must also change. In no small part, the now well-institutionalised focus on groups is an artefact of the methodological, analytical and processing limitations of the traditional student survey. Response rates for many surveys are in decline, the explained variance is low, and stakeholders seem increasingly unresponsive to results [Nulty, 2008]. More effective electronic footprints are available such as those that students create through their interactions with courseware, social networking and other systems. With mobile technologies, people analytics and other techniques made possible by rapid advances in technology, we now have the tools and data required to conduct more sophisticated and individualised analyses [Higher Education Commission, 2016]. Hence we propose a sustainable shift in focus from student surveys towards education analytics.

Hence this paper sets forth a major new line of work examining the success of higher education students. Who are the individuals entering higher education, and how can institutions better manage their experiences as they progress through study? How can we move beyond the suite of popular but limiting constructs on retention and experience, to look instead in more dynamic ways at who people are and what they need to succeed? How can we get information on each and every student, not just the fifth who respond to surveys, and how can we explain more than a fraction of the variation in people's experiences? How can we help institutions and academics change? These are deep and broad yet basic questions which require us to better understand how an increasing number and range of individuals approach higher education, students' identities and expectations, and how institutions can manage and enhance people's experiences.

But why complicate matters with this integrated analysis? In summary there is a pressing need for joined-up leadership, education, and institutional research: higher education management needs to become more evidence-based; work on the student experience needs to move beyond reliance on survey rituals that reify mythical sociodemographic groups; and institutional research (including various emerging forms of 'big data analytics') needs to become less a-theoreti-

Figure 1: **Strategy logic**

cal [Naylor, Coates, Kelly, 2015]. Figure 1 depicts the design space in which the paper is positioned. Finding a sweet spot which unites practical, theoretical and technical angles carries valuable potential for maturing the evidence-based leadership of higher education. Making this step requires the creation and adoption of a ‘new ethnology’ for higher education.

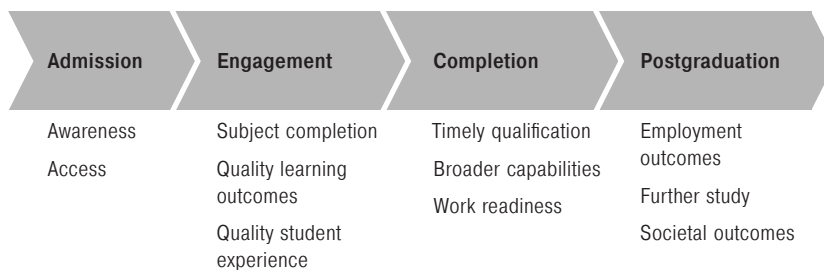
This paper conveys a strategy to provoke a modest shift in this broad direction. Substantively, we investigate who students are and what they expect from higher education—an inquiry that goes beyond stereotypes, generalities and dated assumptions about demography and contexts. Technically, we explore sustainable new approaches for measuring and reporting on these new constructs and profiles. We progress the field of education analytics and help institutions leverage under-utilised existing data for quality enhancement. Practically, we shed new light on how institutional leaders and managers could use new insights and data sources to monitor and improve the student experience. Overall, our analysis seeks to jump beyond dated myths and rituals to instead exploit the opportunities offered by the maturation of online education.

Framing student success

As higher education has grown and diversified, so too has the challenge of helping each learner succeed. The reasons for participation have proliferated, as have the programs, environments and post-graduate pathways. This changed context makes it more important than ever to develop practice-relevant conceptualisations about what is sought through higher education. While clearly not a task that can be approached or accomplished in any easy or conclusive way, it is likely that a basic frame—even one which is highly contestable—carries genuine potential to inform future progress. The key question guiding this task is: ‘What does higher education want for students?’ If the answer—presumably—is ‘success’, then what is a useful way of conceptualising this phenomenon? In the remainder of this section we advance a normative model of success, articulated as a basis for subsequent investigation of student identity, institutional research to inform leadership.

The concept of study success is complex and has not been subjected to widespread conceptual analysis. In this section, we model different facets of study success. Figure 2 provides an overview of the proposed model. The model outlines several thresholds of increasing

Figure 2: **Model of study success**



success. While it focuses primarily on academic matters, it does so in a contemporary way which recognises the broad nature of a person’s higher education engagement. The following description sets out the normative architecture of the model. Subsequent analysis explores how these ideas may play out in context, and be underpinned by data.

Admission Simply becoming aware of higher education is an important facet of success, regardless of a person’s ultimate attendance [Behrendt, Larkin, Griew, Kelly, 2012]. While substantial work is unfolding to better link higher education with precursor opportunities—not least, or only, through better alignments between qualifications, more generalizable credit structures, and more transparent and granular learning outcomes—still the fraught nature of life, career and cross-sectoral transitions often renders incomprehensible even to industry experts entry into the foreign world of higher education.

For many potential students, the first measure of success in higher education is gaining access to an institution or course. A number of factors, including academic preparation, aspirations for further study, and ability to actually enrol and attend higher education, contribute to whether students are successful in terms of their access. To date, most research into access has focused on particular segments of the student population, such as people from structurally defined disadvantaged groups or people entering selective courses, but it is important to recognise that most students would feel a sense of achievement in gaining access to higher education [Behrendt et al., 2012; Gidley, Hampson, Wheeler, Bereded-Samuel, 2010; Godden, 2007; Naylor, Baik, James, 2015].

Engagement Getting involved in higher education is of course just the first of many possible successes possible in higher education. Once engaged in study, a further basic sense of success involves simply passing the units in which a person enrolls. This, of course, implies a lowest common denominator conceptualisation of success (‘at least 50 per cent’), which may be problematic in situations especially involving professional degrees where a particular standard of performance is

expected and yet a student has achieved a bare minimal pass. It also begs the question of whether '50 per cent' at one institution is the same as '50 per cent' at another—almost certainly not the case given the almost complete lack of cross-institutional calibration mechanisms [Coates, 2014a]. Increasingly these are policy rather than technical intricacies, and hint at the complexities surrounding even this basic threshold of success.

Defining success as simply passing subjects sets a very low standard for academic success, and other markers must be prescribed. Given that subjects are graded at more than just a pass/fail basis suggests that we recognise that there are different levels of quality, and recent major efforts have been made to advance more encompassing and scientific notions of such success [Ibid.]. A further definition might be achieving or exceeding an individual's own academic expectations. This is a more student-centred definition that emphasizes the oft-quoted transformative nature of higher education. Here, success is defined as students exceeding personal expectations of their own potential, and touches on the transformational possibilities of higher education.

Study success may also be defined as relating to particular attributes of the student experience. Here, a successful student is one who is engaged in an appropriate way with her or his higher education experience, either with academic experiences or broader life outside the classroom [Zepke, Leach, 2010]. This type of success could apply to individual subjects or semesters, or as a reflection on a broader experience overall. For that reason, it seems appropriate to separate it from the conceptions of success that apply clearly during study, or at completion.

Completion Qualification completion is an obviously important facet of success. Discussions of gross completions as well as retention swirl around this topic. Seemingly simple, completion is not without complexity given many people engage in higher education without seeking a qualification—especially with the increased emphasis on lifelong learning and the move away from traditional, full-time enrolment. There are also questions about whether degree completion should be bound by time constraints, which gets messy given notions of transfer and articulation.

Successful graduation is more than a technical affair, and also increasingly requires the acquisition of a broader set of graduate capabilities. There would appear to be a core set of such capabilities—such as social, interpersonal, critical and leadership skills—along with capabilities nuanced by particular institutional and professional contexts. As well as developing generic skills, a vocational view of higher education might define success as developing specific skills required to practice the role or career in which a student has trained. The tension, particularly in professional degrees, between teaching discipline con-

tent as opposed to work-related skills, demonstrates that this is not quite the same as simply completing a qualification.

Postgraduation Clearly, a host of outcomes flow from completion of a qualification. Gaining employment is particularly important [Coates, 2014b]. But is being employed enough, or is being employed in a career that substantively uses the skills developed in higher education enough? Is someone with an engineering degree who doesn't work as an engineer successful? And does the extent of employment matter? Over what period of months or years should employment outcomes be reviewed [Coates, Edwards, 2010].

As well as vocational and broader social outcomes, study success in higher education often flows into further higher education. Someone completing an associate degree may move onto a bachelor's, or shift from bachelor's to master's, or progress from master's to doctoral, then research or teaching roles at varying points along the way. In this way academic success carries the potential to spur further academic success.

Looking more broadly, a societal view of success looks towards the contribution made by higher education participants towards a more productive, well-informed, aware or just society. The emphasis on public engagement, as well as community access programs and the like, emphasises the importance of this role for higher education. Whether or not students pass their subjects, or are satisfied with their experiences, or complete their degrees, is not as important through this lens as whether they are able to contribute more fully to society because of their study. Again, this is the broad goal of traditional liberal arts education.

While traditionally framing the student life-cycle from entry to exit, the success model extends the temporal and conceptual dimensions of higher education to consider deeper and broader cultural dynamics influencing notions of student success. As new ways of delivering and experiencing higher education evolve, the success model provides a framework that takes into account the diversity of student motivations, experiences and outcomes relative to a normative understanding of success.

Recreating the student experience
Embracing complexity Clearly, succeeding in higher education means different things to different people. While the preceding conceptualisation of success is deliberately decontextualised to the point of theoretical generality, to be of any use it needs to be made real in particular individual contexts. In establishing settings for the future of online education it is important to improve the approach to identifying people.

This section asserts the need to embrace substantially more complexity than has hitherto been the case. In essence, we assert the need to shift from viewing students through the lens of mythical so-

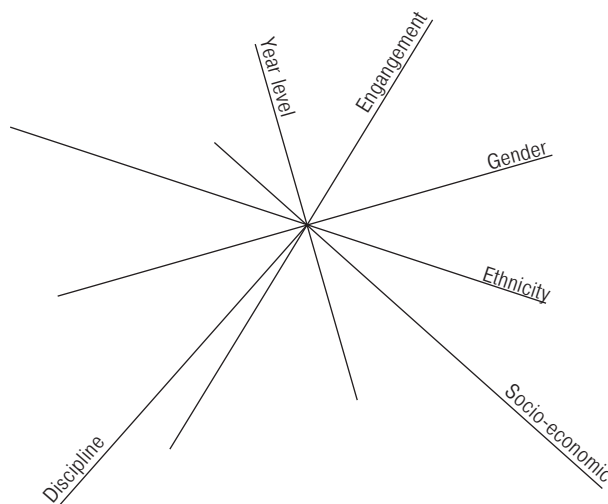
ciological groups, to instead looking through prisms that give life to each person. As the following discussion highlights, this is not just a linguistic slip, but a fundamentally different way of conceptualising the identity of those people who study in higher education. We believe that this shift—broadly, from treating each student as a group member, to treating each student as a person—will likely require much work, particularly in developing robust education analytics, but will ultimately be productive.

From groups to individuals We contended that group-level classifications provide insufficient insight into disadvantage, due primarily to their lack of resolution and their static nature. Research on educational equity has provided frameworks to describe several aspects of student identity, such as ethnicity [Cross, 1991; Ferdman, Gallegos, 2001; Helms, 1995; Kim, 2001], sex and gender [Bem, 1981; Carter, 2000], and sexual orientation [Cass, 1979; D'Augelli, 1994]. These frameworks are inadequate when trying to explain the complexity of student identity in which personal characteristics (socioeconomic status, gender, race, sexual orientation, plus a host of highly individual factors) intersect with features of the collegiate environment (institutional type, academic program, extra-curricular activities) [Braxton, 2009].

An alternative approach is to look beyond aggregate groupings for an approach that more deeply unpacks the extent and nuances of people's identities. A key step here is to shift from dissolving people's identities into broad, unchanging classifications, to exploiting the particularity and dynamism that patterns each person's experience [Jones, McEwan, 2000]. A first move in this direction involves the development of evidence-based typologies based on the needs, behaviours, or cognitive or motivational factors. Examples include those based on Clark and Trow's seminal 1966 study, or Astin's 1993 typology. Many further student typologies in higher education have been developed in the United States (for a summary see: [Coates, 2007]), where there is more of a tradition of this type of research. While they would need revision before being generalised to other contexts, most are based on analyses of many thousands of students and similar categories have been identified over time and by multiple researchers which highlights the integrity.

Towards hyper-intersectionality We invoke the idea of 'intersectionality' to extend this approach. Dill and Zambrana [2009. P. 1] define intersectionality as "an innovative and emerging field of study that provides a critical analytic lens to interrogate racial, ethnic, class, physical ability, age, sexuality, and gender disparities and to contest existing ways of looking at these structures of inequality". Research in intersectionality presents a way in which the connection between aspects of identity are influenced by context [Torres, Jones, Renn, 2009]. It is well proven that disadvantage can be compounded rather than additive. Examples in-

Figure 3: **Example hyper-intersectionality**

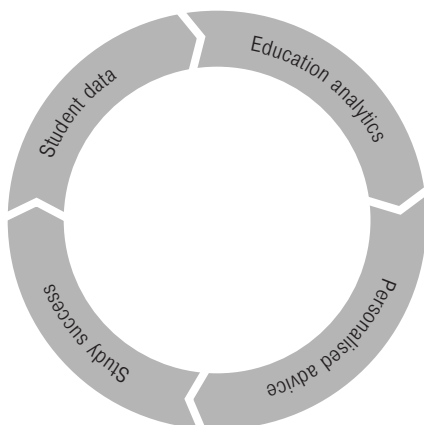


clude interactions between Indigeneity and socioeconomic or remote backgrounds, or interactions between field of study, gender and sociodemographic factors and attrition [Gale, Tranter, 2011]. Despite such insights, research in this area has been limited to mostly binary understandings of intersectionality, such as ethnicity and international status [Malcolm, Mendoza, 2014], gender and race [Linder, Rodriguez, 2012], or ethnicity and religion [Rockenbach, Mayhew, Bowman, 2015]. We assert the strategic value of extending the work of student typologies further, both conceptually and technically, to identify people as a series of intersecting vectors.

The concept of ‘hyper-intersectionality’ forwarded in this paper is the idea of using intersecting vectors of quantitative metrics to account for differences in the numerous identity criteria listed above. Using algorithms to connect student admissions data, education analytics can predict student performance in desirable student outcomes such as grades, persistence, and retention. The appeal of this process is that, unlike the a-theoretical analysis of click-stream data, for example, the interpretations of such findings can be linked with theoretical understandings of student development. However, neither basic nor applied research has yet produced the resources to identify these vectors and meaningful intersections between them [Abes, 2009]. New typologies predicated on data beyond demographics need to be created.

Of course, a required step is to determine how best to identify people. It falls to empirical institutional research to determine what factors are needed to sufficiently identify students. Figure 3 starts to build a picture of how this might be done, showing a range of sample

Figure 4: **Data-driven approach to student success**



personal, environmental and situational factors. As in any general multivariate segmentation activity it would likely require dozens of factors to profile students sufficiently to create managerially and educationally useful profiles. Institutionalised reporting of such profiles would help understand who students are and how to help them succeed.

**Creating
education
analytics
Evidence for
success**

Conceptual consensus acknowledging the need to understand the diversity of today's students is insufficient to advance development. Effective change requires shifts in institutional culture and practice. We suggest that such change should be evidence-based, underpinned by data that identifies who students are and what they need from institutions to succeed. Figure 4 visualises this data-driven shift towards student success.

As technology enabled education stabilises to become an integrated element of institutional and student life, new kinds of data are being spawned that harbour the potential to personalise the education experience. Online education systems that are used to manage the student experience from admission through to graduation and beyond, have the potential to supply information for better understanding students and helping them succeed [Jackson, 2012; Higher Education Commission, 2016]. While there may be an abundance of information on students, however, data siloing—the lack of interoperability between systems and the non-collection of data—prevents the effective use of integrated information about the student experience, hindering progress. Hence multifaceted change is needed to facilitate the collection and analysis of experiential student artefacts for the purpose of understanding students and promoting success. Broadly, we contend, this involves a shift away from the conventional methods used

to study the student experience into new territory defined in terms of various forms of 'analytics'.

Higher education analytics

The empirical foundations of the strategy proposed in this paper rest on the notion of 'education analytics'. Education analytics, most broadly, is understood as the use of data to explain and predict, allowing action on complex education issues. It is helpful to position such analytics in terms of emerging research and practice.

The use of analytics in higher education is considered to have evolved from 'data-driven decision making' that defined 'business intelligence' during the 1980s and 1990s [Picciano, 2012]. With origins of practice in commerce for business management, the use of analytics in pedagogical environments has taken longer to develop [Goldstein, Katz, 2005] and is currently in an early-adoption phase. The use of analytics in higher education has developed rapidly over the last five years with the proliferation of digital systems, platforms and devices. The field of 'learning analytics' has taken shape, which in a formative conceptualisation is defined by Siemens and Gašević [SOLAR, 2011] as "activities concerned with the measurement, collection, analysis, and reporting of data about learners and their contexts, for purposes of understanding and optimizing learning and the environments in which it occurs". The use of analytics for institutional purposes is referred to as 'academic analytics' [Long, Siemens, 2013]. As well, 'social learning analytics' seek to provide information about the construction of knowledge by groups of learners [Buckingham-Shum, Ferguson, 2012].

Education analytics rest on the generation and storage of vast amounts of data, which in turn rests on the incorporation of large-scale systems into core facets of higher education. Such systems are now integrated in operations such as admissions, enrolment, fees and loans, curriculum, assessment, resources, student support, library, survey instruments, applications, general and official communication. Data from such official systems provides the foundations for education analytics. This includes demographic and personal information submitted by the student for enrolment, and academic information generated by students and staff. But limitations on the completeness and connectivity of data sources within and across institutions restricts use [Long, Siemens, 2013]. In addition, teachers and students use a vast range of non-institutional systems to support learning and broader interactions, and data from such platforms can be difficult to source or access [West, 2014].

We assert the need for greater strategic use of education analytics at a formative stage of the field's development. While international scholarship exploring the theory and practice of analytics in higher education is surging [Siemens, Dawson, Lynch, 2013], the use of analytics in applied institutional and national settings remains muted. A study of institutional data use in the United States, for instance, found

that most data collected by institutions is for credentialing or reporting requirements rather than addressing strategic questions, and that much of the data collected are not used at all [Bichsel, 2012]. While the application of analytics for strategic objectives is developing, current practices are often fragmented, opportunistic and theoretically limited. Recent approaches towards the collection of more nuanced student information and the integration of greater sources of information promise to provide greater insight into student identities, including learning behaviours, motivations and needs. The potential for the use of analytics to retrieve student data not just from official sources but from platforms and applications not technically supported by institutions reflects further opportunities.

From retention to success

To date the primary use of analytics has focused on student retention. Examples of analytics designed for this purpose have been executed by different institutions through a variety of methods, and supplemented by a range of interventions both digital and physical. One of the most cited examples is Course Signals developed at Purdue University in the United States [Arnold, Pistilli, 2012]. The analytics system uses data from the learning management system in combination with demographic and other information mined across university sources to gather prior academic history (including secondary school) and academic preparedness. The use of analytics largely for retention purposes reflects a traditional 'top-down' approach to student support by harnessing information that identifies a problem for the teacher or institution to resolve, rather than advancing a more evidenced-based and success-oriented understanding of how students learn and what motivates them to succeed.

Focussing on the use of data for retention has in large part ignored the potential for personalised and adaptive systems to enhance the experience of all students in a much broader range of ways. Education analytics needs to mature to help institutions ensure each student's success. Broadening the scope of analytics using more diversified data sources has the potential to inform a greater range of purposes suited to individual students, such as scholarship eligibility, international exchanges, internships, alternative course offerings, extra-curricular opportunities and employment. Creating more sophisticated analytics carries the potential to not only steer student success along the pathways defined above, but to also influence the skills and knowledge sets developed in higher education [Gibson, Kitto, Willis, 2014]. As a young field of practice and research, the potential use for analytics has yet to be considered in full. However, a recent report from the United Kingdom's Higher Education Commission [2016] asserts that the scope of analytics for broader service to students to improve their whole experience, personalise information and empower them is fast becoming a priority for institutions despite low levels of implementation in learning analytics [Newland, Martin, Ringan, 2015].

By way of example, rather than implement discrete student surveys and administrative data collections, institutions could map data requirements against the model of success (Figure 2) and salient facets of student identity (Figure 3). Data could include previously collected but under-analysed and non-integrated information in existing systems and also incorporate new types of behavioural or cognitive information that has hitherto been out of scope for institutional data collection, analysis and reporting. The derivation of education analytics could then underpin personalised advice to relevant stakeholders—students, teachers and support personnel—with a view to providing the individually focused support that has been shown [Coates, 2014b] to help each student succeed.

**Enhanced
academic
leadership**

We have argued that as each student's use of learning technologies increases and diversifies, institutions have the opportunity to understand the changing identities of students, and to steer each towards success. Students invest heavily in higher education to realise a multitude of outcomes. No longer passive actors within higher education settings, students today are diverse learners in an increasingly diverse and evolving environment resistant to traditional descriptors based on broad demographic categories. The advent of education analytics promises to provide personalised, adaptive and real-time learning environments for each student. Yet education analytics alone are insufficient to advance higher education. Multidimensional leadership is required that joins-up education analytics with a more nuanced notion of who students are and how they experience higher education to enhance study success.

Indeed, effective academic leadership lies at the heart of any strategic change in this area. Such leadership must come from a variety of sources—people in formal leadership roles, teaching academics, support and advisory personnel, the environments people establish, and of course learners themselves. It is important to keep squarely in mind in any such analysis that the nature of academic work is changing [Coates, Goedegebuure, 2012], and new hybrid functions and hence roles are emerging, not least in the field of analytics. Furthermore, higher education is an essentially co-produced activity, and even the best institutions in the world will not inspire success unless students in particular and also a range of other agents engage.

What, then, are the most effective means for building capacity and impelling the strategy charted in this paper? First, there is an urgent need to ensure that online platforms support a range of education and management functions. These tools are not context neutral, and at a minimum we contend that they must furnish metrics to advance the elements of success outlined above. Second, there is a need for case study research that demonstrates the value to institutions and individuals of adopting a broader evidence-based approach to online edu-

cation. Clearly, there is a need to motivate institutional leaders to shift energy beyond preoccupation on access and retention issues. Third, as online education further expands it is necessary to implement various forms of professional development to build the capabilities and competencies linked with success.

Though difficult to generalise across institutions and people, higher education has been slow to adopt evidence-based forms of practice. There would appear to be various reasons for this, not least the political economy of the sector, history and culture, the rapid growth of institutions and analytics, and the fact that much that matters in higher education can be very difficult or complex to measure. Nonetheless, there is a growing need for more evidence-based change. We affirm the need for academics rather than governmental or commercial stakeholders to advance the strategy outlined in this paper.

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Social Capital of Students in the Light of Social Networks: Structure and Key Actors Analysis

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Abstract. The social capital of students is an important resource developed at university, along with professional competencies. We analyze friendship and study help networks among first-year students, examine network structures, and calculate network parameters and

correlations between them. Student relations in different programmes are identical in nature, which is proven by similar structures of both friendship and help networks. We identify statistically significant correlations between network parameters of outcoming and incoming interpersonal ties, as well as between academic performance and peer network status. Friendship ties are more numerous, stable and reciprocal than study help ones. Each network has students who hold the key positions in terms of betweenness and popularity. Academic performance is a significant factor affecting student status in study help networks. We suggest that students holding the key positions in both betweenness and popularity enjoy the best opportunities for using their social capital.

Keywords: higher education, social capital, social networks, study help networks, friendship networks, popularity, network centrality, betweenness.

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When studying in university, students not only obtain new knowledge but also develop social ties, which actually represent their social capital. The latter is a multidimensional phenomenon difficult to measure, so no universal definition exists for it as yet. In the broadest strokes, social capital can be regarded as a resource that actors use to pursue their interests [Gradoselskaya, 2004]. In a classic definition by Pierre Bourdieu, social capital is described as a resource linked to membership in a social group or social network, where the volume of such capital possessed by a given agent depends on the size of the network of connections they can effectively mobilize [Bourdieu, 1986].

Social capital facilitates production [Coleman, 1988], helps in finding a job [Granovetter, 1973¹; Yakubovich, 2005] and promotes innovation [Burt, 2009]. The role of social capital in education is manifest in peer effects: academic performance of a student depends not only on their competencies, personal characteristics and traditional learning environment factors but also on the characteristics and achievements of their peers [Epple, Romano, 2011; Poldin, Yudkevich, 2011].

James S. Coleman emphasizes that social capital is not lodged in actors themselves, it rather inheres in the structure of relations between people [Coleman, 1988]. Therefore, social capital should be studied in conjunction with the concept of social network. The same opinion is shared by Radaev [2002], who defines social capital as a network of social ties of different levels. Thus, social capital can be measured using the characteristics of the network itself and the local characteristics of its actors.

In this article, we analyze the structure of social networks among first-year students of a national university in Nizhny Novgorod and identify the most powerful points in the networks. The data was obtained through a survey of first-year students majoring in Business Informatics, Management, Economics and Law. The questionnaire included questions about the socioeconomic status of respondents, their place of residence, part-time jobs, friendship relations with peers and learning-related interactions with them. Using the survey results, we construct oriented graphs describing friendship and peer support networks, and analyze their main characteristics and the correlations between them.

Applying the social network approach to peer interactions among students is logically relevant [Biancani, McFarland, 2013; Krekhovets, Poldin, 2013]. The approach had been used to describe processes both in schools [Ivaniushina, Alexandrov, 2012; 2013] and universities in Russia [Valeeva, Poldin, Yudkevich, 2013; Pronin, Veretennik, Semenov, 2014]. An overview of social network research in higher education allowed Susan Biancani and Daniel A. McFarland [2013] to reveal the lack of “descriptive works on social networks of students”, which is especially true for Russian studies. This work is an applied study designed to fill the gap by providing a detailed description of the structure of social networks among university students.

1. Social networks of students

1.1. Help networks

While studying, students may work on team projects or help one another in solving training tasks, thus building a social support network. The questionnaire asked students to name the peers that they asked for help most often. The nominated students were classified as helpers. The resulting help network involved over 80% of first-year students.

¹ Translation available [Granovetter, 2009].

Table 1. **Attributes of help networks among first-year students**

	Economics	Management	Business Informatics	Law
Number of students	96	87	81	44
Number of ties	351	251	202	81
Network diameter	10	9	9	8
Average geodesic distance between reachable nodes	4.43	3.78	4.13	3.47
Average number of helpers	3.7	2.9	2.5	1.8
Density (%)	3.9	3.6	3.1	4.3
Proportion of reciprocals (%)	30.8	29.5	17.8	22.2

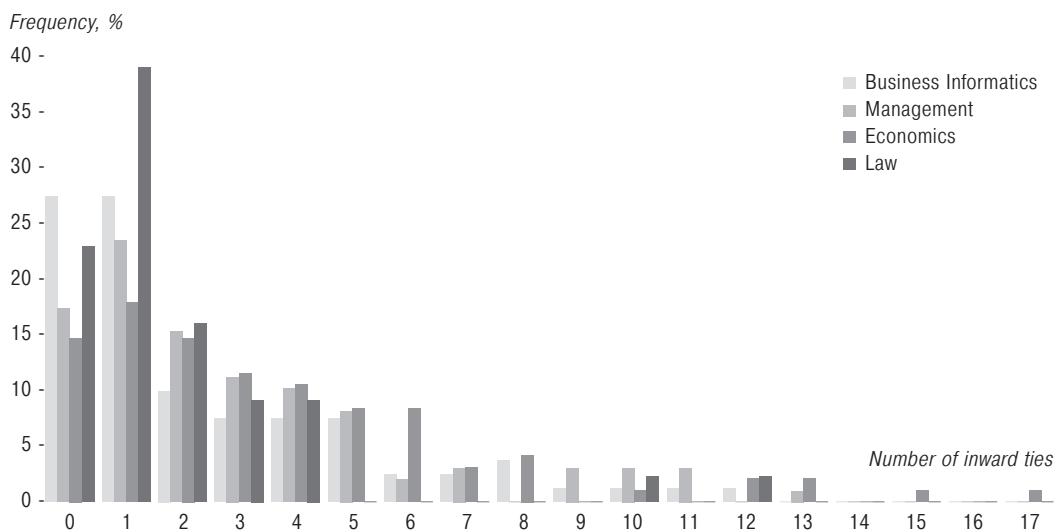
Table 1 presents the standard network characteristics of peer help networks.

We describe the network structure using the density index, which is defined as a ratio of ties in the given network to the number of all possible connections within it [Wasserman, Faust, 1994]. The networks that we analyze have a rather low density, from 3.1% to 4.3%, which is quite typical for social networks as people have limited social circles and the number of real interactions is normally much lower than it potentially could be.

We revealed that network diameter and average geodesic distance between reachable actors are more or less the same across the departments. The distance is measured by the number of (non-oriented) relations in the shortest possible walk from one actor to another. The diameter of a network is the largest geodesic distance in the network. These characteristics show how close the network nodes are from one another, allowing us to assess how fast information is distributed within the network. On average, two students from one department need a chain of four ties to interact on the learning issues, the diameter of the network being from 8 to 10. These parameters depend on the size of the network and the number of nodes and ties, so the highest indices are found in the Economics Department (as the largest one) and the lowest in the Law Department (half the size of the other departments).

The average number of helpers is determined based on the average degree of a network. The degree of a node is the number of connections it has to other nodes in the network, i. e. the number of all nodes connected to the given one [Wasserman, Faust, 1994]. As soon as we use directed ties to describe networks in this study, we can calculate the in-degree and the out-degree for each actor, i. e. the number of peers who named the student as a helper and that of peers nominated as helpers by the student. The number of inward ties shows

Figure 1. In-degree distribution in support networks of students



the popularity of the student in the network, while the number of outward ties shows the student's activity.

According to the results we obtained, the lowest number of inward ties is found among law students, where each actor has on average two peer helpers, as compared to 2.9 and 2.5 in the Management and Business Informatics Departments, respectively, and 4 in the Economics Department.

The degree distribution (histogram) displays how often different degrees can be found in the network. Figure 1 shows the in-degree distribution, which reflects popularity in the network.

As we can see from the figure above, the most frequent situation is where a student is asked for help by one peer. From 10% to 22% of students in different departments do not help their peers with their studies, as no respondent nominated them as helpers. Students who are asked for help more often than others hold the most important position in a help network. The forms of in-degree distribution are pretty much the same across the departments.

Table 1 also displays the proportion of reciprocal ties in support networks. This parameter shows how many pairs of students nominated each other as peer helpers. The average proportion of such pairs in the sample is 25%. This result is quite logical: if a low performer asks a high performer for help, there will hardly be any reverse tie between them. Reciprocal ties are more likely to form between students with similar levels of academic performance.

Help networks among students of different departments are very similar in their structure. Insignificant variations in network parameters are mainly explained by the different sizes of the departments.

Table 2. **Attributes of friendship networks among first-year students**

Attribute	Economics	Management	Business Informatics	Law
Number of students	105	97	93	60
Number of ties	537	486	452	244
Network diameter	8	7	10	6
Average geodesic distance between reachable nodes	3.8	3.2	4.3	2.7
Average number of friends	5.1	5	4.9	4.1
Density (%)	4.9	5.2	5.3	6.9
Proportion of reciprocities (%)	67.4	63	63.3	51.6

1.2. Friendship networks

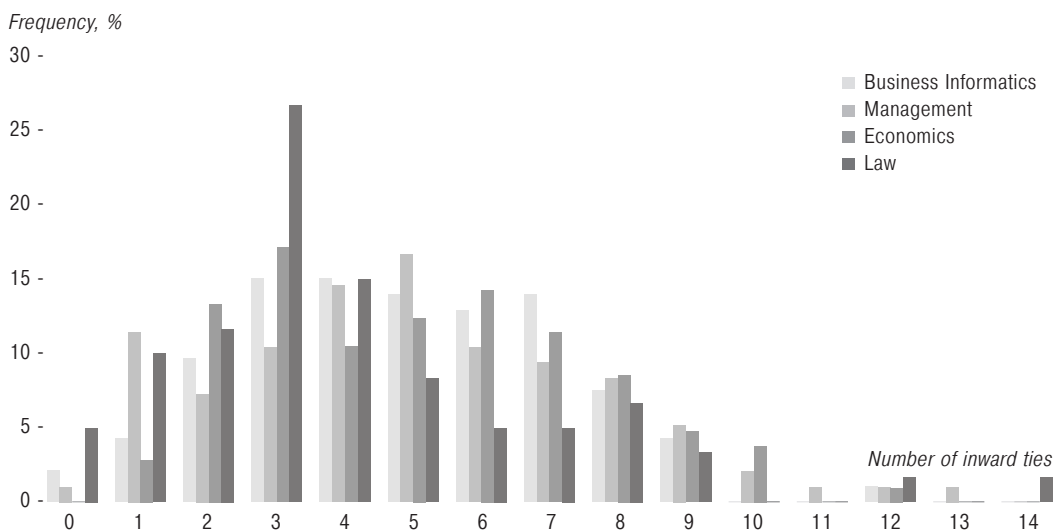
Ronald S. Burt defines social capital as friends, colleagues, and general contacts through which the actor receives opportunities to use his or her financial and human capital [Burt 2009]. As far as friendship ties are informal, they are easier to form and to maintain: friends share not only the university but also their interests. Friendship ties most often serve the basis for numerous studies devoted to the social networks of students.

To construct friendship networks, we asked students to specify the peers with whom they communicated the most, regarding the nominated peers as friends. The survey results allowed us to build oriented friendship networks for the four departments, which included over 95% of enrolled students. Table 2 presents the quantitative characteristics of the friendship network structure.

The density of friendship networks varies from 4.9% to 6.9%, which is almost twice as high as in help networks. In other words, students create many more social ties not related directly to studies, being more likely to engage in informal interactions.

