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TEACHERS' BELIEFS ABOUT STUDENT DIVERSITY: EXCLUSIVE AND INCLUSIVE MODELS

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This article provides an empirically grounded analysis for two fundamentally different models of math teachers' beliefs about student diversity in Russian secondary schools: exclusive and inclusive models. Although teachers' beliefs are considered a central factor for the differentiated approach, teachers' attitudes could be stereotyped and, consequently, the evaluation of a student's ability would be systematically shifted and decisions about the possibility of teaching a student would be incorrect. In-depth interview research allowed us to investigate what criteria teachers employ while classifying students in the classroom and what expectations they have for each group of students. It was revealed that within the exclusive model, teachers have an image of a "normal" student and use discrete categories for labelling students with reference to the "normality". Within the inclusive model teachers tend not to juxtapose students with discrete categories; rather they prefer to compare a student only with herself or himself. Research findings are discussed in the context of a possible "fixed effect" on a student's development. However, there is a need for further investigation of a connection between teachers' belief systems, teaching practices, and students' achievements.

JEL Classification: I24, Z0

Keywords: differentiated approach, ability grouping, classroom composition, teaching practices, mathematics, secondary schools, Russia.

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Introduction

Inequality in education is a significant social problem and is a challenge for national policies around the world. Individual student characteristics such as gender, state of health, family socio-economic status, cognitive abilities and motivation could restrict students' access to educational resources. Applying a differentiated approach in schools is one of the tools of educational policy aimed at overcoming social inequality and increasing the chances to access high-quality education for different groups of students (Lawrence-Brown, 2004).

The idea of a differentiated approach is that grouping allows teachers to better match their instructions with student needs and abilities (Kerchkoff, 1986). A differentiated approach could appear in different forms: within-classroom ability grouping, within-school and between-school streaming. Despite the various forms of this approach, teachers could take into account the vast diversity of students, including their prior knowledge, culture, learning preferences and interest. Thus, applying the differentiated approach allows teachers to adapt curriculum, teaching practices and learning environments to student needs, but within the framework of a unified program of education.

However, in practice the effects of the differentiated approach fall short of the high expectations. A significant base of empirical research has demonstrated that students from lower tracks have less access to educational resources, which in turn affects their learning outcomes (Oakes, 1985; Boaler, 1997; Hanushek & Woßmann, 2006). For example, it has been shown that teachers spend more time on instruction for high-ability groups, but less time on discipline and the organization of the learning process in a classroom (Good & Marshall, 1984; Catsambis, Mulkey & Crain, 2001). Conversely, in case of low-ability groups teachers have to devote considerable amount of the lesson on building discipline in the classroom in order to bring students to the conventional norms of behaviour.

Among the factors which could affect the differentiated approach, teachers' beliefs and expectations are considered central since they act as a guide through which every instructional decision is made (Van Zoest & Bohl, 2005; Thompson, 1992; Meirink et al., 2009; Fang, 1996; Nicolae, 2014; Davies, 2000). More importantly, teacher's expectations play the role of a self-fulfilling prophecy in the learning process (Rosenthal & Jacobson, 1968). In other words, the higher the teacher's expectations are, the more likely that a student will make a greater effort to learn and, therefore, will be more successful. Thus, students modify their behaviour in accordance with the teacher's expectations, which further affects their self-expectations, opportunities and, ultimately, their motivation to learn (Oakes, 1985; Eccles & Wigfield, 1985).

Although teachers' beliefs are the most significant determinant of the learning process in every classroom, for within-classroom grouping this phenomenon takes on particular significance. The problem is that the assignment of students in different groups is mostly based on teachers' beliefs about students' abilities, but teachers' judgements can be systematically stereotyped (Riegle-Crumb, Humphries, 2012). For example, it was shown that teachers view girls, students from low-income families and students with any SEN diagnosis as having 'below average' skills at maths although their peers perform at the same level on the maths cognitive test (Campbell, 2015).

More importantly for educational policy, is the teacher's expectations (Oakes, 1985; Eccles & Wigfield, 1985) and their beliefs in the immutability of maths abilities (Boaler, 2016), can entrench the established order of groups. That is, the longer students are grouped by their abilities, the stronger are the boundaries between these groups and the lower are the students' chances of moving upward (Rosenbaum, 1976). In other words, although the differentiated approach was supposed to decrease the gap in access to educational resources, in fact it continues to reproduce inequality in education (Oakes, 1985; Jorgensen et al., 2014).

In order to fully understand the nature of applying a differentiated approach in within-classroom grouping we need to explore teachers' systems of beliefs above all. Namely, what criteria teachers employ while classifying students in the classroom and what expectations they have for each group of students. Although the idea of a differentiated approach has long been in circulation in the education policy, little scholarly attention has been paid to these issues**.**

This research was carried out on a sample of maths teachers in Russia for two reasons. First, though the current national standard of education (Federal'nyj gosudarstvennyj standart…, 2010) for secondary schools in Russia particularly emphasizes the necessity of a differentiated approach in schools, the underlying ideas of grouping students are not conceptualized well in documents, and relatively few studies have investigated teachers' understanding of the differentiated approach. Second, maths education plays a more significant role in social segregation in comparison to other school subjects (Jorgensen et al., 2014; Atweh et al., 1998; Aguirre, 2009). We focused on investigating poorly explored teachers' beliefs about the categorization of students in the context of the most segregated school subject.

The present study researches teachers' beliefs about the principles and possibilities of applying the differentiated approach in maths education in Russian public schools. In this research, the following questions will be answered:

1. How do maths teachers understand the basic ideas of the differentiated approach?
2. How do the teachers see working with students of different levels?
3. What kinds of requirements and expectations do they have for student achievements?

To address these questions, we employed a qualitative research design as the best methodology for exploring teachers' beliefs and expectations. A grounded theory methodology (Charmaz 2006) was used for analysing interviews with teachers and generating a theory to explain the phenomenon. Glaser and Strauss (1967) strongly recommended avoiding a detailed literature review before the development of a theory in order not to employ in further analysis existing frameworks and hypotheses (Dunne, 2011). Therefore we did not do a substantive literature review on the phenomenon of interest at the beginning of the study. Following the logic of the methodology we use theoretical and empirical evidence only at the last stage of the research in order to discuss the results of the study.

The paper is structured as follows. First, we describe the context of education in Russian secondary schools. Second, we present our data and methodology. Third, we propose two models of teachers' beliefs about possible ways of categorizing students. In the final section we discuss the results.

