# TRANSITION TO SECONDARY SCHOOL

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# Transition to secondary school in Europe

The purpose of the report is to analyze existing data on secondary school transition in the EU-25 and to identify informational gaps on them. First, a secondary analysis from existing datasets on participation and performance in secondary school across Europe was carried out. Secondly, a secondary analysis was carried out at the state level allowing for a comparative analysis between the EU-25 and at the EU level. Thirdly, a critical analysis was conducted in order to identify the information gaps in existing databases.

The basic idea of the analysis was not to study which counties are the best according to PISA tests. Rather, the basic idea has been to study the variance of the results within European Union. Firstly, one key element suggesting the possible element of segregation is the student differences in each country. The second possible element is differences between male and female students. The third indicator or exclusion in this study is the school differences in student performances. The factors connected with these three factors can for example be big differences in student performances, student's background, socio-economic status, students' disruptive behaviour, students' differing interests from academic achievement, different moral development or students not committing to legitimate school work.

## 1. Introduction

Indicators of primary completion help to estimate the number of children who can potentially enter lower secondary education, whereas the transition rate to secondary education indicates how many of them actually enter. This rate is the percentage of children enrolled in the last grade of primary education in one year and continuing their studies at lower secondary in the following year. For the vast majority of countries in the world, almost all students who reach the end of primary education continue their studies at the lower secondary level. In Europe, all countries except Andorra, Malta and the Russian Federation report transition rates above 95%. In EU, Bulgaria and Estonia have the lowest ratio of transition with 96%. The high rates of transition from primary to lower secondary education in most countries signify that the end of primary education is not the most common exit point from the education system. At the upper secondary level, the global gross enrolment ratios stand at only 51. Europe is again an exception, with enrolment rates exceeding 100 %, due to young people rolling in multiple programs. (UNESCO 2005, pp. 80-83.)

Because in Europe practically all students transit from primary school to secondary school, the trends of exclusion can not be identified by numbers at the time of transition. Nevertheless, what happens in secondary school is largely the result of what has happened or what is happening in primary education. The segregate indicators of the secondary school studied next have their roots often in the early development.

## 2. Methodology and sources used

The research question is: Which are the secondary school segregate outcomes in the EU-25 and which additional data would be necessary to be collected in the future? The methodology is secondary analysis across public databases. The main sources for the analysis have been UNESCO'S *Global Education Digest 2005* and *Pisa* student assessment (OECD2004; Kupari, Linnakylä, Reinikainen, Brunell, Leino, Sulkunen, Törnroos, Malin and Puhakka 2004). The data from the databases and reports has been transferred to SPSS and processed to find averages, deviations, correlations and groups.

*Global Education Digest 2005* can be found at http://www.uis.unesco.org/ev.php?ID=6086_201&ID2=DO_TOPIC. It presents a wide range of comparable education indicators. The digest provides data for the 2002/03 school year or the latest year available. Data for 1998 for a subset of indicators are also presented which allows for comparisons over time. It provides measures e.g. on gender participation, progress and completion of the secondary school. It includes different indicators on participating and graduating in secondary school and information in breakdowns and vocational technical secondary education. Comparative data could not be found of Poland and Greece, which are thus omitted from the analysis.

Pisa (OECD Programme for international Student Assesment) home page is at http://www.oecd.org/pages/0,2966,en_32252351_32235731_1_1_1_1_1,00.html . PISA is a three-yearly survey (2000, 2003, 2006...) of 15-year-olds in the principal industrialised countries concentrating on the outcomes of the secondary school. It assesses how far students near the end of compulsory education have acquired some of the knowledge and skills that are essential for full participation in society. Comparisons can be made in two ways: Firstly, children's differences inside each country, in other word children' differences from each other, which is one indication of exclusion. Secondly, the countries' differentiate from each other in their educational outcomes.

Bulgaria, Estonia, Lithuania, Romania, Slovenia and United Kingdom did not take part in the 2003 Pisa test and these countries are thus omitted from the analysis.

## 3. Main trends in secondary school system in Europe.

The entrance age for children to the secondary school varies in Europe from ten to thirteen years of age, the average entrance age being 11.5 years. The duration of secondary school varies from five to nine years and the average duration is seven years. (UNESCO 2005, 80-83.)

Almost every child enrols both in lower and upper secondary schools in Europe. Most of the students enrol on the general programmes of secondary education. This type of programme is designed mainly to lead pupils to a deeper understanding about a subject or group of subjects, especially, but not necessarily, with a view to preparing pupils for further education at the same or a higher level. These programmes are typically school-based and may or may not contain vocational elements. The successful completion of these programmes may or may not lead to an academic qualification. However, they do not typically allow successful completers to enter a particular occupation or trade or class of occupations or trades without further training. (UNESCO 2005.)