Students are interrelated closer in friendship networks than in help networks, which is proved by lower social remoteness indices: network diameter and geodesic distance. Within the friendship networks, a law student needs the least number of ties to interact with any other law student. The longest chain, judging by the network diameter, is typical of the Business Informatics Department: this is partially explained by the fact that different student groups in this department often have classes in different locations far away from one another, so students have fewer communication opportunities. The longest chains in management and economics comprise 7 and 8 ties, respectively. Meanwhile, only 3.5 ties are required to make friendship interactions in all departments. In addition, the geodesic distance is 15–20% shorter in the friendship networks than in the help networks for all departments except Business Informatics where this parame-

Figure 2. In-degree distribution in the friendship networks



ter is the highest of all, which also has to do with the specific organizational aspects.

We also calculated the proportion of reciprocal ties within the friendship networks. It varies from 51.6% to 67.4%, averaging 61.4%, i. e. over 60% of pairs of students identify each other as friends. The proportion of reciprocal ties is much higher in friendship networks than in help networks. One of the reasons for this structural difference lies in the mechanism of formation of social ties in different types of networks. Help ties mostly develop between students with different levels of academic performance; they are one-way, directed from low performer to high performer. Reciprocal ties in help networks are most likely to emerge between students with similar levels of attainment. Contrastingly, friendship ties are structured by the effects of homophily and geographic propinquity [McPherson, Smith-Lovin, Cook, 2001], which make the ties reciprocal in most cases due to their nature.

On average, every student in the four departments has four or five friends among their peers. Unlike in help networks, friendship networks involve a great number of social ties among the actors.

The degree of an actor is an essential parameter showing the actor's status in the friendship network. The more friends a student has, i. e. the higher the in-degree, the more popularity and power he or she enjoys in their social network. Figure 2 displays in-degree distribution in the friendship networks.

As we can see from the histogram above, the in-degree distribution patterns are virtually the same in all departments. Most students have from three to seven friends among their peers. Some students were not nominated as friends by anyone. Yet, their proportion is only

about 2%, which is much lower than in the help networks where over 15% of students have no inward ties at all. Students listed as friends by many peers are the key actors of the friendship networks. The structure of in-degree distribution is different in friendship and support networks. We can suggest that in a help network, students prefer calling on one or two responsive high performers for help, while the network of friendship ties is much more expanded.

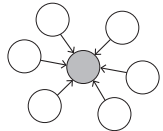
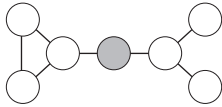
All in all, there are no considerable structural differences among the friendship networks in different departments. The minor discrepancies in specific parameters can be explained by the difference in size. Every student has on average four or five friends among their peers; there are also students who build no peer contacts as well as those who are particularly popular. The friendship networks feature a higher density and a close social distance between the actors, over 50% of the friendship ties being reciprocal.

2. Student popularity in help and friendship networks

Analysis of an actor's position means a lot in terms of describing the structure of a social network. The location of "central" actors is a major objective in network assessment [Freeman, 1979]. Centrality is one of the most effective actor's positioning tools [Abraham, Hasanien, Snášel, 2009; Friedkin, 1991], showing the position of a node relative to all other nodes in the network. Several centrality measures have been studied by researchers; we will only use the two classic indicators of degree centrality and betweenness centrality. Table 3 describes these indicators and provides relevant calculation methods.

Degree centrality shows the actor's position in the network based on the number of ties. When graphs are directed, two measures of degree centrality are normally analyzed: in-degree centrality and out-de-

Table 3. Indicators of centrality in social networks

Indicator	Calculation formula	Graphic interpretation
Degree centrality	$C_d(i; G) = \frac{indeg_1(G)}{n-1},$ where $indeg_1$ is the number of in-ties	
Betweenness centrality	$C_b(v) = \sum_{s \neq t \neq v \in V} \frac{\sigma(s, t v)}{\sigma(s, t)},$ where $\sigma(s, t)$ is the number of shortest paths between vertices s and t , $\sigma(s, t v)$ is the number of shortest paths between vertices s and t that pass through node v	

gree centrality. The former is calculated based on the number of in-ties, while the latter considers the number of out-ties.

Degree centrality is easy to calculate and may be very useful in a descriptive analysis of social networks, allowing one to identify the key actors or the most important social groups within the network. People or groups with the highest degree centrality have a significant influence and more access to information from other actors than those with fewer ties and thus a lower degree centrality.

When measuring betweenness centrality, we analyze an actor's position based on the number of shortest paths between vertices that pass through that actor. Therefore, betweenness centrality describes the actor's position between other actors, i. e. his or her role as a bridge. The node that lies on the highest number of shortest paths will have the highest betweenness centrality. Such individuals act as intermediaries between other actors, forming bridges between different social groups in the network. Their role is crucial for creating and maintaining social contacts and sharing information.

There are students in friendship and help networks who are listed as friends and helpers more often than others. They have the highest in-degree centrality, being the most popular actors within their social networks. To identify the most important intermediaries in the analyzed networks, we measured betweenness centrality for all of the respondents. Figures 3 and 4 display the distribution of betweenness centrality in the friendship and help networks of students. The histograms demonstrate that the peak of distribution falls on the students whose betweenness position is rather weak. The most prominent actors, who account for 5–10% of students in all departments, have a much higher betweenness centrality, which is typical of both help and friendship networks.

Thus, the analysis of in-degree distribution in friendship and help networks showed that there are leaders in both types of networks in every department. Based on the distribution of in-degree centrality, we can deduce that every department has a few students who play pivotal roles in student interactions within the network.

3. Regression analysis of correlations among network characteristics

In this chapter, we analyze statistical relationships between parameters describing the actor's position in the network as well as between these parameters and some individual characteristics, such as academic performance, gender, level of income, living in a dorm, and combining work and study. Academic performance is measured using the mean score in the first term of the first year of studies, which we take from formal student ratings. We have to standardize the mean score by departments to avoid distortions due to different grading systems. To do this, we subtract the mean department score from the mean student score and divide the difference by the standard deviation; as a result, we get a value with a zero mean and unit variance.

Figure 3. **Distribution of betweenness centrality in friendship networks**

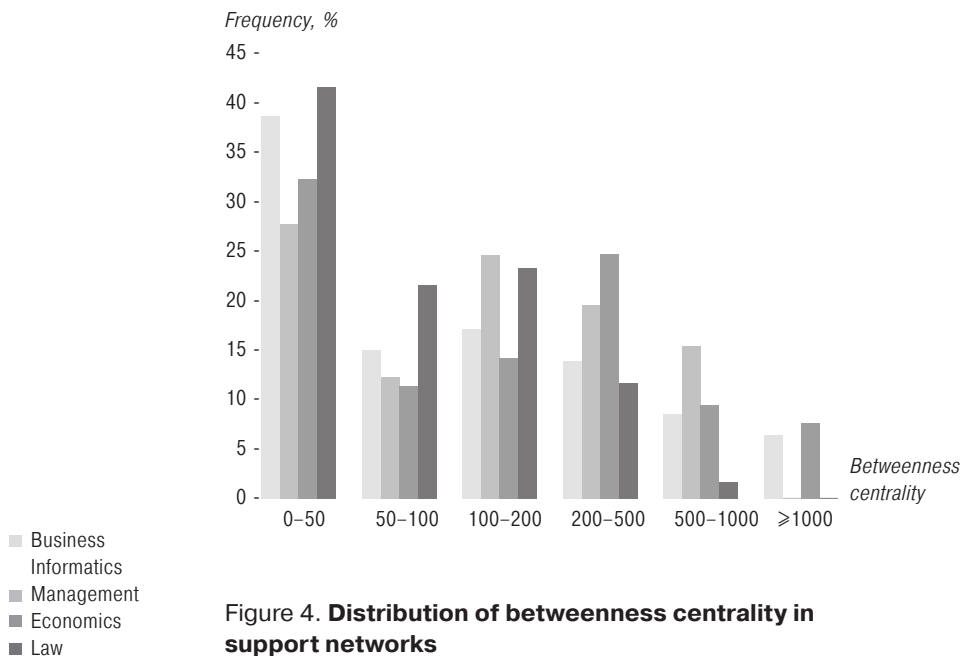
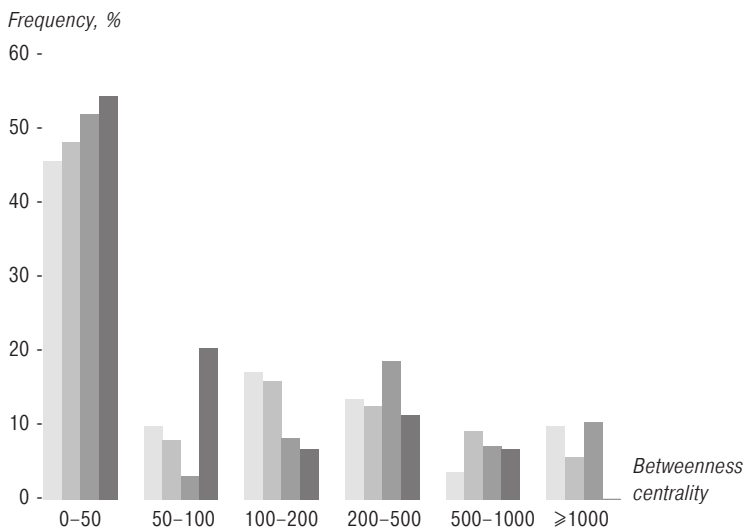


Figure 4. **Distribution of betweenness centrality in support networks**



The “level of income” variable represents an indicator which takes on a value of 1 if student classifies his or her financial standing into one of the four categories offered².

² The categories were determined based on students’ answers to the question: “Please describe the financial standing of your family”. The following

Table 5. **Descriptive statistics of variables**

Variable	Number of observations	Mean value	Standard deviation	Minimum value	Maximum value
Average score (standardized value)	299	0.014	0.984	-2.790	2.481
Gender (male = 1)	303	0.330	0.471	0	1
Living in a dorm (yes = 1)	301	0.150	0.357	0	1
Financial standing = 1	12				
Financial standing = 2	40				
Financial standing = 3	174				
Financial standing = 4	32				
Combining work and study (yes = 1)	303	0,201	0,402	0	1
In-degree centrality (friends)	302	0.202	0.402	0	1
Out-degree centrality (friends)	303	0.056	0.031	0	0.237
Betweenness centrality (friends)	303	0.062	0.024	0.010	0.169
In-degree centrality (helpers)	303	0.031	0.048	0	0.394
Out-degree centrality (helpers)	279	0.030	0.034	0	0.203
Betweenness centrality (helpers)	279	0.033	0.023	0	0.136

Table 5 presents the descriptive statistics of the regression variables. We interpret the regression estimators below as correlational relationships, not as cause-effect relationships where changes in regressors entail changes in the regressand.

Table 6 shows the estimators of regressions where in-degree centrality in friendship and help networks is the regressand. Columns 1 and 3 provide regression estimators based on network characteristics only. Columns 2 and 4 also take additional factors into account. As we can see from columns 1 and 2, student popularity in the friendship network correlates positively with activity in the same network and popularity in the help network. Help network popularity also correlates positively with friendship network popularity but shows weak and negative correlations with help network activity. Unlike in the friendship network, student popularity in the help network depends largely on academic performance: naturally, high performers are asked for help more of-

choice of answers was offered: 1—We have enough money for daily expenses, but buying clothes is rather difficult; 2—We have enough money for food and clothes, but buying a TV, a fridge, etc. is rather difficult without taking a loan; 3—We are quite well-off but would have to save a lot or borrow money to buy a car or to go on an expensive vacation; 4—We are affluent, we can afford to buy an expensive car or to go on an expensive vacation.

Table 6. **Regression estimators of correlational relationships for in-ties**

	(1)	(2)	(3)	(4)
	In-degree centrality (friends)	In-degree centrality (friends)	In-degree centrality (helpers)	In-degree centrality (helpers)
Out-degree centrality (friends)	0.508*** (0,086)	0.530*** (0,103)	-0.159* (0,091)	-0.121 (0,076)
In-degree centrality (helpers)	0.294*** (0,053)	0.261*** (0,076)		
Out-degree centrality (helpers)	0.081 (0,115)	0.085 (0,126)	-0.119 (0,086)	-0.032 (0,079)
In-degree centrality (friends)			0.449*** (0,110)	0.252*** (0,095)
Average score (standardized value)		0.002 (0,002)		0.020*** (0,002)
Gender (male = 1)		0.005 (0,004)		0.002 (0,003)
Living in a dorm		0.001 (0,004)		0.006 (0,005)
Financial standing (1)		-0.011 (0,010)		-0.003 (0,008)
Financial standing (2)		-0.002 (0,007)		-0.014** (0,007)
Financial standing (3)		-0.003 (0,006)		-0.005 (0,006)
Financial standing (4)		-0.003 (0,006)		-0.005 (0,008)
Combining work and study		0.002 (0,004)		-0.001 (0,003)
Constant	0.013** (0,006)	0.013* (0,008)	0.019** (0,008)	0.026*** (0,007)
Number of observations	279	263	279	263
R ²	0.294	0.273	0.137	0.425

The values in brackets represent standard errors; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

ten. The significant role of non-network parameters in the help network can be observed in column 4, where the coefficient of determination (R²) grows thrice as high as in column 3.

Table 7 describes similar relationships but with out-degree centrality as the regressand. Friendship network activity correlates positively with help network activity and friendship network popularity. Help network activity correlates positively with friendship network activity, but the student's popularity has little significance here. Students who live in dorms appear to be less active in the support network. Per-

Table 7. **Regression estimators of correlational relationships for out-ties**

	(1)	(2)	(3)	(4)
	In-degree centrality (friends)	In-degree centrality (friends)	In-degree centrality (helpers)	In-degree centrality (helpers)
Out-degree centrality (friends)	0.347*** (0.054)	0.323*** (0.051)	0.062 (0.083)	0.061 (0.085)
In-degree centrality (helpers)	-0.071* (0.040)	-0.077 (0.048)	-0.060 (0.042)	-0.024 (0.058)
Out-degree centrality (helpers)	0.184*** (0.057)	0.162*** (0.057)		
In-degree centrality (friends)			0.206*** (0.060)	0.191*** (0.067)
Average score (standardized value)		-0.001 (0.002)		-0.002 (0.002)
Gender (male = 1)		-0.003 (0.003)		-0.004 (0.003)
Living in a dorm		0.001 (0.003)		-0.012*** (0.003)
Financial standing (1)		0.019* (0.010)		0.001 (0.011)
Financial standing (2)		-0.002 (0.006)		0.007 (0.006)
Financial standing (3)		0.004 (0.005)		0.007 (0.005)
Financial standing (4)		-0.002 (0.005)		0.004 (0.007)
Combining work and study		-0.001 (0.004)		-0.003 (0.004)
Constant	0.039*** (0.004)	0.039*** (0.006)	0.019*** (0.004)	0.017** (0.007)
Number of observations	279	263	279	263
R ²	0.229	0.247	0.069	0.116

The values in brackets represent standard errors; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

haps, students in dorms are likely to study together and rather ask their neighbors for help.

Table 8 displays the regression estimators of correlational relationships for betweenness ties. Betweenness centrality in both friendship and help networks correlates positively with popularity and activity in the respective network. In the help network, the regressors explain a much larger amount of variation in the regressand: 31.6% as compared to 7.9% in the friendship network for a “long” regression and 26.9% as compared to 4.2% in the friendship network for a “short” regression.

Table 8. **Regression estimators of correlational relationships for betweenness ties**

	(1)	(2)	(3)	(4)
	In-degree centrality (friends)	In-degree centrality (friends)	In-degree centrality (helpers)	In-degree centrality (helpers)
In-degree centrality (friends)	0.205*** (0.070)	0.178** (0.079)		
Out-degree centrality (friends)	0.224*** (0.084)	0.283*** (0.093)		
In-degree centrality (helpers)			0.678*** (0.118)	0.717*** (0.138)
Out-degree centrality (helpers)			0.688*** (0.168)	0.778*** (0.187)
Average score (standardized value)		0.002 (0.003)		0.001 (0.004)
Gender (male = 1)		0.014* (0.008)		0.001 (0.007)
Living in a dorm		0.007 (0.006)		0.008 (0.008)
Financial standing (1)		-0.001 (0.007)		-0.011 (0.015)
Financial standing (2)		-0.002 (0.005)		-0.029** (0.015)
Financial standing (3)		0.010 (0.006)		-0.015 (0.015)
Financial standing (4)		0.015* (0.009)		-0.016 (0.015)
Combining work and study		0.006 (0.008)		0.000 (0.007)
Constant	0.006 (0.006)	-0.010 (0.007)	-0.014*** (0.005)	-0.004 (0.013)
Number of observations	303	284	282	263
R ²	0.042	0.079	0.269	0.316

The values in brackets represent standard errors; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

The average score is the regressand in the regression estimators presented in Table 9. The regressors include the actor's friendship network parameters in column 1, the actor's support network parameters in column 2, and the network parameters of both networks in column 3. The USE (Unified State Exam) admission score is included in the explanatory variables in all specifications, being a standardized value. As can be seen in columns 1 and 2, academic performance and popularity in the network correlate positively. However, when the parameters of both networks come into play as factors (column 3), only popularity in the support network remains signifi-

Table 9. Regression estimators of correlational relationships for academic performance

	(1)	(2)	(3)
	Average score	Average score	Average score
In-degree centrality (friends)	6.207*** (1.665)		1.285 (1.719)
Out-degree centrality (friends)	-3.105 (2.679)		-1.000 (2.335)
Betweenness centrality (friends)	0.284 (1.114)		-0.198 (0.822)
In-degree centrality (helpers)		14.597*** (1.683)	14.231*** (1.738)
Out-degree centrality (helpers)		-2.204 (2.042)	-2.240 (2.060)
Betweenness centrality (helpers)		-0.027 (1.034)	-0.011 (1.067)
USE admission score (standardized value)	0.436*** (0.068)	0.288*** (0.062)	0.287*** (0.063)
Gender (male = 1)	-0.366*** (0.111)	-0.215** (0.097)	-0.217** (0.100)
Living in a dorm	0.004 (0.113)	-0.145 (0.100)	-0.145 (0.100)
Financial standing (1)	-0.038 (0.266)	0.112 (0.266)	0.134 (0.263)
Financial standing (2)	0.132 (0.207)	0.366* (0.196)	0.367* (0.195)
Financial standing (3)	0.231 (0.163)	0.311* (0.158)	0.319** (0.158)
Financial standing (4)	-0.081 (0.217)	0.074 (0.200)	0.081 (0.200)
Combining work and study	-0.395*** (0.130)	-0.304*** (0.117)	-0.305*** (0.118)
Constant	-0.096 (0.231)	-0.378** (0.165)	-0.376* (0.209)
Number of observations	282	261	261
R^2	0.329	0.489	0.490

The values in brackets represent standard errors; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

cant, i. e. friendship network popularity in column 1 is due to the fact that some of the friends are helpers, too. The correlation between popularity as a helper and academic performance is easy to explain. Interestingly, male students have a considerably lower average score than that which is implied by other factors including the USE admission score.

As follows from the above, there are statistically significant correlational relationships between network characteristics of in-ties and out-ties as well as between academic performance and the actor's position in the social network of peers.

4. Conclusion This paper provides an analysis of the social networks that students form while studying at university. We study learning-related interactions and friendship relationships among students. Friendship networks have a much higher density, which means there are more interactions among students than in help networks. Friendship networks also feature a higher level of reciprocity. There are few reciprocal ties in the help networks, where helpers are normally better-performing peers. Therefore, we can suggest that friendship networks are more important than help ones in terms of social capital accumulation.

Student interactions in different departments are identical in nature, which is proved by structural similarities between friendship and support networks. The insignificant variations in network parameters are explained by the different sizes of the departments, not by specific characteristics of the learning process.

Both types of networks have actors who play a pivotal role. Popular students have a high in-degree, while active students have a high out-degree.

Student popularity in a friendship network correlates positively with activity in the help network. The most popular actors in help networks are also popular in friendship networks. Help network popularity correlates positively with academic performance, which is quite natural, as high-performers are the ones to help their peers with studies.

There is also a positive correlation between activity in friendship networks and in help networks. The more friends a student lists, the more helpers he or she has, and vice versa. Students who are popular in friendship networks are also the most active, while there is no such correlation in help networks. Living in a dorm decreases help network activity. Perhaps students in dorms solve learning-related issues together and ask other peers for help less often.

Apart from popularity and activity, we also measured the indicators describing the betweenness position in a network. Intermediaries act like bridges connecting all other actors with one another. We revealed positive correlations between intermediary status and student activity in both friendship and help networks. Students with multiple social contacts become prominent intermediaries in the network, and conversely: if multiple paths pass through an actor, he or she becomes popular and begins to create new contacts. We can suggest that students who hold the key positions in a network in terms of both betweenness and popularity enjoy the best opportunities for using their social capital, as their status allows them to involve their social

ties in university to maximum effect. Meanwhile, the key actor position in help networks correlates with academic performance.

Understanding the mechanism of social tie formation and the positions of specific students in social networks is practically important to maintain social and academic interactions among students throughout the period of study. University management and faculties can use this information when allocating students to groups, dorms or team projects. Obviously, apart from the relatively easily observable factors like academic performance, gender or place of residence, a student's position in a network is also affected by other individual characteristics, the role of which is yet to be analyzed.

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The Paradox of “Practical Liberal Arts”.

Lessons from the Wagner College Case for Liberal (Arts) Education in Eastern Europe

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Abstract. The article presents the case study of Wagner College curriculum as an example of paradoxical transformation within contemporary liberal education. The Wagner Plan for Practical Liberal Arts is an important example of overcoming the traditional liberal/vocational distinction in higher education, that has been increasingly challenged by both the economic condition of colleges and wider changes in skills required by the workforce of developed countries.

The Wagner College case is not widely acknowledged, yet it may be important for European liberal education institutions. Even though they are mostly public colleges/programs, they operate in a context that has become increasingly similar to that which Wagner College was facing in the early 1990s. Calls for more liberal education go against governmental expectations, study choices and disciplinary traditions of institutions. Wagner builds on the triple assumption that learning is really practical, that higher education can have a practical impact

on a local community and that broad interdisciplinary knowledge is even more useful preparation for a future career. Such claims, even though controversial, fit well with the pragmatic consensus in American “pragmatic consensus” that strengthened around liberal arts in last three decades.

For Eastern European liberal education, which is a growing field, Wagner provides an interesting example of holistic educational vision that was implemented with relatively limited resources. Apart from administrators, this study may also be of interest to teachers and students who consider the traditional academic setting due to be revamped, even in liberal education programs. Any strategy of development of liberal education in Eastern Europe requires scaling up and making it more relevant for major stakeholders (as happened in the Netherlands and is now taking place in the UK), as well as overcoming the neoliberal pressures and academic reluctance. The Wagner case example may spark much needed discussion on how to accomplish it without losing our soul.

Keywords: Eastern Europe, civic engagement, liberal education, liberal arts education, pragmatism, higher education, practical liberal arts.

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Introduction Liberal (arts) education¹ is becoming increasingly popular among universities worldwide. Just three decades ago, this educational concept was almost exclusively limited to American colleges—especially private, residential liberal arts colleges. Today, there are more than 183 programs, located on all continents in various organizational and curricular settings. About a third of these operate in Europe, and a further third of these are in former Soviet countries [Godwin, 2013]. Notable examples include Smolny College in St. Petersburg, MISH and Kolegium Artes Liberales in Warsaw, the European Humanities Institute in Vilnius and Bratislava International School of Liberal Arts; some younger institutions include the Liberal Arts College of RaNePa in Moscow².

Defining liberal (arts) education is a perennial task and little agreement has been reached as to the essence, format and aims of higher education of this type³. Viewed from the perspective of higher education systems in continental Europe, liberal (arts) education can be considered an innovation: promoting small scale, intensive and interdisciplinary education introducing students to all major fields of knowledge and developing their academic skills. In Eastern Europe, much has been said about its role in providing for active and responsible citizenship and the ability to manoeuvre the realities of global and free-market economies.

The general trend in understanding liberal (arts) education was a kind of a negative definition: the enemy of liberal educators was a single-field, market-oriented education offered by mass scale higher education systems and expected by major stakeholders: the gov-

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² A description of liberal arts programs in Eastern Europe lies beyond the scope of this article. Those interested in particular examples may want to consult—apart from institutional websites Kontowski [2016]; Detweiler & Axer [2012] for Poland, Kudrin [2015]; Becker et al. [2012] for Russia, and van der Wende [2011]; Ivanova & Sokolov [2015]; Gillespie [2001]; Peterson [2012]; Godwin [2015a] for some critical approaches. It should be noted, that neither list of liberal arts institutions in Europe, nor explanation for their recent rise, are agreed by major scholars working in this new field.

³ Some readers may be aware of an article by Jonathan Becker (2014), who proposes the definition of liberal education targeted for non-US audiences; Kara Godwin prepared a set of three criteria (Godwin 2015b), apart from the self-definition; the last approach was also employed in a milestone work by Bruce Kimball [1995a], who traces the history of the concept. Another recommendable work for readers interested in the diversity within liberal arts movement is [Rothblatt, 2003].

ernment, students and their parents and international organizations⁴. Such an unspoken consensus allowed for the most inclusive coalition of liberal educators to happen, especially from countries lacking any grassroots tradition of liberal arts. Studying liberal arts education even within Europe leads to a conclusion that very different things use the same label, but at least there was some kind of an understanding of what liberal arts is not—it is not vocational education.

Yet, the developments within the advocacy movement for liberal arts, led by the Association of American Colleges and Universities, are targeting exactly this assumption. The skills developed in the liberal arts education setting—like critical thinking, problem solving etc.—are what is needed by industries; therefore liberal education is the best preparation for a future job [Hersh, 1997a; 1997b]. This kind of inclusive, approach-based shift allows its supporters a belief in a neoliberal consensus between markets, democracies and student learning and knowledge advancement all requiring, in their different missions, liberal (arts) education [Nussbaum, 2012; Association of American Colleges and Universities, 2012).

In the realities of Central and Eastern Europe, such an approach to liberal (arts) education can prove especially effective. Dismantling the ivy-covered wall of an ivory tower—one common accusation towards classical liberal arts—opens up the discussion of liberal education that can be for everybody (not just elites) and support the chances of students in the job market (rather than asking for lifelong sacrifices). It also creates a more supportive environment for cooperation between academia and businesses, more bargaining power towards most parents, and possibly a stronger foothold against governmental indicators. But obviously, it requires some compromises of the traditional role of academia, both in high-minded theory and at the shop-floor level. Still, without a strong liberal education tradition, lack of private and corporate philanthropy and shrinking resources, many institutions committed to liberal arts may be considering exactly this kind of turn⁵.

⁴ One may argue that this argument goes all the way down to Aristotle and Seneca the Younger, who distinguished *artes liberales* and *artes serviles*, with the latter being useful for economic survival.

⁵ Even in the US, the number of 'purely' liberal arts colleges continues to fall; up to the mid-XIX century they constituted almost 100% of higher education institutions (being "distinctively American" [Hawkins, 2000]); later on the more market- and research-oriented institutions developed, and by early 1990s they started to close down for financial reasons; however, from almost 212 small liberal arts colleges in 1990 [Breneman, 1994], there are no more than 130 just two decades later [Baker et al., 2012]; the numbers do not include liberal arts colleges that are part of major research universities, but clearly suggest the anti-liberal tide across American Higher Education.

The article design

The following article provides a case study of a little-known internationally liberal arts college: Wagner College, located within the confines of New York City. Wagner has been selected for its original bend—and blend—of tradition of liberal arts somewhat closer to the more vocationally oriented and economically stable institutional mission. But in doing so, Wagner did not lose sight of liberal education ideals; it just wrapped them out differently and “updated” its curriculum—and wider operations—to meet the challenges of the 21st century. Its signature is the “Wagner Plan for Practical Liberal Arts”, which is both theoretically controversial and allowing for a survival.

The case study would focus on the idea of practical liberal arts, which can be easier translated for the realities of Central and Eastern Europe than organizational features of a private liberal arts institution. Wagner is also similar to them in being located within big cities, major attractors for economic development; and at the same time, dissimilar in trying to benefit from this location. Wagner is a well-documented, award-winning and complex institution, operating on a common premise of reuniting student learning, community engagement and work preparation in higher education under the common theme of practical liberal arts.

The following sections discuss the idea, history, organization and curriculum of Wagner college. The main part discusses the definition and the aim of practical liberal arts. In discussion the specific features, potential pitfalls and the relevance of Wagner example for Eastern and Central European liberal educators are identified.

Part 1: Wagner and its practical liberal arts
The Idea and the History

Established in 1883, Wagner College was first a Lutheran Ministerium, in its first year serving just 6 students. After initial expansion, in 1918 it moved from its original location in Rochester, NY to its present premises in Grymes Hill on Staten Island, New York, NY. During the first massification phase, it opened its doors to women (1933), and then expanded its size owing to G. I. Bill funded veteran-students and then baby boomers. For the most part of its history it was fairly typical for the United States, a small scale⁶, private, residential liberal arts college, serving mostly the NY state population by offering a liberal arts curriculum.

In the 1970s’ the growth of this private liberal arts college had come to an end with the development of new branches of St. Johns University just across the street (1971), and City University of New York a mile away (1976). Soon enough the first institution with a Catholic character, and the latter with just a fraction of Wagner’s tuition fees have together undermined the position of the Wagner College (Smith 2010, p.xviii). In dire circumstances, the college acted defensively:

⁶ In the US context, it means 1000–2500 students spread across four years.

discounted tuition to the public college level, ceased to be selective, and auctioned some properties. In late 1980s it was practically bankrupt, there were less students applying than places offered and most of the faculty left.

Since the appointment of its new president in 1988, the defeatist attitude has disappeared and Wagner has experienced a tremendous turnaround. In little over a decade later it rose from (lowest) 4th grade to the top tier in the Carnegie Classification⁷. Over 75% of students came from outside the New York and New Jersey area [Guarasci, 2001. P. 106], and the budget was balanced.

Norman R. Smith has to be credited for saving the institution, which managed to overcome a typical conundrum of growing competition, rising costs of teaching and extensive extracurricular activities and services, falling liberal arts enrolments and resulting financial pressure to get rid of residential character, liberal education (including two-year general education protocol)—or even better, both. This wave has first challenged [Breneman, 1994; Neely, 2000], and then forced closure or transformation into vocationally and professionally oriented institutions [Ferrall, 2011; Baker et al., 2012]. To see a bigger picture, one may want to count these ‘distinctively American’, private, residential liberal arts colleges, offering liberal arts and sciences curriculum⁸—an original and major force in American higher education for the most part of its history⁹. From more than 700 institutions in 1955, there remained some 212 in 1990 and, according to a recent study, 130 in 2012. Wagner College was one of the unlikely survivors.

Richard Guarasci joined the institution in 1997 as a Professor of Political Science as well as its Provost and Vice President for Academ-

⁷ Carnegie used to have separate league tables for liberal education institutions (and serious troubles with defining liberal arts education at the same time). In the latest iteration a liberal arts institution is supposed to grant degrees primarily in liberal arts fields and be primarily undergraduate. Of these, 20% were selective [Ferrall, 2011. P. 10].

⁸ By ‘liberal arts and sciences’ curriculum it is assumed awarding degrees in disciplines that have no direct vocational utility (like nursing, business, technology, education), and in many cases only leading to further graduate studies in the disciplines (law, theology, medicine etc.). In the American context, since the gradual abolition of traditional curricula and introduction of a choice-based, contemporary curriculum with the instruction in English, it has never been easy to come up with a positive definition of what is liberal arts education [Bérubé, 2006; Association of American Colleges and Universities, 2012; Gaydos et al., 2007]. As this part explores a particular solution to liberal-vocational tension, this general issue will not be discussed in much detail.

⁹ Aside from trade schools, until the rise of public land-grant colleges from the 1860s almost all four year colleges were private liberal arts institutions. After that period, they were challenged by the research university model, and vocational institutions opened to meet a skyrocketing demand for marketable skills, and later on non-selective, two-year, cheaper junior/community colleges [Cole, 2009; Rudolph, 1990; Geiger, 2011; Graham, 2005; Boyd, King 1975].

ic Affairs. He was a leading force behind the Wagner Plan for Practical Liberal Arts (1998) that focused on making a difference rather than just survival. The Plan encompasses learning communities and reflective tutorials in the curriculum, with civic engagement at the operational design, under an umbrella of integrated and experimental learning [Guarasci, 2003a]. Since 2002 he has served as the 18th President of Wagner College.

The plan was bold, controversial—and most importantly, it worked. By 2000 the U. S. News and World Report ranked Wagner College in its top tier of northeast colleges and universities. In 2000 the Association of American Colleges and Universities identified Wagner College as having one of the most innovative and promising undergraduate curricula in the United States. In an issue released on 9/11, Time Magazine named Wagner College as one of its colleges of the year for its first-year program [Guarasci, 2001. P. 106–107].

“Practical liberal arts” is a forward-looking approach, capitalizing on three main transformations of American liberal education: ‘from instrumental to developmental model of college experience, from consumerist to participatory understanding of learning and from individualist focus to social ecology of learning’ [Sullivan, 2012. P. 144]. Initially the Wagner Plan had a rather accidental relationship with the New York and Tri-State Area [Angelo, 2005]. Over time, the physical environment of the college became prominent in the distinct educational vision of Wagner College.

Organization and the Curriculum

The Student body at Wagner is 1750 students¹⁰, mostly living in one of the most beautiful college campuses in the U.S. (according to the Princeton Review, 2005) in four residence halls. Its facilities, built mostly in the 1950s, overlook Downtown Manhattan and the Atlantic Ocean. The college has its varsity sports Wagner Seahawks team, comprised of 18 disciplines, as well as its own theatre. Of its undergraduate students, 25% take at least one semester abroad, and 45% are engaged in a community service or volunteer work.

There are 96 faculty members, mostly full-time, 35% of them tenured, forming five disciplinary and one interdisciplinary department. Twenty-seven undergraduate majors, as well as eleven minors of pre-professional programs are on offer.