The context of maths education in Russia

In Russia the differentiated approach traditionally appears in two forms: tracking students in schools and classes by their subject interest ("profil'naya") and grouping students in the classroom by their abilities ("urovnevaya") (Sirotyuk & Duminike, 2005). However most studies analyse the effect of tracking students by ability only. For example, it was shown that the students of advanced maths classes have better exam results (Zakharov et al., 2013) and a higher chance of entering university (Starkova, 2006). At the same time, little scholarly attention has been paid to the effects of grouping students. Specifically, teachers' beliefs about the most effective ways of grouping students, and how they choose which teaching practices to apply have been poorly explored.

Maths education in Russia is a particularly interesting context for exploring teachers' beliefs within the differentiated approach for several reasons. First, the quality of mathematics education and mathematical literacy of people in the country as a whole are considered as the main factor of the future economic development of the country, namely its scientific and technological progress (Koncepciya razvitiya…, 2013). At the level of school education mathematics acts as the main "tool for intellectual development" (Kozlov & Kondakov, 2011).

Second, every student in Russia has to pass high-stakes maths exams twice during their compulsory schooling, after 9th (BSE)[4] and 11th (USE)[5] grades, in order to graduate from the school. In both cases exams on mathematics, together with Russian language, are obligatory, if a student wants to get a school diploma, go to high school or enter universities or professional

[4] Basic State Exam - Osnovnoy gosudarstvenniy ekzamen, OGE
[5] Unified State Exam - Yediniy gosudarstvenniy ekzamen, EGE

colleges. But after the 11th grade a student has the option to decide the level of difficulty of exam she/he want to take, basic or advanced. If a student wants to enter STEM or economics faculties of prestigious universities, she or he has to pass the advanced level of USE. But it should be noted, while the basic USE is an obligatory exam for every student, the advanced USE is a facultative one.

Methodology

The research design included a qualitative stage of 30 semi-structured interviews with maths teachers working in general secondary schools from 9 regions of Russia. The sample of the study was formed by mixed target selection. The main criteria were the teaching subject (mathematics), the type of school (general), the level of the education (secondary school), the school's size (large, medium and small; urban and rural), the maximum variation of Russian regions and the territorial availability of the school. All of the recruited teachers have higher education. The majority of the respondents were females who have taught maths for not less than ten years.

The grounded theory approach (Glaser and Strauss, 1967; Charmaz, 2006) was implemented to analyse the interviews. Following the logic of the grounded theory paradigm, the study did not start with a working theory of how the teachers differentiate students and which beliefs they espouse. Rather, a framework was developed that combined the different points of view brought out by the participants (Bogdan & Biklen, 1998) on the topics such as the abilities and motivation of "weak" and "strong" students and the determinants of students' success or failure in mathematics. The central ideas, important to the participants, were transformed into the questions of the research.

We engaged in a three-phase coding and categorization process using the constructivist strategy of the grounded theory approach (Charmaz, 2006), which allowed us to interact with the data. At the beginning, the interviews were transcribed and analysed by initial coding. During initial coding the researchers closely studied segments of the transcribed interviews for their analytic input. Then, during the focused coding phase, the most significant initial codes were used to integrate the large numbers of interviews. The teachers' beliefs were conceptualized via memo-writing for generating theoretical assumptions. Finally, similar teachers' principles of differentiated approaches were identified and grouped in two models. Thus, we used analytic induction to derive a framework for the teachers' beliefs based on our analysis of the data gathered.

Findings

The constructivist grounded theory approach allowed us to reconstruct two grouping models of Russian maths teacher beliefs by highlighting their basic principles, which we will consider in more detail below. These two models of teachers' beliefs are used in maths classrooms in order to

classify/categorize students. The principles of these two models were shaped by teachers' beliefs about the motivation and success of students, about the nature of maths abilities, as well as about the most effective ways of working with various groups of students. The former is called an exclusive model; the latter an inclusive model. The main findings of the studies are presented in Table 1.

Tab. 1 A comparison of exclusive and inclusive models of teachers' beliefs

	Exclusive model: normalization and labeling	**Inclusive Model: individualization and diversity**
Characteristics of comparison	Judgemental function Norm-referenced Comparison of a student's success with the standardized, normal model in terms of "better/worse". The juxtaposition of "strong/weak" students.	Descriptive function Self-referenced Evaluation of a student's success within the trajectory of that student in terms of her or his development, without judgment and hierarchy
Focusing	On the standard(sample) / On the class as a whole	On the individual student / On the unique path of a person's development
Teaching practices	A teacher shapes students to the conventional standard (sample) in terms of mindset and behaving. Sorting out "weak" students and organization of selected classes, groups	A teacher works with a student's individual trajectory of development. Development of a tolerant attitude towards diversity in the classroom
Requirements to the students	Formulating standardized expectations for students (for example, minimum level of expectations for "weak" students)	Formulating personal expectations for a student Multilevel requirements/ expectations in accordance with the current results of the student

The role of teacher	Teacher is a “translator” of norms and standards. Her or his role is to bring or to coach students to the minimum accepted level. Teacher tend to deny their responsibility for the possible failure of the “weak” students	Teacher is rather a master or sculptor than just a “translator” of knowledge. Her or his role is to reveal abilities of each student by observing their characteristics and development. Teacher has a clear understanding of her or his responsibility for students’ results (for each of them)
Core teacher’s beliefs	There is a right and normal image of a student: she or he is a successful person, a good citizen. So all the students have to be taught in one standard way to become a "normal" way. There are two categories of students: who are gifted, and who not gifted. Ungifted students are better to be sorted out from talented.	It is possible to teach everyone, because there are not any "untalented" or "unteachable" students. Teachers should only take into account individual characteristics of students and factors, which could affect child’s development. It is impossible to divide students according to their school grades because it is increasing inequality. It is necessary to take into account the variety of alternative ways of thinking

The exclusive model of teachers’ beliefs

In general, the exclusive model of differentiation is based on a teacher’s belief in the predetermined future of a student’s success or failure by their level of cognitive abilities, interest in the subject, and motivation to learn. Within this model maths teachers are strongly convinced that students’ abilities in mathematics have been distributed unequally. That belief explains the failures in mathematics of one group of students and the outstanding results of another.

In addition, student diversity in the classroom is seen by the teacher as a problem that needs to be solved, and is commonly reduced just to a few types by categorization, for example, ‘mathematicians’, ‘humanitarians’, ‘normal’ or even ‘retarded’. The one category of students (for example, weak students) is always characterized by teachers in terms of their failure, lack of skills or motivation, while another category of students (for example, strong) are high-achievers and highly-motivated.

Teachers’ beliefs about “normal” mathematical abilities and motivation significantly determine their expectations for the students assigned to the different categories. Teachers expect every student to be motivated to achieve these norms since they use such phrases in interviews as "to catch up ...", "reach for ...", "to teach with great effort to..." or "fall down to ...".

Within the exclusive model teachers’ beliefs are determined by the underlying idea of a “normal student”. The image of a “normal student” externalizes one’s self in teaching practices with

two main mechanisms: normalization and labelling. In the following sections we described these mechanisms in detail.

