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Development of Achievement Disparities in Czech Primary and Secondary Education ¹

Abstract

In all international comparative studies the Czech Republic exhibits a relatively strong relationship between a student's achievement and his/her family background, and large differences in achievement and in compositions of students in different schools and tracks. At the same time the Czech education system is characterized by very early tracking. This paper explores the development of educational inequalities in the Czech Republic at the level of primary and secondary education over the last decade. The analysis is carried out with data from international comparative surveys (OECD PISA, IEA TIMSS) and uses a multilevel linear modeling approach. The analysis shows that, despite the proclaimed intention of Czech policy makers to lower educational inequalities, there has been an increase in the differences among the results of individual students, schools, and tracks on the level of lower and upper secondary education during the monitored period. At the same time, schools are increasingly differentiated by their learning climate.

Keywords

educational inequalities, student achievement, socio-economic background, tracking

Entwicklung von Leistungsdisparitäten in der Tschechischen Primar- und Sekundarstufe

Zusammenfassung

In allen internationalen Schulleistungsstudien weist die Tschechische Republik einen relativ starken Zusammenhang zwischen den Leistungen der Schüler und ihrem familialen Hintergrund auf, sowie große Unterschiede zwischen den Leistungen und der Zusammensetzung der Schüler in den verschiedenen Schulen und Schulformen. Gleichzeitig zeichnet sich das tschechische Schulsystem durch eine sehr früh einsetzende Schulformgliederung aus. Dieser Aufsatz befasst sich mit der Entwicklung von Bildungsungleichheiten in der tschechischen Primar- und Sekundarstufe innerhalb des letzten Jahrzehnts. Die hier vorgestellten Analysen basieren auf Daten aus den internationalen Vergleichsstudien OECD PISA sowie IEA TIMSS. Auf Basis von

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Mehrebenenanalysen wird gezeigt, dass es trotz der ausdrücklichen Absicht der tschechischen Bildungspolitik, Bildungsungleichheiten zu mindern, im betrachteten Zeitraum zu einer Vergrößerung der Leistungsunterschiede zwischen den Schülern, den Schulen sowie den Schulformen der Sekundarstufe I und II kommt. Gleichzeitig zeigt sich eine zunehmende Differenzierung der Schulen hinsichtlich ihres Lernklimas.

Schlagworte

Bildungsungleichheit, Schülerleistungen, sozio-ökonomischer Status, Gliederung des Schulsystems

1. Impact of the Differentiation of Educational Careers on Learning Inequalities

Besides academic abilities and direct family influences (e.g. genetic influences, differences in study conditions, nutrition, and health conditions), studies on the relationship between educational achievement and family background often focus on factors connected to educational careers. These are significantly influenced by the structure of the education system, the degree of its differentiation (that is, the extent of the differing educational opportunities) and the age at which the pupils are first sorted into different tracks.

At an early age, parents play a greater role in decision-making. Educated parents consider education to be important, understand the education system and are able to advise their children on their choice of school. Children with disadvantaged family backgrounds receive far less support from their parents. Systems restricting the choice of school are less unequal than systems in which educational career decisions are made at an early age (Erikson & Jonsson, 1996).

International achievement surveys repeatedly show that education systems sorting children at an early age into tracks according to their abilities or allowing choice of school exhibit greater differences in the achievement of individual students and schools than systems educating all students together during the period of compulsory education. These studies also show that countries tracking students at an early age, have on average a somewhat lower educational achievement than countries educating all students together (cf. OECD, 2001, 2004, 2007a). The analysis of Hanushek and Woessman (2005) on the data from international achievement surveys also indicated that early tracking might reduce overall performance. Negative effects of tracking on overall performance were also reported by Hoffer (1992).

Most longitudinal studies of the impact of tracking by student academic abilities in primary and secondary education do not, however, support the hypothesis that tracking leads to a decrease of average scores. In these studies, no statistically significant differences were found between the overall average scores of the students educated in heterogeneous groups and students divided into tracks according to their academic abilities (Gamoran & Mare, 1989; Gamoran & Nystrand, 1990;

Gamoran, 1992; Kerckhoff, 1986; Kulik, 1992; Slavin, 1990). Nevertheless, all studies agree that homogeneous class arrangements are disadvantageous for students placed in lower tracks. A higher concentration of students with sub-par academic results in certain classes leads to worse learning conditions in these classes (bad peer influence, inadequate teachers, low expectations and, consequently, low educational prospects). These students then have less favourable conditions for learning than their peers in heterogeneous settings or in higher tracks and achieve lower results than they would achieve if they were educated in heterogeneous groups. A similar mechanism also causes students in higher tracks to achieve better results. Tracking contributes significantly to an increase in inequalities (cf. Gamoran & Nystrand 1990; Hanushek & Woessman, 2005; Hoffer, 1992; Kerckhoff, 1986).