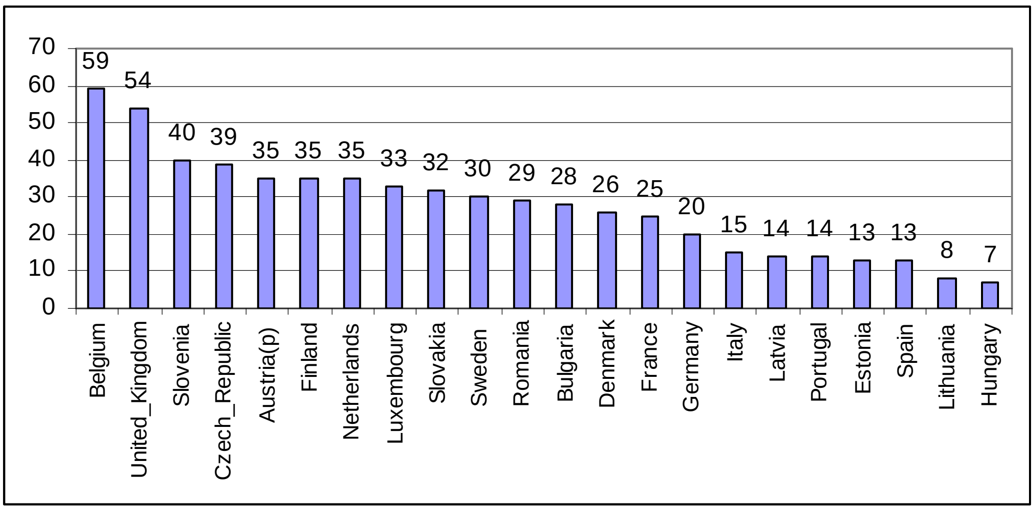


**Figure 1. Enrolment in technical and vocational programmes (percent of all secondary school enrolment)**

Technical and vocational secondary schools are designed mainly to lead pupils to acquire the practical skills, know-how and understanding necessary for employment in a particular occupation or trades. The enrolment in technical and vocational programmes varies considerably across

Europe. The minimum is in Hungary (7% of the students) and the maximum in Belgium (59% of the students). Irish statistics was not applicable. (UNESCO 2005, pp. 80-83.)

## *3.1. Gender*

Globally gender parity on entry to lower secondary has been reached in 60 out of 133 countries reporting data. In the remainder, gender differences are not exclusively in favour of boys though girls are still disadvantaged in far more countries than boys. However, globally in 27 countries boys are less likely than girls to enter lower secondary education, whereas the opposite is true in 46 countries. (UNESCO 2005, pp. 26.)

On the whole, there are no big differences among girls' and boys' enrolment ratio in Europe. The percent of girls' enrolment varies from 47% to 54% across Europe the average European percent being 49.7%. The enrolment ratio is in favour of girls for both lower (1.08) and upper secondary (1,07) schools. The total enrolment of girls has increased from 110% in 1999 to 115% in 2003, which means that girls roll in to multiple programs more. The percentage of repeaters is lower for girls (1.91%) than it is for boys (2.64%). (UNESCO 2005, pp. 80-83.)

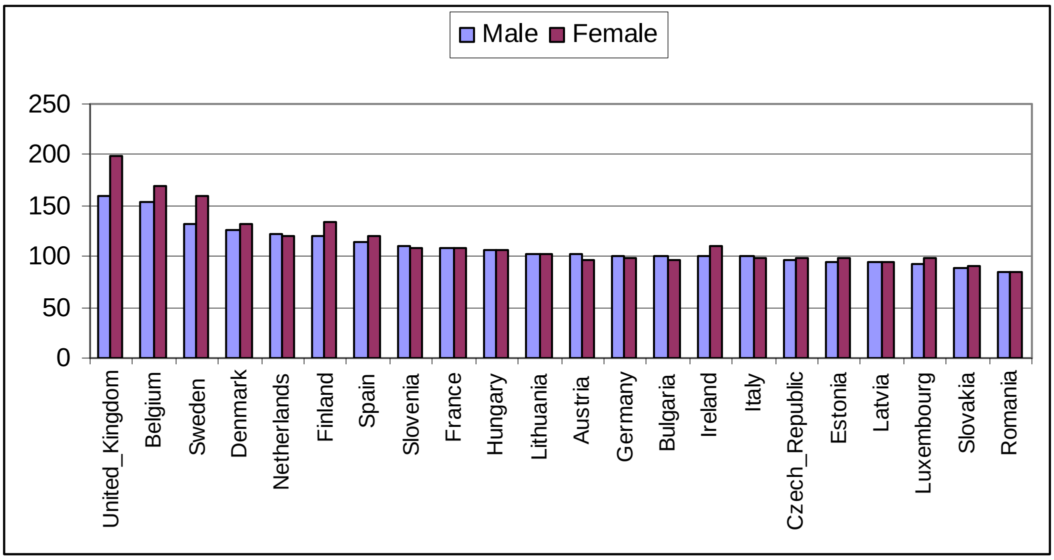


**Figure 2. Gross enrolment ratios for males and females**

The gross enrolment ratio varies noticeably in European countries. The biggest enrolment ratios are in United Kingdom (1.78) and Belgium (1.61). The smallest enrolment ratios are in Romania (0.85) and Slovakia (0.89). (UNESCO 2005, 80-83.) As can be seen in the Figure 2, male and female enrolments tend to increase or decrease in similar fashion within each country. There are no great differences on the ratio between male and female students in Europe as can be seen in Figure 3.