The mechanism of normalization: who is a "normal student"?

The mechanism of normalization permeates the teachers' discourse. While expressing their attitude to the students and their parents, and to the educational process as a whole, teachers use such judgemental categories as "the norm", "normal", "abnormal". Teachers tend to identify everything that goes beyond conventional norms as abnormal. That belief is also expressed in reference to the authority of the majority determining whether or not a student is "normal".

...we don't have remedial classes there. Although after a medical and psychological evaluation some students were recommended to study in these classes. And we were forced to open them. But there is also the peculiarity and desires of their parents. So they refused and [in the end] we did not open them. And, so we say, they have finished school. They graduated as normal children. That is, they gradually straightened out, slow and sure, graduated and moved on (Interview 52).[6]

And when I've taught them since the fifth grade, I had them, as they say, to create for myself. I teach them how to think in the way I think. Therefore, the way of thinking that I construct for them then really helps to prepare for final exams ... (Interview 62).

We learn the multiplication table. He cannot. I say to parents: So, then look for the problem, the reason, why can't he do it? Any healthy person can easily learn the multiplication table (Interview 11).

Teachers have a clear understanding about the "norms" of development, speaking, thinking, memory, attention, and motivation. Except for a few individual differences, teacher's views correspond to a single directive model of "good", or "normal", student. "Normal student" is a healthy, high-ability child with a good memory, logical thinking and a high level of motivation to succeed (a sense of patriotism and civic education sometimes are added to the list). A "normal student" wants to become a successful person by trying to match the system's expectations, *"those guys are good, strong, normal, they stayed in the 11th grade; even those who were weak, they passed the USE later"* (Interview 21). An important feature of a diligent student in that model is her or his ability to copy or imitate: *"Naturally, they are starting to copy us, well, the copies are different: some of them are good whereas others are not really good. But many children are trying, yeah"* (Interview 32).

[6]Numbers of citations are made by two figures: the first one is for a region, the second one is for the number of an interview within the region.

Teachers assess student's ability by referring to the conventional standards of cognitive abilities: *"Among 16 children only four children can think normally. The others 12 students are fairly weak"* (Interview 33). Moreover, every "abnormal" or "weak" student is expected to be brought up to standard:

... our principal decided that our school will set a course for the alignment of children with disabilities. That ... everyone has. Each student has some problem. Pure dystrophy and, there it is, short-term memory, and so on, you know? We, therefore, are suffering now. We cannot gather children. Although we will have them not only in remedial classes now. We are an ordinary, normal school. But rumours, as they say, will be ahead of us for a long time (Interview 11).

Due to the dominant idea about the necessity to standardize maths abilities and achievements, children with various disabilities become the most vulnerable students in the school. In other words, 'normal health' appears for teachers as a significant foundation for student's classification, and 'unhealthy' children are often placed into the special group.

... If you do not take into account their state of health, then what? That is, if you don't count such children, then, in principle, a classically healthy, but weak child – is a child with difficulties. There are a number of reasons ... A) the earlier development of the child. B) their health, that, in principle, doesn't let him be a successful child in mathematics (Interview 94).

Teachers are trying to demonstrate tolerance towards children with developmental delays, poor academic achievements, and weak health; they express pity and indulgence in some degree towards them. *"All kids are good for us. As for me, I do not have such kids, even if he is lame, somehow or something, I always try to make them all the same, even if I scolded him, then I feel pity"* (Interview 22).

Teachers consider the diversity of children's characteristics (their language, family resources, level of motivation, abilities, etc.) as one of the biggest problems in the learning process. By perceiving peculiarities as deviations from the norm and denying the value of diversity, teachers demonstrate a fear of any kind of differences and try to equalize students by making them "*all the same*."

The mechanism of labelling: strong and weak students

Several ways of labelling students were observed. The most common and accepted categories among teachers are 'strong' and 'weak' students, which could also mean the following dichotomies: 'advanced', 'underachievers', 'talented', 'untalented', 'motivated', 'unmotivated', 'mathematicians', 'humanitarians'. Teachers tend to prioritize one category over another regardless

of the label. That is, one group of students is ‘strong’ and another one is ‘weak’. In general, the following kinds of labels were revealed within the exclusive model:

- ‘capable / incapable’, differentiation by maths abilities,
- ‘mathematicians / humanitarians’, differentiation by the mindset,
- ‘motivated / unmotivated’, differentiation by the level of motivation.

Although these ways of differentiation are interrelated and even overlap in some aspects, usually one of them plays a leading role in defining a teacher’s beliefs. In the following section each way of labelling is considered in detail.

Capable / incapable, beliefs about the nature of maths abilities

Maths ability is the central construct to classify students in maths classrooms as ‘capable’ and ‘incapable’. In teachers’ conceptions maths ability completely predetermines the whole process of student learning.

Everything depends on the children's [maths] abilities. A smart child, of course, solves problems quickly, well, it depends how capable the child is, and those who learn a little, of course, will be poking around with it, unless, of course, he solves it. It depends on the ability and depends on it very, very much. ... They are motivated only because they want to solve it, but if it works or does not work, this depends on the abilities (Interview 21).

In teachers’ opinions maths abilities are not just an indicator of a student’s success in mathematics, but rather a crucial factor for her or his future success in social and professional life in general.

Our children will not be engaged in scientific work. That is, anyway all of them will be workers. In an extreme case, they will finish school. Well, they can also graduate the institute here. It is not necessary that everyone has a development (Interview 11).

Teachers almost unanimously say that school mathematics is mainly aimed at developing logical thinking. However, teachers do not believe that every student has the required level of logical thinking or at least has the possibility of developing it. *‘There is one problem – all kids are different. We do understand that not every child has logical thinking, not every child can develop logical thinking. Therefore, this is difficult’* (Interview 52). Teachers are convinced that if someone wants to be successful in mathematics he/she must be born with well-developed logical thinking; otherwise it is almost impossible to develop logical thinking in school. For instance, there is a category of children whose logical thinking is so undeveloped or even absent, that teachers define them as ‘incapable’. But it is not clear yet, whether logical thinking is the purpose of maths education or the main factor for success in maths education.

Ultimately, in teachers' conceptions maths abilities are largely inherited, and so there is almost nothing a teacher can do for developing a student's abilities in the classroom. These beliefs raise the important question of a teacher's responsibility for a student's development.

I believe, it is 80 per cent. And everybody says that [maths abilities] are 80 per cent inherited. First, it is "baked" into a family, the genetic material, right? Plus nurturing, plus developing – on the whole it is 80 per cent from the family. Then, I believe, it is social, that the streets and environment give it to them. And I believe that school, well, can give only five or six per cent. If it [maths abilities] is not based in the family, well, how can I put it, then the school is powerless here. We can leave no stone unturned, but we will get nothing in return (Interview 13).