Researchers describe three types of effects of tracking. Apart from instructional effects, which consist of varying demands in the curriculum and teachers of varying quality (Gamoran & Nystrand, 1991; Oakes, 2005), there are also social and institutional effects. Social effects are created by different social environments emerging in each track, in which students form their own self-perception of their abilities. Different teaching methods in each track then cause systematically different forms of socialisation. Institutional effects are created by the stability and general familiarity of the structure of tracks and the fact that each track carries a certain connotation concerning its graduates (Lucas, 1999; Lucas, 2008; Pallas, Entwistle, Alexander, & Stluka, 1994; Sorensen, 1984).

Studies also show that it is not possible to sort students correctly on the basis of their study abilities, especially at an early age. Test results of young children are not stable, educated parents can better prepare their children for the sorting procedures (e.g. entrance exams), and in the case of failure, they still ensure their child's enrolment in a higher track. Hallinan (1992) demonstrated a strong impact of the socio-economic status on the placement of students with the same grades to different tracks and a strong impact of the socio-economic status on mobility between tracks (Hallinan, 1996). Children with a low socio-economic status, have a significantly higher representation in lower tracks than their educational achievement corresponds to (cf. Ireson, Clark, & Hallam, 2002). Some studies also support the hypothesis that early allocation into lower tracks discourages students (cf. Harlen & Malcolm, 1999; Hutmacher, Cochrane, & Bottani, 2001; Slavin, 1990).

The existence of different educational opportunities does not only depend on the existence of tracks. It can also be caused by the existence of schools with a high or low quality for parents to choose from, and by the concentration of students with unfavourable social backgrounds in certain schools. The composition of students influences a school's learning climate. The spread in individual school achievement can be better explained by the school climate than by, for instance, educational resources. The school climate is greatly influenced by the norms and values the students bring to school and which, in turn, are influenced by their family background (OECD, 2007b). In Czech schools, also, the composition of students in a school is a determining factor of student achievement (Straková, 2007).

2. Research Questions

This paper explores the impact of tracking in the Czech system of primary and secondary education. It aims to answer the question of whether there is a growing difference in the knowledge and skills of students of different schools as a consequence of the growing differentiation of educational pathways, and investigates which groups of students are most affected. This paper also seeks answer to the question of whether there is a growing difference in conditions for learning in different schools. The hypothesis is that due to the uncontrolled differentiation of the system, there is an increasing difference in the achievement of students in individual schools as well as in their conditions for learning.

3. Differentiation of the Primary and Secondary Education System in the Czech Republic – Development

The Czech Republic has a long tradition of a highly differentiated educational system. Tracking occurs very early. At primary level parents can, beside the mainstream basic schools, also choose for their children to go to special education schools (for slightly mentally disabled students) and schools/classrooms with extended curricula of selected subjects. At the lower secondary level students can apply for multi-year gymnasia (long academic track). At the upper secondary level students finishing compulsory education at basic school can choose between four-year gymnasia (short academic track), a technical track, and a vocational track. A diagram of the Czech education system is included in Appendix A.

The most controversial segment of the Czech education system, with respect to tracking, is the multi-year gymnasium entered by 11-year-old children. These schools were common during the pre-war period and restored shortly after 1989. They have traditionally been considered a guarantee of high quality education. During the communist period, multi-year gymnasia were abolished and replaced by comprehensive schools. Various measures were taken to support educational opportunities of the children from working-class families. Some of them offered an easier way to gain a certificate (e.g. prep-schools for working-class members). Graduates of these shortened courses often failed at higher levels of education, as they were not properly prepared for studying either with respect to their knowledge or their willingness to appropriately exert themselves intellectually. Supportive measures for the working classes were therefore effective only to a limited extent and, paradoxically, even furthered the generally shared belief that study abilities are only ruled by heredity. The education system evolved according to the concept that different intellectual abilities require differentiated education. A network of selective classes and schools with an extended curriculum of particular subjects on one hand, and special schools for “slower” students on the other, gradually emer-

ged. Even though the number of students entering secondary and tertiary education slowly grew, the system stayed relatively closed on these levels. Full upper secondary education² was, by tradition, intended only for a very narrow part of the population. The percentage of full upper secondary education graduates rose from 11 % to 39 % between 1946 and 1989. Full upper secondary and university education was therefore much sought after and hard to attain, while at the same time the Czech society showed very little correlation between educational attainments and income. High education did not ensure high income; it merely sheltered from being required to perform heavy manual labour. Access to full secondary and tertiary education was often made difficult for children from families with academic background; education was, however, often highly valued in these families and therefore the parents sought for ways to ensure (despite various obstacles) their children's higher education. Family was the main factor in reaching higher education (Štech, 2008). Czech society entered the post-communist era with a strong aversion to comprehensive schools, the differentiated education system, engrained ideas about the inheritance of intellectual abilities and the determining role families play in educational career choices. The concept of the comprehensive school was connected to the communist ideologist rhetoric and was perceived as a danger for the elites.