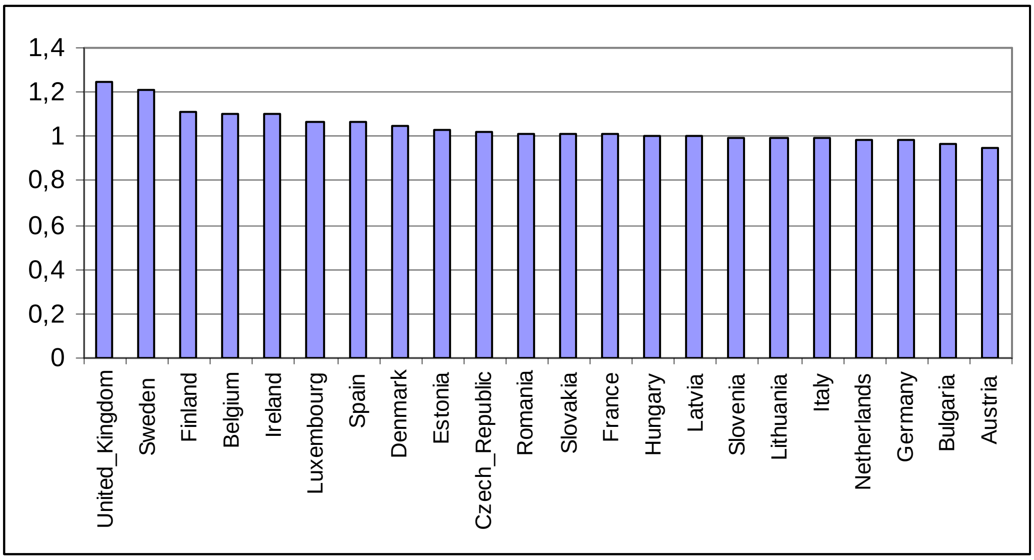


**Figure 3. The ratio between males and females in gross secondary school enrolment**

In United Kingdom and Sweden the ratio between boys and girls is the largest, girls attending more than 20% more to secondary schools than boys. In Austria girls attended secondary schools 5% less than boys and in Romania 3% less than boys. In general the ratio is a little bit in favour of girls (104). (UNESCO 2005, 80-83.) Although there are no big differences in quantity of boys and girls, they differ substantially on their performance, as can be seen in Figure 4, which describes girls' and boys' differences in PISA mathematics test scores.

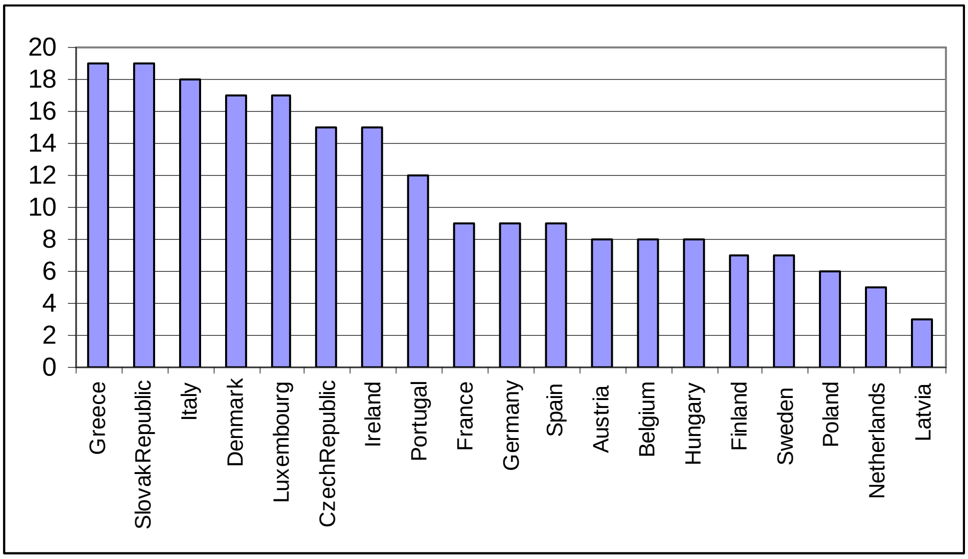


**Figure 4. Gender differences in student performance in PISA mathematic test scores (all differences are in favour of boys)**

In every country in European Union girls' average in student performance was lower than boys' in mathematics, the average across countries being 5 points in favour of boys (Kupari et.al. 2004, pp. 25). The picture looks totally different though, when we look at the reading test scores in Figure 5.

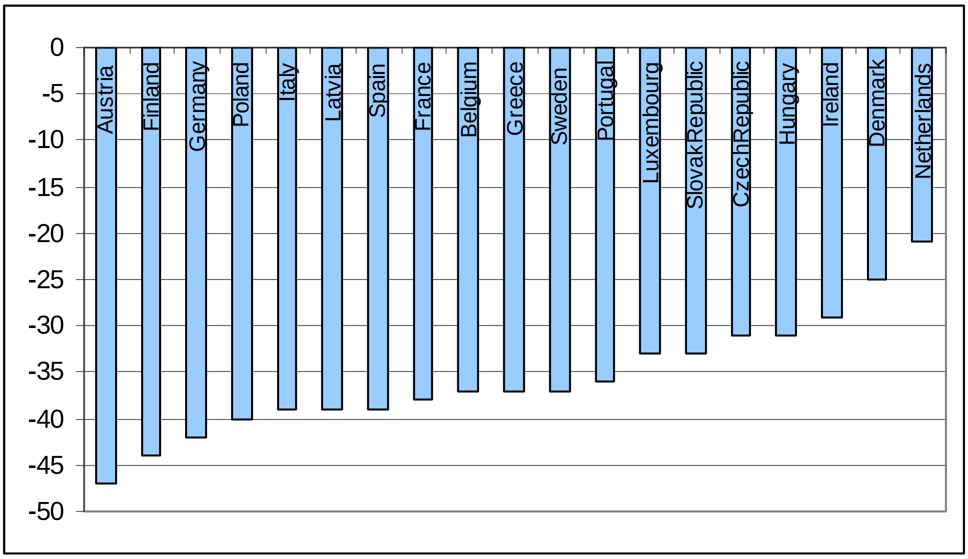


**Figure 5. Gender differences in student performance in PISA reading test scores (minus means that the difference is in favour of girls)**

Gender differences concerning student performance in reading is in favour of girls in every European Union country tested in PISA (Kupari et. al. 2004, pp. 27). Girls' score averages across European Union are in average 35 better than boys'. The differences are the largest in Austria and smallest in Netherlands. In science the gender differences are more mixed. as can be seen in Figure 6.