Maths teachers have a strong belief that they can define student's potential in maths "by eye", namely by relying on their subjective experience: '*We all see the potential of our children*' (Interview 11). In the case of such differentiation, teachers often use terms as 'given' and 'not given', meaning gifted and not gifted, in order to indicate the possibilities for student development. Teachers take responsibility off themselves for a student's possible failure.

Yes, mathematics depends on skills a lot. Some are not given [these skills], and you can even pass through their minds, but no, they will not do it. And with some you can do anything but they will solve by themselves. They may spend the whole lesson playing on their phone, talking to someone, but in the end they will do a test and they will do it better than anyone else. [Some are given [an ability in maths] and the others are not (Interview 21).

According to the teachers' beliefs, only "capable" students can successfully develop maths abilities, because they already have the necessary characteristics: logical thinking, memory and intelligence. "Incapable" students can acquire only basic mathematical skills, in other words, the "ceiling" of their development is strictly fixed.

The probability that everyone will achieve success in mathematics is certainly not high. ... There are issues with health, education, their social environment, society, of course. The teaching staff, which over the years has had various changes, they lead the child. Well, for some of the many abilities, their mathematical education is developing (Interview 94).

'Humanitarians' and 'Mathematicians': beliefs about a mindset

Regarding the division between "mathematicians" and "humanitarians", teachers believe there is a strong connection between the level of a student's maths ability and her or his mindset. Teachers divide students by their disposition either to maths or liberal arts. A student's disposition does not mean just interest in the particular subject, but genetic predisposition, which therefore is difficult to change.

It has become harder to teach, from a human point of view, because there is a generation who understand mathematics worse. This means that the children are a humanitarian generation, so children are good at singing, dancing, reading, poetry writing, but with mathematics they are not strong at all, and to teach these children to love maths is hard enough (Interview 32).

In the teacher's opinion "mathematicians" are "strong" or high-ability students and easily acquire the material because of their special mindset, namely, a good memory and well-developed abstract thinking. At the same time "humanitarians" have to devote much more time to studying material, they are low-ability students and do not have a stable interest in mathematics. Teachers label these students as "weak" and do not see any chance for their success in future.

Some people naturally work with formulas, work with mathematical problems, solutions, so they have some interest, they get it better. Those who don't have it – the humanitarians – they are just incapable, it seems they do not want to, so as a result it is impossible for them (Interview 41).

Mathematics, it is for the gifted ones in terms of mathematics. If a child has a logical mind, this subject comes easy to him. If the child has no logical thinking, we can say that he is a humanitarian, then it is much more difficult for him and he has work much harder. This is of course very difficult. (Interview 52).

Teachers typically excuse their inability to work with "weak" students' by referring to medical or biological reasons. For example, they refer to the scientific discourse by using special psychological and medical concepts or using terminology from remedial institutions: "dystrophy", "short-term memory", "remedial classes", "mentally-retarded children".

You see, they have a short-term memory. And I read psychological works, all the doctors said: "Those who have a developmental delay, they will never be free from it. They will always have a short-term memory". It means that what he learned today, he knows it. Tomorrow he might not. Of course, he might know it. But not for sure (Interview 11).

This child has a short-term memory. He just cannot take it ... Further we will not be able to teach him anything. The child has a non-mathematical mindset (Interview 12).

In general, it is a non-mathematical mindset as a special construct that is used for explaining the failure of "weak" students and the futility of the teachers' expectations for their achievements. Teachers understand that they do not need to make any efforts for increasing achievements of these students.

The "motivated" and "unmotivated": beliefs about students' motivation to learn

Another way of labelling students is based on the teachers' beliefs about the significant role of a student's motivation in the learning process. Teachers strongly believe that a student's devotion

to studying and her or his desire to achieve good results are more significant predictors of future success than maths abilities. A high level of motivation to learning could be caused by both the practical purposes of education, such as the student's need to pass the USE, and a general interest in a subject. So the level of a student's motivation determines which teaching practices are applied in the classroom. *"If a child has a desire, motivation, he can to learn it from other sources after all. Can he? He can. Well enough"* (Interview 12).

Together with maths abilities, a student's motivation is believed to be largely determined by family factors, hereditary or parenting practices. In the teachers' opinion, parents have a strong influence on the development of a child's motivation to learn and attitude to the value of education, especially in the early years. School teachers can have an influence on a student's attitude to education only in primary school. If a student's motivation and desire for success were not formed by the beginning of secondary school, a teacher can do almost nothing to change it. Thereafter teachers assign unmotivated students to the "weak" group, because they do not believe in their future success: "*If this child was neglected by a teacher, and he didn't learn something in primary school. ... For example, if he is not able to read fluently ... for this child it is very difficult to orientate oneself, and he will never achieve high results"* (Interview 12).

However, a special type of motivation, namely, instrumental motivation can arise only in senior classes, because students begin to think about their future life towards the end of their school life.

Ninth grade children, whose age suggests a total lack of responsibility, cannot be managed at this age. [We cannot] instil in them a responsibility for their own destiny, for these exams. In the eleventh class it is already inside them, they are ready for it, they know it. At this stage there is even no need for parents. They are ready for it. in the ninth grade they are not ready for that, even when parents stand and talk. Such an age (Interview 62).

In the case of instrumental motivation, the teacher's role is reduced to regular counselling about the importance and usefulness of knowledge for students' future life. But still there is the problem of a teacher's inability to work with the internal motivation of students. In other words, teachers doubt that they can affect student's motivation and interest, and, moreover, they do not have any effective practices for increasing motivation.

There is a saying, you can lead a horse to water, but you can't make it drink. The same with students. And if he does not want to learn maths – it is useless. I'll never make him learn myself. First, he who wants to learn something, can. That is, if I was able to convince him that it is necessary. Neither his mum nor I need this. If you know it or you don't, it's for you personally. And if he realizes that he needs it personally, then he will learn. And we, well, we still have these

children, who say, "But I do not need this. And you cannot make me learn it anyhow." And he can learn it all just for marks. And we begin to say, "How will you pass an exam? You will not pass it, will you? And if you will not pass the exam, you will not have this certificate. You will not go the army as well, because now they don't accept without certificate. You will not go to work, they will see that instead of certificate you have a letter of graduation." So we have to use such methods. (Interview 11).

Ultimately, a student's plan for her or his future also appears to be one of the indicators of her or his interest in the subject. If a student aims to pass the USE at advanced level, a teacher considers his/her choice as an indicator of great interest in the subject and "strong" maths abilities. On the contrary, if a student chooses to pass the USE at the basic level, a teachers assign him to the group of disinterested ones, which are "weak" and "humanitarians". In addition, the student's decision whether she or he should continue education in higher education also points to her or his level of motivation. Thus, a student's decisions about their trajectory could affect teaching strategies.