This situation significantly influenced the development of the education system after 1989. This period has been characterised by further, entirely uncontrolled, differentiation (creation of new educational pathways, the formation of educational opportunities of vastly different qualities) on the level of compulsory education and by the opening of access to full upper secondary and university education; this was viewed negatively by a portion of the population. Society still retains the belief that intellectual abilities are inherited. Rising access to higher education is often considered a threat to the quality of education. A significant part of the population considers higher education appropriate only for the best. High tracks are seen as an important tool in the cultivation of elites (Matějů & Straková, 2005) and the topic of equal opportunity is dismissed, often with references to socialist ideas. These opinions in society have not been changed by international comparisons, which repeatedly show that in the Czech Republic there is a stronger dependence of achievement and attainment on family background than in other countries. These results are supported by surveys both among students (OECD 2001, 2004, 2007a) and adults (e.g. Koucký, Bartušek, & Kovařovic, 2007).

Data in Table 1 show the development of student representation in ISCED 1 (and ISCED 2 tracks from 1991/92 to 2006/07.³ The data show that the percentage of students in individual tracks is more or less stable on the level of compulsory education after the growth in the early 1990s, and since 2000 it has remained on

2 Full upper secondary education (general or technical) concludes with the *maturita* exam and passing it entitles students to apply to tertiary education.

3 ISCED 1 corresponds to primary school (grades 1 to 5), ISCED 2 corresponds to lower secondary school (grades 6 to 9).

a similar level. There has been a certain decrease in the number of students with special educational needs educated outside of the educational mainstream.⁴

Table 1: Percentage of Students in Classes with Extended Curricula, Multi-level Gymnasias and Special Schools

	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
Classes with extended curricula	5.5	6.9	8.1	8.4	8.9	7.5	7.7	8.0
Multi-year gymnasias	2.4	4.0	6.5	8.3	9.5	10.9	11.4	10.8
Special schools	4.4	4.5	4.4	4.4	4.5	4.1	4.1	4.0
Total outside mainstream	12.3	15.5	19.1	21.1	22.9	22.4	23.2	22.9

	99/2000	2000/01	2001/02	2002/03	2003/04	2004/05	2005/06	2006/07
Classes with extended curricula	8.2	8.6	8.6	9.4	9.6	11.3	9.5	10.0
Multi-year gymnasias	10.7	9.7	9.5	9.4	9.6	9.8	10.2	11.0
Special schools	3.9	3.9	3.9	4.0	3.9	4.0	3.5	3.6
Total outside mainstream	22.8	22.2	22.0	22.9	23.1	25.1	23.3	24.5

Source: Statistical yearbook of education 2008; see IIE (2009)

Statistical yearbook data do not, however, cover the entire spectrum of the various educational possibilities during compulsory education. The Educational Act of 2004 launched a curricular reform introducing a bi-level curriculum: at the national level the curricular framework is defined while schools are expected to design their own educational programmes following the national framework but also taking into account specific needs of the local community. Many headmasters, however, interpret the reform as an invitation to determine their educational profiles through optional subjects and to create selective classes of all sorts, to offer parents special educational opportunities for their children. This tendency is enhanced by a decline in the student population that leads to stronger competition between schools for students. These selective schools and classrooms are not visible in regular statistics. In 2008, 20 % of primary school headmasters stated that their schools had selective classes, 8 % of which already in the first grade (IIE, 2008). Two percent of primary school headmasters stated that students have to pass school entry exams before admittance into the first grade. The existence of school entry exams is not systematically monitored.

4 There is a lack of data for the socialist period, but during the post-communist period the Czech Republic was placed among European countries with the highest percentage of students educated outside of the educational mainstream in special education. Due to the decrease in the past few years, the Czech Republic has moved from the country with the highest percentage of students educated outside of the educational mainstream in Europe to 3rd place after Belgium and Germany (European Commission 2007, www.eurydice.cz).

International comparisons show that the Czech education system, apart from the fact that it preserves separation of students into tracks, supports the choice of school. The Czech Republic is among the countries in which the student's place of residence plays a lesser role in the choice of school.⁵ This increases the danger that the difference in educational opportunities will not only be caused by sorting the students into pre-determined educational tracks, but also by the differing quality of single schools and the student compositions in these schools. Data from a special survey of Czech parents show that the majority of educated and well-off parents carefully choose a primary school for their child, whereas parents with basic or vocational education and little financial resources send their children to nearby schools (STEM/MARK, 2009). There have been no studies on the impact of greater competition for students (caused by the population decline) on the choice of school and social composition of the schools, but it is clear that at least schools in large cities respond to the parents' desire to choose the best school for their child by providing special educational opportunities.

Available data show that the differentiation of the compulsory education system in the Czech Republic is relatively high. Differentiation occurs at a very early age, almost 25 % of all students are officially educated outside of the educational mainstream, and the system increasingly supports the choice of school (see Table 1). Data in the statistical yearbooks show that the differentiation has not been growing in the past years; that may, however, be caused by the fact that there is no systematic monitoring of the latest trends. There is, therefore, no information about the number of schools "for talented students" or the number of selective classes and schools not formally belonging to the system of schools "with extended curricula".

To place the situation in the Czech Republic in an international context, Table 2 provides an overview of the age of first differentiation of educational careers in the OECD countries. Although the Czech Republic declares only the age of selection for multi-year gymnasias (not language or special schools or schools for talented students), it is placed among the countries with the lowest age of the first selection.