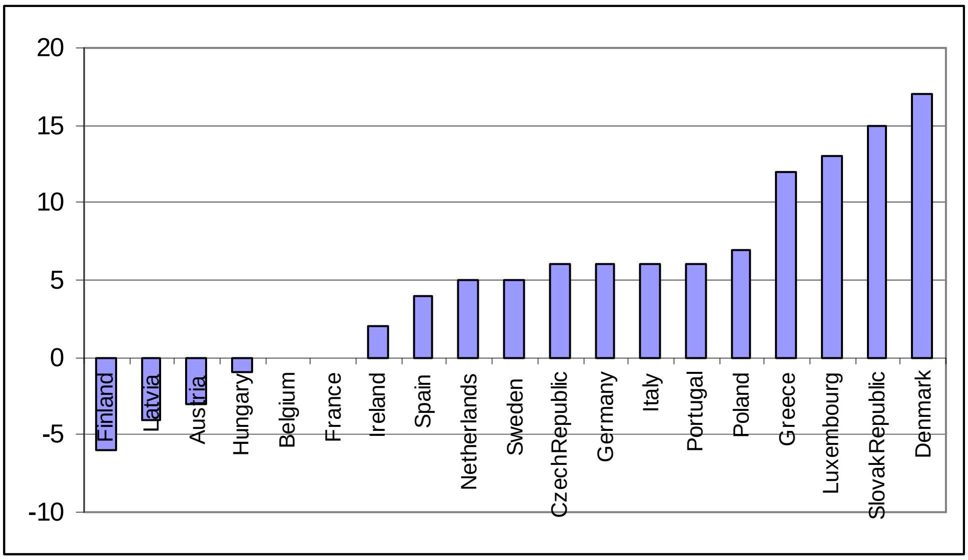


**Figure 6. Gender differences in student performance in PISA science test scores (minus means that the difference is in favour of girls)**

On average boys performance a little better than girls on the PISA science test in the European Union, the average being five points (Kupari et. al. 2004, pp. 27). It is notable that Finland has the largest differences (in favour of girls) while, as we shall see, Finland seems to be one of the least segregate European Union countries on other factors presented by UNESCO (2005) and OECD (2004). It is also interesting that in Denmark the test scores were most in favour of boys. Many times Scandinavian countries tend to be similar in many respects, but for some reason in Denmark all four tests were substantially in favour of boys. The difference should be looked closer. A more comprehensive picture of boys' and girls' differences can be studied when mathematics, reading, problem solving and science test scores are added up. The results of the adding up can be seen Figure 7.

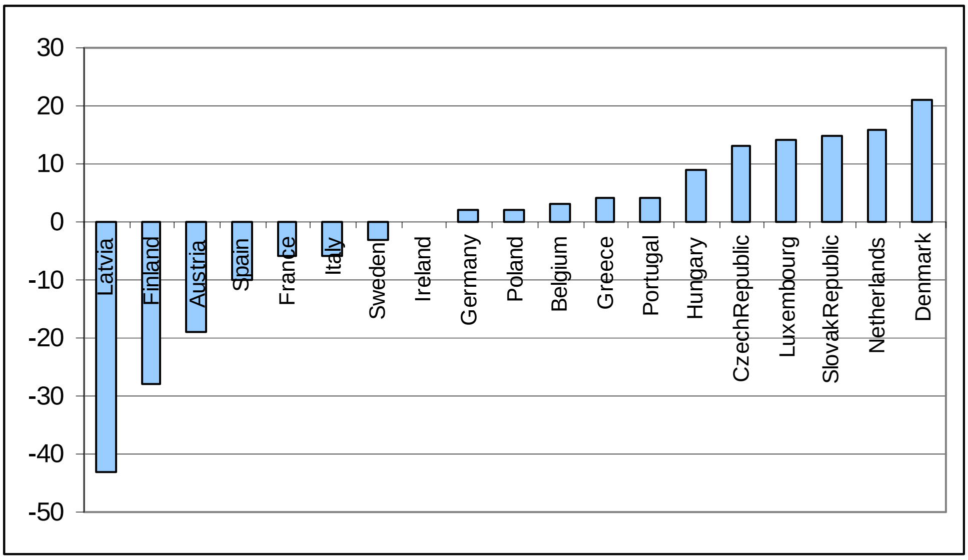


**Figure 7. Gender differences in student performance in total score. Differences in PISA scale scores (minus means that the difference is in favour of girls)**

The total score of the PISA test, when mathematics, reading, science and problem solving are added together is a little bit in the favour of girls, namely 6 points in average (Kupari et. al. 2004). It must be acknowledged that a big amount of the girls advantage comes from the Latvian girls' better performances. All in all, girls' and boys' academic performances are quite equal. Nevertheless, boys often better performances in mathematics and girls' often better performances in reading can result in segregation later in the forms of differing qualifications, interests, role expectations and careers.

### *3.2. Across country comparison*

The segregate aspects of secondary school are not as huge inside the European Union as in comparison to the world-wide comparison. However, the little differences across Europe are still worth investigating. It would be also worth studying the segregate elements in primary schools, as the seeds of exclusion may have their origin in the early developmental stages of self-image, socio-economic standing, ways of interacting and personal orientation in the environment. Primary school is nevertheless out of the scope of this study.

### 3.2.1. Enrolment and repeaters

The enrolment ratio describes the ratio between the total amount of students and the amount of students in different programs. The enrolment ratios for both lower and upper secondary schools can be seen in Figure 5.