Two children, yes, they chose the basic level, and four children chose the advanced level. And so, well, in addition to the program that we are going through, we have to work with the children individually, have consultations, we have elective classes to solve non-standard problems. You've seen today,... that problem was not supposed to be solved by everyone, it was only for those who are going to the 10-11th grades, because they are motivated children (Interview 12).

Teacher's expectations and requirements for 'strong' and 'weak' students

Maths teachers have different beliefs about effective learning strategies for "strong" and "weak" students. While "strong" students are expected to demonstrate a high level of knowledge and understanding of the material no matter how difficult the topic is, "weak" students are just expected to be patient and persevere at studying mathematics. Moreover, "strong" students are mostly perceived as self-reliant and capable of studying even advanced material without a teacher's assistance. But "weak" students have to be controlled and guided by both teachers and parents. Ultimately, these beliefs about students' learning strategies could lead to different teaching practices in the classroom. For example, in case of "strong" students, teachers do not have to make special efforts to train them, because they have a strong belief in the inherited nature of maths abilities. Therefore, within the exclusive model of differentiation, students' access to educational resources is also limited for "strong" students.

That is, those who are gifted, they can do nothing, do no exercises, be distracted by something else, and then turn up and solve everything. But children, well, who are weak, they need

to practise, practise, practise and practise constantly. If they don't and just sit back and don't any homework, do not work in the classroom, they will not have any results, ever (Interview 21).

Many teachers are not sure how to work with the higher educational needs of students, they only point out the necessity to develop them "somehow". Mostly teachers express some confusion about which techniques and methods can be used for this purpose: *"... we try to develop them somehow. We try to give them such creative tasks ... to join them to the scientific community. So that they do some research"* (Interview 11). This confusion may indicate that teachers of secondary schools are focused mostly on developing the basic level of education rather than an advanced level.

Applying special methods to increase the level of motivation and interest of the "weak" students are seen as quite a time-consuming part of teachers' work. "*... when you go, you have a program, and in a class of, say 30, there is one, and I cannot pay more attention to the weak student, otherwise the rest will just sit there*" (Interview 32). What is more, teachers consider a low level, or even lack of motivation, as the student's problem, rather than the teacher's. So students can only try to catch up with other students by themselves: *"there were 30% of these unhappy children, who had to catch up, class was friendly enough, and these children had to catch up with them.*" (Interview 32). Students with low motivation are not engaged in the learning process and forced to "pass the time" during the lesson. In case of "strong" students, or students with a high level of motivation, teachers tend to work with an established interest in mathematics: by devoting time to the extra classes or suggesting problems of different formats and levels of difficulty.

I do such things sometimes, well, that I have standard tasks, and then written on the board, is a problem which they cannot solve, and good children, they are all good, I mean, those who understand mathematics well, they look at this problem and after a while they start to ask questions: "Am I think along the right lines or not?" They are challenged in this way. Depending on what we want to achieve in the classroom, the problem can be put anyway you like and it can be of any kind (Interview 32).

A teacher's belief in the impossibility of developing maths abilities or increasing interest in secondary school could lead to different expectations and requirements for them. That is, teachers do not see what the future may hold for "weak" students and therefore they do not apply the complex system of teaching practices needed to develop students' abilities or motivation. In contrast, in the case of strong students, teachers see the possibility for their further development, so they are ready to make extra efforts in teaching them.

Regarding exam preparation, teachers find it useful to devote more time to train the students who have decided to pass the advanced level of the USE ("strong" students) in comparison with

those students who have decided to pass the basic level USE ("weak" students). Thus, "strong" student will get extra classes beyond the standard curriculum.

If a child is less prepared, it is enough for him that we study in the classroom. And if a child needs to prepare for the exam, if he really needs get higher results – we work with him individually. That is, working on the test tasks; working out the most difficult problems in extra lessons (Interview 81).

Particularly, teachers suggest students solve different types of problems while preparing for the USE. That is, a teacher considers studying standard problems with a known algorithm and paying special attention to real-life maths problems as the most effective way to prepare "weak" students. In the case of preparation for the advanced level of USE, teachers mostly use more difficult and more complex problems that require non-trivial solutions.

During preparation for the exams, of course, an enormous amount of time is given to the basic level, because there are many [realistic] tasks at the basic level. At the advanced level, because the advanced exam is a little more focused on other things, such problems are solved with the aim of repetition, but we also understand that the advanced exam is chosen by those children who can cope with such [realistic] problems. Therefore, they should be neither trained, nor retrain to solve these problems ... because for a child who chooses the advanced level – he has a certain mathematical base and he reaches this base... well, it has been building for years. In particular, the general culture of this person – it has been laid in such way that word problems on computing of power are easy for him.[…] A different mathematical education has already been laid down (Interview 94).

According to the teachers "strong" students do not need to study real-life maths problems with purpose, because these students have already mastered the general skills of problem solving. But the abilities of "weak" students strongly depend on the problem's context and therefore they need to work on the typical algorithms of standard problems.

Teachers' expectations for the possibilities of students with different abilities and interests can be summarized in the following statement: while the achievements of "weak" students are supposed to be kept at the basic or at least at an acceptable level, "strong" students are meant to achieve high results. Although in this case teachers have precise strategies of working with each group, the possibility for a student to move "upward" remains unclear.

The inclusive model of teachers' beliefs differentiated approach

In contrast to the first model with the idea of a "normal student", alternative ideas were identified among teachers' beliefs about the classification of students, namely, ideas of diversity

and individualism. We refer to these ideas as principles of the inclusive model, primarily because it does not support the exclusion or stigmatization of "weak" students, but rather asserts a necessity "to educate everyone": *"We need to bring everyone who comes, those ready to take it all, and those not ready, sick children, with weak health, and healthy children. We teach everyone today"* (Interview 97). Within the inclusive model, teachers strongly criticized the idea of dividing students into "strong" and "weak" groups within or between classes. From their point of view, that kind of classification is perceived as inefficient and impersonal. Teachers believe that labelling students by ability increased inequality in education by reducing access to educational resources for "weak" groups.

The underlying ideas of the inclusive model mean that teachers do not label and classify students in the classroom. Therefore we consider below how these ideas are reflected in preferable teaching practices.

Concepts of teaching practices within the inclusive model

The basic ideas of the inclusive model are rooted in teachers' beliefs about the possibility of developing maths abilities regardless of a student's background or his/her interest in the subject. Moreover, within this model teachers do not believe in such a phenomenon as a "mathematical mindset", i.e. the completely inherited nature of maths abilities.

Children are born with the same potential, I am deeply convinced, and probably will die believing it. Another thing is that we need to develop their skills; otherwise, they could be nipped in the bud and not develop (Interview 96).