5 In the PISA 2006 survey, 21 % headmasters of schools educating 15-year-old students stated that the students' place of residence was an important factor in their admittance decisions. This number placed the Czech Republic among the ten OECD countries in which the student's place of residence plays the least important role in the admittance procedure.

Table 2: The Age of First Separation of Students into Tracks⁶

Country	Age of the first selection
Austria, Germany	10
Czech Republic, Slovak Republic, Hungary, Turkey	11
Mexico, Belgium, Netherlands, Switzerland	12
Luxemburg	13
Italy, Korea	14
Greece, Portugal, France, Ireland, Japan, Poland	15
Norway, Australia, Canada, Denmark, Finland, Iceland, New Zealand, Spain, Sweden, Great Britain, United States	16

Source: OECD (2006).

4. Data and Methods

Data from OECD PISA and IEA TIMSS surveys, the only available sources with continuous information about the performance of the Czech education system,⁷ were used to answer the question of the trends in differentiation of the educational achievement. The PISA study assesses student achievement in the domains of reading, mathematics, and science of 15-year-old students in three-year intervals and provides a number of contextual variables. For the analysis, scores characterising the level of reading literacy⁸ and the index of social, cultural, and economic status⁹ from 2000, 2003 and 2006 were used. Students attending ninth and tenth grade were included in the analysis. The TIMSS research provides information about fourth and eighth grade students' achievement in mathematics and science in a long-term period (the first survey was conducted in 1995, the last one in 2007). However, the study provides only a limited description of the family background of individual students; TIMSS research results were therefore used only as supplemental information.

The development of the differences is documented by mostly descriptive statistics; multi-level models are then used to verify the findings resulting from

6 Values for Switzerland and Germany can differ between different Cantons, or Federal States.

7 Unfortunately, there are no national surveys available in the Czech Republic capable of replacing or complementing international surveys. National assessments are carried out in schools willingly participating in the surveys and are not representative of the system. No longitudinal surveys for compulsory education are available that would follow the students and allow for proper determination of their progress in different tracks.

8 Scores of reading literacy are presented on the same scale in all three cycles of PISA and therefore allow direct comparison of results in each cycle.

9 The index included the following variables: the highest index of the professional status of the parents (ISEI), the highest education of the parents, economic family situation (family possessions), the availability of educational resources, and cultural possessions.

these descriptive statistics. The multi-level modelling method was used because of the methodology of the sample selection. First, schools from the database of all schools attended by 15-year-old students were randomly selected, followed by another random selection of 15-year-old students from these schools. It is not, therefore, an entirely random sample. Multi-level modelling allows for a separation of school-level characteristics (common to all students in the given school) and student-level characteristics, specific for each student.

5. Results

Differentiation of Student Achievement in Individual Schools and Tracks

Table 3 provides the intra-class correlation coefficients for mathematics scores (*mat*) for students in fourth and eighth grades in 1995, 1999 and 2007 (the TIMSS survey) and reading scores (*read*) as well as an index of economic, social, and cultural status (*escs*) for students in the ninth and tenth grades¹⁰ in 2000, 2003 and 2006 (the PISA survey). The table clearly indicates that in the monitored period the differences at the level of primary education between individual schools remained almost unchanged while the intra-class correlation coefficients among the students of higher grades students rose not only for test results but also for the index of their economic, social, and cultural status.¹¹ This means that increased tracking in primary schools (classes for talented students, entrance exams into first grade) so far has not had a great impact on the homogeneity of primary education with respect to student achievement. At the lower secondary level and, in particular, at the upper secondary level, there is progressively a greater differentiation between schools with good and bad students and between those attended by students from educated and well-off families and those that are not.¹²

10 The Czech PISA sample included 50 % of grade 9 students and 50 % of grade 10 students. At the same time, the Czech Republic oversampled grade 9 students to create a grade-based sample. The comparison of both samples confirmed that grade 9 and grade 10 subsamples well represent the specific grades.

11 This information is not collected for students of primary education, as it is presumed here that these students are not able to provide reliable information about their parents' education and occupation.

12 The intra-class correlation coefficient growth in the case of the index of economic, social, and cultural status is all the more important as between 2000 and 2006, there was a statistically significant decrease in its dispersion (the population is becoming more homogeneous in the aspects measured by this index and the differences in the background measured by this index are decreasing in the population). The standard deviation of the index was 0.84 (0.013) in 2000 and 0.76 (0.009) in 2006 (standard errors in parentheses).

Table 3: The Intra-class Correlation Coefficients for Mathematics or Reading Scores and the ESCS Index (Source: TIMSS and PISA Data)

		1995	1999/2000	2003	2006/2007
Grade 4	ξ2 (mat)	0. 22			0. 22
Grade 8	ξ2 (mat)	0. 23	0. 36		0. 40
Grade 9	ξ2 (read)		0. 34	0. 46	0. 42
	ξ2 (escs)		0. 22	0. 24	0. 24
Grade 10	ξ2 (read)		0. 58	0. 60	0. 71
	ξ2 (escs)		0. 26	0. 35	0. 29

Source: TIMSS 1995, TIMSS 1999, TIMSS 2007, PISA 2000, PISA 2003, PISA 2006.