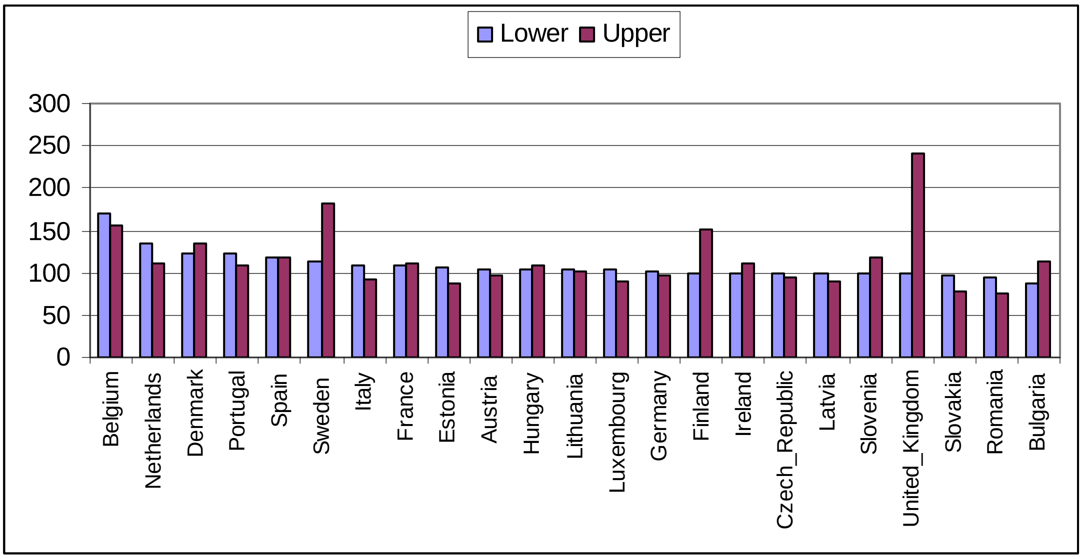


**Figure 8 Enrolment ratios in lower and upper secondary schools**

The countries are in order from the largest to the smallest enrolment ratio in lower secondary school. The figure shows that the biggest enrolment ratio in lower secondary education is in Belgium (1.71) and lowest in Bulgaria (0.87). The enrolments from lower secondary schools to upper secondary schools are not directly related, the biggest enrolment ratio in upper secondary school being in United Kingdom (2.40) and Sweden (1.82) were students enter multiple programs most. (UNESCO 2005.) Although United Kingdom and Sweden look similar in their enrolment, their future development looks very different, as can be seen in Figure 9.

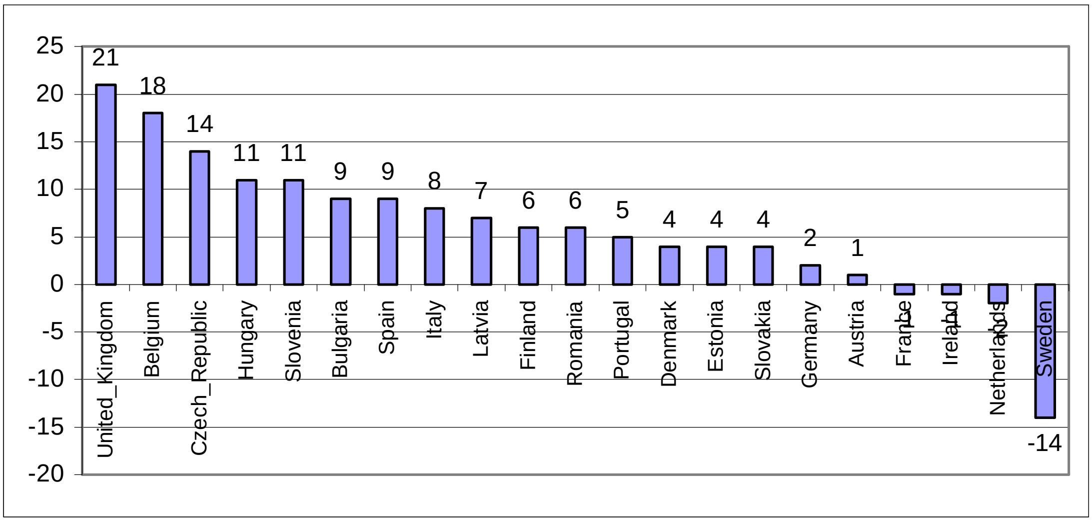


**Figure 9. The change in gross enrolment ratio from 1999 to 2003**

In United Kingdom and Belgium the gross enrolment rate has increased most from 1999 to 2003. In Sweden the gross enrolment rate has decreased most. As the enrolment for these countries is more than 100%, the changes probably concern mostly multiple enrolments. (UNESCO 2005.) In general the enrolment ratios are on the rise. Even in Sweden with the largest diminishing the enrolment ratio is well over 100%. Summing it up, we can say that secondary school itself is not a segregate institution, as almost everybody attends it, many students more than once. The segregate elements lie within and between secondary schools. One aspect that can indicate segregation is the percentage of repeaters, which is presented in Figure 6.