Wagner College publishes its Common Data Sheets, Factbooks,

¹⁰ Wagner was one of the few private LAS colleges that decided to shrink its undergraduate student body instead of further discounting its tuition, a common practice in the aftermath of the 2008 financial crisis (and a driver of further growth in the sticker price). In 2011 there were still 1830 students [Woodhouse, 2015]. It has to be noted that Wagner offers some graduate programs for more than 300 students, in business administration, education, microbiology and health-related fields. The dropout after one year is about 15%, and six-year graduation rates are ca 60–70%.

Assessment resources and Annual reports for everybody interested in quantitative, operational data. As the aim of this report is to provide a description of the vision of liberal education there, those will not be analysed in more detail.

The Wagner College curriculum at present consists of a minimum of 36 units required for graduation¹¹, which are divided into a major (12–18 units)¹², electives from outside the major, and most notably a general education requirement (22–24 units) representing the philosophy of liberal arts education. The traditional liberal education is reflected in distribution requirements (under which students choose ten courses from humanities, social sciences, sciences and arts). Other elements that can be found on many other campuses are foundations courses (basic skills: writing, mathematics etc.), and intercultural understanding courses (American Diversity, International Perspectives).

The practical side of the Wagner curriculum is reflected by their nine courses divided into three learning communities (LC). Each LC is comprised of a common cohort of 28 students who attend three courses. The first LC is the first year program: students take two courses from different disciplines on a common theme; they need to take part in a community involvement activity (service learning, participatory learning, field trips, and community research); and finally they take a writing course in which they link practice with theory (a reflective tutorial). The intermediate LC, during 2nd or 3rd year, combines writing, research and an integrated project to be presented at the end of semester, based on two courses (or one co-taught interdisciplinary course)¹³. The senior LC, taken within the department of the student's major, includes a capstone course, a reflective tutorial and an experiential project—a 'practicum' (field-based internship or applied learning component, taking 100 hours, which includes a writing project and a presentation).

Taken together, this curriculum design combines hands-on learning with more traditional courses, and includes required college-level academic skills with a modern version of contemporary civilization courses [Allardyce, 1982]. In short, the Wagner Plan emphasizes experiential and community-based learning [Guarasci, 2001. P. 107], fully aware of the location of the college on economically and culturally divided Staten Island. It should be clear that this curriculum is "practical" in more than one sense: as practising academic work, as bring-

¹¹ Compilation based on: [Wagner College, 2012; Guarasci, 2003b; Aldas et al., 2010].

¹² Some students may choose to do a double major—similar to two undergraduate degrees pursued by a portion of Eastern European students in the hope of better employability—or an optional minor.

¹³ In some cases, this requirement may be completed by study abroad, Washington Centre internship or independent study

ing theory to practice, and as making oneself practical for the local community and business.

What is Liberal Education for Wagner?

The idea of practical liberal arts, as it has been most recently developing at Wagner¹⁴, connects the engaging classroom (small classes, critical thinking and hands-on learning) with off campus learning by doing community projects and internships.

The “practical” side of liberal education is best defined through our curriculum because of the specific linkages created by our learning communities, reflective tutorials and the commitment faculty make to connecting students with the world outside the classroom [Wagner College, 2011a. P. 136].

This understanding of liberal education was a result of being forced to redefine its positioning in higher education by introducing more engaging pedagogies, developing the civic dimension of undergraduate instruction and rethinking its options given the immediate as well as broader context of operation as a private urban liberal arts college. By overcoming the age-old distinction between *artes liberales* and *artes serviles*, its dedication to ‘practical liberal arts’ led to what one may call success, but not without paying the price for leaving the ivory tower and entering a potentially double-edged relationship to external forces.

Pedagogical benefits of the practical arts [Brint et al., 2005], or experiential learning, are supposed to safeguard the liberal education dimension—especially in learning communities. Much of the Wagner curriculum follows a typical liberal arts college protocol (60% of the modules), including four basic skills and two intercultural understanding classes, and a 10-class elective distribution requirement. Wagner is therefore far from professional or vocational training of its undergraduates, and may be called a liberal education institution.

However, one sign of Wagner’s dedication to the concept of ‘practical liberal arts’ is a lack of a definition of ‘liberal arts’ as such. The liberal arts profile is assumed as obvious, and efforts focus on providing a unique selling point¹⁵.

A Note on the American Context

Understanding the paradox of practical liberal arts requires an introduction to the distinctive features of American higher education. Its development was a dialectic blend of Western European tradition with the physical and social features of the new continent it was serving.

¹⁴ The Wagner Plan has been revamped since 2011.

¹⁵ For a more detailed discussion on liberal-practical discussion in literature, consult Hines Jr. [2005]; Schwartz & Sharpe [2010]; Raelin [2007]; Carver & Harrison [2015].

While democratic and utilitarian values inevitably gave tone to the entire structure, other outlooks, such as those of pure research and liberal culture, continued to exist (in somewhat modified form) within the framework and were not totally assimilated to the dominant ethos [Brubacher, Rudy, 1997. P. 424].

From early on, higher education in America included more disciplines, offered to a larger number of students and a more diversified student body, considered the idea of service important for the institution, and had extensive extracurricula organized—and not merely accepted—by its colleges and universities. These factors are also important in the case of Wagner.

The history of American colleges is filled with tension between the intrinsic and extrinsic value of liberal education [Kimball, 1995a; Rudolph, 1990]—therefore dismantling the Senecian vision of learning just for learning's sake. Tocqueville has already noted, and the argument was well developed by Richard Hofstadter [1963], that Americans by and large had serious reservations against intellectuals, rooted in the democratic spirit (instead of hierarchy-loving aristocratic societies). This idea was responsible for a pragmatic trust within American higher education¹⁶, that over time became more and more influential in shaping curricula and institutional missions. From an external perspective, this was probably the most important reason why higher education was not merely imparting knowledge.

This “something more” could have taken many different forms, from concern over the souls of students [Kronman, 2007], establishing diversity within a college, service-learning and global/community engagement, sport and art-related extracurricular activities and last but not least the idea of including work placements as part of the curriculum. The rising cost of attending college brought increased attention to a value-for-money approach, both in financial cuts for public institutions (mostly by the republican politicians and excluding STEM and vocational fields) [Newfield, 2008], and some re-profiling of private institutions striving to offer towards more applicable knowledge, including liberal arts colleges. This was generally not met with any strong objection, as “student consumerism is a central part of the ethos of American higher education” [Altbach, 2011. P. 245].

¹⁶ In the now classical account: The function of education in inculcating usable skills and in broadening social opportunities was always clear. The value of developing the mind for intellectual or imaginative achievement or even contemplative enjoyment was considerably less clear and less subject to common agreement. Many Americans were troubled by the suspicion that an education of this kind was suitable only to the leisured classes, to aristocracies, to the European past; that its usefulness was less evident than its possible dangers; that an undue concern with the development of mind was a form of arrogance or narcissism which one would expect to find mainly in the morally corrupt [Hofstadter, 1963. P. 309].

The aim of practical liberal arts

Wagner declares that it is overcoming the vocational-liberal distinction by offering ‘practical liberal arts’ education. Since both economic [Slaughter, 1985] and ideological [Carnochan, 1993; Pratt, 1992] discussions within liberal education advocacy came to a sort of dead end in the 1980s, the new mainstream way to defend it focused on quantitative (measurable student experience) and qualitative descriptions (integrative, holistic approaches) of the benefits of this particular educational vision. It was assumed onwards, that the aim of the college was to shape both critical citizens and successful members of a modern economy (or idealist and realist at the same time [Adler, Mayer, 1958. P. 79–94]).

In fact, it is believed at Wagner that liberal arts have a useful, transferable, lasting value—especially through their ability of linking theory and practice beyond immediate applicability [Guarasci, 2003b; Roche, 2010. P. 156–157; Lieverman, Freedland, 2012]. The Wagner plan uses some elements of the ‘new practicality’ agenda [Scott, 1991. P. 24–26], but hopes to use it critically, challenging students’ vision of social structure and ‘useful’ education, and—although it does not say it directly—wants to put their students in situations that will shape their characters.

The main vehicle that is supposed to train students in exercising judgment rather than simply mastering facts [Schwartz, Sharpe 2010] is a learning community¹⁷. Wagner offers three of them, hoping that those new pedagogies—linking engaged classroom learning with off-campus activities—would improve student learning, but also equip them with qualities that together can be summarized as being an active, critical, cooperative citizen¹⁸.

The concept of learning communities has some pedagogical backing: they start with students rather than discipline, require out of class learning and diversify learning experiences [Bain, 2004. P. 110–120]. They are also a ‘high impact practice’ that has been empirically tested to improve student learning [Kuh, 2008; Pascarella, Terenzini, 2005], along with some other practices that are present at Wagner¹⁹.

¹⁷ Wagner was not the first college to introduce Learning Communities, which received some scholarly attention and are becoming even more popular in organising learning environments for liberal education, both in four-year colleges [Lenning, Ebberts, 1999; Smith et al., 2004; Goodsell Love, 2012; Dammien McAuliffe, Buck Sutton 2014] and community colleges (Rosario et al. 2013).

¹⁸ This civic dimension is not incidental in Wagner’s case: “Joining civic engagement and liberal education opens lines of inquiry that promise new pedagogies, ones that place the student and learner as an agent and author of learning and knowledge” [Checkoway et al., 2012. P. 111].

¹⁹ See: first year seminars, common intellectual experiences (in the form of big themes), writing intensive courses (reflective tutorials), diversity/global learning, service/community based learning and capstone courses/projects. Most Wagner students also do internships.

One last note about the democratic [Guarasci, 2003a. P. 29] or practical arts approach is their coincidence with what Kimball calls the “pragmatic consensus” [Kimball, 1995b. P. 89–97]. After many decades of struggling with more idealistic approaches, American liberal education is currently embracing seven pragmatic themes: multiculturalism, values and service, community and citizenship, general education, integration with K-12, pedagogical attention to learning and inquiry rather than just an act of teaching, and assessment. All of them have their place at Wagner, which is part of many civically-oriented initiatives in American higher education²⁰.

Matters of learning and thinking are inseparable from a social ethic, from matters of social action where knowing and practice in the social context are inseparable. They are the very core of civic responsibility (...) a commitment to community (to other) beyond the self [Harward, 2012. P. 14].

Dedication to its community of students, but also the surrounding community of Staten Island, led Wagner to opening of its Port Richmond Partnership in 2008 [Guarasci, 2014; Wagner College, 2013]. “Designed to extend Wagner’s commitment to learning by doing and to rejuvenate an economically distressed community”, it hopes to alleviate the critical situation in terms of health care, education, housing, and employment. Recent, largely undocumented migrants are targeted with various interventions that allow students to apply their knowledge in practice, propose solutions to social problems (e. g. obesity) and open the pathways for promising high school seniors to attend classes at Wagner College over the summer, community advocacy projects, internships and civic learning field trips.

One may be interested in what other habits of the heart can cultivate such closeness to New York, with the multiple business opportunities that Wagner embraces as well. But Wagner’s approach seems consistent and realist: it may well be that not all of the students share the civic approach of the institution, but one cannot at the same time claim to develop strong, independent learners, and expect them to come in just one shape. Practicality, a three-dimensional matrix of engaging pedagogies, service learning and internship opportunities lies at the heart of what Wagner believes to be a feasible modern update for liberal arts education. The overall attitude is therefore practical, both at the mission, promotion and curriculum level, and at the floor level of real actions that Wagner College undertakes to prove its dedication to the ideal.

²⁰ For example, Campus Compact, Bringing Theory to Practice, as well as learning communities oriented Washington Center for Improving the Quality of Undergraduate Education.

Part 2: Discussion
Turnaround, fame
and price

The turnaround story of Wagner College ranges from the point where it was ‘completely out of money’, (with senior administrators leaving, faculty demoralized, reputation tragic and to make things worse: under-admission [Smith, 2010. P. 8]) to the point where its prizewinning engaging curriculum is used as an example of putting effective educational practices into practice two decades later [Association of American Colleges and Universities, 2007. P. 35].

At Wagner College the change was deep and quick. Trust and innovation became soul mates. Involvement has a way of converting problems from external constraints into personal challenges [Guarasci, 2001. P. 108].

The resurrection of Wagner College came from within, and the essential ingredients were remarkable vision, commitment, and leadership shared by faculty and administrators alike [Guarasci, 2006. P. 2].

The transformation undergone by Wagner College is in many respects a counter-example to the situation faced by liberal education institutions in Eastern Europe. It provides one of the possible ways to avoid stagnation in educational vision and understanding of a social role. The Wagner College case comprises both of the big questions of contemporary liberal education advocacy but also in strategic model of institutional change. Both elements would prove essential for the further development of liberal education institutions in Eastern Europe. As Wagner is placed on the nexus of multiple paradoxes plaguing contemporary liberal education, it is also experiencing the challenges many institutions in less developed countries would eventually face. Those paradoxes can also be contextualized and serve as a benchmark for the positioning of liberal education institutions on the matrix of the academic, professional and civic dimensions of higher education.

But this transformation came at a price that not all of the colleges are ready to pay. Wagner offers graduate and pre-professional programs, even though the pressure to break undergraduate liberal education havens is by many considered detrimental [Scott, 1991. P. 24–26]. Wagner also plays with the internship options and the closeness to downtown New York, especially in enrollment brochures, which is not an obvious way to market liberal education. Finally, Wagner seems to “have it all”, being a model example of many separate threads of education: it offers the most high-impact education practices, civic engagement initiatives, campus athletics, residentiality requirement, honors program, Greek associations (fraternities and sororities), a small community and proximity to the metropolis. Indeed the Wagner Plan aimed at overcoming the typical dilemmas: ‘community and classroom; liberal arts and professional education; and, the

college and its urban setting' [Guarasci, 2003c. P. 36]—and obviously not everybody would buy into it.

The paradox of practical liberal arts

Wagner College has been singled out for this study for its paradoxical stance as a practical liberal arts college²¹. It is not one of the big research universities that are known worldwide, and that indeed play in a league of their own. It is also not a rank-and-file institution that has only a historical or accidental relation to contemporary discussions on American liberal education. Its signature curriculum is not completely detached from the experiences of other institutions, which is the case of laudable St. Johns' College. Therefore, it makes sense to include Wagner in a comparative study.

But Wagner is not "representative" of American liberal education much more than any other institution. If it may serve as a proxy to anything, it would be to the trends affecting the current situation and future prospects of private liberal arts colleges that are not one of the happy few, better recognized as Williams, Amherst or Oberlin.

The idea of liberal arts that Wagner subscribes to (and at the same time shapes and promotes) is that of practical liberal arts. This means that its signature curriculum, as well as its broader college setting and operations, are all set to make a connection between knowledge and action, learning and doing, the academic with the professional and civic. Wagner consciously crosses boundaries that some others [Fish, 2008] would hope to reinstate²²: "community and classroom; liberal arts and professional education; and, the college and its urban setting" [Guarasci, 2003b. P. 36].

Wagner is not a 'liberal arts +' institution, one that retains all the characteristics of a liberal arts college (if there ever was an uncontended list of those), but puts some small service learning component on top of it. Quite the contrary. It has given up on some dimensions that were long deemed essential—undergraduate-only character, or lack of professional and pre-professional majors—at the same time keeping some others (residential character, extensive general education curriculum, collegiate athletics). Those elements have been fur-

²¹ Among the paradoxes of Wagner is its location: Wagner claims to be 'the only true small, private, traditionally residential Liberal Arts College within the five boroughs of New York City' [Wagner College, 2011b].

²² One of those is the very pedagogical dimension of the role of the practical in learning, which used to be contested in the tradition of liberal arts education: Experiential learning as a pedagogy was long held suspect by passionate advocates of liberal education on the grounds that it reduced learning to vocationalism, provincialism, or both. Some advocates also caution against community service and service learning, as if to suggest that alternative approaches as these do not measure up to ones that are traditional in the academy. Experience for its own sake could easily lead to false impressions born from the limitations of personal observation, they argue [Checkoway et al., 2012. P. 111].

ther bound by an overarching educational philosophy, in a clear attempt to rethink and remake a liberal arts college [Chopp et al., 2013; Lieverman, Freedland, 2012].

Solving the jigsaw of running the college is a hard task, because at the end of the day survival of an institution—a vehicle for the ideal of liberal education—relies on balancing its budget. “While making meaningful educational reform may require little or no new funding, sustaining change requires new and robust resources” [Guarasci, 2006. P. 9]. At this point, no liberal arts college—public or private—can finance itself fully from tuition revenue. Breaking through the campus wall is not only a pedagogical and civic imperative; it is also a matter of sustainability of educational business. Showcasing integrity in the curriculum, campus culture and civic engagement help colleges make the case to external constituencies as well as individual donors. Having almost faced closure 25 years ago, Wagner is now also successful in this dimension.

This integration between the most important dimensions of the college is probably the most striking feature of the liberal education offered at Wagner. It is an independent institution run by a common vision of what liberal education should be in the 21st century.

This ideal is, undoubtedly, extremely controversial, as it challenges the hegemonic narration of liberal arts—sustained by its opponents as well as many proponents, especially in Europe. One may wonder to what extent the ideal is lived up to, but one cannot deny its existence. One clear direction of a further research on “practical liberal arts” is exactly the relation between the theory and practice.

Lessons for Eastern Europe

The rise of liberal education outside of the US is a playground of various forces: national and institutional frameworks shape liberal education initiatives, whatever the sources of their vision. In Wagner’s example what is especially interesting is the boldness of the task to rethink this particular college [Chopp et al., 2013] and the eagerness to embrace ‘contemporary urban liberal education’ [Guarasci 2003c. P. 36]. Although not every educational institution may successfully promise “practical liberal arts”, some of them do, and probably some of those even have to in order to survive. Wagner provides an example of how these unwelcoming circumstances can be overcome by a holistic approach.

The Wagner College example can be especially instructive in terms of the educational vision and organizational transformation that followed²³. Both in EU countries as well as in Russia (where liberal ed-

²³ In the case of Eastern European institutions, the very introduction of a liberal education program within a disciplinary, research-oriented public university was a significant change that can be compared with the turnaround of the Wagner College. However, the impact of those changes for the big institutions is definitely incomparably smaller. It is nevertheless possible to com-

education institutions were established during the 1990s and 2000s) universities face growing pressure to create more market-oriented study programs, support them and even align other programs closer to them. This can be especially dangerous for liberal education that may be forced to abandon their goals of preparing “well-rounded”²⁴, multi-talented citizens rather than one-dimensional effective elements of a future workforce. Wagner continues to claim that it offers practical liberal arts: so it still holds true to the idea of liberal education, but does so in a more effective way [Neely, 2000; Ferrall, 2011].

The organizational change, and here is another interesting feature, happened almost without new resources. In times of shrinking budgets, this should be a heartening lesson. Just as the introduction of MISH in Warsaw or the “general social sciences” program in Utrecht, Wagner allowed for a different student experience without much new funding. However, sustaining change can prove costly [Guarasci, 2006. P. 9], as is scaling up. Private institutions have more flexibility in both changing and asking for funding; but they also cannot rely on stable income sources. Public liberal education, as it is developing in Eastern Europe, may be more sustainable, and equitable. In addition, evidencing integrity in the curriculum, campus culture and civic engagement help colleges make the case to external constituencies as well as individual donors, both corporate and private.

Finally, practical liberal arts should not be seen as a ready-made solution that would work in Eastern Europe, if merely implemented. Rather, the take home message is that a successful strategy for a higher education institution should be, well, educational. Besieged by neoliberal policies, market expectations, administrative overload and underpaid staff, many leaders of liberal (arts) education institutions may try to avoid the crisis through a strategic alignment with non-educational aims. A name and mission statement does not make any institution immune to that. However, dressing up as a different person does not always guarantee success. Wagner decided to go against the trend of vocationalizing liberal education institutions, made a different theory based on the principal benefits of experiential learning, and today is a stable, growing institution that made its own brand. And if an educational institution may collect the data on student learning, it can survive a couple more days of neoliberal siege, armed with counter-evidence to imposed expectations, claiming that it is still “useful”, but in another sense of the word²⁵.

pare the challenges (in theory and practice) that those institutions face today with the Wagner College ca. 1987–1998, especially as they are well past the initial enthusiasm and now look for new sources of growth (at best).

²⁴ A term used recently instead of „liberal education” [Hersh et al., 2009], to avoid the all-popular political bias [Bérubé, 2006].

²⁵ According to Mark William Roche, liberal arts education is useful in three non-standard ways: it addresses what is useful as an aim, not a mean; it

There is an obvious parallel to Eastern European liberal education, which is currently, by and large, estranged from national academia as something “external”, fancy and impractical. Russian, as with many Slavic languages, does not have separate words for teaching and learning, and accordingly, education is considered mainly what a teacher does. To understand that mechanisms for learning may be unrelated to some common teaching practices was paramount to Anglo-Saxon pedagogy in the last half century, and can serve as a springboard for meaningful discussion on liberal education across cultures. The call for practical liberal arts may finally be interpreted as an invitation to consider non-academic, i. e. non-lecture based teaching; to engage the students [Kidd, 2005. P. 206], to assign them practical tasks even if they are not in a vocational course²⁶. Wagner does exactly that. And although one can easily imagine opposition to that, this is a discussion about the heart of our business: making students better understand the world around them—and themselves. There are no educators too liberal to admit just that.

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helps understand useful beyond immediate applicability; it develops character (2010, pp. 156–157).

²⁶ “Experiential learning as a pedagogy was long held suspect by passionate advocates of liberal education on the grounds that it reduced learning to vocationalism, provincialism, or both. Some advocates also caution against community service and service learning, as if to suggest that alternative approaches such as these do not measure up to ones that are traditional in the academy. Experience for its own sake could easily lead to false impressions born from the limitations of personal observation, they argue” (Checkoway et al. 2012, p. 111).

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Managerial Strategies of Effective School Principals

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Abstract. The article evaluates the effectiveness of schools with regard to their contextual characteristics. We use data from the 2012/13 Monitoring of Education Markets and Organizations, namely the results of a survey among the principals of 979 schools. A multiple linear regression analysis was performed to reveal the factors providing differentiation of the average USE (Unified State Exam) score across the schools. The analysis results were used to devel-

op an educational outcome contextualization model allowing the evaluation of school effectiveness in the context of individual characteristics. We identified a group of schools that may be classified as effective, i. e. showing ultimate performance under the existing conditions, and analyzed the managerial strategies of the school principals. These strategies turned out to be mostly based on attracting human resources: teachers, students and their parents. Effective schools pursue a consistent selection policy. They recruit children from families of a higher socioeconomic status, which gives them a head start in terms of academic attainment. Such schools also attract committed parents who will motivate their children towards higher achievements.

Keywords: Monitoring of Education Markets and Organizations, effective schools, managerial strategies, contextualization model, social background, teacher selection, student attraction, parental demands.

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It has been empirically proven that socioeconomic factors determining the context of activities of an educational institution also affect its effectiveness. Researchers around the world have long been collecting relevant data and using it to assess school performance: they analyze demographic characteristics of students, take into account the migration, structural, educational and employment status of their families as well as the data on deviant behavior in school. Unfortunately, contextual characteristics play no role in assessing school effectiveness in Russia. Most often, schools are ranked based on a specific cri-

terion, such as the mean USE¹ or SFE² score, making no allowance for the school environment parameters which represent one of the decisive success factors.

This study aims to evaluate the effectiveness of schools with due regard for their contextual characteristics, to identify schools that could be qualified as effective, i. e. showing ultimate performance under the existing conditions, and to analyze the management strategies of the school principals.

We use the data obtained by the Monitoring of Education Markets and Organizations carried out by the Higher School of Economics, namely the results of a survey among school principals, who were asked, in particular, about their professional priorities and managerial practices.

It appears impossible to establish any cause-effect relationship between school performance and specific managerial techniques. However, by analyzing which specific techniques are used by the principals of effective schools and other school leaders we can derive the general effective school management strategy.

Effective school concept

Our research is based on the concept of effective school. Educational effectiveness research has a rich history [Sammons, Hillman, Mortimore, 1995; Teddlie, Reynolds, 2000; Reynolds, 2010; Reynolds et al., 2011; 2012] and reveals the intricate relations among specific factors and processes that shape the high quality of educational effectiveness, enabling the school to have positive effects on student attainment. These factors have been analyzed at both student/class and school levels [Goldstein, 1995; Kilchan, Junyeop, 2006; Kyriakides, Creemers, 2008]. The close interrelation between school effectiveness and teacher performance has been proven empirically [Muijs, Reynolds, 2003; Kyriacou, 2007; Ko, Sammons, Bakkum, 2013; Siraj et al., 2014].

The correlation between school achievements and school resources has also been confirmed in Russia, although it was found to be much weaker (including teacher characteristics) than that between school effectiveness and student characteristics, which can be seen from the previous stages of research conducted by the Center for Socio-Economic Development of Schools³ [Yastrebov et al., 2013]. These findings are consistent with the results obtained by Eric A. Hanushek and Ludger Woessmann [Hanushek, 1989; Woessmann, 2005]. Besides, this has also been confirmed by studies based on large data

¹ Unified State Exam

² State Final Examination

³ Center for Socio-Economic Development of Schools, Institute of Education, National Research University Higher School of Economics. <http://ioe.hse.ru/schooldevelopment>

sets and conducted using more complex statistical methods, so the correlation between school effectiveness and school resources is still considered to be rather limited [Hedges, Laine, Greenwald, 1994; Rivkin, Hanushek, Kain, 2005; Rockoff, 2004].

To identify how disadvantaged a school is and to assess its effectiveness with due regard for the context, we construct a contextualization model based on international practices [National Center for Education Statistics, 2012; OECD, 2008]. This contextualization model is based on consideration of the socioeconomic status of student families. A number of researchers, from pioneers [Coleman, 1966; Bourdieu, 1996; Bourdieu, Passeron, 1980] to contemporaries [Lupton, 2004; Bowles, Gintis, Groves, 2009; Sirin, 2005; Breen, Jonsson, 2005], have demonstrated the strong correlation between social characteristics of student families and academic achievements. This correlation is also manifest in Russian education [Prakhov, Yudkevich, 2012; Pinskaya, Kosaretsky, Froumin, 2011]. There are multiple economic and sociological models explaining the correlation between socioeconomic background and academic performance [Breen, Goldthorpe, 1997; Erikson, Jonsson, 1996; Coleman, 1988; Bourdieu, Passeron, 1980].

The correlation between school effectiveness and social characteristics of students is very important for Russia. According to the 2009 and 2012 PISA (The Programme for International Student Assessment) reports, the index of social inclusion in Russia is considerably lower than average [OECD, 2010; 2014]. In addition, there are studies confirming that children from disadvantaged families are likely to be concentrated in schools with inadequate financial and human resources [OECD, 2010; Konstantinovskiy et al., 2006].

Empirical basis The Monitoring of Education Markets and Organizations is carried out by the Higher School of Economics in cooperation with Levada Analytical Center. Since 2010, it has included annual surveys among school principals. The 2012/13 Monitoring collected information on 1,004 educational institutions. Elementary and middle schools were left out because they take no part in the USE. In our study, we analyze the answers of 979 school leaders.

We used structured face-to-face interviews based on a specifically designed questionnaire to collect the data. The questionnaire for the school principals contained questions about the type of school, its educational effectiveness, the educational trajectories of its middle- and high-school graduates, the school's financial indicators, its staff and recruiting policies, and the managerial strategies pursued by the principals. The 2012/13 questionnaire also asked school leaders to assess the social context their schools had to work in. As a result, we had an opportunity to analyze school effectiveness with due regard for the contextual characteristics.

Table 1. **Regression model parameters**

	Non-standardized β -coefficients	Value	95.0% confidence interval for β	
			Lower limit	Upper limit
(Constant)	47.101	0.000	43.911	50.292
Merged school status	-1.957	0.005	-3.334	-0.580
Advanced school status	4.219	0.000	2.734	5.703
Percentage of teachers belonging to the highest qualification category	0.103	0.000	0.071	0.135
Percentage of children from families where one or both parents have higher education	0.080	0.000	0.053	0.107
Percentage of children with criminal or poor disciplinary records	-0.126	0.086	-0.270	0.018
Percentage of children who are non-native Russian speakers	0.073	0.000	0.036	0.111

Response variable: mean USE score in mathematics

School effectiveness contextualization tool

We performed a multiple linear regression analysis to identify the factors providing the differentiation of the average USE score across the schools. This type of analysis allows for measuring the relationship between the response variable (the mean USE score in mathematics in this case) and a number of independent variables, whose effect is interpreted as a contribution to the change of the response variable, provided that all other variables in the model are held constant.

Table 1 presents the regression analysis results, i. e. the variables that we found to be significant at 95% confidence. The β -coefficient shows how the mean USE score changes following a one-point shift in the relevant independent variable (all other independent variables held constant). The negative coefficient indicates that the correlation between the response variable and the independent one is negative (reverse).

We used the mean USE score in mathematics as a response variable because it is more sensitive to socioeconomic characteristics of students than the mean USE score in Russian. R^2 (determination coefficient) is 0.209 here, which indicates the fraction of variance for the response variable explained by other variables. In other words, the variables listed in Table 1 explain up to 21% of the changes in the mean USE score in mathematics.

The merged school status has a negative effect on the response variable, i. e. it lowers school effectiveness. Numerous school mergers have been initiated in Moscow, leaving many school principals unhappy with the results⁴.

⁴ This information was obtained from principal questionnaires during the 12th

The status of advanced school correlates positively with the response variable, raising the mean USE score in mathematics by 4.22. This category includes lyceums and gymnasiums offering advanced education programs. In fact, we cannot say for sure whether it is the high level of teaching or the better quality of students that actually makes advanced schools stronger. Anyway, it would be wise to impose higher academic requirements on such schools. “Western researchers describe it as the problem of self-selection, which can be a source of error in analysis of actual school effectiveness (understood here as the ability of a school to provide high learning outcomes) if there is no additional information that can be used to deduce the cause-effect relationship between student characteristics and academic performance” [Yastrebov et al., 2013. P. 192].

USE performance is also related to the quality of the teaching staff. A 10% increase in the percentage of the highest qualification category teachers entails a 1.03 increase in the mean USE score in mathematics.

Among the characteristics of students, three variables proved to be significant: the percentage of children from families where one or both parents have higher education, the percentage of children who are non-native Russian speakers, and the percentage of children with deviant behavior among school students. The proportion of children from families where one or both parents have higher education correlates positively with the mean USE score in mathematics. This correlation has been confirmed repeatedly by research on the relationship between academic performance and socioeconomic status, parental education being the strongest indicator of the latter. Parents with high levels of education are more concerned about the educational achievements of their children and more involved in the learning process. Teachers also find it easier to work with students whose parents pay particular attention to their kids' studies, investing actively in their education.

The percentage of children who are non-native Russian speakers was also found to be statistically significant and in a positive correlation with the response variable. This indicator reflects the migration status of a family, i. e. the record of its domestic and international migration. A study performed by the Laboratory for Sociology of Education and Science (HSE) demonstrated that belonging to a specific social class plays a greater role in children's distribution among schools than ethnic background. In addition, migrant parents are committed to integrating their children into Russian society and thus seek to put them in a Russian-language learning environment [Alexandrov, 2012. P. 50–52]. Children immersed at an early age in a Rus-

wave of the Monitoring of Education Markets and Organizations (2014). The data is still unpublished.

sian-speaking class have no language troubles in the future, which reduces the risk of lagging behind and boosts their chances of obtaining a pretty high USE score. The positive correlation between the proportion of non-native Russian speakers among school students and the mean USE score in a school may be explained by the fact that immigrant children often have a higher motivation for learning due to their parents' ambitions and expectations and the "immigrant optimism" typical of first-wave immigrants [Ibid. P. 53].

Finally, the percentage of children with deviant behavior who have a poor disciplinary record or even a juvenile crime record correlates negatively with the mean USE score in mathematics. This variable indicates the presence of disadvantaged students, which hampers school efficiency a lot.

Identifying effective and ineffective schools

As we can see, high USE scores can be provided by both the quality of staff and the socioeconomic background of students which does not depend on the school or the education program. The educational outcome contextualization model that we constructed based on the regression analysis allows us to assess the effectiveness of a school with due account for its individual characteristics. Using the regression model, we can determine the range of "normal" values for each of the independent variables (see Table 1, upper and lower limits of β -coefficients) based on the size of standard error. This adjustment will help us make allowance for statistical errors caused by errors in the coefficients. Such limits are calculated for each observation.

To identify effective and ineffective schools, we compare the mean USE score with the predicted confidence interval values. If the actual USE score lies within the interval, it will mean that the school shows results "typical" of its situation. If the actual USE score is lower or higher than the specified interval, we can be 95% sure that this school deviates from the common pattern and shows results lower or higher than those that can be considered "typical" for its resource and contextual characteristics.

Based on the above, we can classify all schools into three groups: effective schools demonstrating higher educational outcomes than those predicted by the model; ineffective schools demonstrating lower USE scores than predicted; and, finally, typically performing schools which fit into the confidence interval predicted by the model.

Having classified the schools, we analyze the managerial strategies pursued by the leaders of schools of different categories. To do this, we apply a Student's *t*-test to test the hypothesis that the mean values in the two samples were equal⁵.