As mentioned in the introduction, studies from US and UK show that growing differentiation of the system is not accompanied by lower average achievement, but that differentiation has a negative impact on low-performing students in lower tracks. The following Table 4 shows the development of the average achievement of Czech students and the students of individual tracks in the monitored period.

Table 4 shows reading scores of students in individual tracks in secondary education in 2000 and 2006. Tracks that underwent statistically significant changes in the monitored period are set in bold. The last two columns show the average standardized values for the index of economic, social and cultural status for students of the individual tracks in both years.

The table shows that although the general test results in reading literacy of Czech 15-year-old students have not significantly changed in the monitored period, there was a statistically significant decrease among basic school students and students attending the vocational track. On the other hand, results of the students of multi-year gymnasia improved significantly.¹³ Lower achievement of students in vocational tracks can be ascribed to the fact that these tracks are attended by gradually fewer students, and that students with good study abilities leave increasingly for the technical track leading to the school-leaving *maturita* examination.¹⁴ However, this argument does not hold for basic schools, as the proportions of students staying at basic school and leaving for multi-year gymnasia did not change (see Table 1). Lower achievement of basic school students is confirmed by both PISA and TIMSS assessments.¹⁵ In TIMSS, a statistically significant decrease of overall mathematics achievement was observed, this decrease was, however, caused mainly by deteriorating achievement of basic school students; multi-year gymnasia students and students in schools and classrooms “with extended curriculum” showed no statistically significant decrease.

13 Statistically significant differences are in bold.

14 Between 2000 and 2006 the percentage of students in tracks leading to leaving *maturita* examination rose from 64 % to 74 %.

15 Comparison was made only between 1999 and 2007 for the TIMSS research. In 1996, primary school was extended by one year and, following this change, curriculum spread was changed. It is not possible to distinguish between the impact of the extension of primary school and the complementary change in curriculum spread and other influences that may have caused a decrease in mean achievement results between 1995 and 1999.

The last column clearly shows that there are significant differences in student composition between individual tracks. These differences grew between 2000 and 2006.

Table 4: Student Achievement in Individual Tracks Attended by 15-year-old Students (Source: PISA Data)

Track	Reading				ESCS			
	2000	(se)	2006	(se)	2000	(se)	2006	(se)
Basic school	473.8	(3.8)	456.9	(4.3)	-0.09	(0.05)	-0.15	(0.03)
Multi-year gymnasium	582.2	(5.6)	608.9	(3.9)	0.72	(0.04)	0.89	(0.05)
Four year gymnasium	592.3	(4.8)	602.6	(11.0)	0.52	(0.06)	0.67	(0.11)
Technical studies (with maturita)	525.2	(3.4)	522.4	(4.9)	-0.03	(0.05)	-0.02	(0.05)
Vocational studies (without maturita)	435.6	(4.4)	386.2	(12.1)	-0.47	(0.05)	-0.42	(0.05)
Special school	267.6	(10.6)	314.1	(21.5)	na		na	
Czech Republic total	491.6	(2.4)	482.7	(4.2)	0.0		0.0	

Source: PISA 2000, PISA 2006.

International comparative surveys of knowledge and skills of students in compulsory education show an increase in the differences in achievement between students of different tracks. While the results of multi-year gymnasiums are gradually slightly increasing, low tracks on the level of both compulsory (common basic schools) and upper secondary education (vocational track) show a statistically significant decrease. Together with the growing differences between schools and tracks, the differences between individual students are also growing – the standard deviation of the reading scores rose from 96 (*SE* 1.9) in 2000 to 111 (*SE* 2.9) in 2006. All of this shows that since 2000 there has been a significant increase in variation of achievement in the Czech education system. These results prove the first part of the hypothesis formulated above.

Students Negatively Affected by Differentiation of the System

As mentioned above, surveys in English-speaking countries showed that the differentiation of educational careers has the greatest impact on students attending “residual” schools or classrooms or schools for students with low academic abilities. It is interesting to compare this to the Czech education system to see which students are at risk. In the PISA survey, proficiency levels were defined for each category monitored. On each level, students were required to show certain clearly defined knowledge and skills in the given domain. Knowledge and skills on level 2 were defined as the basic minimum for further education and the ability to solve everyday problems. It is important to find out which students are considered to be at risk based on these criteria. Table 5 shows the percentage of students at each proficien-

cy level in reading. It is clear that the percentage of students at the highest level of capability increases and, at the same time, there is a significant increase in the percentage of students not achieving the minimum of the second level. Although the average achievement of Czech students did not show a statistically significant decrease between 2000 and 2006, there are significantly more students at the first two levels. In other words, there is an increase in the number of students at risk of failure on the labour market and in everyday life due to their low reading literacy.

Table 5: The Percentage of Students at Each Proficiency Level in Reading
(Source: PISA Data)

	Reading literacy		ESCS
	2000	2006	
Below level 1	6 (0.6)	10 (1.1)	-0.43
Level 1	11 (0.7)	15 (0.9)	-0.25
Level 2	25 (1.2)	22 (1.0)	-0.10
Level 3	31 (1.1)	25 (0.9)	0.07
Level 4	20 (0.8)	19 (1.0)	0.29
Level 5	7 (0.6)	9 (0.8)	0.63

Source: PISA 2000, PISA 2006.