In general, the inclusive model approach emphasizes the necessity to avoid comparing children with each other or with a "normal student": *"...and it is always a bad thing, you cannot compare children, cannot"* (Interview 95). Therefore teachers do not orient towards unified normative samples when they work with a class, they rather try to choose teaching practices more accurately to better match the abilities and interest in the subject of each student in the classroom. That is, teachers try to organize work in the classroom with reference to the strong and weak points of students. For example, in the case of a heterogeneous group of students, the teachers could suggest a "research project". The aim of this task is to provide every student with the possibility to be involved in the project and to work in a team regardless of their abilities. A student's success in a group research project could enhance their interest in the subject.

I like the method of doing research projects, where children open up and become very serious. At the end of the year I do some little research project, and here you can see all kinds of children's abilities: one draws, the second one calculates, the third one can solve the task, and the

fourth one just represents it in the form of presentations, and the fifth one, who generally cannot calculate this, will present it in front of the class, which creates the impression that he is the only one who has all the information. I give excellent marks with pleasure. This method of stimulation, it is important, it is important for me that the child can work, that he can enjoy learning process (Interview 32).

As well as using various forms of classroom activity, teachers encourage students to apply different ways of solving typical problems. Sometimes teachers might insist on practicing different methods of solving problems and then compare different solutions. That type of instruction gives students an additional opportunity to learn how to formulate and test their own hypotheses, and stimulates them to find a non-typical way to solve problems.

And this time I showed them the T-shechku[7]*. I noticed, most of them continue to use proportions. And I'm telling them, there might be a different option. A variety of ways to find solutions. Especially in eleventh grade, I never allow them to solve a problem the same way. Even in the groups where they were working recently, I said – you solve it this way and you solve it other way. Then compare* (Interview 62).

It is important to notice moments of reflection about the material in every lesson. By using this method, students could learn to estimate their performance in the classroom, evaluate new information in the context of their interests, and opportunities to apply it in their daily lives. Consequently, students can understand their personal values and priorities in the area of mathematics.

So at the end of the lesson, that's summing up, that is a reflection going on there, I often apply it in order students answer these questions: What did I learn today in the classroom? What did I like? What didn't I like? Did you evaluate yourself, as I did? Well, what particular student took a part during the lesson, what did he get for himself and where will he use this knowledge, in life? Probably, this is the most important thing (Interview 82).

In contrast to the exclusive model, teachers of the inclusive model consider motivation to learn and interest in the subject as unfixed, as they are not inherited they are susceptible to outside influence. This idea is reflected in the belief that the teacher could, and should, work with student's motivation by helping them to set on educational goals.

Well, perhaps the role of the teacher is not to just to read a textbook, but still somehow develop the child, to inculcate interest in the first place. And when there is interest, then the knowledge will come, because if the child is not interested, he will not work (Interview 96).

[7] Special method of solving system of two algebraic equations. In this case the teacher used an unofficial diminutive form of the method.

Well, here I am, the aim of my work and teaching, of course, is mathematics, but first – to interest students, so that they become interested in doing maths. And with interest – it's like and it turns out, that's how they would involuntarily find new knowledge for themselves ... So I aspire to this – not to force and coerce with some kind of threat, but to make it interesting for them and so that they aspire to this by themselves, that they work happily in the classroom and at home (Interview 82).

In the teachers' opinion, high levels of interest in the subject are determined by getting pleasure from the learning process itself. If a student has a consistently high level of interest in the subject and could focus on the learning process for a long time, then he can master knowledge and skills more efficiently. Teachers consider applying the same method of motivation for all students as ineffective, because every student has their own interests and goals for education.

It is possible for everyone, results will be different. One can be taught, but only to calculate and enjoy it, and for another calculating is not enough, but some processes and standard solutions, so that he can enjoy the process. And my goal is that they get enjoyment from mathematics. That is the only way to learn it, it is very hard. But every child can be taught maths (Interview 32).

Within the inclusive model teachers also classify students as "humanitarian" and "mathematician". However, these categories indicate the interests of students rather than their inherited, predetermined dispositions as within the exclusive model. Teachers do not support constructing a hierarchy in the class from the perspective of the students' interest in being either a "mathematician" or a "humanitarian". Teachers rather try to correct their instruction with reference to personal interests of a student.

... it is not for nothing that there are humanitarian grammar schools and classes, and, physics and mathematics schools, when there is a profile for the child who understands what he needs, and he knows it and considers it interesting, he goes into the technical subjects further, he goes to a technical university. If I am a humanitarian - I am interested in history, English, literature. In general, for me integrals are a headache. It would be better if I were able to have five hours a week engaged not in mathematics, I would deal with the English, more history (Interview 96).

That a "humanitarian" is not an underachiever in mathematics or "defective", but rather a person with a non-typical way of thinking. But, as both humanitarians and mathematicians must have the opportunity to master an equal range of knowledge and skills, teachers must apply additional, non-typical practices for explaining material.

It's foolish to conclude that some children are, therefore, inclined to the humanities, and some to science and mathematics – it's a myth, it is not true. It's one thing when a child is been developing, and another thing, when he or she has not been developing (Interview 95).

To sum up, within the inclusive model teachers consider special aptitudes and dispositions to mathematics to be a myth. Teachers do not give up on with poorly-motivated students, but they accept the challenge and apply different ways to increase their motivation. That teachers' perceptions about their role in the learning process seems to be different. In this model teachers are aware of the central role that they play both in developing students' abilities, and in constructing student's interests in mathematics and learning. In the inclusive model, teachers tend to take more responsibility for developing students' maths abilities, regardless of their interests, talents and background, compared to those teachers who apply the exclusive model of instruction.

Discussion

A teacher is a significant actor in the learning process since she or he is responsible for almost every aspect of teaching including assignments, the method of assessment and the interpretation of the content of the course. What is more important, every teacher has to assess a student's ability by herself or himself and take various decisions towards a student's future by relying on her or his judgements. The problem is that teachers' attitudes could be stereotyped and, consequently, the evaluation of a student's ability would be systematically shifted and decisions about the possibility to teach the student would be incorrect. In the case of a mixed ability classroom, which is usual for government funded schools, the problem of the estimation of the student abilities becomes even more complicated.

In the present study we reveal teachers' beliefs, which help them to handle diversity in the classroom. Two models of teachers' beliefs were discovered, which teachers use to differentiate students and select teaching practices – exclusive and inclusive models. In fact, the core difference between these two models is the presence of students' differentiation and categorization. Within the exclusive model teachers have an image of a "normal" student and use discrete categories for labelling students with reference to the "normal" student. On the contrary, within the inclusive model teachers tend not to juxtapose students with discrete categories; rather they prefer to compare a student only with herself or himself.