⁵ For each module of questionnaire items, we compare the answers to those in other categories of schools ((a) typical, (b) effective and (c) ineffective) and to the mean sample value (the capital *T* (total) indicates a value much high-

Table 2. **Educational outcomes**

	All schools (T/t)	Typical schools (a)	Effective schools (b)	Ineffective schools (c)
Mean USE score in Russian	66	69 Tc	72 aTc	57 t
Mean USE score in mathematics	54	56 Tc	68 aTc	42 t
Percentage of students who scored over 70 points in mathematics (%)	26	23 t	40 aTc	26
Percentage of students who scored less than 30 points in mathematics (%)	10	8 t	8 t	15 abT
Percentage of students who failed the USE test in mathematics (%)	5	4 t	4	7 abT
Number of respondents	979	582	142	255

Analysis of managerial strategies in effective schools

To group the schools based on their effectiveness, we use the mean USE score in mathematics. Otherwise speaking, we assume that the mean USE score in mathematics is higher than average in effective schools and lower than average in ineffective ones. Table 2 reveals that other indicators of academic performance are also better in effective schools. Thus, effective schools demonstrate a considerably higher mean USE score in Russian and a higher percentage of students who scored over 70 points in mathematics. Conversely, ineffective schools show a higher proportion of students who scored less than 30 in mathematics or failed the test.

We should consider a number of limitations before analyzing the managerial strategies of effective school principals. The proportion of lyceums and gymnasiums is considerably higher among effective schools with the highest educational outcomes than in the other groups. This is a very important circumstance, because “elite” schools are found most often among schools with the highest educational outcomes, as Russian studies show [Konstantinovskiy et al., 2006. P. 189; Yastrebov et al., 2013]. Another statistically significant difference is that rural schools account for 17% of ineffective schools, while the percentage is 10% or less in the other categories. Furthermore, 39% of effective schools and 33% of typically performing schools are based in Moscow, which are rather large proportions. Quite naturally, being located in a capital allows schools to turn the rich cultural and educa-

er than average, and the lowercase *t* indicates a value much lower than average). Letters in the table cells denote significant differences in principals' answers. For example, the mean USE score in Russian is 72 in Table 2, and the cell also contains letters *aTc*. This means that the value of 72 (the cell of the *b* school category) is considerably higher than the relevant values for school categories *a* and *c* and also much higher than the mean sample value.

Table 3. **School staff salaries (rubles)**

	All schools (T/t)	Typical schools (a)	Effective schools (b)	Ineffective schools (c)
A salary that would guarantee that your teachers focus on their primary activity	49.079	50.629 c	51.600 c	44.241 t
A salary that would allow you to attract young promising teachers on a full-time basis	38.196	39.373 c	39.436 c	34.896 t
Average teacher salary	35.534	36.480 c	38.806 c	31.678 t
Average salary of recent graduates (three years or less after graduation)	25.879	26.759 c	28.802 Tc	22.498 t
Average salary of administrative and management staff	48.969	51.414 c	55.940 c	39.770 t
Average salary of other school personnel	18.744	19.578 c	20.564 c	15.684 t
Number of respondents	979	582	142	255

tional setting into additional resources for providing better outcomes [Leland, Harste, 2005]. We should keep in mind that high USE scores may be attributable to these characteristics to some extent.

Teaching staff management

The principal surveys show that effective schools rely on the high level of teaching expertise, demonstrating a significant proportion of the highest and first category teachers (41% and 43%, respectively). The proportions of highly qualified teachers in ineffective schools are somewhat lower (38% and 41%). The percentage of teachers with no category at all was found to be 21% in ineffective schools, which is much more than in effective schools (16%).

Salary opportunities differ greatly across the types of schools. As we can see in Table 3, all groups of teachers in ineffective schools are paid less than their counterparts in effective and typically performing schools. Meanwhile, salary expenses account for 65% of the budget in effective schools, which is less than in other types of schools (68%).

Motivating teachers to increase teaching quality as well as allocating incentives wisely are important ingredients in human resource management. Effective schools use non-financial recognition more often to motivate teachers, resorting less often to penalties. Thus, the principals of ineffective schools believe that position held (28%) and participation in school management (45%), including being a member of the governing board, count for a great deal when it comes to allocating incentives among teachers. Apart from incentive payments, effective schools also use non-financial incentives, e. g. additional professional growth opportunities (exploited by 49% of effective school principals and only 38% of ineffective school principals) and public

recognition (56% and 43%, respectively). If a teacher's performance is measured as low, the teacher will unlikely get a pay cut—this is the policy of 34% of effective school principals. Meanwhile, this type of penalty is practiced by 46% of leaders of ineffective schools.

The role of the governing boards is assessed differently across the school categories. Of effective school principals, 76% report that the management has agreed school bylaws with the governing board, as compared to only 64% in ineffective schools.

School principals' priorities

Only 65% of ineffective school principals pay heed to school budget allocation, as compared to 76% in typical and effective schools. The principals of ineffective schools specify more often among the areas of their focus the things that point to their authoritarian leadership style, including monitoring student behavior (30%, as compared to 23% in other types of schools) and ensuring that teachers fulfill their responsibilities (32%, as compared to 24% in other types of schools). Meanwhile, the principals of effective schools prioritize school budget management (77%) and distribution of teaching hours (41%).

More than half (58%) of the ineffective school principals specify the lack of material resources as one of their foremost problems since the transition to the Federal State Educational Standard of basic general education. The level of per capita spending is considerably lower in ineffective schools than in effective ones. The principals of typical and effective schools have witnessed an increase in per student financing over the last three years (40% of principals), whereas the leaders of ineffective schools only mention a small inflation-based increment (65%).

Attracting parents

When answering what attracts parents in choosing a specific school, the principals actually describe their own school as viewed by parents (Table 4). This is a "mirror" question: the criteria that principals believe are important for parents are most likely the priorities they use to position their own schools. The answers of effective school principals allow for the conclusion that they stake on attracting parents concerned about the educational outcomes of their children.

Among the school characteristics attractive for parents, the principals of effective schools mention the academic performance indicators, such as the high proportion of graduates enrolled in universities (56%), high USE scores (43%) or student achievements in olympiads and competitions (36%), much more often than the principals of other two types of schools. Besides, they also emphasize the importance of modern school equipment (38%) and diverse specialized education programs (31%). All in all, effective schools place an emphasis on the high quality of teaching and the favorable learning environment in their self-positioning. Material resources represent a key factor of

Table 4. What principals believe attracts parents to schools
 (% of school principals who gave an affirmative response to the relevant questionnaire item)

	All schools (T/t)	Typical schools (a)	Effective schools (b)	Ineffective schools (c)
A great number of students with high USE scores	30	30 c	43 aTc	23 t
High achievements of students in olympiads, competitions and exhibitions	25	25	36 aTc	21
Popularity/prominence in the city/district	49	52 c	56 c	39 t
Availability of modern equipment	28	28 c	38 aTc	21 t
High positions in surveys among students and their parents or in rankings based on their opinion	38	40 c	43 c	32
Reputation of school leaders and teachers	31	31	35	27
Transport accessibility	25	25	26	24
Diversity of specialized education programs	22	22 c	31 aTc	16 t
Diversity of supplementary education courses, excursions, study groups and clubs	21	22	26	17
High percentage of graduates enrolled in universities	42	43 c	56 aTc	31 t
Number of respondents	979	582	142	255

school attractiveness for families of a certain socioeconomic status. Many principals of ineffective schools report the lack of material resources suffered by their educational institutions.

Selection policy

Table 5 shows the procedure of recruiting children in elementary, middle and high school classes. Effective schools pursue a consistent selection policy at all stages of education. This is perhaps the most influential factor providing high educational outcomes. Selecting children with parents committed to their education and those with the best admission scores is a consistent policy of attracting families of a high socioeconomic status.

Keeping to the selection policy in elementary school is associated with certain difficulties, as schools are legally obliged to enroll children living in the neighborhood. However, the principals of effective schools are more likely to put a checkmark beside the answer “We always recruit children with the best admission scores”.

It is acceptable to recruit children from other neighborhoods in middle and high school in case there are enough spare places. The principals of effective schools report much more often than their coun-

Table 5. **The procedure of recruiting children to elementary, middle and high school** (% of school principals who gave an affirmative response to the relevant questionnaire item)

	All schools (T/t)	Typical schools (a)	Effective schools (b)	Ineffective schools (c)
Recruiting elementary school pupils				
A kindergarten is affiliated with our school. We recruit graduates from this kindergarten to elementary school	27	27	28	27
We provide pre-elementary education courses. Children who complete them are given admission priority	26	25	24	28
We provide pre-elementary education courses. Children who complete them are given no admission priority	28	28	29	29
Children who live in the neighborhood are given admission priority	62	65 c	60	55
We admit all children regardless of the neighborhood they live in	36	36	32	39
We always select children with the best admission scores	4	4	8 c	2
Recruiting middleschool pupils				
Elementary school graduates progress to middle school	90	90	85	91
If we have enough spare places, we recruit students from other schools to grades 5–9 on a competitive basis	18	20 c	23 c	11 t
If we have enough spare places, we recruit students from other schools to grades 5–9 on a non-competitive basis	60	59 b	46 t	69 abT
We do not provide middle school education	0	0	0	0
We create new classes and recruit children on a competitive basis	4	4	10 aTc	3
Recruiting highschool students				
Middle school graduates progress to high school on a non-competitive basis (if they wish)	68	66	66	75 abT
We select the best middle school graduates	21	24 c	17	16
If we have enough spare places, we recruit students from other schools to grades 10–11 on a competitive basis	28	28	36 c	24
If we have enough spare places, we recruit students from other schools to grades 10–11 on a non-competitive basis	47	47 b	34 t	53 b
We do not provide high school education	2	2	1	0
We create new (specialized) classes and recruit children on a competitive basis	11	11	17 c	8
Number of respondents	979	582	142	255

terparts in the other two groups that they recruit children from other schools on a competitive basis (23%) and create new classes where children are also admitted on a competitive basis (10%). On average, 60% of school principals practice non-competitive admission to spare places, but the low is only 46% in effective schools, as compared to the high of 69% in ineffective ones.

Obviously, the high school selection policies should become tougher, now that we have introduced the Unified State Exam and started using its results to assess school performance. This raises the question of admitting middle school graduates with low educational outcomes to high school, which is practiced by 75% of ineffective school principals. Typical schools normally do not attract children from other schools, but 24% of them do select their own best pupils, as compared to 16% of ineffective schools.

The principals of low-performing schools are the least likely to select their students: most schools in this category are rural, often underfilled. They usually admit children from other educational institutions to middle (62%) and high school (56%) on a non-competitive basis.

Conclusion Using a nationally representative sample of schools, we managed to identify categories of schools that may be classified as effective or ineffective, i. e. those that perform better or worse than predicted by the regression model constructed based on their social contexts. Using the results of principal surveys, we determined the specific strategies of effective school principals that distinguish them from ineffective school leaders.

Effective schools are more likely to use non-financial teacher incentives, such as additional professional growth opportunities or public recognition, and less likely to apply penalties like pay cuts.

Effective schools pursue a consistent policy of attracting and selecting a certain kind of household. Most often, they teach children from families of a relatively high socioeconomic status, thus getting a better head start in terms of academic attainment. Effective schools also attract committed parents who will motivate their children towards higher achievements. The principals of effective schools see the competitive edge of a school in providing a varied education program with extracurricular activities and specialized education opportunities and in motivating students to be active and competitive in learning. The transition to middle and high school should involve selection of candidates and attracting the best-performing students from other schools on a competitive basis.

The limitations to the analysis that we carried out concern factors of environment, not those of management: there are more advanced educational institutions among the effective schools, and most of them are located in Moscow and other large cities.

The general managerial strategy of effective school principals may be narrowed down to attracting high-quality human resources, which applies to both the teaching staff and students and their parents. By recruiting children from the most advantaged families, schools boost their chances for effectiveness at the very start.

This strategy is not a recipe for each and every school to become effective. Schools that work with a more challenging student body need different types of support (e.g. in providing free school meals) and they also often suffer from a lack of financing and material resources, so we can only expect some local improvements from applying the effective school managerial strategies. In our further research, we are going to identify resilient schools that achieve high educational outcomes in challenging contexts (challenging student body and insufficient resources) and define the managerial strategy of such schools.

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School Leadership Manifesting Dominating Behavioural Style Leaping Towards New Public Management of Community Schools in Nepal

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Abstract. This research explores the behavioural leadership style of community schools in Nepal under the New Public Management (NPM) initiative of decentralisation of the educational management system. The theoretical background derives from the leadership behavioural theory of Ohio State and Michigan Universities. Case studies were conducted in three primary community schools located in Kathmandu. Interviews were conducted with school stakeholders and members of the school management committee in order to triangulate the data analysis with a view to validating the dominant leadership behavioural style. The result suggests that all the participating schools adopted relations-oriented leadership behaviour as the dominant leadership behav-

oural style. The decentralisation of educational management by using NPM in community schools enabled the appointment of leaders from the community. It was also revealed that school leaders contributed to the social welfare of the schools for the sake of prestige and political recognition. The school leaders made available lesser time to understand the school's organisational behavioural pattern of the teachers, parents, students and academic programmes. This enabled the school leaders to demonstrate relations-oriented behaviour. Due to the lack of academic expertise, the effective approach of leadership was to adapt chiefly on relations-oriented behaviour. Adopting the dominant leadership relations-oriented behavioural style enabled less flexibility to switch to task-oriented behaviour as determined by the contested environment. The politically contested school context enabled leadership approaches to implement political solutions.

Keywords: leadership relations-oriented behaviour, task-oriented behaviour, manifesting dominant behavioural leadership style, New Public Management

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1. Introduction The Nepalese educational system has taken a different turn, starting from community managed school to public schools and again back to community managed schools in the form of decentralisation of the educational management system. Modern education in Nepal was introduced in 1851 with the establishment of Durbar High School, serving at best the interests of affluent families, especially amongst the Rana family [Ministry of Education, 2003]. The school system in Nepal can be categorised into public schools, private schools and community schools. Private schools emerged in the mid-1980s as a result of the failure of the public school system. Teacher absenteeism and poor educational facilities and infrastructure were the main reasons for the failure of Nepalese public schools [Research Centre for Educational Innovation and Development, CERID, 2004]. As a result, many affluent families had to send their children to private schools while the poor were left with no option other than to enroll their children in public schools [Rajbhandari, 2007]. In order to improve Nepal's public school system, the decentralisation of school management was undertaken by transferring the school management to the local community. This was implemented via the formation of the school management committee (SMC). The school leadership position is assumed by the SMC chairperson who lacks educational expertise and experience. Ministry of Education [2003] stated that the main reasons for decentralising the school management system were to enable local participation in the decision-making process, improve the quality of education through the new public management (NPM) and strengthen the leadership potentials at the local level.

However, the anticipated quality in education through the decentralization of the school management system did not meet the expectation of the national education policy. Consequently, attempts were made by amending the community schools directives (CSD) to ameliorate the existing anomalies in the Education Act. Several amendments have been made in the CSD, meanwhile, the attempt to eradicate the confusion of leadership role for teacher appointments and resource management remained a dilemma. Although, the community managed school (CMS) attempted to establish accountability, however, the process/mechanism to achieve this was not explicitly stated in the current Education Act and regulations [CERID, 2009]. The World Bank [2010] asserted that the administrative responsibilities of the CMS were not clear. While all public schools are also community managed, nevertheless, existing public schools supported by SMC and those supported by the communities differs. Therefore, the schools which are formally transferred to the community are the community-managed schools. However, communities do not want to take responsibility for the school management because they believe the government was abandoning its responsibility to cater for the schools financially. Furthermore, this constitutes the main reason

the communities were not enthusiastic about taking over the managerial responsibility of the local schools [CERID, 2009].

In addition, the school leadership role is not clearly defined by the policies and regulations in the Education Acts and directives. The acts and directives also contradict each other in connection to school autonomy, teacher recruitment, teacher allocations, teacher terminations and financial clauses [CERID, 2003, 2004]. New public management (NPM) involves the decentralization of the school management within public services [Larbi, 1999]. The NPM in the context of decentralization of school administration in Nepal focusses on conferment of autonomy on the school leaders in administering the school. However, these preferences were amended and the autonomy was redefined in favor of the government which still remains unclear.

The purpose of this study is to explore the school leadership adapting dominant behavioural styles in the contested environment to the NPM approach. With significance to this, school leaders are influenced to grow themselves within the political welfare to construct their social prestige. Moreover, the contradiction between the Education Acts and CMS Directives generated confusion for the school leadership role. However, this chaos environment enabled school leaders to formulate their behavioural approaches by creating a harmonious environment that allowed an advantage on their behalf to gain socio-political kudos. In relation to this problem statement, the aims of this study are to illustrate how the leadership behavioural style manifested the school and what the consequences of their dominant behavioural style are. Sergiovanni [1995. P. 29] states that a leader's polity for success leads "to win more for yourself than you have to give back in return".

2. Research Methodology

The qualitative content analysis explores the manifestation of leadership dominating behavioural style to address the consequences of the leadership behaviour in schools' progress under the New Public Management.

2.1 Theoretical construction

This study is based on the leadership behavioural theory developed by researchers from Ohio State University in 1945 and the University of Michigan in 1947. Northouse [2010] identified two types of behavioural leadership styles namely: relations-oriented and task-oriented behaviour in its treatise on the actions of leadership. Employee-centred and production-centred leadership behavioural styles developed by Stogdill (1945) from Ohio State University as well as employee-centred and job-centred behaviour developed by Likert (1947) from the University of Michigan were later replicated as relations- and task-oriented behavioural leadership styles respectively. In this study, behavioural leadership theory explains the school leaders' behavior orientations towards the school's professional community. The theoretical framework was constructed to explore relations-oriented leadership

behaviour and task-oriented behavioural style to observe the consequence of the leadership behaviour towards organisational climate and the effectiveness of the school management. This offered a holistic view towards understanding the manifestation of the behavioural leadership pattern incorporating situations and the school's professional community.

2.2 Data collection procedures

This study was conducted in three primary community schools located in Kathmandu, the capital city of Nepal, with a view to exploring the dominating behavioural leadership style, and the relations-oriented and task-oriented behavioural style of the school leaders. Data were collected through semi-structured interviews with stakeholders including SMC chairperson and members, the principal, assistant principal, five teachers and one administrative staff from each community school. Interview schedules were prepared separately for school leaders and other respondents. The separate interview schedules provided relevant information on behavioural leadership style from the leaders' perspectives as well as the followers' perspectives. The duration of each interview session was at least sixty minutes and a maximum of one and half hours. All the interviews with the key respondents were conducted on the school premises at the convenience of the respondents time, which was arranged by the school principals.

2.3 Data analysis procedures through theoretical implication

In exploring and understanding the dominating behavioural leadership styles, case studies of each school offered additional validation through data triangulation and cross-verification of the responses. The data was tape recorded and transcribed word by word for analysis and for additional reliability. To identify the behavioural leadership style for both task-oriented and relations-oriented behaviour, investigation through semi-structured interviews focusing particularly on manifested task and relations-oriented leadership behaviour was carried out. Data reduction enabled the simplification of analysis by discarding the irrelevant data. Case studies on the schools' behavioural leadership pattern on high and low task- and relations-oriented behaviour was also carried out by data triangulation analysis with a view to giving meaning to the data. For ethical considerations, anonymity was ensured by applying pseudonyms of community schools and respondents. Prior consent was gained via telephone and personal visit for interviews. The timing for the interview was arranged according to the convenience of the respondents.

3. Results

For the purpose of exploring the school's dominating behavioural leadership style, the results are constructed in case studies of school leadership to highlight relations- and task-oriented behavioural style. The case study also examined the consequences of behavioural leadership style that accounted for the school's success in light of NPM.

Bass [2008. P. 61] explained that the effectiveness of leadership as “task-oriented and relations-oriented is contingent on the demand imposed by the situation”. Furthermore, Hersey and Blanchard [1977] proposed the behavioural leadership theory as a combination of task-oriented and relations-oriented behavioural styles that best fit the leaders according to the demands of the situation.

3.1. The dominating behavioural leadership style of School 1

Harris [2003. P. 10] stated that as schools are constantly changing, the challenges of school leaders in responding to the school’s inner life as well as its external context also increase. The effectiveness of school leaders is demonstrated by exercising both professional and political leadership drawn from past experience while responding to a new situational context. This drives the choice of leadership style by the school leaders either to adopt working with internal affairs and an external context significantly, or inside-out and outside-in from micro to meso and to the macro level [Rajbhandari, 2011; 2012].

In School 1, the chairperson was a politician and a former minister. His behavioural leadership pattern tended towards relations-oriented, hence, rationally implying the political leadership incorporating both external and internal aspects into the school management. The principal supported this by saying:

“He is a politician, however, he does not introduce politics into the school. He is polite and his thinking towards the development of the school is very positive.”

In a collectivistic culture, relations-oriented leadership behaviour is easier to build with professionals and politically influenced people. The connection of the school management with the political environment brings progressive development through the generation of resources from donors and the government. This is made possible since the political leaders help to bypass the bureaucracies in the politically influenced environment. Teacher 1 attested this fact as follows:

“The chairperson is a politician. In the Nepalese system, the political network connection for bringing any developmental programme to the schools is necessary. Without the connection to higher level authorities, nothing is possible. The chairperson, being a former minister, has political connections which have helped the school to secure resources from donors and a land grant from the municipality.”

In corroborating the response of Teacher 1, the principal asserted the need for strong school leadership by mentioning that;

“We know the politics in our country, our chairperson has a good reputation in our nation. With him in our school, everybody respects us and listens to us.”

School leaders are mostly educationist, however, in the Nepalese educational setting, most chairpersons are either politicians or business people. This then necessitates the need to clarify the role of head teachers as academicians in leading the teachers, students and non-academic staff members. Moreover, in Nepalese schools, the formation of SMC is mandatory. The chairperson is delegated with authorities that are further passed down to the members of the SMC. In the schools' organisational structure, head teachers are primarily delegated with the responsibility for schools' administration and academic affairs. Consequently, head teachers assume the leadership for the day to day operation of the school. However, approval from the chairperson for accommodating programmes such as for any form of changes and development into the school system is considered very important. Therefore, the chairperson drives the leadership by giving time and energy to mobilise resources for the school's developmental programmes. Teacher 2 supported this by stating that:

“He gives adequate time, he is positive towards school development. He is a politician and he has his influence to secure resources from the donors.”

Moreover, within the academic culture, school leaders maintain relations-oriented behaviour; however, concern about tasks is often connected to student achievement. Head masters adopt task-oriented leadership behaviour to promote the school's effectiveness. The distribution of responsibilities is vague and complicated as indicated in the national educational policy and directives. This has resulted in problems in regards to the role of the chairperson in the school's leadership. Due to the fact that the chairperson is concerned with the developmental aspect of school management, he is also involved with the school's external affairs. In addition, the responsibilities of the chairperson as a politician and a school leader hinder him from giving full time attention to the school. The principal stated:

“He is a national figure; he could have used his connections to help the school much better during the process of development. Though, he did many things for the school, but more effort would have yielded more positive results which I think he didn't do. I know he has his own professional life. But he could have used his connections much better so as to enable the school to obtain the benefit of additional financial resources. The Chairperson does not actually relate with the teachers.”

Reflection from the principal regarding the chairperson's leadership behavioural style indicates it is relations-oriented. Nevertheless, the behaviour of an individual is guided by personality, values and interest, cognitive complexity, preference for taking risk, and personal satisfac-

tion. These patterns of leadership behaviours reflect both the task-oriented and relations-oriented. Consequently, the chairperson's preference for risk-taking as well as the value of and an interest in the school reflects the combination of relations- and task-oriented leadership behaviour. The principal supported this claim by mentioning that:

"The Chairperson is democratic in nature, we discuss matters arising with the teachers and then come up with an agenda for deliberation of the SMC. The chairperson does not interfere in the administration of the school. He approves the agenda without hesitation as he is aware that the items on the agenda are to be implemented for the benefit of the school. His motive is to ensure that this school offers quality education to students. He believes in taking a risk and this has made us more capable and motivated to support and implement many good programmes in our school."

In the collectivism culture, risk-taking behaviour is associated with cooperation and indulging the organisational member. Risk-taking simply does not signify the task-oriented, however, in a collectivism society, the risk is distributed amongst and between the members. Therefore, it minimises the cost of the burden of the implemented decisions. Relating to the fact about sharing for planning and organizing, Teacher 2 stated thus,

"He gives time to the school if the school requires; we celebrated our 50 year anniversary. If the school faces any difficulties in its finances or recruitment he is always there. However, managing and planning is initiated by the principal collaborating with the SMC."

In regard to the school behavioural leadership style, the chairperson collaborates with the SMC members. The democratic style of the chairperson enabled him to delegate authority to the headmaster for academic affairs. This enabled the chairperson to develop informal relations with the teachers and the administrative members. Teacher 3 affirmed this by mentioning that:

"The Chairperson is positive and talks with us about the school through informal meetings. We haven't had any chance to build a good rapport. If we don't have any rapport, then it's obvious that we don't know their attitude and behaviour. However, in regards to professional work, he is very positive towards the school development."

Confirming the view of the Teacher 3, Teacher 1 also added that:

"We desire to have good communication with the chairperson. If the opportunity abounds for communication, then, we may as well

grow more. He is very positive and optimistic regarding this school. He doesn't interfere in any issues regarding the developmental aspects."

Despite the demonstration of relations-oriented leadership behaviour towards the school leaders, the chairperson aligns with the SMC members alone in formulating the school's policies and plans. Moreover, the primary role of the chairperson is to develop the school by securing various resources to meet the needs of the school. Therefore, working outside the school occupies the chairperson's time working and this limits his concentrations inside the school as he has to delegate more powers and responsibilities to the head master. Furthermore, engaging in external affairs allows the chairperson to meet with the teachers and non-teaching staff informally for a short time. However, structural hierarchy was maintained by addressing all the issues directly to the headmaster instead of the chairperson. In doing so, he believes that the headmaster is the most suitable person that can resolve immediate issues affecting the teachers. Teacher 2 confirmed as follows:

"I think he should be more concerned with the school's internal affairs while paying less attention to external affairs. Hence, he gets more information from the principal and then formulates and executes policies accordingly in the school. He is well acquainted with people working here; he is social and talks informally with everybody, which makes most of us motivated."

Corroborating the view of Teacher 2, the principal said that:

"He wants every issue to be handled at first by the head teacher before bringing it to his attention so as to make my work easy. On top of that, the operational structure is more like a hierarchy and this is important in Nepalese culture. Otherwise everybody would approach him."

Furthermore, the leadership behavioural pattern of School 1, demonstrates relations-oriented behaviour by involvement in the school internal affairs and informally meeting the teacher and non-teaching staff in the school. The demonstration of task-oriented behaviour is confined within the SMC membership for the school's developmental planning and progress. Therefore, the headmaster is delegated with the responsibilities for the interest and value of the teachers whereas the external affairs are confined within the SMC.

3.2. The dominating behavioural leadership style of School 2

Enhancing students learning is directly connected with a well-managed, efficient and conducive school environment [Hopkins, 2003. P. 55]. Consequently, most school leaders are inquisitively engaged in developing a conducive environment for learning. In the Nepalese school system, a conducive environment is also highly connected with

infrastructure and financial resources. In regard to this, school leaders are expected to generate resources for physical development. For example, this includes the construction of classrooms and physical facilities as well as the renovation of the old buildings. In this regard, many community schools are involved in the restructuring of school buildings. Moreover, the physical development is necessary for the community schools due to the congested and poor physical facilities (lack of drinking water and toilets) and poor infrastructural facilities (dilapidated buildings and classrooms).

The school leader's crucial task is to bring about physical changes in the school. Focusing on the physical development is important for two reasons, namely: (i) the necessity of renovation and (ii) to attract student's enrollment from competing nearby schools. In regard to the relevance and necessity of the development of physical facilities, the Principal (head teacher) stated that:

"This should be a very good school. We want this school to have good infrastructure such as buildings and good classroom facilities. Every member in the SMC has to be very active. Their concern towards the school should be to bring the development in different aspect related to physical facilities as well as academic affairs." In addition, the SMC member supported this claim by adding that:

"We all participate in initiating the development projects. We don't usually gather to discuss with the teachers but we have the teacher's representative who comes to the SMC meetings to represent the interest of the teachers. We have more meetings in this school than is required. We are concerned with the construction of buildings and additional floors to accommodate the students."

To facilitate the changes, school leaders need to be cooperative and share their discussions with the SMC members in order to address the developmental needs of the school. In regard to this, the chairperson has developed good relationships with the teachers while most of the teachers and the chairperson live in the same local community. The behavioural leadership style of School 2 reflects the value and interest of the teachers. Teacher 4 acknowledged this by stating that:

"We didn't have drinking water facilities in the school. We met the chairperson face-to-face and requested him to do something. He then invested his own money to install a drinking water tap. It cost a lot and also the government didn't even bother to think about it. I think it is quite wonderful of him to understand our needs."

Have adopted a relations-oriented behavioural leadership style, the chairperson's personal satisfaction was to bring about the necessary development to the school by understanding the situation and being

more open with the teachers and non-academic staff. The Assistant Principal (headmaster) supported this claim by stating that:

“I have worked in some schools before. I have found the difference in leadership if I have to compare. Our chairperson is social and the credit goes to him for generating resources for the school’s development. We have informal communication. He is visionary and makes things clear for everyone. The chairperson visits the school quite often even if there is no meeting.”

Adapting the relations-oriented behavioural style was necessary for the chairperson primarily because he resides in and belongs to the same community where the school is located. Moreover, most SMC members are also residents within the same community. More importantly, as a business entrepreneur in the locality, the chairperson had developed close relationships with many people in the community through business connections. This enabled him to demonstrate the relations-oriented leadership behavior style. The chairperson was elected for some years by the SMC which also encouraged him to build good relationships with the teachers and the SMC. The head teacher supported this by saying that:

“He is a local member of this community, but I feel that he should be in this school for a longer time. What he says, he does. The chairperson has a vital role in school development. He drives the teachers as well as the SMC to contribute towards the developmental projects of the school. The chairperson also has the vital role convincing the local community to support the community school. The chairperson collaborated with SMC members to drive the resource generation scheme by visiting people in the localities and organization.”

Hopkins [2003. P. 56] stated that in a stable school system, maintenance has higher priority than development especially when school leaders are focused on protecting and promoting the interest of the school system. On the contrary, the school development has higher priority than its maintenance in the Nepalese school system. School leaders are focused on external affairs in order to generate resources for the stable development of schools. The leadership role in the Nepalese community schools involves other organisations seeking the opportunity to generate resources. Engagement in external affairs to bring about development in the internal affairs of the school requires cognitive leadership complexity. Furthermore, the chairperson must understand the school from outside in order to develop the school’s infrastructure with the resources generated from the donors.

The behavioural leadership style of developing the school’s infrastructure reduced the chairperson’s time and concern for academic

affairs. This was enabled by adopting the democratic leadership style and further delegating authority to the headmaster. Nevertheless, the teachers desire the chairperson's involvement in the academic affairs which they believe would enhance motivation and commitment by also emphasising the task-oriented leadership behaviour. The assistant principal mentioned:

"The Chairperson is not really concentrating on academic aspects at all. He is concentrated on the management and financial aspects. The Chairperson is only concerned with students' SLC examination results. He wants all the students to pass, which means a 100 percent successful result. If the chairperson had monitored the academic side more closely, things would have been better than they are at present."

The SMC members in collaboration with the school's leaders adopted a high relations-oriented behavioural leadership style to develop the school's infrastructure and physical facilities. This was promoted by the chairperson in order to address the urgent developmental needs which the government had not paid attention to. The relations-oriented leadership behaviour of the chairperson also promoted good relationships with the developmental agencies which awarded grants for the improvement of infrastructure in the school. In addition, the financial donation from the chairperson personally was an important contribution to the wellbeing of the teachers and students. The assistant principal admitted this by stating that:

"The chairperson is very active in generating resources at the moment. We had many problems with financial aspects before, but now it's being properly addressed and we have realised the importance of development."

Financial resources were necessary to improve the quality of education in the school by bringing about the teaching and learning infrastructural development, such as computers, library, classroom facilities, building toilets and so forth. Therefore, the personal interest of the chairperson was to enhance the quality of education by bringing the SMC members together. His disposition to embrace collaboration within and outside the school indicated the importance of his contribution in fostering the development of the school. The principal mentioned this as follows:

"The chairperson is very co-operative. He encourages and initiates development projects in the school. The chairperson has initiated infrastructural development such as the construction of buildings and toilet."

Despite the government claiming to be paying attention to the well-being of the schools, it must be emphasised that these leaders were not taken seriously prior to the appointment of the chairperson. Therefore, the chairperson initiated the development of infrastructural facilities related to the wellbeing of the school leaders through collaboration with the SMC members. The highly relations-oriented behavioural style enabled the school to progress in several areas such as construction of buildings and toilets in addition to resolving land conflicts. The leadership approach, strong on relations-oriented behavioural style, encouraged collaboration with donor agencies for generating funds. The school leader's benevolent democratic leadership styles promoted a relational school climate. However, the management of the school's academic affairs was delegated to the principal so that the chairperson was able to demonstrate little on task and highly on relations-oriented leadership behaviour.

3.3. The dominating behavioural leadership style of School 3

The decentralisation of the school management system enabled the school leaders to effect developmental changes thereby becoming change agents. Bower [1990] mentioned that innovation is the key to success in effecting developmental changes in regard to the reform strategies necessary to decentralise the school management system. In addition, Bower further asserted that the change agent who brings innovations could be anybody involved with school leadership. Meanwhile, the demand for innovation in the school management is highly anticipated from the school leaders who are saddled with the responsibility of bringing effectiveness into the school system. Reeves [2002] suggested that it is essential that school leaders spend ample time in the school in order to manage it effectively. Therefore, failure to bring about effective changes in the school management system can lead to catastrophic consequences. This can eventually lead to closure or merging of schools. More often, the victims who suffer the consequences are the students.

The school leadership approach in initiating changes for the future therefore prompts the school leaders to remain flexible and mobile in their approaches of relations- and task-oriented behavioural leadership styles. Hersey, Blanchard and Johnson [2001] identified four possible combinations of behavioural leadership style namely: (i) task-oriented behaviour, (ii) employee centered behaviour or relations-oriented, (iii) a combination of relations-oriented behaviour and task-oriented behaviour, and (iv) neither task-oriented behaviour nor relations-oriented behaviour.