Among the students failing to reach the second proficiency level for reading literacy are 30 % of students in the final grades of basic schools, 60 % of students in the vocational track, and 85 % of students in special schools. Only 6 % of students in the technical track fell into this category, and no students attending gymnasia are in this group. Some characteristics of these failing students, in comparison to their more successful schoolmates, are shown in Table 6.

The analysis of the PISA trend results supports findings from foreign surveys and international surveys. Even though growing differentiation has not led to a statistically significant decrease of average achievement so far, it negatively impacts on students who are weakest academically and, at the same time, come from family backgrounds with a low economic, social, and cultural status.¹⁶

¹⁶ The data available from international comparative studies do not allow for estimation of the proportion of Roma and minority students in groups at risk. No information on ethnicity was collected in the Czech Republic, it is thus impossible to compare the results of Roma children with the results of children from the majority population. In recent years, there have been, however, several surveys of educational careers of Roma children that showed that Roma children are overrepresented in special schools and are at serious risk of dropping out of school before finishing secondary education. Immigrant children have constituted so far only a small percentage of Czech students. Their proportion is, however, continually increasing.

Table 6: Students with an Inadequate Level of Reading Literacy (Source: PISA Data)

	Level 0,1	Level 2-5
At school I feel like an outsider	27.3	12.1
At school I feel lonely	21.7	9.4
I do not want to go to school	38.2	22.7
I use a computer daily	62.8	74.9
I use a computer to find information	86.9	96.9
At least one parent with tertiary education	12.4	54.4
Index ESCS	-0.313	0.138

Source: PISA 2006.

Differentiation of Conditions for Learning

The multi-level modelling method was used to confirm the hypothesis that there is an ongoing differentiation of the system and that the performance of students in individual tracks is increasingly influenced by uneven conditions for learning as well.

Table 7 shows the parameters of multi-level models of the dependence of the reading-literacy scores¹⁷ on chosen factors at the student and school levels.¹⁸

The first model attempts to estimate the impact of the socio-economic background and attended track on student achievement. This model explains student achievement by an index of economic, social, and cultural status (*escs*) at the level of both student and school (*escs_school*), characterising thus the family background of students attending the given school. At the school level, tracks (four-year gymnasias, multi-year gymnasias, technical track, and vocational track) are also included in the model in comparison with basic school. All of these variables have a statistically significant influence on students' achievement. Comparing the models for both periods, we found that in 2006 the differences caused by individual tracks increased significantly (in 2000, the transition between basic school and multi-year gymnasium represented an increase of 74 scale points in the reading-literacy score, in 2006 the increase was 110 scale points; the decrease caused by the transition from basic school to vocational track was 26 scale points in 2000 and 61 scale points in 2006). The increase in score related to one unit increase of the index of economic, social, and cultural status at the school level was comparable in both years, the influence of the *escs* index at the student level decreased slightly. Comparison of the model parameters in 2000 and 2006 confirms the previous

¹⁷ The reading literacy test was used as there are comparable results available since 2000 and because reading literacy is, in the opinion of the author of this paper, the most important part of functional literacy, as it is a necessary condition for further education.

¹⁸ Data from a sample entering the international comparison and consisting of ninth and tenth grade students were used. Models work with tracks on the level of primary and secondary education.

claim that in the last decade there has been a significant increase in differences in achievement of students in different tracks.

Table 7: Parameters of Multi-level Models of Factors Influencing Achievement in the Reading Literacy at the Level of School and Student (Source: PISA Data)

2000	Model 1			Model 2		
	<i>coeff.</i>	<i>se</i>	<i>sig</i>	<i>coeff.</i>	<i>se</i>	<i>sig</i>
intercpt	503.39	1.82	0.00	503.44	1.79	0.00
escs_school	39.67	9.16	0.00	39.63	8.81	0.00
multi-year Gym	74.24	7.40	0.00	71.51	7.71	0.00
four-year Gym	76.69	8.21	0.00	71.78	8.25	0.00
technical	44.26	4.62	0.00	41.84	4.84	0.00
vocational	-26.08	5.57	0.00	-24.72	5.25	0.00
tcshrt				-2.89	3.44	0.40
neg_school				-6.43	6.53	0.33
escs	18.54	1.77	0.00	17.72	1.75	0.00
neg				-7.25	1.30	0.00
2006	Model 1			Model 2		
	<i>coeff.</i>	<i>se</i>	<i>sig</i>	<i>coeff.</i>	<i>se</i>	<i>sig</i>
intercpt	507.97	2.94	0.00	508.32	2.75	0.00
escs_school	37.31	15.30	0.00	41.26	12.01	0.00
multi-year Gym	110.79	12.93	0.00	98.32	13.80	0.00
four-year Gym	116.20	12.93	0.00	96.85	11.56	0.00
technical	58.77	8.40	0.00	49.65	8.35	0.00
vocational	-61.09	13.27	0.00	-54.85	13.12	0.00
tcshrt				-6.90	4.50	0.10
neg_school				-37.97	12.67	0.00
escs	12.17		0.00	11.87	1.99	0.00
neg				-5.76	1.63	0.00

Note. Each model explains more than 90 % of the variance at the school level.
Source: PISA 2000, PISA 2006.