In addition, within the exclusive model the inequality of inherited cognitive abilities is considered to be the main factor determining a student's future. This inequality of abilities plays the role of a natural constraint, demonstrating the limits and possibilities of a student's development in mathematics and could not be changed either by the teacher or the child. In other words, teachers construct an informal "ceiling" for a student's possible development in accordance with their

perceptions of student's abilities and motivation. However, it should be emphasized, that the teachers' belief in an inherited nature of maths abilities are not baseless. In fact, up to 70% of variation of a student's cognitive abilities could be explained by genetic factors (Krapohl et al., 2014), even motivation to learn is inherited to some degree. However, the inherited nature of abilities and motivation is the same both for 'weak' and 'strong' students, so the possibility to develop these constructs are equal for each student.

Although teachers' beliefs about students' categorization are poorly explored, the results of the present study are consistent with other research. First, our two models of teachers' beliefs could be considered in the context of the theory of mindset (Dwerck et al., 2011). According to this theory beliefs about the stability of cognitive abilities could be dichotomized into two mindsets: fixed and growth. While those who hold a fixed mindset believe that cognitive abilities cannot be changed, people holding a growth mindset believe that abilities are malleable and can be developed through effort and learning. As our study has shown, teachers' belief in the immutability of student abilities is a specific characteristic of the exclusive model, and for this reason the exclusive model could be compared to the fixed mindset. In turn, teachers' belief in possibility of developing every students' maths ability are similar with the growth mindset.

The results of the present study do not allow us to claim the presence of a connection between the model of teachers' beliefs and her or his students' academic success; however it was demonstrated in numerous studies, that fixed and growth mindsets are correlated differently with a school achievement. A teacher's mindset could impact her or his instructional approaches (Swan & Snyder, 1980; Gutshall, 2013); and in turn, a student's mindset, and correlated with this, the student's academic success could be influenced by a teacher's mindset (Mueller & Dweck, 1998; Butler, 2000; Yorke & Knight, 2004). Thus, if the exclusive and inclusive models are completely congruent with fixed and growth mindsets, then models of teachers' beliefs described in the present study could also have an impact on a student's result. Further research need to be done in order to shed a light on that question.

Second, the two models of teachers' beliefs about student differentiation exist within special education as well – pathognomonic and interventionists models (Jordan & Stanovich, 2001). Within the first model teachers consider students' individual characteristics as a hindering barrier, and do not want to modify or adapt teaching practices to every student's needs. Regarding the second model, teachers embrace students' personal needs and are willing to modify their teaching practices and monitor every student's progress regularly. Thus, these two models identify teachers' differing attitudes to the variety of student characteristics and the necessity to modify their practices rather than to focus only on the "normal" student.

Third, teachers' beliefs about suitable teaching practices for different group of students, revealed in our study, are consistent with quantitative research on instructional design within the differentiated approach. For example, it was shown that encouraging students to take an active role in the learning process and to use higher-order thinking skills results in greater student achievements (Hallinan & Kubitschek, 1999; Brown, 1994). However, teachers tend to use such challenging practices only in high-ability groups of students; at the same time they suggest only knowing and recalling facts for low-ability students (Scantlebury & Kahle, 1993; Boaler, 2002). Also, in line with the beliefs of the exclusive model, teachers tend to set different benchmarks for student achievements, for example, low-ability students are praised just for acquiring minimal volume of knowledge (Oakes et.al., 1992).

The exclusive and inclusive models of teachers' beliefs could also be used for explaining the teacher's role in the learning process. Namely, if a teacher adhered to the exclusive model, her or his belief in the immutability of the student's maths abilities could reduce the teacher's responsibility for a student's outcomes and, consequently, decrease the general effect of teaching in the classroom. On the other hand, a teacher's belief in the possibility of developing everyone's ability could lead to a bigger teaching impact on the learning process. The results of the present research allowed us to observe only how teachers see their own roles in the learning process; however, we cannot conclude that there is a clear connection between a teacher's system of beliefs, teaching practices and students' achievements.

Another problem with the exclusive model is the "fixed effect" of a student's development. The peculiarity of this field differentiation is groups of students are rarely changed during the learning process. In other words, the established groups are fixed and boundaries between these groups are impermeable. Categories of "strong / weak" students are not just 'opposite' in the teacher's perception, but moreover they are hierarchized; "strong" students are considered as more capable and promising and "weak" students are viewed as "lagging behind" the leaders. These practices obviously stigmatize students and lead to the exclusion of those who do not meet the conventional norms or were assigned to the category of "weak" students.

The two highlighted models of teachers' beliefs are ideal, and do not consider the complexity and difficulty of social reality or the diversity of teachers' attitudes and practices. In practice, the characteristics of these models may overlap with each other or combine within one teacher's approach to teaching. However, these models allow us to see a significant difference in modern teachers' conceptions about the principles of the differentiated approach in Russian secondary schools.

References

Aguirre, J. (2009). Privileging mathematics and equity in teacher education: Framework, counter-resistance strategies, and reflections from a Latina mathematics educator. In B. Greer, S. Mukhopadhyay, A. Powell, & S. Nelson-Barber (Eds.), Culturally responsive mathematics education (pp. 295-319). New York, NY: Routledge Education.

Atweh, B., Bleicher, R., & Cooper, T. (1998). The construction of social context of mathematics classroom: A sociolinguistic analysis. *Journal for Research in Mathematics Education*, 29(1), pp. 63–82.

Boaler, J. (1997). Experiencing school mathematics: Teaching styles, sex and setting. Buckingham, England: Open University Press.

Boaler, J. (2002). Learning from teaching: Exploring the relationship between reform curriculum and equity. *Journal for Research in Mathematics Education*, 33, pp. 239–258.

Boaler, J. (2016). Mathematical mindsets: Unleashing students' potential through creative math, inspiring messages and innovative teaching. San Francisco: Jossey Bass.

Bogdan, R. C., & Biklen, S. K. (1998). Qualitative research for education: An introduction to theory and methods. Needham Heights: Allyn and Bacon.

Brown, A.L. (1994). The Advancement of Learning. *Educational Researcher*, vol. 23, pp. 4-12.

Butler, R. (2000). Making judgments about ability: The role of implicit theories of ability in moderating inferences from temporal and social comparison information. *Journal of Personality and Social Psychology*, 78, 965 – 978.

Campbell, T. (2015). Stereotyped at Seven? Biases in Teacher Judgement of Pupils' Ability and Attainment. *Journal of Social Policy*, 44(3), 517-547.

Catsambis, S., Mulkey, L. M., & Crain, R. L. (2001). For better or for worse ? A nationwide study of the social psychological effects of gender and ability grouping in mathematics. Social Psychology of Education, 5, 83–115.