Moreover, the involvement of school leaders was expected to bring about development in the schools in line with the NPM. However, the development in the school was evaluated by the influx of financial resources alone. This was because of the chairperson's political reputation and his involvement in raising funds for the school. In most community and public schools, the chairperson is elected on the ba-

sis of their popularity and political connections. This also enables the chairperson to enhance their social prestige while getting involved in the school management. The principal asserted his view on the appointment of chairperson by saying that:

“In some parts of Nepal, the appointment of chairperson is celebrated like it is a politician who wins an election because the school has lots of property. We are really fed-up with this kind of situation. We don’t have an opportunity to grow professionally. We are educationists and we are taking responsibility for the schools but those people who come to manage the schools are not from an educational background. I am frustrated and feel like resigning from the school. We are planning to go back to a public school and therefore hand over the management back to the government so they can manage the school as they want.”

Consequently, the behavioural leadership approach manifested in this instance is the laissez-faire leadership style through which the chairperson demonstrated highly on relations-oriented behaviour. Hersey and Blanchard [2001] stated that flexibility and a combination of leadership relations- and task-oriented behaviour is essential for every leader to implement in situational differences. In addition, they also believe that leaders can combine two to three of these styles and apply it to a situation. Moreover, in the case of School 3, the behavioural leadership style illustrated two patterns, the relations-oriented and the neither task nor relations-oriented. Specifically, the chairperson demonstrated relations-oriented behaviour when he was inclined towards social well-being by adopting socio-emotional relations, however, for task-oriented, socio-professional was non-existent. The relations-oriented behavioural leadership approach did not motivate the employees towards goal-directed behaviour, thereby worsening the situation and impeding the accountability. The other pattern of neither task- nor relations-oriented behavioural leadership approach did not lead to achievement, therefore, impeding effective management of the school. The assistant principal supported this by stating that:

“The roles and responsibilities of the SMC are seen in their meetings as a committee but their contribution to the school management is nowhere to be seen. Moreover, it’s the headmaster who drives the academic affair but the management affair that was supposed to be driven by the SMC committee is not being driven.”

The assistant principal further confirmed that the SMC’s involvement with the school’s management did not actually benefit the development of the school, as follows:

“The Management Committee is just there but it doesn’t really work on the improvement of the school, rather it’s the teachers and the headmaster who actually drive the school. In fact, if there is no meeting being held, the SMC members will not know anything about the school. This is not really helping in regards to the development of the school.”

Moreover, relations-oriented leadership behaviour lead to socio-emotional interactions between the school leaders and this was considered favourable. The assistant principal admitted that the socio-emotional behaviour was personal and informal rather than a professional approach when he said:

“The Chairperson always talks to everybody whenever he comes to school. He asks about the teachers and non-teaching staff. His interaction is very promising.”

In relation to this, the assistant principal provided insight about the leadership behaviour and the SMC’s responsibilities when he stated that:

“I expect the chairperson to take the initiative to develop the infrastructure in the school since it’s very important. The technical issues regarding the land and buildings have to be taken seriously. SMC is shifting the responsibility to the principal and the teachers. SMC doesn’t show any sense of responsibility and do not take these issues very seriously.”

The assistant principal emphasised that remuneration and benefits could motivate the SMC members when he said:

“The school does not provide any remuneration to the SMC for attending meetings. They only have positions in the SMC but when it comes to taking responsibilities they don’t bother to put in their effort.”

The behavioural leadership style is regarded to be effective when the leaders are successful in influencing the followers positively. Therefore, influencing the followers require immense intellectual capabilities. Moreover, in educational settings where many of the followers are intellectually inclined, the behavioural leadership style significantly contributes towards participation and delegation by adopting both relations- and task-oriented behaviour.

A behavioural leadership style combining relations- and task-oriented behaviour embraces both autocratic and democratic styles. At the time of change, the restraining forces are quite strong and become resistant to such change. Embracing changes by school leaders

through participation could drive these restraining forces towards the changes. Nevertheless, a standalone leadership approach can lead to teachers and SMC members becoming irresponsible. To increase participation from all sections of the community with a view to ensuring the growth of the school, it was considered that the enrollment of students should be increased. The support of the SMC members for this decision was very poor as they did not take any action. The view of the administrative staff reflects the standalone approach of leadership when she stated her optimism;

“He supports us both infrastructurally and economically. He is also concerned with increasing the enrollment of the students. He is progressive by advocating that if four students are enrolled from one family, one should get free education. He agrees to any kind of development initiatives. In regards to finance, he donates money from his own pocket to meet the school needs occasionally. This also encourages other parents or community members to make donations but the donations are very small.”

The behavioural leadership style in School 3 is neither task- nor relations-oriented behaviour due to the poor formulation of the national educational policy and the political system of the country. The community managed schools are still facing difficulties with frequent amendment of CMS directives because of its vague definition of autonomy in community schools in regards to hiring and firing, resources generation and utilisation. The administrative staff supported this assertion by stating that:

“The chairperson is concerned about the school’s development. He wants to take necessary action against ill-disciplined teachers but again it does not come with the authority given to the SMC by government. Even when disciplinary action is taken, there is again some political influence with somebody from higher ranking authority calling and asking us to withdraw such action. Actually, it’s all about the autonomy that has been given to the SMC which is only on paper.”

Corroborating the issue related to responsibilities and political influences in the school, Teacher 1 expressed his views by stating that:

“I think with the lack of administration and leadership, we don’t have responsibilities for the school. We are more politically influenced. Our name is more famous when we are into politics but there is no name when we are teachers. Anyhow, we get a salary even if we are not teaching properly. Then it’s obvious that there is no development in the schools as this results in lower student achievement and increased dropout.”

Teacher 1 was also of the opinion that SMC's effective involvement in academic affairs could lead to further development. Bringing up new ideas to implement changes is difficult. Therefore, the chairperson could encourage the SMC to participate in the management of the school. Supporting this claim he stated that:

"Interference from the SMC is the most important factor for the school to develop. Interference means dedication to lead the school towards development. Moreover, there hasn't been a change of attitude in the staff since the transfer; the school's name from the public to the community has only changed. Actually, the same people working for the school now and then are the same with the same old attitude. So the school is not progressing."

He further mentioned that;

"If there is interference, the attitude will change and force the principal and teachers to work harder. This will lead to commitment. Without the SMC's interference, the school will not grow. The SMC is not able to utilise their potential to grow the school."

Moreover, failure to collaborate with a view to promoting participation management could be attributed to the chairperson who could not inspire the SMC members. Teacher 1 confirmed this by stating that:

"I will the blame the SMC which doesn't meet to discuss how to improve teaching and learning activities. We don't have discussion. No policy on how to provide counseling to weak students. All of us have the attitude of doing our job but without any commitment and dedication. The chairperson is very progressive, whatever we ask he approves. He believes in us and delegates all the authorities to the head teacher and teachers."

The behavioural leadership style shows relations-oriented behaviour which promotes socio-emotional growth. However, an attempt to achieve professional growth was demonstrated by adopting a laissez-faire leadership style which employs neither task- nor relations-oriented behaviour. Leadership behaviour employing socio-emotional enhanced social wellbeing, however, non-adoption of intellectual development is demotivating the teachers in regards to contributing towards the development of the school.

4. Discussion and Conclusion

Community Managed Schools (CMS) in Nepal made a historical and political contribution towards educating the general public when education was not accessible during the Rana regime. However, CMSs were also established to promote the political ideology against the Rana Regime. Nevertheless, CMS in Nepal enhanced the education

of children from local communities before independence. Increased numbers of CMS were nationalised after democracy was gained from the Rana Regime in 1951. The entire CMS system motivated the teachers despite the schools having poor quality infrastructure. A centralised educational management system was expected to enhance the quality of education, however, the outcome was poor. This resulted in the emergence of private schools in the mid-1980s as the public began to lose faith in government schools [Rajbhandari, 2007]. Consequently, the government transferred school management to the community in anticipation that the NPM would bring about quality education, additional finance, collaborations with donors and teacher appointments. The participation and involvement of the community in schools and in enhancing NPM lead to the decentralisation of the educational management system as initiated by the World Bank [The World Bank, 2000].

Under the decentralisation of the educational management system in which community participation and involvement is shaping the NPM, it was found that the leadership role has broadened the scope of management beyond expectation. This led the community school leaders to collaborate with non-governmental organisations (NGO's) for financial assistance and technical support in order to reduce government bureaucracies when accessing resources to develop the schools. The results suggest that this leadership approach was not limited to a standalone approach in administering the school management and resulted in a conducive environment for collaboration with external agencies' participation and involvement in.

Effective leadership enables school leaders to demonstrate goal-oriented behaviour with possible alternative behaviour and contextual solutions [Rajbhandari, 2013. P. 33]. Nevertheless, leadership approaches in school management under the framework of NPM were accountable for generating funds and building connections. The findings suggest that school leaders were elected from the local community on the basis of chairperson's popularity and political connections. This prompted almost all of the community schools to elect politicians and business tycoons to be their chairpersons. This, however, gives no room for academically sound individuals to become chairperson despite residing in the local community. The findings suggest that the Nepalese educational system was highly politicised as the students' union interfered in schools, thereby closing it through strikes. It is also clear that the NPM was influenced by politically sound leaders and business entrepreneurs who demonstrated their relational cohesive behaviour to resolve issues by engaging their political connections.

Although, the NPM is concerned with the holistic development of schools, more political approaches and finances are required in the community schools. The results suggest that among the three schools selected for the exploration of leadership behaviour using the NPM, the leaders of Schools 1 and 3 had political backgrounds as various

former ministers of Nepal. The leader of School 2 was a business tycoon well-known in the country. All these leaders have become assets to the community schools by rendering services through collaboration, financial contribution and using their political contacts to remove bureaucracies as and when required. However, the leaders of the three schools were unable to eliminate the disruption by the students' union who wished to close down the school by strikes and lockouts. This occurred despite the school leaders having an influential political background. The reason for this is yet to be explored and requires further analysis.

Furthermore, the dominating behavioural leadership style of the school leaders embraced the theory of leadership behaviour which reflects that school leaders in all of the three schools exhibited high on relations-oriented behaviour as their dominant behavioural approach. Nepalese socio-culturally is considered a tightly-knitted society by implying relations-oriented behaviour. This further enabled the leadership and followership approaches to embrace relational and behavioural commitment from amongst and between. Relations-oriented behaviour dominated the leadership approaches found in the three community schools due to the nature of the chairperson's professional engagement. The results suggest that the ownership of schools was not carried out with attitudinal commitment; however, behavioural commitment is highly favoured to foster organisational behaviour as seen in teachers' discipline, teachers' appointment, elimination of teachers' mismatch, administration of timing and teaching schedule.

The findings suggest that the chairpersons of the SMC were motivated to contribute to social welfare and gain recognition through their involvement in schools. The findings also suggest that the leadership approaches were directed towards external issues rather than real school administration of academic enhancement. Therefore, academic administration was delegated to the head teacher which was further transferred down to a few teachers. This leads to a communication gap between the school leaders on the one hand and the teachers and students on the other hand. The results also suggest that chairpersons were highly involved with their personal and professional work rather than allocating their time to school management and administration. They were present in the schools only during the SMC meeting summoned by the head teachers at the convenience of the chairperson's time and availability. This further indicates that task-oriented behaviour was least exhibited by the school leaders. It was also found that the chairpersons of the three community schools had no knowledge of academic management and administration.

Despite demonstrating relations-oriented behaviour, the school leaders did not contribute enough time in understanding the organisational behavioural pattern of the teachers, parents, students, and academic programmes. This shows that they adopted a relations-oriented behavioural approach to develop the socio-political image. This

promoted the social image in building trust within social and political aspects for future prospects. Nevertheless, business entrepreneurs in Nepal also rely heavily on political connections. On this basis, many business entrepreneurs are elected as a members of parliament, political financial advisors, and donors for political campaigns.

Moreover, the findings reveal that involvement in the schools was just an avenue to gain political recognition for furthering their political ambition. The school leaders are recognised as socially well-known individuals who are highly regarded as prestigious symbols of the school. Moreover, informal meetings with the chairpersons were often employed in resolving personal problems and taking advantage of the chairperson's political connections. This also enabled the school leaders to demonstrate high relations-oriented behaviour towards the school's stakeholders.

In terms of schools' development, the results reveal that many external agencies came to render technical and financial support. The reason being the political connections of the chairpersons. Therefore, the political connections of the chairpersons brought advantages to the community schools. For example, School 1 was granted a few areas of land in the locality by the municipality. School 2 was successful in resolving a historic land dispute with the community locals. School 3 was able to gain financial and technical support from the NGOs and the members of local community. It also managed to improve on the participation and involvement of local rich people and business entrepreneurs in the development of the school.

In conclusion, in the Nepalese context, a school's development is evaluated in terms of the amount of financial donations it receives. Adequate financial resources enable the development of infrastructure in poorly managed schools. This also indicates the chairperson's successful leadership. Hence, financial resources were accumulated by collaborating with local enterprises and donor agencies such as international non-government organisations (INGO's), community based organisations (CBO's) and non-governmental organisations (NGO's). The political connections of the chairpersons offered adequate benefits to the community schools. Collaboration with donors was possible through relations-oriented behaviour. Relations-oriented leadership behaviour is the dominant behavioural approach adapted by the school leaders. The manifestation of relations-oriented leadership behaviour was also demonstrated inside the schools between the teachers and SMC members as well as outside the schools between the donors and the SMC members. However, a combination of task-oriented and relations-oriented behaviour was also demonstrated by the leaders due to the lack of educational and academic expertise as well as the situational context. Although the findings in the three schools suggest that relations-oriented manifested itself as the dominant behavioural approach, it can only be hypothetically assumed. Moreover, the results suggest that this manifestation of behaviour was essential to

bring development to schools which operated in a contested educational environment. The manifestation of relations-oriented leadership behaviour offered opportunities to harmonise the environment that best suit the contextual administrative setting. Finally, the adoption of NPM in a community school initiated growth. However, the school's development was measured with relational behavioural leadership approaches building and bonding with the external environment which enables the development of physical facilities alone. But would there be a better solution to resolve the politically contested contextual issues without adapting politically manifesting behavioural approaches towards relations-oriented?

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Analysis of Real-World Math Problems: Theoretical Model and Classroom Applications

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Abstract. The Russian education standards stress the importance of real-life applications of mathematics. However, the educational outcome standards do not provide a clear idea of how a math teacher should organize their syllabus to develop relevant skills in students. As long as there is no universal definition of a real-world math problem, it is rather difficult to qualify the problems that teachers use in the classroom. We analyzed algebra problems that teachers give to secondary school students.

Using three parameters, 83 word problems were coded: situational relevance, mathematical modeling, and non-triviality. We carried out a cluster analysis to identify typical categories of mathematical problems. As a result, we determined three types of problems differing in the abovementioned characteristics. Only one cluster appeared to feature all three characteristics typical of real-world problems. Therefore, a portion of the tasks that teachers give students as real-world fail to qualify as such according to the proposed theoretical model.

Keywords: secondary school, algebra, real-world problems, everyday context, math word problems, transfer of learning, mathematical modeling.

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Education standards in many countries emphasize the vital importance of bridging school mathematics with real-life situations. A Realistic Mathematic Education approach was developed in the Netherlands in the mid-1970s. Later on, many countries picked up the idea and continued research in this area [Treffers, 1993]. The Mathematics in Context curriculum was launched in the US and the UK in 1996 [National Council of Teachers of Mathematics, 2006; Dickinson et al., 2011]. In 1997, Norway also introduced new education standards which regarded teaching “everyday” mathematics just as important as teaching arithmetic, algebra and geometry [Royal Ministry of Education, Research and Church Affairs, 1999].

National education standards in Russia were amended in 2010, and they also placed a focus on developing knowledge application skills, in line with the global trend. Thus, the 2010 Federal State Gen-

eral Education Standard imposed the following requirements for the school mathematics curriculum: “By learning the subject area of Mathematics and Informatics, students should realize the importance of mathematics and informatics in everyday life”. As for mathematics education outcomes, they should demonstrate “the ability to model real-life situations in algebraic language, to analyze the constructed models using algebraic tools, to interpret the results obtained” and “the ability to apply worked concepts, results and methods to solving real-world math problems and problems in allied disciplines”.

While education standards determine requirements for education outcomes, The Fundamental Nucleus of General Education Curriculum Content (2011) should be applied to the development of curricula, syllabi, teaching and learning aids. This document clarifies the conception of the new standards, defining the goal of learning mathematics as follows: “Mathematics helps solve real-world problems: family budget optimization, time management, critical evaluation of statistical, economic and logical information, correct assessment of partnership/offer profitability, and simple engineering and technical calculations required in real life”.

Therefore, the two key national documents regulating the content of education in Russia underline the importance of applied methods of teaching mathematics in school. However, the abovementioned requirements for mathematics education outcomes do not provide a clear idea of how a math teacher should organize his or her course to develop applied math skills in students.

The new standard also changed the assessment and testing materials. Today, the math exam for Grade 9 students consists of three modules: Algebra, Geometry and Real Mathematics. The Specification of Assessment and Testing Tools for the 2015 Basic State Examination in Mathematics defines Real Mathematics problems as “problems that are worded to contain a real-life context familiar to students or close to their life experience”. Explaining the goal of such problems, the authors use phrases like “real numeric data” and “real relations between values”. However, the Specification does not stipulate any criteria for qualifying a problem as having a real-life context or being associated with personal experience, and neither does it provide insight into the concept of “real data”. That is why the specificity of Real Mathematics problems still remains unclear despite the available definition.

Similar changes occurred to the math exam for Grade 11 students. Now, the Specification of Assessment and Testing Tools for the 2015 Unified State Exam in Mathematics prioritizes the goal of assessing the ability to “apply acquired knowledge and skills in realistic contexts and everyday life”. Consequently, the Unified State Exam (USE) now includes problems aimed at “testing the basic expertise and skills of applying mathematical knowledge in real-life situations”. However, this definition does not establish any criteria for identifying problem wording as a “real-life situation” either.

Solving problems of this type successfully contributes quite a lot to the final score in both tests. Thus, the Real Mathematics module in the BSE consists of seven problems out of a total of 26. At least two of these seven problems should be solved to get the minimum passing score. The USE offers four (out of 20) problems to test the ability to apply acquired knowledge, their contribution to the initial test score being 20%.

Teacher attitude to transformations is what largely determines the success of any education reform [Thompson, 1992; Barlow, Reddish, 2006; Handal, Herrington, 2003; Hanley, Darby, 2006]. Misinterpretation of the main ideas may become the biggest setback for reform implementation [Ross, McDougall, Hogaboam-Gray, 2002]. Discrepancies in understanding the concept of real-world problems by the school community can be a hindrance for introducing the new education standards in Russia. In the absence of a universal definition, teachers are guided by their own criteria when selecting real-world problems. For instance, a survey of 62 secondary school math teachers showed that they prioritized topical relevance over authenticity when choosing real-world problems for a lesson [Gainsburg, 2008].

This paper seeks to analyze the teacher's perception of the problems that allow assessing real-life math skills. Our research is aimed at answering the following questions:

- What are the qualification criteria for real-world math problems?
- What real-world problems are used by math teachers in the classroom?

1. The notion of a real-world math problem and its key characteristics

Real-world math problems are used in school lessons and final tests throughout the world. Yet, there is still no universal definition for these types of problems. Depending on the conception, researchers may call them real-world or realistic problems [Cooper, Harries, 2005; Gainsburg, 2008; Pais, 2013], modeling tasks [Blum, Borromeo Ferri, 2009; Frejd, 2012], contextualized tasks [Carvalho, Solomon, 2012; Palm, 2006], everyday problems [OECD, 2013], applied tasks [Palm, 2006], etc. In Russia they are traditionally called practice-oriented tasks, in particular when referred to in the specifications of assessment and testing tools. In this study, we use the term *real-world problems* [Fridman, 1977].

Definition and theoretical model determine the goal and the structure of real-world problems, so they are crucial for problem construction. Besides, only a theoretical model allows the authors to verify the conformance of problem realization to the project, i. e. the construct validity of a real-world problem. A theoretical model should include a set of universal criteria to compare and evaluate real-world problems in various application contexts. This overview aims to identify the set of characteristics common for real-world problems.

There are multiple definitions of real-world problems, which means that many different characteristics may be used in theoretical models of such problems. Using everyday language is the first criterion considered by all researchers: problems should describe situations with the help of words, symbols and events that people come across every day. However, everyday problems can be set in myriads of contexts, so it is important to identify clearly the characteristics of everyday situations to qualify problems based on those situations as real-world.

The Programme for International Student Assessment (PISA) sets real-world problems in three types of real-life contexts [Watanabe, Ischinger, 2009]. Problems with personal contexts have a direct reference to students' day-to-day activities, like buying a commuter rail ticket, going shopping or reading a package insert. Problems are also constructed in educational and occupational contexts. These situations are not restricted to everyday activities, and the content of relevant problems may be related to other school subjects, such as biology, chemistry, geography, etc. Finally, a real-world problem may require working with public information from newspapers, magazines, TV shows and the Internet.

Regardless of the type of context, it is vital to consider the degree of realism of the situation: it can be cases from personal or social life with real names and events, or it can be problems with fictitious contexts that have nothing to do with real life. For instance, the statistics course uses a number of problems asking students to find the probability of picking a black or white ball from a bag. Naturally, a situation like this is irrelevant to a student's life [Palm, 2006]. A special place belongs to the so-called cleaned contexts, which do not contain details or circumstances that are not required to solve the problem [Deba, 2011; Du Feu, 2001].

Real-world math problems are designed to make students apply conceptions and procedures that they have learnt from the school course. A problem situation dressed up in everyday language is supposed to be translated into mathematical language. Modeling, or identifying the relations between objects in a problem, is an important stage in solving any word problem, including real-world problems [Talyzina, 1988; Fridman, 1977, Blum, Niss, 1991]. The answer obtained has to be assessed with regard to the original context, i. e. interpreted back to that context. Therefore, the use of everyday language as the first characteristic of real-world problems implies two unavoidable processes: mathematical modeling and interpretation.

The second criterion of a real-world problem is situational relevance of context: objects and relations in the context should be directly relevant to the solving strategy and to the answer obtained. Another taxonomy of real-world problems was developed for PISA, based on the degree to which the context should be used to solve a problem [Watanabe, Ischinger, 2009].

1. Zero-order context: the problem is constructed using everyday language, but the context does not have to be used to find the solution.
2. First-order context: the context is relevant and needed for solving the problem and judging the answer. (Unlike in second-order contexts, the relations between objects are pre-modeled here, e. g. presented in a graph or formula.)
3. Second-order context: the context is also needed for solving the problem and judging the answer, but the student also has to construct a mathematical model of the situation in this context.

Thus, we can see that a problem designed to test the ability to use one's knowledge in real life should be (i) formulated using everyday language and (ii) situationally relevant.

Other researchers also point to the parameters describing the solving environment [Palm, 2006]. Specific conditions of the solving environment may contribute or, vice versa, detract from the solving process. Real-world problems should be constructed with due regard to the following: (i) availability of additional tools; (ii) availability of solving instructions; (iii) possibility to get advice or discuss an issue; (iv) time limit / no time limit.

Yulia Tyumeneva [2014] explored the key characteristics of real-life situations that should be preserved in real-world problems. In addition to everyday language and situational relevance, she also offered non-triviality and relative structural rigidity as real-world problem criteria. Non-triviality is understood as the unorthodoxy of a problem, i. e. the absence of any reference to the algorithm sought for [Jonassen, 1997].

Besides, as an analogy with real life, a problem cannot have a rigid structure or only one right solution a [Ibid.]. However, the school has to put limitations on the answer judgment criteria in order to provide reliability of judgment. That is why relative structural rigidity is regarded as a possibility of using more than one solving strategy.

Thus, an analysis of the existing conceptions allows us to identify the following parameters of real-world problems: use of everyday language (requiring modeling and interpretation), situational relevance, solving environment, non-triviality, and relative structural rigidity. These can be included in the universal theoretical model and serve as the basis for the construction of real-world problems.

Certain constraints are placed on the format and content of any task by the context of application. For example, mass testing does not provide a possibility of discussing the solving process or consulting an expert. In this case, it is very hard to ensure complete congruence of a real-world problem with reality in terms of the solving environment. Approaching this challenge at a broader level, we will also face the conflict between construct validity and test reliability. The maximum possible congruence of a task with real life would require

a complex and sophisticated assessment procedure and thus would work against any possible standardization and test reliability in general [Wiggins, 1993].

In our study, we analyze problems that math teachers use in the classroom, not those given in tests. The classroom environment in a regular school also places constraints on applying all of the real-world problem parameters. For instance, only direct observations show whether students are encouraged to interpret the results obtained. In fact, participant observations of teacher and student behavior are the only way to find out whether teachers require the translation of results back to everyday language and motivate students to use diverse and unorthodox algorithms.

The situation in which real-world problems are solved is often impossible to evaluate. Was there any time limit? Was the student allowed to consult an expert or their classmates? Was the student allowed to use additional tools? Specific constraints on congruence of real-world problems with day-to-day contexts are also imposed by the solving environment. Hence, the theoretical model of real-world problems that we have elaborated needs to be revised each time to meet the conditions and application goals at any given moment.

2. Research method

In the course of our research, we analyzed the problems that algebra teachers gave their Grade 8 and 9 students. The teachers were asked to do a demo lesson on a curriculum-relevant topic. They were instructed that “the lesson should be primarily designed to make the students understand the relations between what they learn in the classroom and possible applications in real life”.

The study involved 18 math teachers in municipal general education institutions in eight regions of Russia. The students who participated in the demo lessons were learning under the basic program.

We sampled 83 word problems out of the tasks used by the teachers in the demo lessons. The teachers qualified those word problems as real-world and used them in the classroom to illustrate how mathematics could be applied to everyday life. Analysis of the problems did not consider the data obtained from observations of teacher and student behavior, which placed certain constraints on the research results.

We analyzed the selected word problems in two steps. First, we defined the parameters of the real-world problems with regard to the sample constraints and coded all the problems using those parameters. Second, we used a cluster analysis to analyze the resulting data matrix. We chose this statistical analysis method because it allows observations to be merged into homogeneous clusters based on the preset characteristics. In other words, a cluster analysis makes it possible to find out which types of real-world problems math teachers use in the classroom.

3. Problem coding Given the goals and application contexts of the sampled real-world problems, our analysis was based on three theoretical model parameters: use of everyday language (only at the level of mathematizing), situational relevance and non-triviality.

1. Situational relevance. This parameter shows the relevance of the problem context to the student's everyday life. The context can make a reference to day-to-day activities, education or human-society interactions. The problematic nature of a question suggests that the solution can serve as the basis for specific actions in the given context.

Let us analyze the following problem as an example.

How many ways can Boldino Farm Firm sow rye, wheat, barley and corn on four ploughed fields during spring sowing?

The farm firm's activities make the context of this real-world problem. However, the question posed is not problematic as the decision to sow specific grass on a ploughed field has nothing to do with the variety of crop combinations.

The context of the following problem is situationally relevant because the solution can serve as the basis for specific actions.

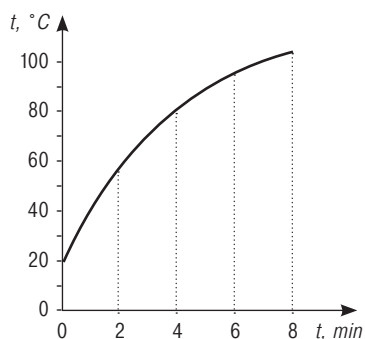
A patient takes 5 drops of medicine on the first day and increases the dosage by 5 drops daily. As she reaches the dosage of 40 drops/day, she keeps to it for 3 days and then starts decreasing the dosage by 5 drops daily down to 5 drops on the last day. How many bottles of medicine should the patient buy if each bottle contains 20 ml of medicine, which is 200 drops?

2. Mathematical modeling. This parameter implies the need to translate the problem conditions from everyday language into mathematical language, e. g. to express the relationship between objects as an equation. The following problem is solved by presenting the numbers in the text as terms of a sequence and applying a formula to calculate the sum of the arithmetic progression.

A free-falling body travels about 5m in the first second and 10m more in each consecutive second. Find the depth of the mine if the body reaches the bottom in 5 seconds after it starts falling.

In some cases, problems formulated in everyday language do not require application of mathematical conceptions or procedures, e. g. when the student is supposed to work with graphs, charts or figures. Although such problems do ask the student to find a specific regularity, no special mathematical knowledge is needed to do this, so translation into mathematical language is not required.

Figure 1. Heating curve for water



The graph in the figure shows the heating curve for water based on data obtained by a student. Answer the following questions: What was the temperature of the water when the countdown began? By how many degrees did the temperature of the water change in the first 4 minutes? By how many degrees did the temperature of the water increase in the last 2 minutes of observation? (Fig. 1)

3. Non-triviality. We understand non-triviality as the absence of reference to routine types of problems, i. e. the absence of any clichéd wording that gives a hint of the specific solving algorithm. The following problem contains routine language that sends the student to the required strategy.

A tiler lays 3 tiles in the first row, 5 in the second row, and so on, 2 tiles more with each row. How many tiles will he need to lay the seventh row?

This problem suggests applying the arithmetic progression formula and can be found in school textbooks quite regularly. Whereas, in the problem on buying the right number of bottles of medicine described earlier, the formulation of problem conditions and question is not connected with any specific topic in the curriculum.

Each parameter of our theoretical model is a dichotomous variable, coded as 1 if present and 0 if absent. All of the selected problems were coded by the same person based on the three parameters mentioned above. To test the reliability of the developed theoretical model, three independent researchers were offered to code 25% of randomly sampled problems. The experts made coordinated decisions in 90% of the cases, which is an acceptable level of the coding system reliability.

4. Clusters of real-world problems

Out of the total sample, 63% of the problems were coded as requiring mathematical modeling. Situational relevance turned out to be typical of only 26%. Only 12% of the problems had non-routine wording. The specific nature of our research did not allow any assessment of the content of real-world problems.

We applied hierarchical clustering to identify the types of real-world problems. This choice of method was made because typing is a search-driven objective and the number of clusters is not predetermined. In hierarchical clustering, each observation is treated as a separate cluster and then merged with the closest similar observation into another cluster. Clusters merge cases that are the closest to one another based on the specified characteristics. The clusters themselves represent groups of observations that differ from one another as much as possible based on the same characteristics. This type of analysis identifies the existing categories of problems, but not the relations between observations, variables or clusters.

The cluster analysis was performed using the SPSS20.0 statistics package. Assuming that clusters can be a different size, we chose the within-groups linkage method for clustering. As the clustered variables were dichotomous, we measured the distance between observations using the Sørensen-Dice coefficient.

As a result of hierarchical clustering, we classified observations into three groups. The identified clusters differ from one another in terms of the specified real-world problem parameters that served the basis for clusterizing. Hence, this classification describes the types of presented problems in the best possible way.

Table 1 shows the number of objects in each cluster and their percentage share in the overall number of observations. The resulting clusters differ in the number of observations in them, and this decision seems adequate as the sample is not representative of the different types of problems. We did not control the sources that teachers could use to select problems for the lessons. It might be that some types of problems were easier to find than others. Therefore, the equal size requirement appears to be unrealistic.

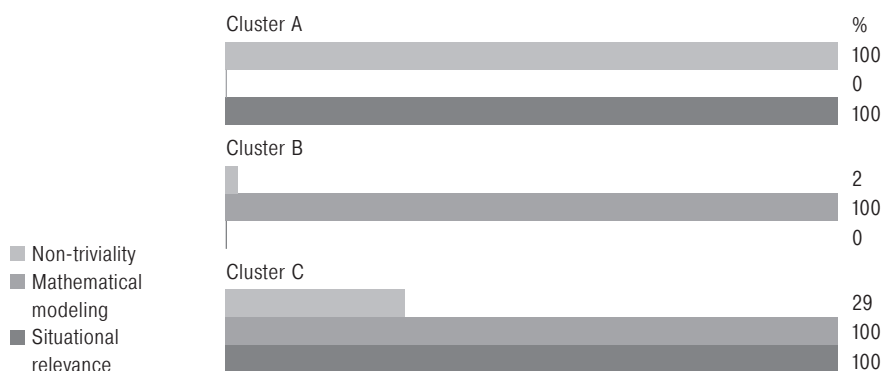
As we can see in Figure 2, the problems grouped in each cluster are characterized by different sets of parameters.

Cluster A groups real-world math problems, each of which is non-trivial and situationally relevant. However, no mathematical modeling is required to solve these problems. They can be formulated using everyday language, and the question may be relevant for the given context, but solving the task does not imply the application of mathematical knowledge.

Cluster A mostly contains problems on working with graphs and charts, it also includes the water heating problem (Fig. 1). The problem is worded in the context of an experiment, which is familiar for the learning process. However, solving the problem implies reading a pre-constructed graph, so mathematical modeling is not required.

Table 1. **Distribution of problems across clusters**

	Observations in a cluster	Share in the total sample (%)
Cluster A	7	8
Cluster B	52	63
Cluster C	24	29
Total problems	83	100

Figure 2. **Percentage distribution of real-world problems across clusters**

Most problems in *Cluster B* have only one parameter: they require mathematical modeling. Only 2% of the problems are also qualified as non-trivial, but this insignificant proportion can be reasonably neglected. The problems in this cluster are worded in everyday language and require translation into mathematical language. Meanwhile, they are not situationally relevant, and they are also formulated using routine words and phrases pointing to the specific solving algorithm. Let us give an example.

Two cyclists started a 60km ride at the same time. One cycled 10km/h faster than the other and finished the ride 3 hours earlier. What was the speed of the cyclist who came second?

The context of this problem is trivial and also familiar to students. However, the question it sets is not problematic and the solution cannot be considered important for the student. Moreover, the very description is routine: it can be easily found in math textbooks and requires a specific, well-known solving method.