In an attempt to find the causes of the large and growing differences between the test scores of students in different schools, variables characterising conditions for learning were included in the models. Unfortunately, there were few variables in the PISA 2006 useful for this purpose.¹⁹ Variables characterising a negative attitude towards school (*neg²⁰*), entering the model at the level of both student and school (*neg_school* – as an indicator of learning climate), were used. The interna-

19 The PISA 2006 student questionnaire focused on the students' attitude towards science and environmental issues.

20 The *neg* variable is a factored score of the percentage of agreement with the following statements: school is a place a) where I feel like an outsider, b) where I feel awkward and inappropriate, c) where I feel lonely, d) I don't want to go to.

tional data file composite variable *tcsprt*, providing information about the lack of good quality teachers and other staff in the headmasters' view, was used as another characteristic of the conditions at school level. The results clearly show that in both periods, a negative attitude towards school has an impact on student achievement at the individual level. In 2006, it significantly influenced the aggregated level as well. This supports the hypothesis that education in individual schools is gradually more influenced by the learning climate. Since 2000, the importance of the *tcsprt* variable has also increased. Although in 2000 the influence of the lack of teachers was statistically insignificant, in 2006 it was already bordering on statistical significance. This finding indicates that the students' achievements in individual schools are to an increasing degree influenced by the staff quality and the learning climate, in which conditions in each school vary greatly. The analysis confirmed the second part of the above-stated hypothesis.

6. Conclusions

Analysis of the data from international achievement surveys between 1995 and 2007 showed an increase in differences in achievement of individual students, schools, and tracks at the level of lower- and upper-secondary education in the monitored period. At the level of primary education, the situation remained unchanged. At the same time, schools are increasingly differentiating by learning climate; some schools are attended by students with positive attitudes towards school and education, while others are attended by students whose attitudes towards school are negative. The difference in the teaching staff quality is also beginning to play a bigger role. The analyses supported the hypothesis that in the Czech education system there is a growing difference in the achievement of students in individual schools and tracks and in the conditions for learning in individual schools.

Growing differences between schools are probably supported by the ongoing curricular reform, which led many schools to offer specialised curricula to attract parents looking for high-quality education for their children. At a time of population decline, the competition over students is exceptionally intense. At the same time, parents are urged by the media and educational specialists to choose their children's school carefully, to visit the classes, and to talk to the teachers or the headmaster that will educate their children. In many families, especially in educated and well-off families living in cities, the choice of a school for their children therefore becomes an important choice in life. Parents pay much attention to this and the strategy of offering special curricula "for talented children", bilingual Czech-English courses, and others is a means to attract better students with motivated parents, meaning more financial resources.

This is a new situation for the Czech education system. During the communist rule, children could apply for schools with extended curricula and slow learners were diverted into special schools with reduced curricula. Otherwise there was no free choice of school at the compulsory level. Children were distributed to schools

according to their catchment areas. Since 1989 the situation has changed dramatically. The system is based implicitly on competition between schools, not on the attempt to reach a state in which all the schools will provide high quality education and the choice of school will not have consequences on the children's education.

Parents who are motivated to provide their children with a good education and who are well-informed about the education system, choose their children's school carefully. Residual schools and classrooms are attended by less motivated students, whose parents are not able to help with study requirements. Their achievement is deteriorating. This is supported by the findings of various studies, showing decrease in the achievement of students with the least favourable family background in lower tracks. Studies conducted in the Czech Republic support the findings of foreign research and international comparisons, according to which growing differentiation is harmful for the weakest students.

International survey data support the hypothesis that even though, according to the Czech statistical yearbook, the education system appears stable, there is an increasing differentiation within the system and, consequently, of student achievement in higher and lower tracks. Cross sectional studies, however, are not an ideal source for studying the impact of tracking. The findings should be confirmed by other data. The most valuable source of information would be a longitudinal survey that would compare the achievement of students prior to the selection and during their study in different tracks. At the same time, a monitoring of the educational system that would document the number of schools/classes for talented students, specialised educational offers (e. g. bilingual education), the frequency of entrance examinations into the first grade of compulsory school or the mechanisms of the school choice would be helpful.