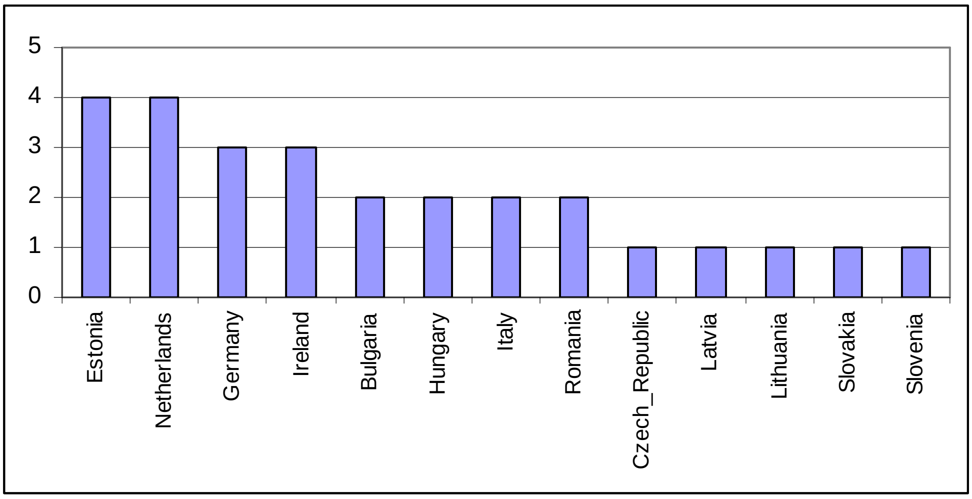


**Figure 10 Percentage of repeaters in secondary school**

The percentage of repeaters is available only half of EU countries. In Estonia and Netherlands the percentages are the highest and in Czech Republic, Latvia, Lithuania, Slovakia and Slovenia the lowest. Nevertheless, as the average percentage of repeating is only 2.01%, repeating a class is not a major issue concerning exclusion in Europe. In Finland for example, instead of repeating a class, different kinds of special education are preferred. The role of special education in general in European secondary schools would be worth studying, as special education is at its best a powerful tool against segregation.

### 3.2.2. Pisa results in the light of exclusion

In PISA-tests students' performance can be compared across countries. This is an indicator of the quality of the educational and cultural system to raise children with good learning results. In the light of exclusion, the differences among student performances are more important. In Figure 11, the relationship between student variance and test scores is presented.

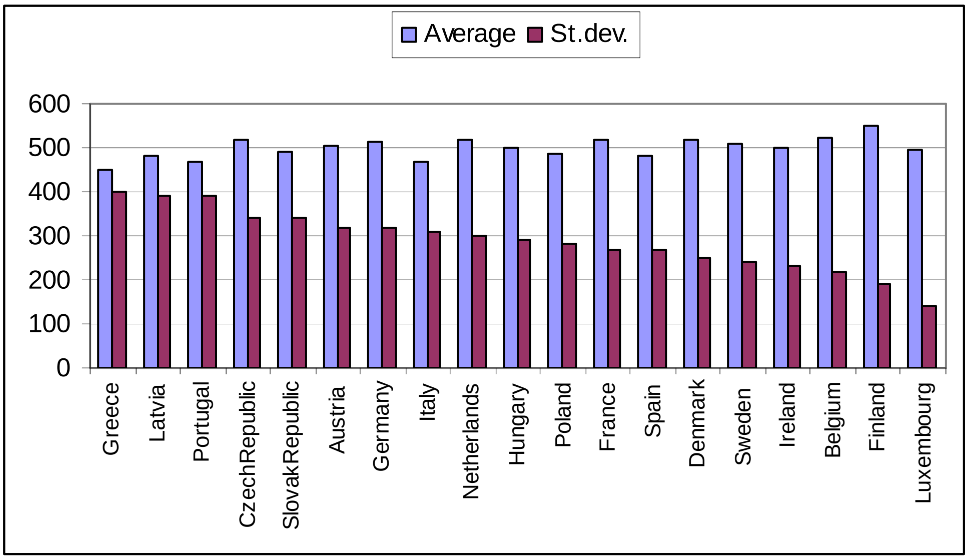


**Figure 11. Standard deviations (multiplied by one hundred) and averages on test scores in problem solving**

The countries are ordered according to the variation between students in each country (Reinikainen 2004, pp. 98). The larger standard deviations are related to smaller averages, the Spearman correlation co-efficient $r_s$ (19) being -.511, p = .026. Greece, Latvia and Poland have the largest differences between students, Luxemburg and Finland the smallest. The mathematic test scores (OECD 2004, 92) resemble the problem solving results, as can be seen in Figure 12.

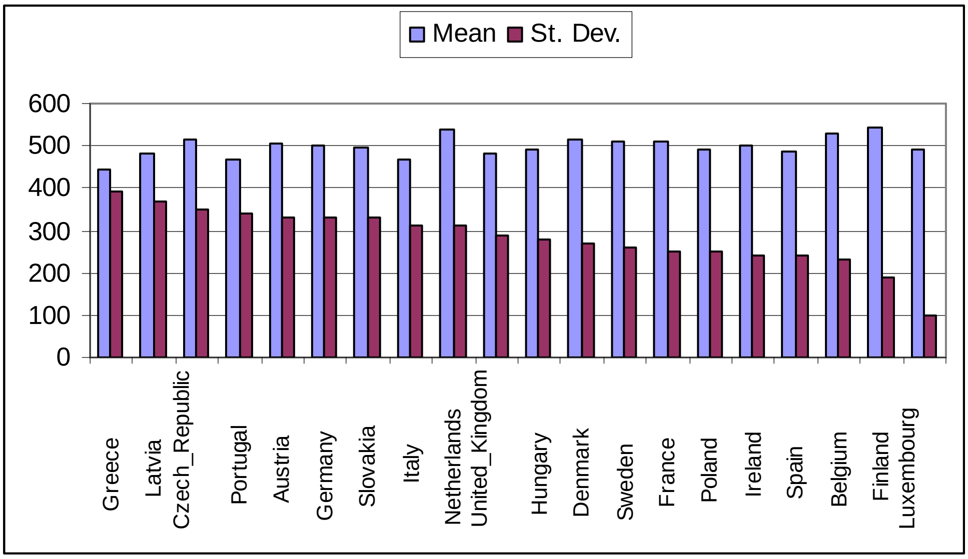


**Figure 12. Standard deviations (multiplied by one hundred) and averages on test scores in mathematics**

The larger standard deviations are again related to smaller averages, $r_s$ (20) = -.387, p = .092, a correlation not statistically significant. The countries in the mathematics test are mostly in the same order as they were in problem solving. The found relationship between test differences and test scores can be seen also in the reading test results, in Figure 13.