Cluster C is represented by the problems which are all situationally relevant and suggest mathematical modeling. However, only 29% of the problems in this cluster are formulated without using phras-

es referring the student to a specific solving paradigm. The following problem is typical of this cluster, and it has all three of the specified parameters.

A park has a railway loop line and a bike path, the movement along which is performed according to the equation $y=0.16x^2-32x+1,300$. Locate traffic lights to ensure the safety of cyclists.

This problem is solved with the help of graphs. The situation it describes is rather common in park planning, thus it is situationally relevant.

5. The teacher's choice of real-world problems

Math teachers now have to pay more attention to real-world problems due to the introduction of new national education standards and the associated changes in the content of final tests. However, they find it difficult to select problems for the classroom in the absence of clear qualification criteria. This study was performed to summarize teachers' ideas of real-world math problems and to determine the most widespread types of such problems.

As a result, we identified three categories of real-world problems which differ greatly from one another within the theoretical model that we developed. Thus, problems in one cluster have only one real-world problem parameter, namely they require the translation of problem conditions from everyday into mathematical language. Meanwhile, this parameter is not typical of any problem in another cluster. There is only one cluster where word problems possess all the three qualification characteristics. It means that some of the tasks that teachers use as real-world problems fail to qualify as such.

Problems of all the types identified can be used in math lessons, but teachers should not forget about the main goal of real-world problems, which is to test the student's ability to apply mathematical knowledge to real-life contexts. That is why it is extremely important for a real-world problem to be as congruent as possible with a real-world situation, i. e. to have the key characteristics inherent to this type of problem.

A math teacher decides which problems should be solved in the classroom, which of them are suitable for covering a specific topic, and which develop required competencies and skills. The characteristics of real-world problems are refracted through a prism of the teacher's attitudes. As we showed in our study, teachers may sometimes prioritize mathematical modeling or non-triviality as the key qualification criterion in different situations. The results that we obtained are consistent with the findings of another research, which revealed that teachers underestimate the value of real-world context authenticity [Gainsburg 2008].

The absence of clear qualification criteria of real-world problems also results in the lack of sources where teachers could find such tasks; no guidelines or manuals with real-world problems are provided for math teachers. In addition, teachers have to adjust real-world problems to specific learning situations. For instance, some mathematical conceptions are difficult to explain using real-world problems, but abstract material does not allow teachers to demonstrate real-world applications of mathematical knowledge. The teacher may simplify real-world problems by reducing the “contextual noise” and emasculate their everyday-language content to the benefit of standardization. On the one hand, teachers are faced with the necessity to develop problems on their own; on the other hand, independent problem construction may compromise the validity and reliability of real-world problems [Wiggins, 1993].

The sampling method that we used places some limitations on the research. We only analyzed the texts of real-world problems, without considering the results of classroom observations. Having not analyzed how teachers work with such problems, we cannot say whether they asked the students to translate the results back to everyday language or whether they allowed the students to choose a solving strategy, a parameter that we call flexibility. Therefore, the parameters of interpretation and flexibility were dropped from the theoretical model.

The sampled problems were used by math teachers during demo lessons. It is not improbable that they work with other types of tasks in their everyday practice. Besides, we cannot judge on the representativeness of these types of real-world problems all over the curriculum for Grade 8 and 9 students.

In summary, specific aspects of research design leave us with no data to make some important conclusions on math teachers’ practice of using real-world problems in the classroom. Observing how teachers and students deal with these problems, as well as possible standardization of this process, are promising paths of research in this field.

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Interregional Youth Migration in Russia: A Comprehensive Analysis of Demographic Statistical Data

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Abstract. Not dissimilar to many other countries, migration in Russia has a pronounced age-dependent pattern with the peak intensity at the age when people obtain a professional education. In this paper, we analyze migration intensity at student age (17–21) using three sources of demographic data with due regard for their key opportunities and limitations. We compare the migration attractiveness of Russian regions in three ways: (1) applying APC

analysis to registration data, separately for two periods: 2003–2010 and 2011–2013; the reason for sampling these two periods is because there was a significant change in the migration statistics collection practices in 2011; (2) using the age-shift method to analyze the data of the 2002 and 2010 Russian Censuses; we offer a way to refine the census data by discarding the non-migration-related changes in the age-sex structure; (3) using information about the average ratio of full-time university enrolments to the number of high school graduates in the academic years 2012/13 and 2013/14 across the regions. Based on the four indicators of migration intensity (intercensal estimates, statistical records for the two periods, and the graduate-enrolment ratio), we develop a ranking of the regions of Russia in migration attractiveness for young adults. A position in this ranking depends not only on the level of higher education development in a region but also on the consistent patterns of interregional migration in Russia. The regions in the European part of the country have a much higher chance of attracting student migrants.

Keywords: youth migration, educational migration, positive net migration, age-period-cohort analysis, age-shift method, rating of region attractiveness.

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Youth migration is an independent area of research, primarily because it is related to education [Raghuram, 2013; Knapp, White, Wolaver, 2013; Smith, Rérat, Sage, 2014]. Researchers have been progressively shifting their focus to the youngest age cohorts associated with the very first education and migration decisions [Smith, Rérat, Sage, 2014]. Such decisions impact greatly on the entire futures of young people and the spatial distribution of human capital as such [Faggian, McCann, 2009; Faggian, McCann, Sheppard, 2007; Mulder, Clark, 2002]. Competing for the most talented students becomes an important factor of development for the regions [Findlay, 2011].

Western researchers identify the category of *thecollege-bound* [Plane, Heins, 2003; Plane, Henrie, Perry, 2005], who demonstrate a clear age-specific migration pattern with peaks in the late teens, when most young people move for educational purposes [Pittenger, 1974; Castro, Rogers, 1983; Rogers et al., 2002; Wilson, 2010]. Empirical research has proven that, in contrast to all other age groups, migration rates have never dropped at student ages¹, even in the light of the recent economic crisis [Smith, Sage, 2014]. This is partially explained by the ubiquitousness of higher education [Chudnovskaya, Kolk, 2015]. The economic benefits of gaining a higher education beat all the constraints [Psacharopoulos, 1994; Psacharopoulos, Patrinos, 2004]. An integrated analysis shows that the cost of moving at an early age is lower than the aggregate costs of missed opportunities [Belfield, Morris, 1999].

Student migration flows are directed towards not only large cities but also university centers that are sometimes far from metropolitan areas [Cooke, Boyle, 2011]; this is how migration of youth differs from migration of other age groups [Dustmann, Glitz, 2011; Van Mol, Timmerman, 2014]. The quality and reputation of a university plays the critical role in the complex process of shaping high school graduate migration flows [Abbott, Schmid, 1975; Agasisti, Dal Bianco, 2007; Ciriaci, 2014]. Economic well-being of the region also has a significant influence on the migration decisions of youth [Findlay, 2011], but this effect becomes dominant later, with the migration of university graduates [Baryla Jr, Dotterweich, 2001; Beine, Noël, Ragot, 2014]. Thus, educational migration of youth follows specific regularities and requires a close study.

Researchers in many Western countries study migration of specific age groups by drawing on the comprehensive statistics which includes both census and register data [Raymer, Beer, Erf, 2011; Raymer, Smith, Giulietti, 2011; 2010] which allows them to trace the migration trajectories and the structural characteristics of different types of migrants.

¹ Specific age ranges vary from study to study depending on the national and regional peculiarities of education systems and statistical data collection techniques. They normally lie within the period from 15 to 24 years.

In Russia, the research on youth and particularly student migration has been mostly based on sample surveys among high school graduates [Katrovsky, 1999; Florinskaya, Roshchina, 2005] and university students (asking them about their migration experience and intentions) [Chudinovskikh, Denisenko, 2003]. Some studies focus on specific regional universities [Popova, 2010], and there has also been some post-educational migration research [Varshavskaya, Chudinovskikh, 2014]. A special niche belongs to the works by Nadezhda Zamyatina, who explores youth migration in a broader, non-educational context, paying particular attention to the perception of migration, the choice of destinations and the attitude of youth to their “small motherland” and the host city as a complex system of orientations [Zamyatina, 2012].

However, although this field of research is quite well developed, there are still some major information constraints in studying youth migration in Russia. The existing demographic statistics can only be used on certain conditions due to the data collection techniques used and the temporal-conditional nature of student migration (student migrants have a temporary registration in the city of studies, which was not included in Russian statistics until recently). In this paper, we analyze migration of student-age youth by comparing three sources of information:

- 1) Current statistical migration data: data from the Russian Federal State Statistics Service (Rosstat) based on the records of registration at the place of residence (and also at the place of stay for nine months or more since 2011);
- 2) Russian national censuses of 2002 and 2010: these provide an opportunity to compare the size of specific age groups between the two years;
- 3) Rosstat data on the ratio of full-time university enrolments to the number of high school graduates in the academic years 2012/13 and 2013/14 across the regions.

A major part of our research is about providing a critical assessment of the data sources mentioned above. In particular, we analyze one by one the situations where such sources are inadequate to the youth migration rates reported and identify the reasons behind these situations. The drawbacks of each source can be mitigated to some extent by using more than one of them at the same time. Our analysis is not intended to give a correct assessment of interregional youth redistribution, but it determines quite precisely the interregional differentiation of increase/decrease in the size of youth cohorts due to migration. We compare the data from available information sources to rank the regions by this parameter. In our view, the reliability of the comprehensive ranking method is confirmed by the essential similarities in the distribution of regions among the indicators estimated based on different sources.

Our study is designed to demonstrate the opportunities and limitations of demographic statistics in research on youth migration in Russia, to assess the education-induced youth migration trajectories of recent years, and to compare the results obtained using different information sources. However, we do not analyze the factors of youth migration and cannot trace all possible trajectories of social and spatial youth mobility as Russian statistics provide no sufficient data for this. In this study, we proceed on the assumption that education plays the title role in interregional youth mobility [Klyachko, 2016] and only consider other factors marginally, as far as statistics are available.

We expect to draw the attention of researchers analyzing the development of education structures in Russia to the opportunities and pitfalls presented by Russian statistical data. The research findings can be applied as analytical material in discussing regional aspects of the development of higher education in Russia.

Youth migration according to 2003–2010 statistical records

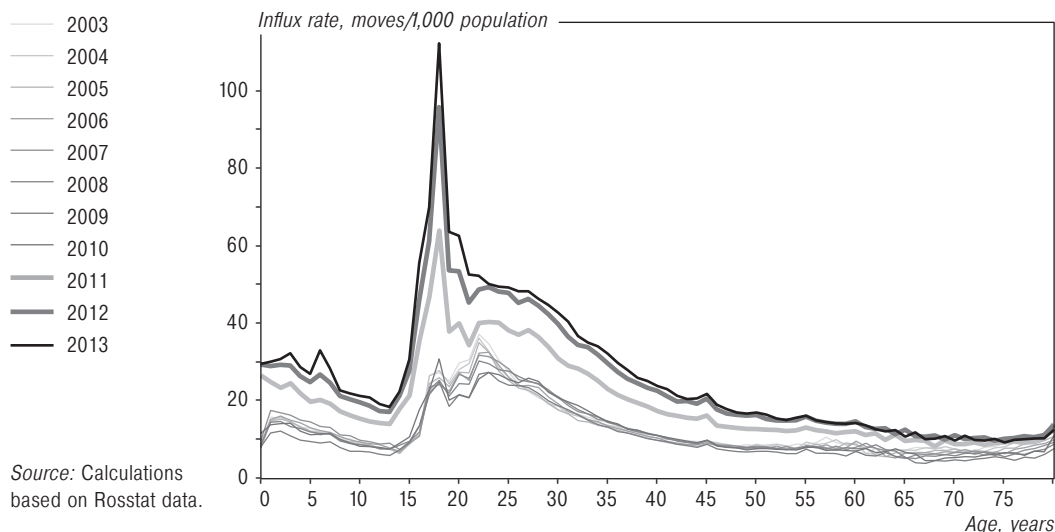
Back in the Soviet era, when strict rules applied to registration at the place of residence/stay, current statistical records were traditionally the main source of migration data. However, the source became less accurate when the Soviet Union collapsed and the registration rules were liberalized [Chudinovskikh, 2004].

The inability to trace migrations of youth, mostly students, became one of the key challenges for the current statistical records [Chudinovskikh, 2008; 2010]. For the most part, students were registered every year (for a period shorter than one year) at *the place of their stay*, not *residence*. Such migrations did not make it into the statistics until recently. It was only in 2011 that statisticians began to record those who were registered at their place of stay for nine months or more, which produced a sharp “increase” in internal migration rates (Fig. 1). Yet, this improvement in Russian statistics, though incredibly valuable, does not apply to 2003–2010, which is the best part of the analyzed period (for a more detailed analysis of discrepancies between registration and census data in the last intercensal period, see our previous works [Kashnitsky, 2015; Kashnitsky, Mkrtchyan, 2014]).

In this chapter, we analyze how current statistical records reflect interregional migration of student population despite all the above-mentioned limitations. To do this, we need to compare the regions of Russia to one another, but we do not seek to make accurate assessments of youth migration rates for each region.

Changes in the size of population or specific age group in a region may be caused by interregional or international migration. Given our goal to assess the redistribution of youths between Russian regions, the latter is of no particular interest to us. Of course, there is also internal redistribution of international immigrants, but part of these migration flows is documented in international migration statistics, while the rate of undocumented flows is anyone’s guess. The overwhelm-

Figure 1. **The number of youth migrants per 1,000 cohort population, internal migration, 2003–2013**



ing majority of international immigrants come to Russia in search of a job, not education. The rates and trajectories of these immigrant migration flows is a topic for a different study.

Despite the considerable underestimation of youth migration, the highest rates are observed at a young age (Fig. 1), this peak being time-constant.

In 2011–2013, the peak of migration shifted even more obviously to the age of 17–18, when most young people graduate from high school and enter university. Even the aggregate data on Russia confirms the hypothesis that student migration used to be underestimated before the 2011 reform.

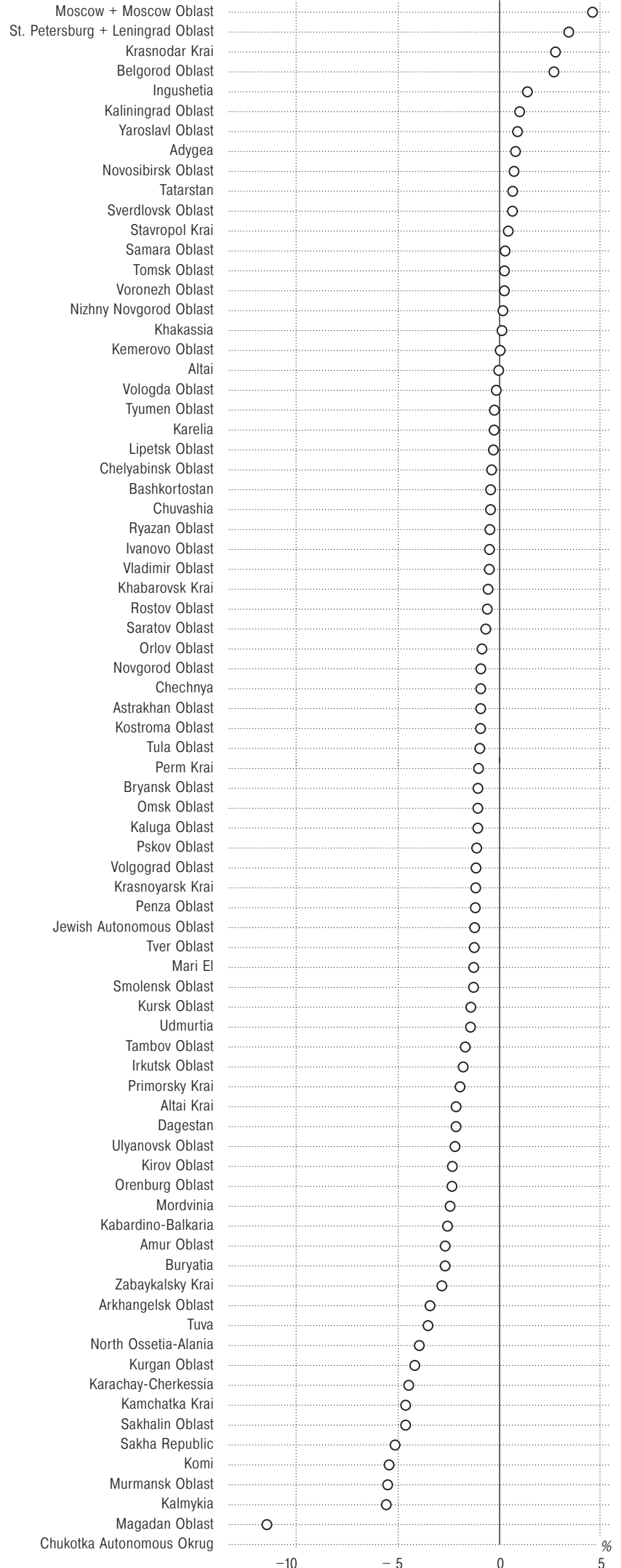
Figure 2 displays the common 2003–2010 migration balance broken down by region. The absolute youth migration data is set against the common migration balance of the region.

Unsurprisingly, Moscow and Moscow Oblast turned out to be the undisputable leader in attracting internal migrants: the metropolitan area grew by 780,000 people in the intercensal period. The increase in the student population (hereinafter understood as population aged between 17 and 21) is the highest in Moscow and St. Petersburg. We consider it necessary to merge the capitals with their federal subjects for the purpose of this analysis: there is no use in treating Moscow and Leningrad Oblasts as independent players in the migration market. In addition, registration data provides no opportunity to analyze Khanty-Mansi and Yamalo-Nenets Autonomous Okrugs separately from Tyumen Oblast and Nenets Autonomous Okrug from Arkhan-

Figure 2. **Common interregional migration balance, Russia, (1,000 population)**



Figure 3. **Common interregional migration balance, Russia (% of change in the initial size of population)**



gelsk Oblast. Thereby, the number of analyzed regions is reduced from 83 (the official figure) to 78.

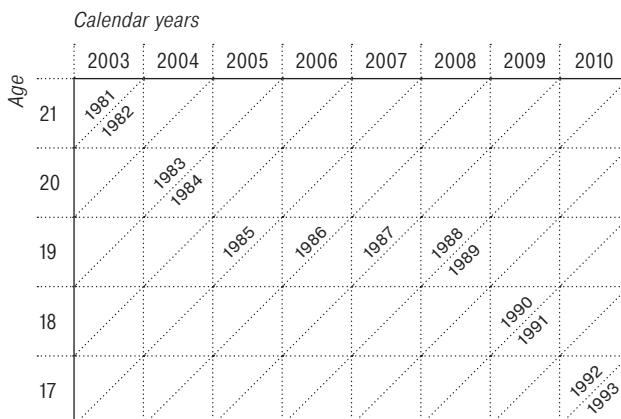
The total migration influx does not always correlate strongly with the influx of youth. For instance, Krasnodar Krai, a popular destination for internal migrants, rather attracts older adults than youth. We operate with absolute data that are not weighted by the size of regions or the proportion of the student population in them. While weighting adjustment of population at large is an easy job, a cohort analysis is required when we choose the coefficient denominator to assess the rates of youth migration (see below).

Only 18 of the analyzed regions of Russia were found to be attractive for internal migrants based on the whole intercensal period (Fig. 2). In all other regions the population decreased due to interregional migration. Student migrants also favored 18 regions, mostly the same ones as above, which are prospering in the internal migration market. However, there were remarkable exceptions, too. For example, the most youth-attractive regions included Tomsk Oblast (ranked 7th) with its renowned universities, where the increase in the number of students (17–21 years, only five one-year age groups!) was almost four times higher than the overall increase in population.

A huge polarization of the regions by population outflow is manifest when we present the data of the 2003–2010 common interregional migration balance as relative to the initial size of the population reported by the Census of 2002 (Fig. 3). With such proportional measurements, the influx to St. Petersburg and Leningrad Oblast is only slightly lower than that of Moscow. An analysis based on weighted data reveals clearly the phenomenon of Belgorod Oblast. This generally peripheral region allures migrants more than any region with a million-plus city—except the two capitals, of course. We also identified two thinly populated subjects of the Russian Federation that suffer the most from population outflow: Chukotka Autonomous Okrug and Magadan Oblast.

To compare the youth migration rates, it would be useful to calculate similar relative coefficients for the youth migration balance. However, there is a challenge here: people who made education-induced moves at the age of 17–21 from 2003 to 2010 may belong to thirteen different birth cohorts (from 1981 to 1993) (Fig. 4). Youth population was very unstable throughout the analyzed period due to some structural factors like the sinusoidal birth rate patterns of the 1980–1990s. So, it would be wrong to weight the common youth migration balance over eight calendar years by the size of youth population in 2002 (i. e. the number of people born between 1981 and 1986) or to weight the mean youth population by the last intercensal estimate, i. e. by the mean of the 2002-estimated population born in 1981–1985 and the 2010-estimated population born in 1988–1993. Naturally, the use of the cohort-component method is inevitable.

To compare the regions, we need to find out how interregional youth migration affected the size of the youth population in each of

Figure 4. **Lexis diagram: birth cohorts aged 17–21 in 2003–2010**

the regions in 2003–2010. In other words, we need a comparative index that would demonstrate correctly the rate of youth influx to every region and would be representative of all cohorts that lived in the relevant *temporal rectangle*². Cohort-component analysis allows us to calculate such an index, the *interval coefficient of cohort net migration (ICCNM)* [Kashnitsky, Mkrtychyan (in print)]. This coefficient shows the mean change in the *integral* cohort that is covered fully by the temporal rectangle. According to the ICCNM calculation method that we use, the integral cohort net migration is the age-based average of specific coefficients for real-life cohorts³.

A cohort-component analysis of youth positive net migration in 2003–2010 (Fig. 5a) and 2011–2013 (Fig. 5b) reveals a sharp increase in internal youth migration rates (or at least in the number of recorded movements of young people) during the latter period, when the methods of migration statistics collection had been reformed. While the increase in youth cohorts varied between –15.5% and +7.8% across regions in the eight years of the intercensal period, the following three years (after the new registration rules came into force) witnessed a variation of –30.2% to +23.3%. The difference in duration of the two periods does not matter because the ICCNM index is averaged by cohorts.

On the whole, the regional distribution of the index appears to be quite stable. Most regions retain their positions in the youth net migration ranking almost unchanged. The Pearson correlation coefficient between regional variables for the two analyzed calendar periods is

² We apply the term *temporal rectangle* to denote the analyzed calendar period covering the analyzed age cohorts.

³ Coefficients may be averaged by cohorts or periods.

Figure 5. Interval coefficient of youth cohort positive net migration (percentage of change in the cohort) for the periods

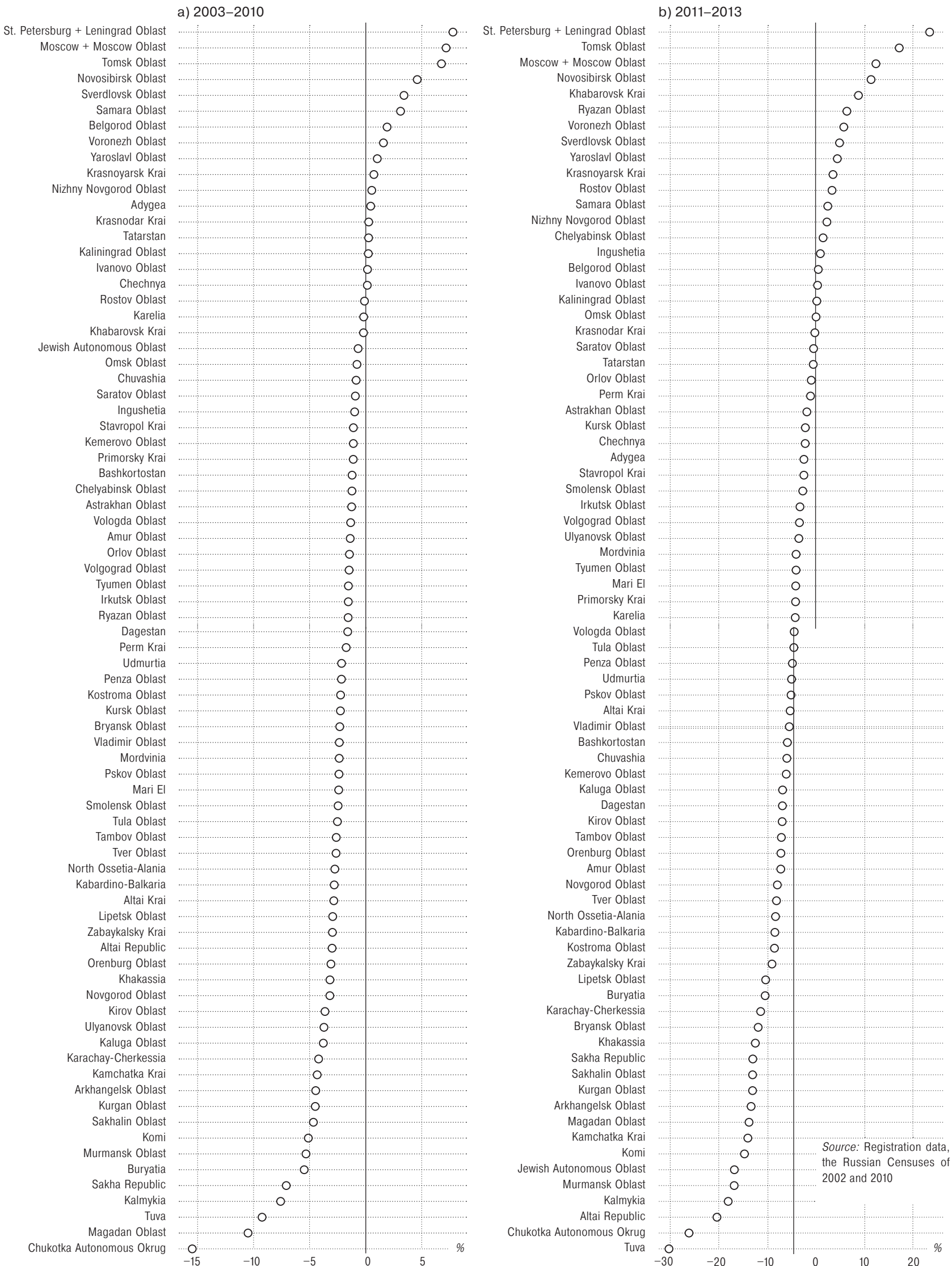
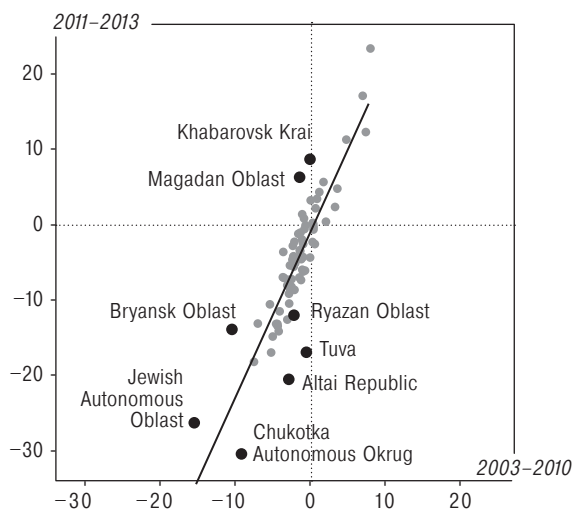


Figure 6. **Regions with the highest change in the rate of youth influx**



Source: Registration data, the Russian Censuses of 2002 and 2010

Note: The figure shows 10% of the regions with the biggest residual error of linear regression.

0.87. However, the rates of youth positive net migration changed notably in some of the regions (Fig. 6).

In contrast to the other leading regions, the increase in the rate of youth influx to Moscow has been rather small over the last few years. Conversely, although youth outflow has increased in the most depressed regions of Chukotka and Magadan, its dynamics have been rather moderate as compared to the changes in other regions.

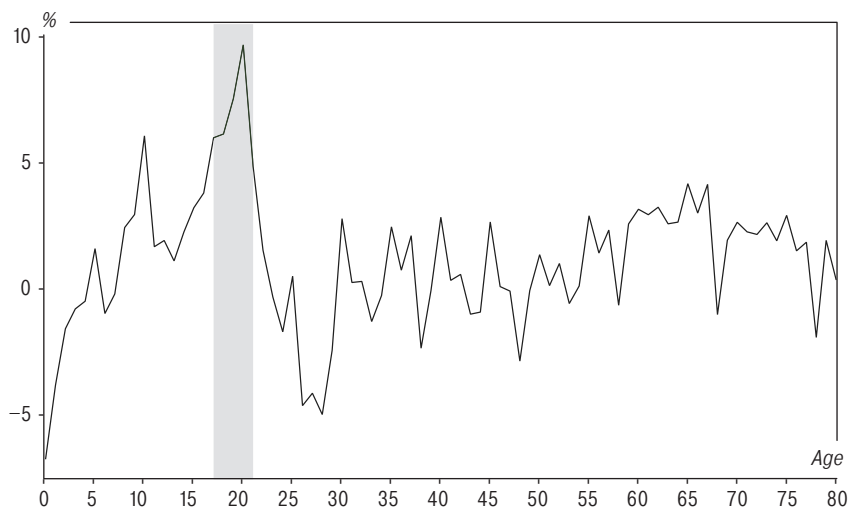
The overall rates of interregional youth migration nearly doubled between 2003–2010 and 2011–2013. However, this growth is mostly explained by the changes in the rules of registration at the place of residence/stay: what used to be latent variables became available for analysis.

Interregional youth migration based on the censuses of 2010 and 2002

Population censuses allow the retrieval of migration data not covered by registration data, which was especially important for the period before the 2011 reform. Comparing census data with registration data is a pretty standard procedure to detect undocumented migrations at various levels of administrative division, including regions. The cohort-component method is used to apply this procedure to specific categories of population (e. g. youth).

The Russian Census of 2010 revealed considerable deviations from registration data in a number of regions. Just as with the census of 2002, Rosstat attributed those deviations to undocumented migration. The population of Russia turned out to be one million bigger than had been estimated based on the registration data. The highest population growths were observed in Moscow, St. Petersburg, Moscow and Len-

Figure 7. **The difference between the 2010 census data and the estimated population as a proportion of the population estimated on the census date (%)**



Source: Our own estimates based on the Russian Census of 2010 and assessments as of this date.

ingrad Oblasts, Krasnodar and Stavropol Krajs, Voronezh and Rostov Oblasts [Mkrtchyan 2011]. Internal migration played the key role in providing this positive net migration, which means that the population decreased in many northern and eastern regions, and the macro-regions of Privolzhye and Ural. Hence, the trends in interregional population redistribution observed from registration data are confirmed by census data and include an outflow of population from the east and its concentration in agglomerations like Moscow and St. Petersburg. The census revealed that migration rates in 2003–2010 were actually higher than could be observed from the registration data.

The census of 2010 also brought to light a considerable additional underestimation of youth migration⁴ [Andreev 2012]. The deviations between estimates and census data are most conspicuous in youth statistics (Fig. 7) (for more details, see [Mkrtchyan, 2012]). The peak deviation, 9.4% from the estimated youth population, is observed at the age of 20, which has to do with, among other things, *age heap-*

⁴ Deviations in census data are interpreted as undocumented migration, pursuant to the statistical procedure accepted by Rosstat and generally supported by experts. This is dictated by the major problems of assessing migration during the intercensal period with relatively accurate birth and death rate statistics. The challenges of this approach include underestimation of inaccuracies and errors of the last two censuses on which calculations are based. In this work, we use the information provided by Evgeny Andreev (New Economic School) and base our calculations on 2002 and 2010 census data (using the cohort-component method) and registration data obtained in the intercensal period.

ing that clumps the population's ages at values ending in 0. Nevertheless, the deviations at the neighboring ages (19 and 21) were also quite significant.

It would be wrong to attribute these deviations to international migration alone. First of all, international immigrants move to Russia most actively at older ages. Besides, most of them were not covered by the censuses, which can be seen from the summary data on citizenship and ethnic composition. The overall deviation in the size of the Russian youth population was 615,000 people, or 5.7% of the cohort. A considerable role was probably played by double counting, which is primarily made possible as a result of registering internal student migrants at the place of their study in addition to their home registration. Double counting deteriorates a lot the value of this data for the analysis of student migration rates, but it is still useful for exploring the spatial regularities.

Deviations in the youth cohorts of specific regions are different not only in their degree but also in their sign (Fig. 8). Positive deviations in the size of the youth population were observed in 37 of the 78 regions and negative ones in 41 regions. Thus, even overestimated cohort values show that half of the regions had an additional migration-induced outflow of youth that was not covered by statistics.

In some regions, changes in the number of young people may also be explained by the so-called special contingent. It mostly includes army conscripts (they are not covered by migration statistics but are captured by censuses in the region of their conscription), the majority of whom fit into the analyzed age limits. If the military base is located in the region of residence, no deviations will occur, as these are only possible in the case of military service in other regions.

Using the 2010 Census data, we compare the population of men and women aged 18–19 (the age of most conscripts). On the whole, the number of males is 3.8% larger than that of females, which is determined by purely demographic reasons, namely the higher frequencies of male births. However, the ratio is largely disturbed in some of the regions, where the population of men is more than 15% greater than that of women (Table 1). With few exceptions, these are the regions showing a consistent population outflow, but such imbalance cannot be explained by regular migration in Kaliningrad, Leningrad and Moscow Oblasts [Mkrtchyan, Karachurina, 2014]. The sharp increase in the male population over the female population at this age may be attributed to the big military (=men's) schools, like those in Kaliningrad Oblast.

It appears that youth population should be adjusted for the population of conscripts. To do this, we subtract the redundant number of males for the regions with the ratio of 18–19-year old men to women exceeding the national average, i. e. the number of men aged 18–19 exceeding that of women by more than 3.8%. The cumulative reduction in the youth cohorts of these regions was 156,000 people. Follow-

Table 1. Population of men and women aged 18 and 19 in some of the regions of Russia, 2010.