Charmaz, K. (2006), Constructing Grounded Theory. A practical guide through qualitative analysis, London, Sage Publication.

Davies, P. (2000). Differentiation: Processing and understanding in teachers' thinking and practice. *Educational Studies*, 26(2), pp. 191-203.

Dunne, Ciarán. (2011) The place of the literature review in grounded theory research, *International Journal of Social Research Methodology*, 14:2, 111-124.

Dweck, C., Walton, G. M., & Cohen, G. L. (2011). Academic tenacity: Mindsets and skills that promote long-term learning. Seattle, WA: Gates Foundation.

Eccles, J. and Wigfield, A. (1985). Teacher Expectations and Student Motivation, in J. Dusek (ed.), Teacher Expectancies (pp. 185-226). Hillside, N.J.: Lawrence Erlbaum Associates.

Fang, Z. (1996). A review of research on teacher beliefs and practices. *Educational Research*, 38, 47-64.

Federal'nyj gosudarstvennyj obrazovatel'nyj standart osnovnogo obshchego obrazovaniya [Federal State Educational Standards for Secondary (Complete) General Educaion] (2010). Retrieved from: http://www.dof-edu.ru/images/secondary%20education%20standard.pdf

Glaser, B.G., & Strauss, A. (1967). Discovery of grounded theory. Chicago, IL: Aldine.

Good, T L. and Marshall, S. (1984). Do Students Learn More in Heterogeneous or Homogeneous Groups? In P. L. Peterson, L. C. Wilkinson, and M. T. Hallinan (Eds.), The Social Context: Group Organization and Group (pp.15-38). New York: Academic Press.

Gutshall, C.A. (2013). Teachers' mindsets for students with and without disabilities. *Psychology in Schools*, 50(10), 1073-1083.

Hallinan, M.T., Bottoms, E., Pallas, A.M. & Palla, A.M. (2003) Ability Grouping Student Learning. *Brookings Papers on Education Policy*, 6, pp. 95–140.

Hanushek, E., & Woßmann, L. (2006). Does educational tracking affect performance and inequality? Differences-in-differences evidence across countries. *Economic Journal*, 116, 63–76.

Jordan, A. & Stanovich, P. (2003) Teachers' personal epistemological beliefs about students with disabilities as indicators of effective teaching practices. *Journal of Research in Special Educational Needs*, 3(1), 1-12.

Jorgensen, R., Gates, P., & Roper, V. (2014). Structural exclusion through school mathematics: using Bourdieu to understand mathematics as a social practice. *Educational Studies in Mathematics*, *87*(2), 221–239.

Kerckhoff, A. C. (1986). Effects of ability grouping in British secondary schools. *American Sociological Review*, 51 (6), 842-858.

Koncepciya razvitiya matematicheskogo obrazovaniya v rossijskoj federacii [The strategy for development of mathematical education in Russia] (2013). Retrieved from http://минобрнауки.рф/документы/3894

Kozlov V., Kondakov A. (eds.) (2011). Fundamental'noe yadro soderzhaniya obshchego obrazovaniya [The Fundamental Nucleus of General Education Curriculum Content], Moscow: Prosveshchenie.

Krapohl, E., Rimfeld, K., Shakeshaft, N. G., Trzaskowski, M., McMillan, A., Pingault, J.-B. J.-B., Plomin, R. (2014). The high heritability of educational achievement reflects many genetically influenced traits, not just intelligence. *Proceedings of the National Academy of Sciences*, 111(42), 15273–15278.

Lawrence-Brown, D. (2004). Differentiated Instruction: Inclusive Strategies For Standards-Based Learning That Benefit The Whole Class. *American Secondary Education*. 32 (3), pp. 34–62.

Meirink, J. A., Meijer, P.C. Verloop, N. & Bergen, T.C. M. (2009). Understanding teacher learning in secondary education: the relations of teacher activities to changed beliefs about teaching and learning. *Teaching and Teacher Education*, 25(1), 89-100.

Mueller, C., & Dweck, C. (1998). Praise for intelligence can undermine children's motivation and performance. *Journal of Personality and Social Psychology*, 75, 33 – 52.

Nicolae, M. (2014). Teachers' beliefs as the differentiated instruction starting point: research basis. *Procedia - Social and Behavioral Sciences*, 128, pp. 426-431.

Oakes, J. (1985). Keeping track: How schools structure inequality. New Haven, CT: Yale University Press.

Oakes, J. (1992). Can tracking research inform practice? Technical, normative, and political considerations. *Educational Researcher*, 12-21.

Riegle-Crumb, C., & Humphries, M. (2012).Exploring Bias in Math Teachers' Perceptions of Students' Ability by Gender and Race/Ethnicity. *Gender and Society*, *26*(2), 290-322.

Rosenbaum, J. E. (1976). Making inequality: The hidden curriculum of high school tracking. New York: Wiley.

Rosenthal, R. and Jacobson, L. (1968). Pygmalion in the Classroom: Teacher Expectations and Pupils Intellectual Development. New York: Holt, Rinehart, and Winston.

Scantlebury, K., & Kahle, J. B. (1993). The implementation of equitable teaching strategies by high school biology student teachers. *Journal of Research in Science Teaching*, 30(6), 537–545.

Sirotuk, A.L., Duminike, Y.S. (2005). Sovremennye koncepcii obucheniya: tradicionnyj, raznourovnevyj, profil'nyj, individual'nyj, prirodosoobraznyj podhody [Modern conceptions of learning: traditional, multilevel, cross-sectional, individual, nature-aligned approaches]. *Kafedra*, pp. 54-63.

Starkova, E.V. (2006). Dostupnost' vysshego obrazovaniya: ocenka ekspertov [Access to higher education: experts' estimation*]*. *Zhurnal issledovanij social'noj politiki*, 4(2), pp. 183-205.

Swann, W., & Snyder, M. (1980). On translating beliefs into action: Theories of ability and their application in an instructional setting. *Journal of Personality and Social Psychology*, 38, 879 – 888.

Thompson, A.G. (1992). Teachers beliefs and conceptions: a synthesis of the research. In D.A. Grouwns (Eds.), Handbook of Research on Mathematics Teaching and Learning (pp. 127-146), New York: Macmillan.

Van Zoest, L.R. and Bohl, J.V. (2005). Mathematics Teacher Identity: a framework for understanding secondary school mathematics teachers' learning through practice', *Teacher Development*, 9(3), 315-345.

Yorke, M., & Knight, P. (2004). Self-theories: Some implications for teaching and learning in higher education. *Studies in Higher Education*, 29, 25 – 37

Zakharov A., Carnoy M., Loyalka P. (2013). *Which Teaching Practices Improve Student Performance on High-Stakes Exams? Evidence from Russia*. NRU Higher School of Economics. Series EDU "Education".

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