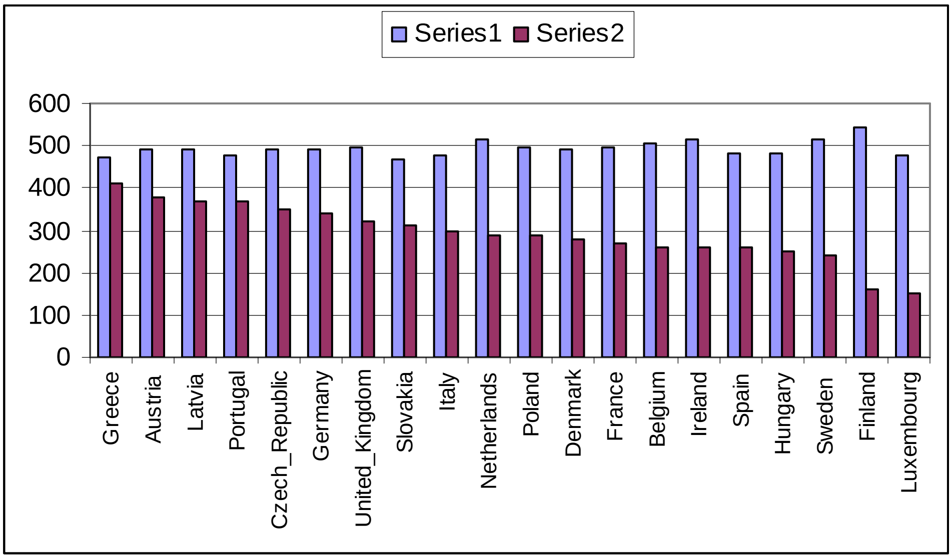


**Figure 13. Standard deviations (multiplied by one hundred) and the test scores in reading**

Larger standard deviation in reading is connected with lower mean with the reading section of the PISA test (OECD 2004, 281), $r_s$ (20) = -.441, p = .052. Again the order of the countries in their test differences is similar as in problem solving and mathematics. The same pattern continues in Figure 14.

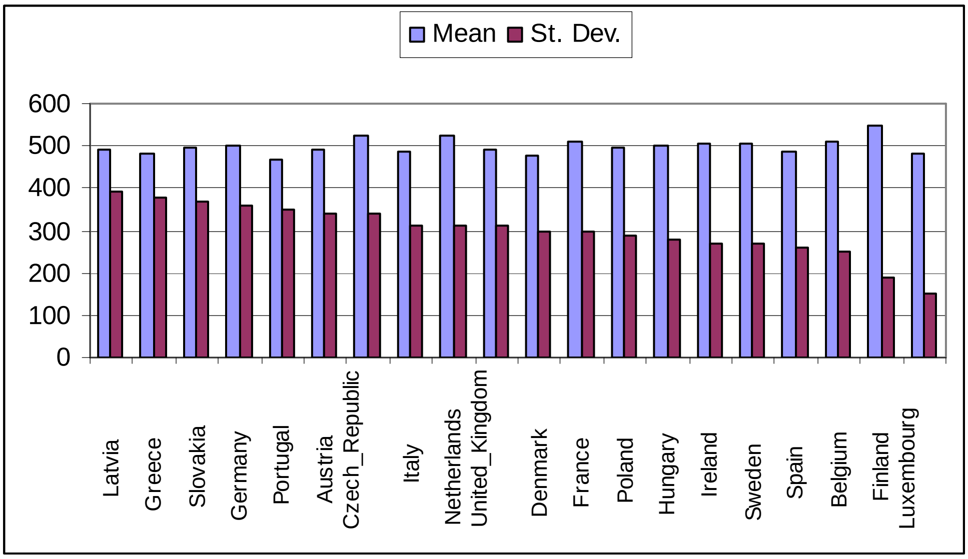


**Figure 14. Standard deviations (multiplied by one hundred) and averages on test scores in science**

In science the relation between test scores' standard deviations and means (OECD 2004, 294) is not statistically significant, $r_s$ (20) = -.300, p = .199. However, again the trend is similar, larger differences mean lower averages. The test variations among students' scores correlate positively across all parts of the PISA test. Some countries seem to produce more student performance differences than others. These tendencies are summed up in Figure 15.