	Men (thousands)	Women (thousands)	Ratio of men to women (%)
Russian Federation	1911.3	1840.9	103.8
Arkhangelsk Oblast	15.0	13.0	115.2
Komi Republic	11.4	9.8	116.7
Vladimir Oblast	19.0	15.8	119.9
North Ossetia-Alania	12.3	10.2	120.3
Republic of Buryatia	16.2	13.2	122.8
Moscow Oblast	96.8	74.8	129.4
Zabaykalsky Krai	20.4	15.5	131.7
Pskov Oblast	9.8	7.3	133.5
Jewish Autonomous Oblast	3.0	2.3	134.7
Leningrad Oblast	22.9	17.0	135.1
Primorsky Krai	33.9	23.9	141.9
Kaliningrad Oblast	16.9	11.6	145.6
Sakhalin Oblast	7.1	4.9	146.1
Kamchatka Krai	5.0	3.3	150.1
Khabarovsk Krai	27.0	18.0	150.1
Murmansk Oblast	12.0	7.5	159.6

Source: Estimates based on the Russian Census of 2010.

ing the adjustment of the data specified in Table 1, Vladimir, Moscow, Kaliningrad and Pskov Oblasts, as well as the Republic of Buryatia, Primorsky and Khabarovsk Krai turn from youth-host to youth-donor regions, and the youth outflow rates in other regions turn out to be considerably higher. These adjustments are applied in Figure 8.

If we proceed from the hypothesis of youth cohort double counting when interpreting the data on the regions whose net migration rates became more positive following the census, we will find that regions showing positive migration rates do not in fact always have them. It means that the rates of youth influx must have been assessed adequately for the most part. However, the outflow rates are most probably underestimated.

Our previous works show that the North Caucasian Federal District republics were the most controversial regions in the censuses of both 2002 and 2010. For example, where did the additional influx of 45,000 young people to Dagestan (a 14.9% increase in the youth

cohort) come from? The degree of this deviation is comparable to St. Petersburg. In reality, Dagestan must be losing young people, as confirmed by the statistics of the recent years mentioned above. The 55,300 (23.4%) deviation in Stavropol Krai is also rather questionable. Of course, Stavropol Krai universities attract students from North Caucasian republics, but there is also an outflow of youth to other regions, in particular to Moscow and St. Petersburg. Besides, the overall influx of youth to the North Caucasian Federal District is 79,000 people, or 8.5%. Where could it possibly originate? It is hard to argue with the sign of youth migration rate in Stavropol Krai, but the size of positive net migration is more than doubtful. Additional youth migration to Kabardino-Balkaria and Karachay-Cherkessia also seems debatable. The Southern Federal District demonstrates a high additional rate of influx to Rostov Oblast, which is 46,700 people, or 15%. It is also probable that the regions with small deviations in fact did not attract additional student migrants. These include Lipetsk Oblast (0.4%), Tambov Oblast (0.8%), the Republic of Khakassia (0.9%), etc.

According to the censuses, the rest of the regions received a sizeable or even a very substantial additional inflow of youth. These are, primarily, Moscow with Moscow Oblast and St. Petersburg with Leningrad Oblast, which accepted a total of 283,000 additional students, thus increasing their youth cohorts by 18.3% and 15.8%, respectively. Other regions include Tomsk (+23%), Voronezh (+12%), Novosibirsk and Ivanovo (+11%), Volgograd (+10%) Oblasts, Krasnodar Krai and Nizhny Novgorod Oblast (+9%), Ryazan (+8%), Smolensk and Penza Oblasts (+7%). We can probably also include Stavropol Krai and Rostov Oblast to this category, but these two regions showed much more humble youth inflow rates.

Another 18 regions increased their youth population by 2–7%. With the exception of the Sakha Republic (we have certain doubts about the appropriateness of including it), these are the regions in the sufficiently developed part of the country. Eleven regions had their youth cohorts almost unchanged (from +2% to –3%) or, rather, insignificantly reduced if we remember the challenges associated with censuses of the youth population. Another two groups of regions faced a 3–10% and a more than 10% reduction in youth population. The most significant reduction was observed in the northern and eastern regions with a consistent outflow of population in general. Youth cohorts shrunk by over 20% in Chukotka and Kamchatka Krai, Murmansk and Sakhalin Oblasts, Jewish Autonomous Oblast, and the Tuva and Altai Republics. Apart from the overall population outflow, these regions also have a relatively low potential of universities as additional student migration factor.

Some estimate results look paradoxical, like the outflow (though small) of youth from Perm and Krasnoyarsk Krai and Irkutsk Oblast with rather high historical standards of university education. However, the 2010 census also witnessed an additional outflow of the over-

all population in the abovementioned regions. At the same time, the Sakha Republic had an additional influx of youth. It is also odd that the youth influx rate in Yaroslavl Oblast is lower than in Ivanovo, Tula or Penza Oblasts.

Therefore, there is a pronounced correlation between census-added youth migration and the overall patterns of trans-regional population migration. However, the results of migration depend not only on the economic situation in a region but also on the level of university development.

The youth migration data obtained from the censuses do not allow us to assess migration trends as we can only estimate the time of migration approximately. When we compare the data of two censuses, the whole eight-year intercensal period is the time unit. This is quite a lot for any specific cohort, especially that of young people, and it can be inherently heterogeneous in terms of migration intensity. For instance, a large influx of 18-year-olds in 2003 may be followed by an even larger outflow of 24-year-olds in 2009. In such a case, comparing two censuses, we will only see the resulting balance of the cohort's size, but the temporal student influx will be overlooked.

The ratio of university enrolments to the number of high school graduates as an indicator of student migration in the region

We can also assess the region-specific rates and trajectories of youth migration through comparing the number of students admitted to Bachelor's and Specialist's degree programs on a full-time basis (both in state-owned or private universities) to the number of high school graduates. To do this, we use the Rosstat data for the academic years 2012/13 and 2013/14. The logic is quite simple: if the number of new university students in the region was considerably lower than that of university-oriented high school graduates, we can suggest that "excessive" graduates set off to conquer universities outside their home region. And vice versa, if the number of first-year students was much higher than that of local school graduates, it means that "excessive" freshmen must have come from other regions.

We performed some preliminary calculations to ensure the adequacy of comparison. First, not all high school graduates head for university, although the percentage is very high. Some of them take vocational training, others enter the military, the labor market, etc. This is why we only use the proportion of high school graduates who pursue higher education in the same reference year, which was 78% in the academic year 2013/14, according to our estimates. Very similar results can be found in the article by Tatyana Klyachko [2016]. Therefore, the data on the number of high school graduates was adjusted for this proportion. Second, not all university candidates are fresh high school graduates. Entrants to Bachelor's and Specialist's degree programs also include people who did not graduate from school earlier the same year: repeat applicants, service leavers, fresh vocational school graduates and labor market participants [Shugal, 2010].

Figure 8. Deviation of the 1989–1993-born cohort (aged 17–21 in 2010) estimates from the actual size over the 2003–2010 intercensal period (%)

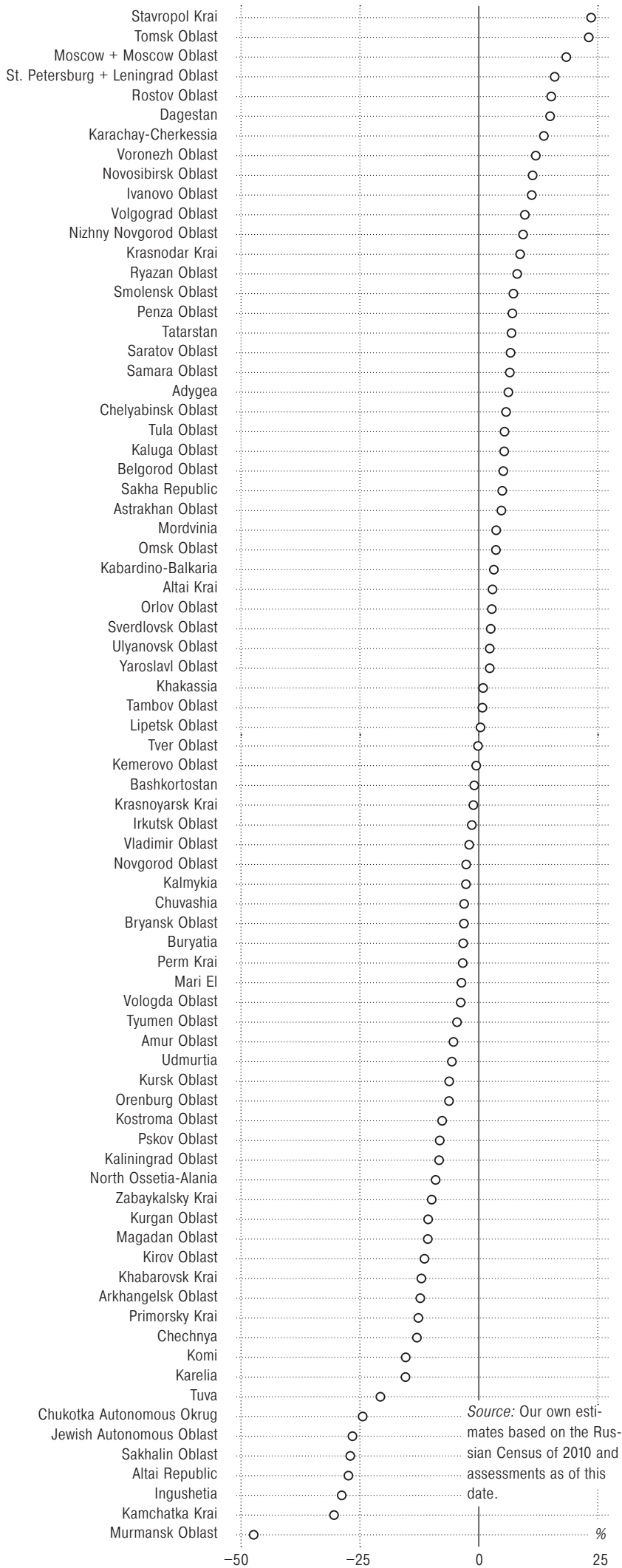
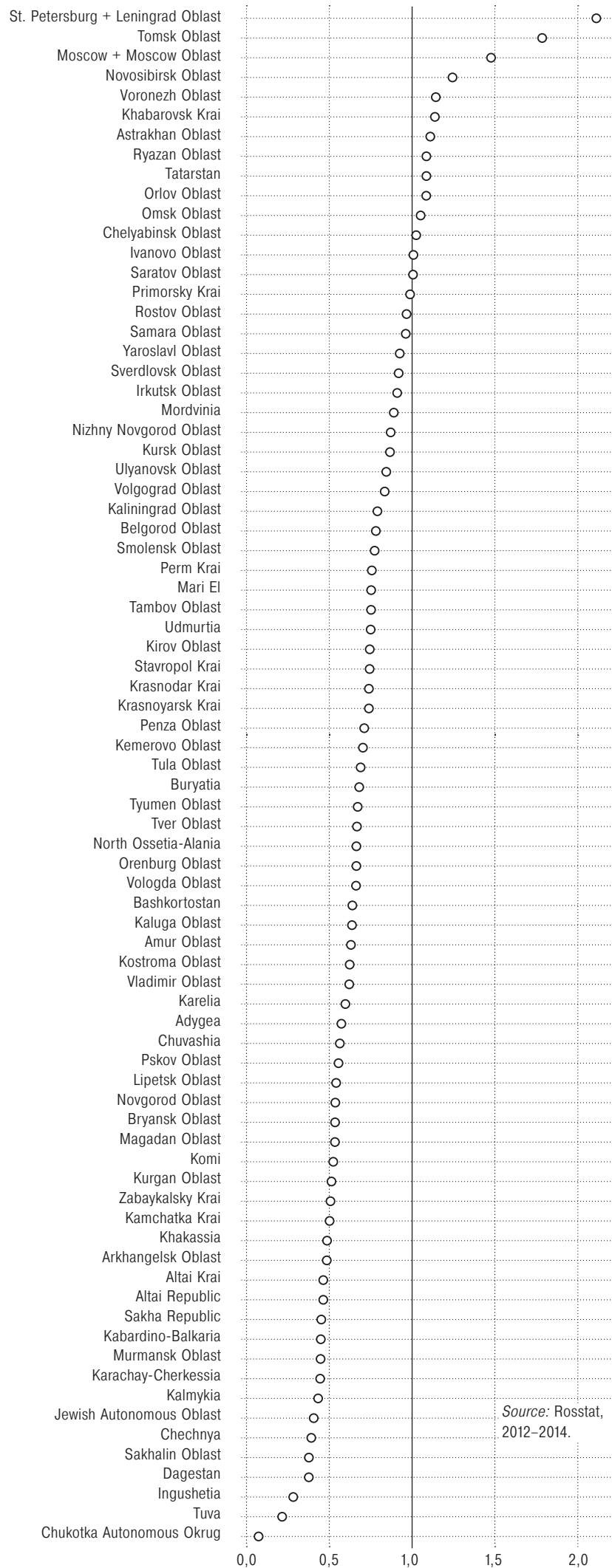


Figure 9. The ratio of full-time university enrolments to the number of high school graduates



The proportion of fresh high school graduates among students admitted to Bachelor's and Specialist's degree programs on a full-time basis was 87% in 2013. We rely upon full-time education programs because they suggest a constant proximity to the educational institution, while part-time student statistics may distort the migration estimates. With due regard for these adjustments, we obtain the number of first-year Bachelor's or Specialist's degree students who graduated from high school the same year. After comparing the total number of freshmen with the total number of university-oriented high school graduates, we get the values describing the redistribution of student flows among the regions. For each region, a positive deviation of the ratio from 1 indicates migration attractiveness for young people, while a negative deviation indicates an outflow of youth to universities in other regions.

The national average ratio is 0.74, which means that Russia has more "outflow regions" than those with large educational centers. Only 14 out of 78 regions were found to be migratorially attractive based on this index in 2012–2014. These include, first of all, St. Petersburg and Leningrad Oblast, Moscow and Moscow Oblast, Tomsk, Novosibirsk and Voronezh Oblasts and Khabarovsk Krai, i. e. the regions where the biggest universities are concentrated (Fig. 9). If the ratio of first-year students to the total number of high school graduates is significantly higher than 1, we can safely suggest that the region had an influx of students from other parts of the country. Most regions witnessed youth outflows of different rates. In many of them, the local universities enrolled less than half of all school graduates, the proportion plummeting to under 10% in Chukotka. The ratios of university enrolments to high school graduates show that universities in the North Caucasus receive much fewer students than the local schools produce. A similar trend is observed in many northern and eastern regions of Russia.

The comparison of the ratios of first-year students to high school graduates with the census and current youth migration statistics shows that the list of the most migratorially attractive regions remains the same, irrespective of the ranking method.

The final ranking of regions based on student migration rates

Our analysis shows that different data sources mostly provide a pretty common picture of youth migration in Russia. The categories of regions based on specific indicators and the degrees of their attractiveness to students are quite close for the four indicators, which is confirmed by rather high correlations between the indicators (Table 2).

Similar results obtained by analyzing youth migration based on different sources prove that the four estimated indicators can be used to develop a composite synthetic indicator that will allow the most trustworthy ranking of the regions of Russia by youth migration attractiveness.

Table 2. **Pearson correlation coefficients between the estimated indicators**

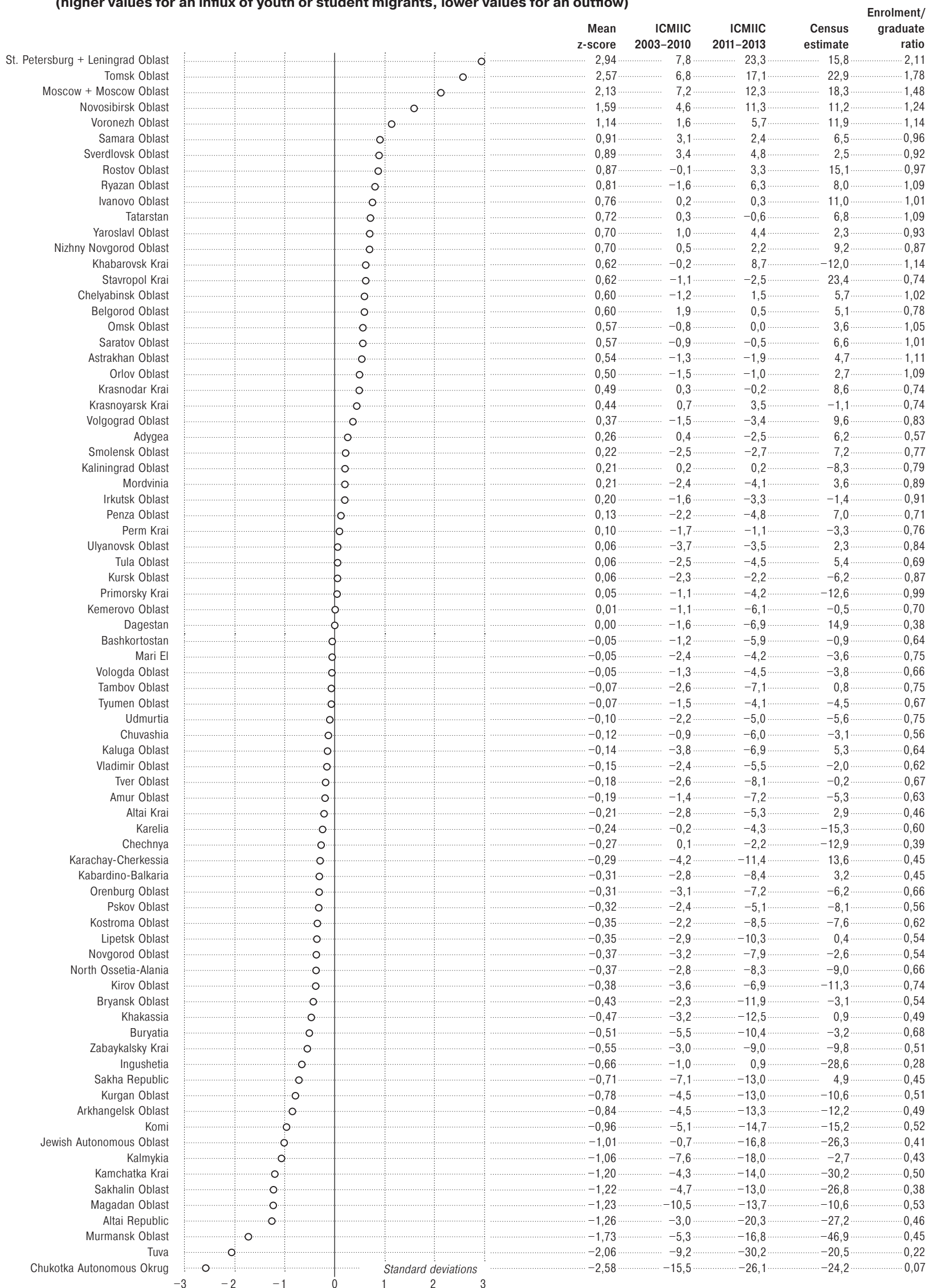
Indicator	No.	(1)	(2)	(3)	(4)
Change in the size of the 1989–1993 cohort for the 2003–2010 intercensal period (%)	(1)	1	0.53	0.62	0.63
Registration data, ICPCNM of the 1981–1993-born, 2003–2010	(2)	0.53	1	0.88	0.72
Registration data, ICPCNM of the 1989–1996-born, 2011–2013	(3)	0.62	0.88	1	0.8
Ratio of students admitted to Bachelor's and Specialist's degree programs on a full-time basis to the number of high school graduates, academic year 2012/14	(4)	0.63	0.72	0.8	1

As soon as these four indicators differ in both calculation methods and final measurement units, we convert them to a common scale using z-scores (standardized values). Z-standardization consists in subtracting the sample mean from each indicator value and dividing the difference by sample standard deviation. This way, the original measurement units are converted to a common scale (standard deviation units), enabling a comparison of standardized values. We standardize all the four student migration rate indicators and average the data for each region. The resultant indicator of a specific region shows the number of standard deviations by which the regional value differs from the national four-indicator-based average. The resultant ranking is shown in Figure 10. Zero values indicate average regional indicators, not the boundary between the influx and outflow of youth.

The absolute leaders are Moscow and St. Petersburg (with oblasts), Novosibirsk, Tomsk and Voronezh Oblasts. Their leadership was provided by the evolution of the Soviet higher education system (and by the administrative status in case of the capitals), which developed a powerful education potential in these regions to meet the requirements of the planned economy [Kuzminov, Semenov, Froumin 2013]. They are followed by the regions which are also close in leadership. Many of them have million-plus administrative centers: Yekaterinburg, Rostov-on-Don, Samara, Nizhny Novgorod, Kazan, Omsk. However, the category of “almost leaders” also includes some “ordinary” regions, such as Yaroslavl, Ryazan or Ivanovo Oblasts, which do not have any administrative or population advantages over their neighbors.

Relatively high positions in the ranking are occupied by many central and southern regions of the European part of the country, demonstrating a certain advantage of their geographic location. However, the student-attracting regions also include Krasnoyarsk and Khabarovsk Krai, which suffer the full negative effects of the “western drift”, finding it much more difficult to attract student migrants. As the statistics shows, having just started to decline, the population outflow from the East to the West has rebounded recently following the migration statistics reform [Zakharov, Vishnevsky, 2015]. Yet, the eastern regions

Figure 10. Ranking of the regions of Russia based on the 2003–2013 student migration rates (higher values for an influx of youth or student migrants, lower values for an outflow)



of Russia still cannot hope for a youth influx increase; their universities will have to make strenuous efforts to attract additional students. Few of these regions make it to the top of the ranking.

The lower part of the ranking covers not only the eastern regions but also almost all the republics of the Northern Caucasus, where low levels of higher education are exacerbated by the traditional outflow of population due to the lack of jobs, relatively backward economies and domestic political instability. Young people are also leaving many of the regions in the European part: Bryansk, Orenburg, Lipetsk, Kostroma, Pskov, Novgorod, Vladimir, Kaluga, Tver Oblasts, and the Republics of Karelia and Udmurtia. Clearly, these regions lose to their neighbors. Yet, the failure in this competition is not predetermined as we can see from the examples of Voronezh, Yaroslavl, Ryazan, Orlov and some other Oblasts.

As we have mentioned before, the attractiveness of a region for student migrants is also greatly affected by the size of the administrative center population: the regions with million-plus cities have more chance of getting to the top. Meanwhile, middle-ranked Perm Krai and Volgograd Oblast as well as bottom-ranked Bashkortostan obviously lose the struggle for youth to the more successful neighbors and the giants like Moscow and St. Petersburg, and neither geographic location nor large regional centers can help them.

Conclusion Having analyzed the youth migration patterns based on the data for different periods obtained from different sources (census data, registration data, the ratio of full-time university enrolments to the number of high school graduates), we can assess migration attractiveness of regions and regional higher education systems for young people. We have produced a ranking of regions that reflects the years-long evolution of their education systems and the summary of decisions made by young people (and, maybe, their parents) regarding the preferred destinations for higher education.

Despite all the pitfalls of each specific youth migration indicator that we have described in this article, the findings are in line with our expectations based on the overview of foreign studies. Quite naturally [Baryla Jr, Dotterweich, 2001; McHugh, Morgan, 1984], the most youth-attracting regions are largely represented by the most economically powerful cities housing the top universities: St. Petersburg, Moscow, Samara, Yekaterinburg and Rostov-on-Don. Migration to these administrative centers helps young people to kill two birds with one stone: get an education and, later, find a job in the same region, thus reducing the costs of migration (both economic and social). The top positions of such largely university-based centers as Tomsk, Novosibirsk and Voronezh proves that the quality of university plays a key role in shaping youth migration flows [Abbott, Schmid, 1975; Agasisti, Dal Bianco, 2007; Ciriaci, 2014].

All the indicators used in this article provide an adequate assessment of youth migration trajectories. We believe that this integrated assessment allows leveling random fluctuations of certain indicators caused by the estimation methods and the specific features of the analyzed time period. Just as with the development of education systems, migration trajectories are rather inert, which has been proven by the estimates in this work.

The choice that young people make about the destination of their higher education studies depends not only on the potential of university centers but also on the overall migration tendencies in the country and the socioeconomic situation in the regions. For many, obtaining a higher education is an opportunity to make this move with lower costs and gain their first important migration experience at an early age. This is why different regions and youth-attracting centers have unequal opportunities: Moscow and St. Petersburg universities enjoy a huge competitive edge due to the overall migration attractiveness of the largest cities. Close attention should be paid to the increase in youth influx to certain regions of the Asian part of Russia: here we have important “second-tier” attraction centers that resist the prevailing migration trends effectively.

The above analysis of youth migration trajectories may serve as a benchmark in strategic planning designed to advance the national and regional education systems. The possibility of attracting student migrants from other regions offers a crucial advantage to universities and is a powerful factor in their socioeconomic development.

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How University Students Develop and Meet Their Need for Additional Education

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Abstract. We analyze how university students develop and meet their need for additional education as the critical way to engage in lifelong learning, which starts in student days and continues throughout the life cycle. The article investigates into the theoretical approaches to the nature, content and orientation of the need for additional education, identifying the key factors encouraging university students to acquire additional major-related knowledge so as to sharpen their

competitive edge in the labor market. We show that 71% of students experience the need for additional education, and 51% have already received some along with their regular university studies. We rely upon the determination theory to allow for not only extrinsic factors of development of the need for additional education (employer requirements, current trends) but also intrinsic ones (commitment to increasing one's competitiveness in the labor market, need for personal fulfillment). The article also explores how students develop and meet their need for supplementary knowledge and skills depending on their major field of study. We suggest taking specific measures to develop the additional education system, notably developing more actively students' need for constant improvement of their competitive power and better self-fulfillment in career and life, and expanding significantly the range of services offered by additional education institutions.

Keywords: lifelong learning, higher education, educational needs, additional education, need for additional education, competitive edge in the labor market, personal fulfillment.

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**Students as a
Resource for the
Additional
Education System**

The dynamic changes in labor market requirements for university graduates and the need to adjust to them determine the relevance of research on the trends in the need for additional education across different student categories and the main contradictions in the development and realization of such need. A number of sociological studies have addressed the acquisition of knowledge and skills beyond the

higher education standard by students to enhance their competitive power in the labor market [Gudkov, 2009; Lukashenko, 2003; Tereshchenko, 2005; Froumin, Dobryakova, 2012; Cherednichenko, 2014]. Master's and senior Bachelor's students who seek to obtain knowledge extending their basic university skills engage in continuing education as early as when obtaining their very first degree. The public demand for lifelong learning becomes their personal need. It brings forth a unique system of interaction between students, teachers, developers and organizers of ever more numerous supplementary education courses offered by universities or dedicated lifelong learning institutions.

Additional education has been traditionally regarded by both foreign and Russian researchers as a type of adult education associated with professional conversion or advanced training in a specific field [Grummell, 2007; Huberman, 1974; Knowles, 1980; Derzhavina, 2008; Konstantinovskiy, Vakhshayn, Kurakin, 2007; Lagutina, 2001; Gorshkov, Klyucharev, 2011]. For example, Christopher Knapper and Arthur Cropley define lifelong learning, which includes additional education, as a process that would “last the whole life of each individual; lead to systematic acquisition, renewal, and upgrading of knowledge, skills and attitudes, as this became necessary in response to the constantly changing conditions of modern life, with the ultimate goal of promoting self-fulfillment of each individual” (citation from [Grummell, 2007. P. 183]).

The need for additional education in specific fields has been investigated across different social groups identified based on the level of institutional education (secondary general education, elementary vocational education; secondary vocational education, incomplete higher education; higher education, two diplomas of higher education, postgraduate studies) [Konstantinovskiy, Vakhshayn, Kurakin, 2007. P. 305–310; Konstantinovskiy et al., 2011. P. 118] and employment rate [Ozerova, Borodina, 2013. P. 305]. Statistics shows that “the higher the level and quality of education, the more often people invest in it, including additional education”, and “additional education is more often pursued by those with higher education experience (54%)” [Konstantinovskiy et al., 2011. P. 76–77]. “Employees aged over 30 engage the most in additional professional education (71.4% of all employees involved), the proportion being 19% for employees aged 25–30 and 9.7% for those under 25” [Ozerova, Borodina, 2013. P. 302].

While developing possible models of continuing education monitoring, Russian sociologists pay special attention to the “structure of people's demand for education, which represents an *order* for meeting the educational needs” [Belyakov et al., 2006. P. 151]. First of all, they assess the need for additional education among those who realize a couple of years after graduating that they need to gain knowledge and skills demanded by employers by attending a dedicated course or obtaining a degree in some related field. Much less focus is

placed on the need for additional education among those getting their basic university education, i. e. senior Bachelor's or Master's degree students. Meanwhile, students tend to combine basic and additional education at university increasingly often, which means that part of them are aware of the need to develop a body of knowledge and skills to ensure their competitive edge in today's labor market. To do this, they seek to gain some work experience by getting a part-time job either related to or rather differing from their prospective occupation. Others attend specialized courses outside the basic education program to improve the skills that they acquire from standard education programs as well as to learn new knowledge in a pretty different field.

As we can see, the development of the additional education system in the existing situation may be boosted if students as a social group engage in a self-motivated lifelong learning. Development and implementation of additional education courses with due regard to specific student needs would promote such engagement of youth in the process of constructing themselves as experts demanded in the labor market.

The student need for additional education has been obviously underexplored, which is explained by several factors. First, only a limited proportion of students are involved in additional education parallel to their basic education. Second, an efficient university system that would develop the need for such education in students is still in its infancy. Finally, a major part of the teachers are not focused on developing additional education modules that would provide students with the knowledge required to adapt to a dynamic world. Research on student additional education experience and demand for it will help enhance the relevant education sector and inspire students towards lifelong learning in their future professional life.

The determination theory in research on the need for additional education

Specific features of the development and realization of the student need for additional education have been studied in terms of the self-determination theory. Thanks to the latter, a set of extrinsic and intrinsic factors of such need may be identified. Researchers have been traditionally guided by Abraham Maslow's conception, where needs are believed to be the main triggers of all sorts of human activities [Maslow, 1999. P. 21–22]. The needs as such are formed under the influence of extrinsic and intrinsic factors predetermining all human life. Every action should be correlated with the opportunities offered by nature and society and one's personal willingness to grasp them [Merenkov, 2003. P. 30–37]. By accepting everyday life requirements imposed by the society, one can turn the public demand for (self-)education into their own intrinsic motivator.

People with higher education are demanded in a society that needs experts capable of working with sophisticated machines and mechanisms applied in various industries and analyzing the laws of

nature and societal evolution in the course of transformative human activities [Ukhanov, 2009. P. 70–71]. There is a body of basic knowledge from which students get the basic idea of their prospective occupation as well as of the techniques and technology applied nowadays by companies and enterprises. However, the rate of change in today's industrial world is so high that students need to learn additional knowledge and skills in demand even before they graduate. In this situation, a number of factors stand out that predict the enthusiasm of senior Bachelor's and Master's students in acquiring competencies supplementary to those that they develop within the basic education program.

Additional education has been normally understood as obtaining knowledge and skills beyond the general and specialized education already acquired. People usually get interested in acquiring new competencies when they feel the need to realize themselves in a specific field or to expand their horizons. Today, additional education is available in dedicated training centers or within the basic education program, for high school students, students at all stages of vocational education and experts engaged in lifelong learning. Students represent a particular category, as their need for additional education is formed and realized while they have to conform to the federal State higher education standard requirements, being determined by specific extrinsic and intrinsic factors.

Extrinsic factors include, firstly, the existing labor market requirements for young specialists. Graduates should be conversant not only in their specific major but also in related fields, being able to obtain and analyze information from both Russian and foreign sources, to cooperate with colleagues effectively when solving complex production problems. Secondly, extrinsic factors include availability of institutions offering additional education courses that could enhance competitive power of recent graduates. Thirdly, students also consider the demand for employees willing to engage in continuous self-improvement and advanced trainings, those who will be able to communicate with foreign partners and to find prospects for the company's products. Obtaining foreign communication skills and international experience in additional education, students provide themselves with broader opportunities for social mobility in the future. Researchers Karen F. Olwig and Karen Valentin confirm presence of "the close relationship between migration, education and social mobility" [Olwig, Valentin, 2015. P. 247].

The principal intrinsic factors encouraging students to get additional education involve successful employment orientation, where a broader array of competencies may boost the chances, and discontentment with the basic education obtained within the framework of the federal standard. Some students understand that they need to gain knowledge in related fields fearing that expertise in their major will not get them any high-paying job, which also plays an important role.

Source of empirical data “Feedback on student experience in the form of surveys” is a vital mechanism abroad, allowing students to affect changes in higher education and promoting greater engagement in learning [Kidd, Czerniawski, 2011. P. 194]. However, research on student experience conducted by Russian universities has not yet had any tangible effect on management decisions or development and improvement of higher and additional education programs. The lack of feedback on students’ educational needs is the key inhibitor of additional education development.

Specific aspects of the student need for additional education were investigated in a sociological study conducted in Russian Universities (Volgograd State University, Far Eastern Federal University, Kalashnikov Izhevsk State Technical University, Kazan Federal University, Moscow State Linguistic University, Plekhanov Russian University of Economics, ITMO University, St. Petersburg State University, Tyumen State University, Ural State Mining University, Ural State Forest Engineering University, Ural State Academy of Architecture and Arts, Ural State University of Railway Transport, Ural State Law University, Ural Federal University, Southern Federal University) in May—September 2015. The sample included 623 senior Bachelor’s/Specialist’s and Master’s degree students. This group of respondents was selected based on the assumption that senior Bachelor’s degree students get a certain idea of their prospective professional activities and possible employer requirements during internship and externship. Master’s degree students also get interested in additional educational resources to enhance their competitive power in the labor market.