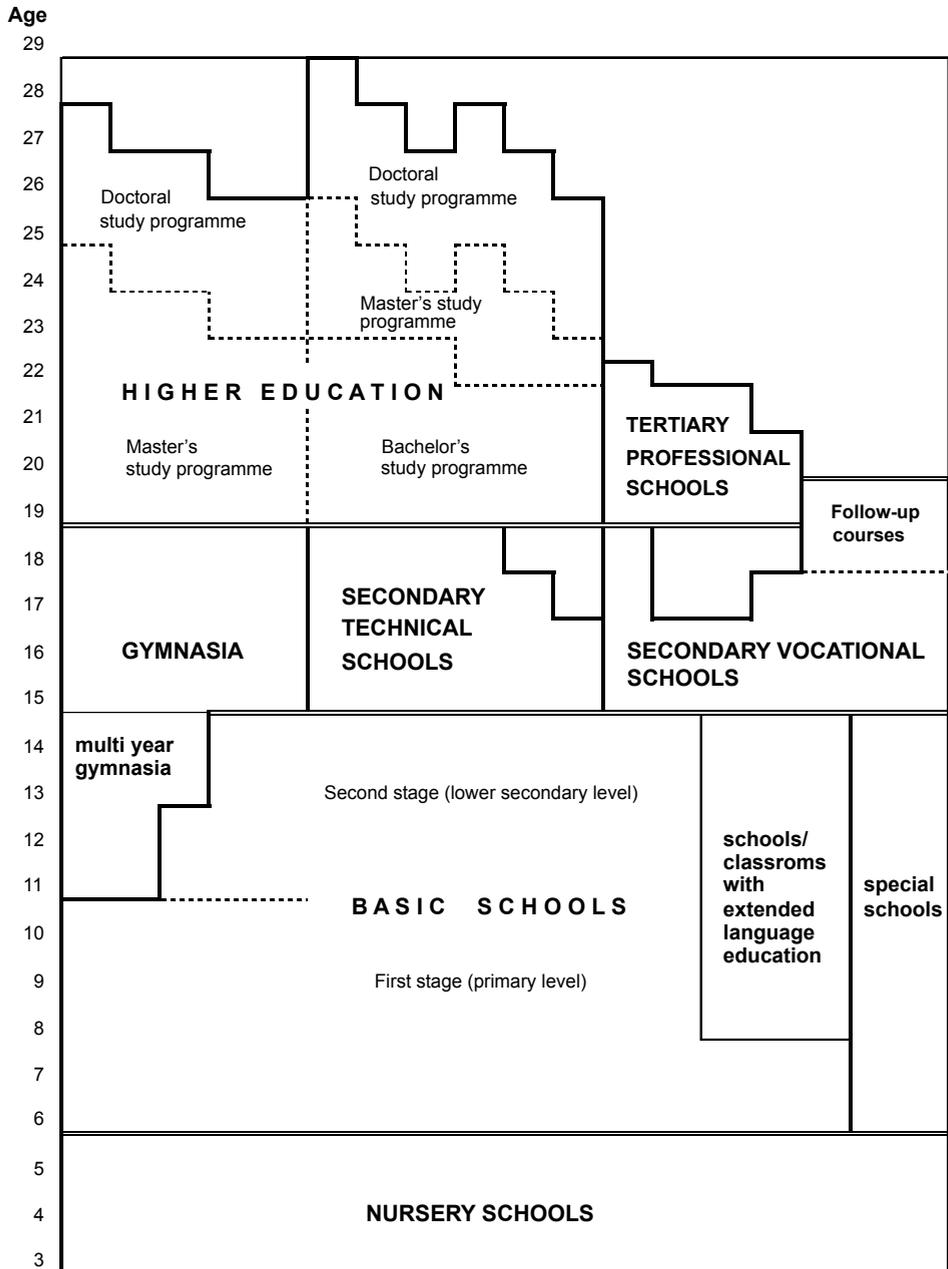
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Appendix A

Structure of the Education System of the Czech Republic



Appendix B

Variables Used in Multilevel Models

2000					
	<i>N</i>	Minimum	Maximum	Mean	<i>SD</i>
<i>Individ. Level</i>					
escs	109141	-3.7	2.4	-0.03	0.78
pv1read	109141	214	780	506	84.3
pv2read	109141	204	805	506	84.1
pv3read	109141	204	804	506	84.3
pv4read	109141	120	789	507	84.1
pv5read	109141	158	795	506	84.6
neg	109141	-1.8	4.2	0.00	1.00
<i>School Level</i>					
neg_school	220	-0.9	0.9	-0.02	0.34
escs	229	-1.9	1.1	-0.11	0.47
tcsprt	210	-1.0	1.6	-0.53	0.60
multi-year GYM	229	0	1	0.10	0.31
four-year GYM	229	0	1	0.10	0.30
vocational	229	0	1	0.18	0.39
technical	229	0	1	0.20	0.40
2006					
	<i>N</i>	Minimum	Maximum	Mean	<i>SD</i>
<i>Individ. Level</i>					
escs	117278	-3.9	2.4	0.08	0.74
pv1read	117278	153	834	493	104.4
pv2read	117278	110	830	493	104.9
pv3read	117278	120	845	493	104.5
pv4read	117278	93	867	493	104.9
pv5read	117278	132	820	492	106.0
neg	117278	-2.9	8.2	0.00	1.00
<i>School Level</i>					
neg_school	233	-1.0	1.2	-0.04	0.23
escs	233	-0.8	1.1	0.15	0.42
tcsprt	220	-1.1	2.8	0.04	0.74
multi-year GYM	233	0	1	0.23	0.42
four-year GYM	233	0	1	0.05	0.22
vocational	233	0	1	0.20	0.40
technical	233	0	1	0.08	0.27