Using online survey data, we analyze the factors of development of the need for additional education in students, preferred educational patterns and student experience.

The main parameters of quota sampling include the level of respondent’s education (51% of Bachelor’s/Specialist’s students, 49% of Master’s students) and form of education (full-time). The sample included 66% of female students and 34% of male students. 36% of Bachelor’s/Specialist’s students and 64% of Master’s students had already had some experience of professional activities. Students in Engineering and Humanities accounted for the highest proportions in the sample (Tables 1 and 2).

To assess the specific features of the student need for supplementary education, we used answers to the following survey questions: Do you feel the need to attend additional education courses (short- and long-term courses outside your major curriculum or elected within or outside your university)? What is behind your need for additional education courses? What additional education courses would you like to attend? Which format of additional education would you prefer? What information is important for you in electing additional education courses?

Table 1. **Bachelor's and Specialist's degree majors** (% of the number of respondents)

Engineering	37.1
Humanities (including Social and Political Studies)	21.9
Informatics and IT Technology	14.0
Management	7.0
Science (including Mathematics)	7.0
Economics	6.7
Arts	5.7
Other	0.6

Table 2. **Master's degree majors** (% of the number of respondents)

Humanities (including Social and Political Studies)	34.4
Engineering	22.7
Informatics and IT Technology	14.6
Science (including Mathematics)	13.3
Management	7.5
Economics	4.0
Arts	3.2
Other	0.3

To assess the specific features of realization of the student need for additional education, we used answers to the following survey questions: Are you attending any additional education courses within or outside your university? Specify the additional education courses you are attending at university. What do you think could be improved in organization of additional education courses?

Reasons for development and specific features of the student need for additional education

Sociological research reveals that 67% of employers attach great importance to diplomas and certificates of additional education when recruiting recent graduates¹. However, most students have no clear understanding of which requirements they need to meet to increase their competitive power in the labor market. The basic university curriculum does not provide them with such information.

Professional self-fulfillment oriented students seek to push the limits of what they learn at the university. 71% of Master's and senior Bachelor's degree respondents show a strong need for additional education. 84% of motivated students intend to engage in additional education within the next year or two, 39% of them during their university studies. Desire to expand employment opportunities and ambition to deepen professional knowledge are found to be the principal motivators for additional education (54% and 53%, respectively).

¹ The research covered Ural companies with over 500 employees and surveyed personnel directors or HR specialists, managers or leading experts accountable for employee selection criteria and hiring decisions [Monitoring of Popularity and prestige of UrFU and Its Competitors in the Urals, 2014. Available at: http://strategy.urfu.ru/fileadmin/user_upload/Strategy/Upravlenie%20strategicheskogo%20razvitiya/Marketingovie%20issledovania/Monitoring_izvestnosti_UrFU_i_konkurentov_2014_g..pdf].

In order to assess how major affects the choice of specific additional education courses, we divided the respondents into three groups depending on their educational trajectories:

- 1) Students obtaining additional education within their university field of studies (21% of the sample). They pursue a Master's degree in the same major as their Bachelor's/Specialist's degree, and they are also interested in additional education in this major;
- 2) Students obtaining additional education in a field related to their university field of studies (52%). The respondents pursue a Master's degree in a major other than their Bachelor's/Specialist's degree. Additional courses they engage in differ in their content from the basic higher education program;
- 3) Students with experience of additional education in both their university major and related fields of study (27%).

Only 12% of respondents changed their major when applying for a Master's degree. These are mostly Bachelor's degree students in Management (74%), followed by students in Economics (17%) and IT (11%). Students with Bachelor's/Specialist's degrees in Economics and Management most often switched to Humanities or Engineering, while those in IT applied mostly for a Master's in Science. Students tend to change their major mostly when they understand the challenges of getting employed within their Bachelor's degree major or when they don't have enough state-funded opportunities available for Master's degrees in their original major.

The majority of respondents (75%) realized their need for additional education while pursuing a Bachelor's/Specialist's degree. Only 7% attended supplementary courses during their Master's studies, and 18% reported to have engaged in additional education at both levels. Besides, we revealed that students obtaining additional education within their majors were primarily focused on expanding their professional expertise and developing relevant skills (65%) (Table 3).

Students who changed their major when applying for a Master's degree most often explain their need for additional education with a desire to boost their chances for a successful employment. Many of them believe that improved language skills, for example, will help them find a job involving international business trips or get employed abroad. Students with combined educational trajectories opt more often for courses that will allow them to develop their professional skills and fulfill their potential in a field related to their major, e. g. by working as a design engineer after learning to use various IT technologies.

For about one-third of students, the motivation for additional education came from their discontent with the basic education program. So far, modernization of higher education designed to bring it into line with employer and student needs has been rather slow in Russia. Students receive no useful information about how they can use what they

Table 3. Development of the need for additional education in students with previous experience (% of the number of respondents)

Motivation for additional education	Student groups		
	SE within the major	SE outside the major	Combined educational trajectory
Enhancing professional skills	65	49	57
Developing new skills, personal fulfillment	34	40	53
Broadening one's horizons	57	50	52
Boosting competitive power	47	62	42
Discontent with the basic education program	32	29	30
Obtaining a supplementary degree (diploma, certificate, etc.)	26	24	24
Potential employer's requirements	16	16	10

Table 4. Reasons for development of the need for additional education in students with or without part-time job experience (% of the number of respondents)

Motivation	Senior Bachelor's/ Specialist's degree students		Junior Master's degree students	
	Having a part-time job	Having no part-time job	Having a part-time job	Having no part-time job
Boosting competitive power	54	58	47	64
Broadening one's horizons	34	43	56	50
Developing new skills, personal fulfillment	38	43	41	49
Enhancing professional skills	47	56	59	46
Discontent with the basic education program	39	34	27	28
Obtaining a supplementary degree (diploma, certificate, etc.)	33	26	24	25
Potential employer's requirements	16	13	13	6

learn in real-life companies. That is why we believe that the content of elected additional education courses should become part of the basic education program over time. This way, the list of extracurricular courses offered to students at university will be constantly extended.

The experience of combining work and study has no effect on the development of the need for additional education. Students of all categories are mostly motivated for getting extracurricular knowledge and skills by the aspiration to enhance their competitive power in the la-

bor market (Table 4). Moreover, this factor is even more important for students without any experience of working part-time while studying.

The desire to enhance professional skills appears to be the main reason for development of the need for additional education in senior Bachelor's/Specialist's degree students with no part-time job and Master's degree students with work experience. Chances are, students suffer from the lack of specific skills in Bachelor's degree programs. Master's degree students, in their turn, treat supplementary knowledge not only as a factor of professional expertise enhancement but also as a means of climbing the career ladder.

Realization of the student need for knowledge and skills not provided by the basic education program depends on the opportunities offered by the additional education system. Today, this system does not always provide a choice of courses that students associate with competencies required for a successful employment. Most often, it offers "trendy" courses in management, marketing, finance, interpreting, IT, etc. Expertise in these fields is generally believed to boost competitive power of graduates in the labor market. However, young people who have pursued these education programs for two years at the best tend to have professional competencies inferior to those acquired during four- or five-year basic university studies. Ensuring a relevant choice and content of additional education courses for both Master's and senior Bachelor's degree students is a separate direction in the development of additional education for university students.

Of those with previous additional education experience, over 60% would like to go further with this type of learning. Most often, they prefer courses in foreign languages other than English (37%), project management (31%) and personal growth (33%). Conversely, students with no previous additional education experience are oriented toward traditional courses in English (55%), public speaking (37%) or fundamentals of entrepreneurship (30%) (Table 5). Early engagement in additional education develops a focus on consistently expanding and deepening existing knowledge and skills as well as acquiring new competencies to boost the chances of self-fulfillment in career, public and leisure activities.

40% of respondents revealed demands that we qualify as specific needs for additional education. They are mostly typical of students with engineering as their major. They seek to obtain new knowledge in such promising technologies as missile and rocket engineering, robotics, metrology, modern medical electronics, biotechnology, and quantum mechanics. Specific needs can also be found among students oriented to self-fulfillment in public life: graphic design, user interface design, interior design, landscape design, imageology, behavioral psychology, clinical psychology, neuropsychology, crime science, film direction, beauty and fashion industry, etc. Specific needs also include the demand for a specific IT technology (Cisco, ASP, Python,

Table 5. **Fields of study in additional education depending on the previous experience** (% of the number of respondents)

Field of study in additional education	Students with previous experience	Students with no previous experience
English	50	55
Advanced specialized training within the major	41	42
Public speaking	26	37
Personal growth and development of self-management and organization skills (time management, activity planning, etc.)	33	34
Entrepreneurship	25	30
Project management	31	28
Foreign languages other than English	37	27
IT technology	30	26
HR management, management training	15	19
Economics and finance	17	17
Marketing, management	14	13
Tax and financial accounting	12	12
Other	8	12

AutOCAD) not yet provided within basic university education. Such demand is experienced by 28% of respondents.

Realization of the student need for additional education

Based on the survey, we identified the conditions that would promote the development of the additional education system according to what is in demand in the labor market and encourage students to develop more actively the need for specialized knowledge outside the basic education program.

First of all, the respondents point to the need to update additional education programs on a permanent basis. Designers of such programs should respond immediately to the emergence of new fields of expertise caused by rapid development of science, engineering and technology. Today, additional education courses are mostly elaborated by university professors, many of whom see it merely as an additional source of income. There is nothing that could motivate them for updating the content of their courses.

Obviously, we should build a system encouraging teachers to update constantly both curriculum-based and additional education courses. In the flexible remuneration scheme, a university teacher's salary consists of "base salary and bonus, the size of which depends on the overall department performance (unbudgeted profit)" [Kupera,

Shmidt, 2006. P. 85–86]. Such profit may include earnings from development of new additional education programs. Besides, teachers will have a chance to fulfill themselves in new courses.

The respondents also focused on the importance of improving the organization of additional education. The schedule of courses offered does not fit into the university timetable. The cost of learning leaves out the actual financial standing of most students. The preliminary meetings with developers of new courses do not always disclose the value of the latter as a means of increasing competitive power in the labor market, nor the originality of learning methods, including the opportunities for developing project management skills.

The respondents believe that the following should be done to meet the student need for additional education as fully as possible (Table 6):

- 1) Improve student-teacher interaction
- 2) Solve the urgent organizational issues in additional education
- 3) Provide an efficient way of notifying students about the new courses
- 4) Adjust the cost of additional education to students' financial standing (the price tag affects the choice of 77% of respondents)
- 5) Upgrade the content of courses on a permanent basis (content is a vital aspect for 64% of respondents)

Student-teacher interaction can be improved by using new learning methods: business games, team projects, simulation video games in professional activities, solving cases of real-life companies. In addition, students should be given an opportunity to communicate directly with experts in specific fields when they work on individual projects. Creating feasible projects or engaging in research during the learning process also promotes closer interactions between students and teachers. By including personal success stories in the content, developers of additional education courses could encourage teacher-to-student and peer-to-peer transfer of self-fulfillment practices.

Students see the following ways to upgrade the organization of additional education:

- Develop a flexible timetable; deliver courses during vacations (summer schools)
- Provide working in small groups, which will facilitate enrolment for narrowly specialized courses and allow for grouping students based on their level of proficiency so that everyone could obtain the knowledge and skills they actually need instead of helping their peers to catch up;
- Focus on classroom studies as a preferred form of obtaining knowledge and skills (51% of students). Development of distant learning courses should not be a priority, although some Russian researchers in lifelong learning emphasize the importance of

Table 6. Prerequisites for realization of the student need for additional education (% of the number of respondents)

	Student groups		
	SE within the major	SE outside the major	Combined educational trajectory
Affordability	64	60	70
Flexible timetable	50	60	61
Notifications about new courses that might be of interest to me	63	61	54
Free-of-charge attendance	54	54	44
Project activities involved	27	30	41
Extensive information on a course available online	32	27	30
Preliminary meetings with developers to assess the value of a course	20	26	30
Face-to-face interactions with teachers	36	28	29
A more relaxed schedule	20	26	23
Modules from various education programs included	18	17	19

advancing online education [Tikhomirova, 2014. P. 30]. Western studies confirm the demand of students for direct interactions with teachers during the educational process. They show that e-learning should be complemented with classroom studies as “e-learning technology has proved to be insufficient to provide necessary student-teacher interaction” [Carroll, 2013. P. 352];

- Reduce the lecture-based part of courses and create podcasts for students.
- Inefficiency of the existing system of notifications about new courses for students was signaled by many respondents. Students mostly get information about additional education courses from their friends (44%) and social media (43%). Respondents suggest (i) providing remote notifications on the website of educational institution (43%) and through targeted emails (32%) and (ii) foreseeing the possibility of vis-a-vis notifications in the form of meetings with course developers (27%). Such policies will allow students to be aware of both the content and the value of new courses for their prospective professional activities.

Implications Russian higher education is facing a major challenge of creating conditions to engage the best part of the faculty in the development of courses reflecting the latest progress in science and technology both

in Russia and abroad. Using these programs, students will be able to jump into professional activities accelerating the renewal of Russian science and industry.

The student need for additional education is determined by both extrinsic and intrinsic factors. Such factors are formed by the current trends, in particular by the English language trend, on the one hand, and by the desire to get certified in innovative fields of science, engineering and social process management, on the other hand. The development of the need for additional education is affected greatly by the relevant experience during the last years of Bachelor's studies. Those with the previous experience are able to make a more reasonable choice of further educational and career trajectories and to assess the value of new courses they are offered within the Master's program.

As students develop specific needs for supplementary knowledge, new forms of teacher-student interaction in the learning process evolve. The role of students in the educational process organization is changing, making them the customers of new knowledge ensuring their personal fulfillment and successful employment.

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Subjective Innovations: Pedagogical Movement in the Context of Radical Social Change

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Abstract. The innovative pedagogical movement that boomed in the second half of the 1980s exhausted itself relatively early on and never became a sustainable factor of institutional development in Russia. In this article, we investigate the reasons behind this phenomenon using

interviews with participants and narrative analysis of periodicals and archival materials. By doing so, we justify the point that the goal of promoting subjective emancipation and adopting the culture of freedom dominated the goals of organizational project management. We show that the pedagogical movement was dependent on the institutional patterns ingrained in the social order of the late Soviet era. Innovations developed within the framework of a specific situation: individual communities emerging around individual authors were capable of establishing the “new” as a subjective legacy, but they were unable to develop or even retain it in existing institutionalized forms.

Keywords: history of education, innovation pedagogical movement, subjective emancipation, subjectification of innovations.

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Problem exposition and research methods

In this article, we try to explain why the powerful innovation movement in pedagogy that boomed in the second half of the 1980s exhausted itself relatively early and had virtually no effect on the institutional development of the Russian higher education system. We believe that the specific features of the late Soviet society, which gave rise to the pedagogical movement, require a special theoretical perspective to analyze the innovation processes. The most widespread approaches to the study of innovations [Christensen, 1997; Fenn, Raskino, 2008; Rogers, 2003] are based on the linear-time model. In this case, the distribution of innovations is plotted on the axis of time as a series of consecutive stages. Thereby, innovations are objectified and regarded as a product or technology distanced from its creator.

However, modern sociology of innovations favors more and more the idea that production of something new is closely related to the openness of the system and its overall tolerance for uncertainty [Stark, 2011]. Unlike the capitalist society built around institutional pluralism, Soviet society was largely homogeneous at the level of public representations. Consequently, emergence of the new implied providing a subjective emancipation of teachers against the homogeneous background of formal rhetoric and educational practices and an exercise of personal liberties by school principals, teachers and students [Dneprov, 2006:79; Pinsky, 2007; Shchedrovitsky, 1993]. In a situation like that, a linear progression from idea to product and/or technology becomes rather troublesome, as distribution of a specific product is replaced by cultivating the value of the individual. Identifying one's activities as innovative in the context of the pedagogical movement in the late Soviet Union and Russia of the 1990s thus became inseparable from representing these activities as unique, documenting authorship [Nemtsev, 2006] and opposing the social world to the "philosophical idealism" attitude vigorously [Shchedrovitsky, 1993]. As a result, the leading innovational practice was the "practice of self", i. e. that of building one's own free personality.

We believe that the movement faded away soon after the collapse of the Soviet Union because although some of the creative solutions were very refined, the relevance of innovative pedagogical subjectiveness was provided externally, through the political and economic infrastructure of the socialist state. Following the dissolution of this structure, the innovation movement broke up and moved in separate directions mostly developed around individual charismatic authors [Bolotov, 2009]. As long as innovations are born through critical thinking and cultivating of personal liberty, they turn out to be isolated from the issues associated with reforming the social structure and its institutional forms by means of a civil action. In this article, we would like to disclose the process of innovation subjectification. We are not asking ourselves whether the new was actually new, thus leaving aside the genealogy of specific ideas. Neither are we regarding the new as something that appears to replace the old. A new history begins where declarations about creating the new are especially abundant. In the late Soviet Union, a concentration of such declarations was observed in school and, more broadly, in the pedagogical movement. Teacher innovativeness developed as a special kind of practice within the discussion on the challenges of secondary education and within the institutional forms.

The focus on meanings generated in the subjective field determined our choice of interview as the main research method. In cooperation with the third project participant ArtemKulakov, we conducted 28 in-depth, semi-structured interviews between January 2015 and January 2016. We applied the snowball sampling technique [Babbie, 2001], recruiting our acquaintances among representatives of the in-

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novation movement. In the course of our research, we also sampled a few teachers who worked at educational institutions in different parts of Russia during the period in question but were not in touch with any innovation movement participants. In addition, we talked to our foreign colleagues who had visited the Soviet Union and later Russia on multiple occasions at that time as researchers and/or experts representing international agencies. All of the respondents provided their informed consent to interviews. Some of the interviews were conducted through electronic platforms. Given the procedural nature of subjective generation of the new, we approached the interviews as an extensive discussion or even as a dialogue.

The interviews became the venue of research as such [Kvale, 1996], defining further directions for analysis. To proceed from collecting individual viewpoints to reconstructing the mechanics of the innovation pedagogical movement, we generalize the content of the resulting interviews to find out how the discourse machine in question worked [Silverman, 2013; Yin, 2009]. The active interview, allowing improvisation and direct rhetorical effect on the researcher [Holstein, Gubrium, 1995], results in a number of limitations to such generalization; we will comment on them in the final chapter. Treating history as an open set of acts, which keep being performed where and when a specific story is told again [Zerubavel, 2004], we consider the boundary between facts and their narrative reproduction to be permeable [Brown, 2006]. The perspective of telling a specific story from the past can be made more precise. With this in mind, we compared the interview results with issues of *Uchitelskayagazeta*, other periodicals and monographs, documents from personal files and public archives. Our research of open sources and archives was based on the list of basic categories that was developed after the initial encoding of the interview scripts [Ibid.]. Although informed consent implies the anonymity of all the respondents, we find it possible to disclose the names of some interviewees, provided that their actions have been described in other available sources and their opinions do not jeopardize anyone's safety or reputation (cf. [Walford, 2008]).

Findings In March—April 1987, *Uchitelskaya gazeta* published a series of six articles under the general name of *Zhizn' Ivanova* [The Life of Ivanov] by Simon Soloveychik, the famous journalist specializing in pedagogy. Providing a detailed description of the activities of researcher and pedagogue Igor Ivanov, who developed the theory of collective upbringing of children through organizing shared creative activities [Dimke, 2015], Soloveychik puts forward a hypothesis about the ambivalent social nature of a child whom he believes to be a personality and at the same time “part of a collective, a people, a society [Soloveychik, 1987]. He then analyzes the development of personality, identified as humanization, and learning to be in a collective, identified as socializa-

tion, interpreting the two phenomena as indispensable components of the process of upbringing, “joined together but not dissolved in each other”. The following articles in the series develop this fundamental point. Soloveychik believes that a fully-fledged relationship between humanism and collectivism can be provided by collaborative pedagogy, which thereby “leads the teacher by innovative paths to genuinely communist education relationships”. Making allowance for certain limitations of the expressive means that were available in print at that time, we can still see that Soloveychik does not justify the importance of collaborative pedagogy by opposing it to the history of Soviet school. Rather, he derives some truth that was already ingrained in its structure. For example, Ivanov’s “Marxist-Leninist” ideas become the basis for collaborative pedagogy due to their common focus on creativity. Moreover, in some contexts collaborative pedagogy is regarded as a process “driven by the will of many people and collectives”, comparable to the creative process in its scale [Ibid.]. Identifying collaborative pedagogy with teacher creativity, in its turn, erodes away the boundary between the “Perestroika-minded” initiatives of *Uchitelskaya gazeta* journalists and the school reform that had been launched in 1984 and had already brought the value of initiative and creativity to the fore [Strizhov, 1984]. Meanwhile, the terms *creativity* and *innovation* existed as means of integration with the ideological context, providing a mutual permeability of pedagogical and political contents.

The copresence of ideology and pedagogy produces a “terminological defocusing” effect, where concepts mutate into each other little by little, slipping away from any direct comparison of their meanings. The “new” becomes impossible to locate in time and space, let alone to attribute to a specific author. On the one hand, associating innovations with creativity allowed for rhetorical legitimation of the pedagogical movement [Suddaby, Greenwood, 2005], making it recognizable for the ideological “radars”. On the other hand, it inhibited defining clearly the criteria of innovativeness and identifying proposed solutions as new technologies, giving the impression that the content of teaching was inflexible: “...The teacher’s creative potential has always been the most important thing in our business” (*Skype interview with a teacher of Russian and literature, Krasnodar Krai*). All of the respondents found it difficult to establish the date when the innovation pedagogical movement had been born. As the distance from its epicenters (Moscow, Krasnoyarsk, Izhevsk, Tomsk) increases, teachers have more trouble distinguishing between the innovation discourse and the general advanced training and retraining requirements (*interview with a teacher of Russian and literature, Komi Republic*) or just another rallying cry of “some bureaucratic functionaries” (*interview with a teacher of mathematics, St. Petersburg*).

Given the ambivalence of language clichés used in the late Soviet era [Yurchak, 2016], a special role was played by formal and position-

al characteristics of the rhetoric, i. e. *how, where and by whom* something was said. Thus, having hibernated in the mind of the teaching community for a long time, the idea of innovativeness/creativity was suddenly brought to the fore in 1986–1987 due to wide circulation in the mainstream print media. The “standard” innovation development pattern, from the inception of an idea to its distribution and embodiment, shrinks in this case to squeeze out the embodiment phase. Emphasizing the “special responsibility” imposed on the “journalist teacher” [Tsirulnikov, 1987] only contributed to the situation where the teacher movement’s development was provided by the existing institutions of agitprop nature. The lack of independent civil and professional organizations was especially noticeable to the external observer (*answers of S. Kerr to our written questions*). Vagueness and some habitualness of the initiative, creativity and innovation discourse provided the basis for broad tactical coalitions among members of the teaching community, journalists and employees of party organs and governmental agencies (cf. [Sigman, 2014. P. 387]).

Innovative projects and various pedagogical experiments launched in the second half of the 1980s were often supported by representatives of party and government elites (*interviews with A. Adamsky, V. Shadrikov*), regional Komsomol and/or communist party committees (*interview with V. Lozing*), the management of specific universities (*interviews with V. Bolotov, I. Frumin, B. Khasan*). The very notions of *experiment* and *experimental school* legitimated the innovation movement and limited its development at the same time (cf. [Sigman, 2014. P. 142 et seq.]). Elite patronage definitely emancipated teachers of relevant schools, who had “always felt a little away from the common system” (*interview with a teacher of aesthetic disciplines, Kemerovo Oblast*). However, it was unable to provide a fully-fledged translation of results, which made such institutions largely unprepared for independent existence in case their patrons disappeared. In the “game” (*interview with A. Adamsky*) of groups inside party, government and academic elites of all levels, an innovative initiative often became the tool of providing or supporting a breakthrough, as it happened with the Basic Experimental School under Krasnoyarsk University, for instance (*interviews with B. Khasan, B. Elkonin*). Intensive personal growth that must have had a place at such institutions did not result in creating any stable external forms of collective self-organization or in building an institutional framework to ensure the ability to promote pedagogical experiments in the context of the changing social situation and national education policies. Distancing themselves as much as possible from public activity was in some way a perfect strategy for many innovators after the collapse of the Soviet Union:

Я понимал, что выжить я смогу, если буду сидеть тихо. Я ни у кого ничего не просил. Я никуда не лез. Я старался работать тихой сапой. Поэтому никто мне не предлагал никакой

помощи, но я был счастлив тем, что не мешали. Это было так неожиданно и так здорово!¹ (*interview with B. Bim-Bad*)

Many participants of the innovation movement withdrew themselves demonstratively from the process of institutional construction even after the disintegration of the Soviet Union, when they had an opportunity to influence the national policy (*interview with A. Adamsky, Skype interview with Y. Turchaninova*). Even when self-organization was in place, as when a network of innovative schools was created under the auspices of the Eureka Institute of Educational Policy (*interview with A. Adamsky*), it did not entail the development of any innovation assessment procedures or universal criteria of the positive value of innovations inside the professional community (*interview with V. Bolotov*). Many experiments turned out to be equivalent to the figure of the innovator, the unique author of a specific idea. Being in the gravisphere of a bright figure affected school teachers as well as students, but the effect came to naught with distance from the “celestial body”. This was also true for the innovative teachers who had gone public before Perestroika:

Через ежегодные донецкие семинары эти приемы и опорные сигналы расползались по стране, но дальше надо было работать с этим 24 часа в сутки, как работал Шаталов... часто в абсолютно... крайневраждебном окружении. То есть ты приезжал туда, нахлебывался этого наркотика товарищества, единства, общих целей и обещанных успехов, а потом ты со всем этим приезжал домой. Хорошо, если в Москву и там находилось еще пять—семь бесноватых, а если в Мухосранск, то просто в абсолютно враждебное окружение. И должен был... и, в общем, дальше все развивается по нормальным путям² (*Skype interview with Y. Turchaninova*).

The intensive cultivation of teacher creativity to add to the leader’s bright personality was also reproduced in activities of well-known innovative schools in the 1990s:

¹ I knew I would survive if I kept it low. I was not asking for anything, not messing with anyone, I was just trying to work on the quiet. So no one would offer me any help, but I was happy with being allowed to do my job. It felt so strange and so good!

² These techniques and supportive signals were stalking around the country through annual Donetsk seminars, but then you had to work on it 24/7, as Shatalov did... often in a completely... an extremely hostile environment. So you would come there, get high on this drug of comradeship, unity, common goals and promised success, and then you would bring it all home. You were lucky if you lived in Moscow and there were five of seven more frenetic enthusiasts like you, but if you brought it to a Podunk town, you would find yourself in a totally hostile environment. And you had to... well, it would soon come back to normal then.

Когда я готовила какой-то проект с ребятами по химии, и с этим проектом мы должны были выступить сначала внутри секции, потом вынести это на школу, а потом на район, потом на город. Вот это я только работала с Лозингом. А в остальных школах... ну, были там какие-то кружки... не такого масштаба... Поэтому новаторство, я вам честно говорю, почувствовала в работе с Лозингом. А остальное, ну, знаете, традиционно³ (*teacher of chemistry, Kemerovo Oblast*).

The very fact of copresence in the gravisphere of a specific personality, whose gravitational force filled all available time and space, was the nucleus of the event which was irreproducible in the author's absence. Due to personalized interactions, there were no resilient institutional forms of the established informal collective interaction traditions. Expressly trust-based relationships within the circle brought about distancing from regular school problems, a high specificity of innovation movement results and their inaccessibility for ordinary teachers (cf. [Bolotov, 2009]). Although members of the innovation movement denounced categorically the very term *regular school* [Kasprzhak, 1992] and the reforms launched under the guidance of Eduard Dneprov were explicitly designed to promote diversity of secondary education formats [Dneprov, 2006], regular school remained virtually unchanged [Bolotov, 2009]. The collapse of the Soviet Union, which seemed to have temporally neutralized external political pressure on the professional teacher community, put the innovation movement in a situation where the old institutional channels no longer worked but no alternative forms had been developed at that point (*interview with A. Adamsky*). There was a prevailing orientation toward protecting innovative schools from the hostile external environment (*interview with T. Kovaleva; interview with A. Adamsky*).

It appears that, when starting their journey into a socialist system, many representatives of the innovation movement simply could not imagine the existence of school as an economically and politically independent unit. Financial and management issues were moved aside to the periphery of the innovation movement. This "blind spot" in the minds of the innovators, who were liberals with illiberal economic views (cf. [Sigman, 2014. P. 181 et seq., 322–333]) surreptitiously provoked conflicts between the educational and financial authorities of the new Russia as well as mutual distrust between innovative teachers and professional economists (*interview with N. Tipenko; in-*

³ When I prepared a chemistry project with students and then we were supposed to present it within the section, then at the school, regional and municipal levels... This was how I worked for Lozing. As for the rest of the schools... well, they had some kind of study groups... of a smaller scale... So I have to admit I only experienced innovations while working with Lozing. And the rest, well, it was just as usual.

terview with T. Klyachko). The reformatory economics projects of the late 1980s were based on the belief in the rigidity of the socialist economics organization. Apart from private and public production, they also identified the category of collective goods, which included school. Production of collective goods served the interests of companies and was supported by those companies [Saburov, Alexeev, Vavilov, 1988]. The innovation movement in the late Soviet Union had a sort of mosaic, fragmented structure. The mosaic patterns reproduced the distribution of areas of comparatively greater liberty in Soviet ideological (*Uchitelskaya gazeta* as compared to *Pravda* or *Izvestiya*) or education (Krasnoyarsk University as compared to Moscow State University) apparatuses. Feeling the resistance of the professional establishment centralized in the Academy of Pedagogical Sciences of the USSR (*interview with Y. Turchaninova; interview with B. Elkonin*), the members of the innovation movement created tactical coalitions outside the pedagogical community. The movement gained wide currency for some time due to the support provided by party and governmental officials of different status and by a large portion of mass media. However, the innovation movement was disoriented by the collapse of the Soviet Union and the subsequent dismantling of the established relations of power, leaving the innovators in their disengaged enclaves.

**Research
limitations and
prospects**

We reconstruct the logic of how the innovation process developed in the pedagogical movement inscribed in the event that was undoubtedly perceived as “wreckage” by many people (*interview with M. Klarin*). Combining the approaches of social and cultural anthropology, historical sociology and political science, we use the history of the pedagogical innovation movement to develop a preliminary conception of the innovation process in a specific context of high social turbulence and the lack of established public participation institutions. The main conclusion that we draw based on this analysis is that innovations in the late Soviet era developed within the framework of a specific situation, where it was possible to generate the new as a subjective legacy of individual collectives built around charismatic personalities and at the same time impossible to retain or develop the innovations in institutionalized forms. The desire to avoid the routine procedures that shaped the world of the late Soviet people [Yurchak, 2016] was also transferred to the method of implementing pedagogical innovations, which were based on the exaggerated value of the “transcendental world” of critical thinking [Shchedrovitsky, 1993] on the other side from public discussions. Since direct participation in this transcendental world was available to very few, the value and consciousness of actions performed by most participants of the innovation movement and innovative experiments were directly dependent on personal contact with the key figures, whose importance was justi-

fied performatively, through the “supplement” of faithful admirers and inner-circle employees.

Building on the image of collective and collectivist Soviet school, the pedagogical movement focused on the demand to provide customized education and maximum personal liberties. Our research shows that this emancipation was always somehow limited: it was an improvisation within the limits set by a specific “author” with his or her “own” school, who had an explicit or implicit ambition to impose some reading, writing and routine habits on their followers. Pedagogical innovations had a truly totalitarian nature which, ironically, could only be fully implemented in a totalitarian state. In the absence of the latter, innovation institutions took the defensive position, increasing the self-containment of their practices. Modernization of education launched by pedagogical experiments in the second half of the 1980s continued after the dissolution of the Soviet Union, but only within isolated enclaves. Paradoxically, the former management system would have to be reanimated to restore the influence of those enclaves and the relations among them. Left without the direct patronage of the elite, many innovative experiments reproduced the isolationist attitude towards the national context and fostered the concept of a possessor of unique experience (cf. [Dzhagalov, 2011]).

History exists in myriads of opinions, but some of them have not yet been expressed. Analyzing the history of the innovation movement, we intended to hear out the history of the new. This history exists in verbal actions, so we admit readily that acts of communication prevail in our narrative structure. Focusing on the challenges of producing individual and collective subjectivity, we did not discuss possible correlations between the innovation movement and social effects of education. Researchers still have a lot of work to do in order to assess the role that the booming pedagogical initiatives of the late 1980s played in deepening the inequality in access to high-quality education. Statutory regulation and promotion of pedagogical innovations is yet another avenue for research. What exactly the role of the 1992 education law was and how it was related to other elements of the legal system is also yet to be discussed. We can only say now that the opportunities provided by that law were largely reduced by numerous infrastructure limitations caused—again—by poor institutional organization [De Groof, 1993]. Using the Russian case alone to explore the subject structure of innovations, we did not take to the comparative analysis methods. However, comparing our case to international experience, and the context in Russia to that in post-Soviet republics and the satellite states of the Soviet Union, should become an important area for future research on innovation processes. We have accumulated a relatively small body of data, which makes it difficult to apply quantitative analysis methods. With the increase in the number of sources—interview scripts, processed printed and archival materi-

als—we hope to start using corpus-based methods, a tool successfully applied by linguists.

We are convinced that an insight into the local theory and history of the production of the new has not only an archaeological value. Research on the innovation movement in the late Soviet Union shows how an attempt to initiate changes in education without changing or considering the broader social context exhausts the initial momentum fairly quickly. Personally productive innovations do not always become socially productive. Some of the subjective achievements are never objectified. We find it important to keep developing a theory to explain and predict possible failures in distributing innovations to the broad social context in cases when innovation processes are delegated to individual charismatic leaders and organizational support is provided by the state. It is also necessary to continue differentiating approaches to history-based research on innovations by their opportunities and risks for modernizing education under the existing conditions.

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