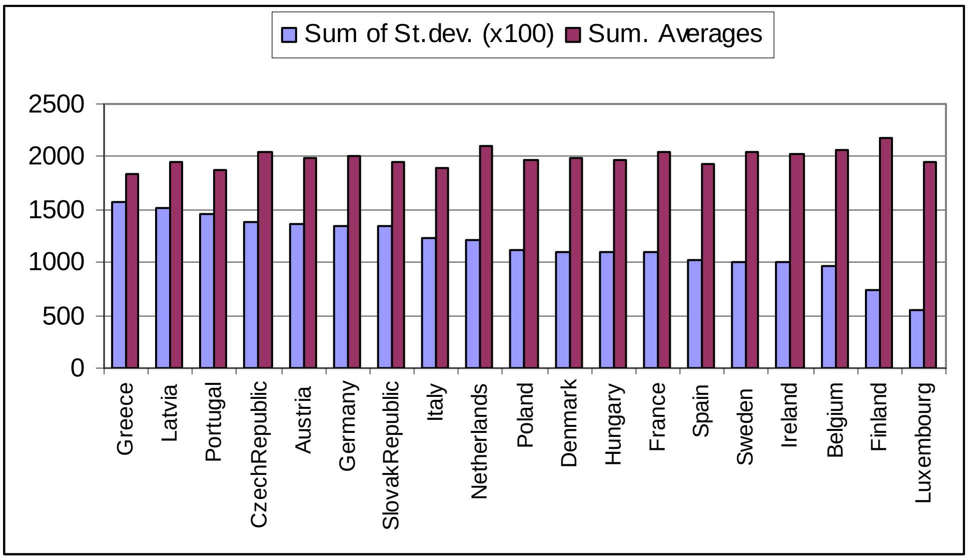


**Figure 15 Problem solving, mathematics, reading and science test averages and variances added up together**

For figure 15 the averages and standard deviations on mathematics, reading, science and problem solving was added up together to form two summary variables. Greece, Latvia and Portugal have a consistently large differentiation in all test scores. Luxembourg and Finland have the smallest test differences. A larger standard deviation in students' performance in PISA-test 2003 is related to lower average of the same test, $r_s$ (19) = -.472, p 0 .041. Thus there seems to be a general tendency for the students to have better test results if the students differ less inside their own country. By lessening segregation among students the overall performance of the country may be increased. This should motivate political actions to keep everyone involved.

### 3.2.3. The within country differences in PISA-results in EU

Variation in student performance within countries can have a variety of causes, including the socio-economic backgrounds of students and schools; the ways in which teaching is organised and delivered in classes; the human and financial resources available to schools; and system-level factors such as curricular differences and organisational policies and practices. (UNESCO 2004 159.)

When we sum up the average standard deviations in mathematics, reading, science and problem solving tests we get an index describing the country's student differences in school performance (cf. Figure 15). We get an indicator which describes the differences between students within a country. Countries with larger differences among student performance are more vulnerable in terms of exclusion. In Figure 16 the relationship between PISA test score variance and the percentage of girls attending secondary school (UNESCO 2004, 80-83) is presented.

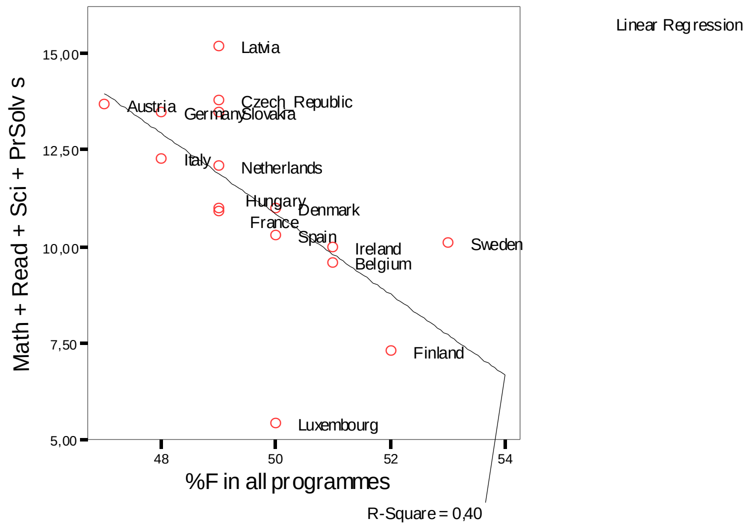


**Figure 16. Children's differences in PISA-test scores and the percentage of females in all secondary school programs**

Perhaps surprisingly there is a strong correlation between test result variance and the percentage of girls attending secondary school, $r_s$ (16) = -.783, p = .000. For some reason the more there are girls attending secondary schools, the smaller the variance between students in that country. This peculiar connection needs more attention as it was the strongest indicator of student differences. The percentage of female students explains 40% of the country differences. The girls seem to have some kind of unifying effect. The reason for this can only be guessed. Could it be that girls relate to less competitive studying? In Figure 17 the differences in the total test scores (cf. Figure 15) are related to the percentage of the female repeaters (UNESCO 2005, pp. 80-84).

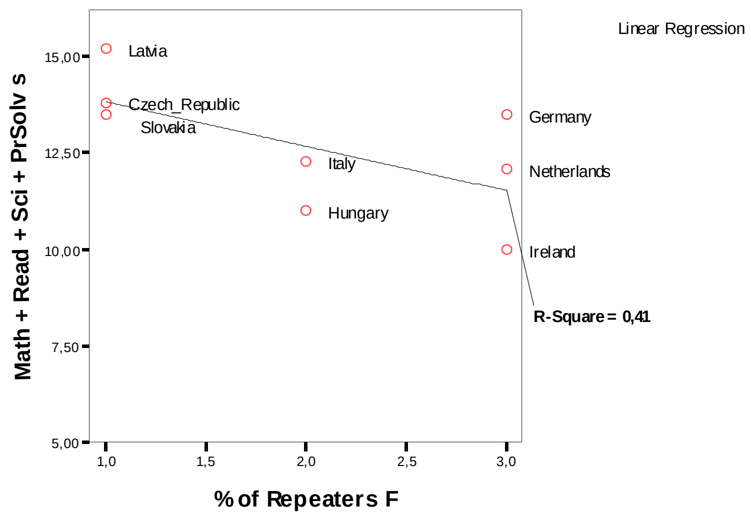


**Figure 17. Children's differences in PISA-test scores and the percentage of female class repeaters in secondary schools**

The percentage among female secondary school class repeaters varies from one to three percent. It is worth noting that in case of 17 EU-countries the percentage of female repeaters was not for some reason available. Nevertheless, there seems to be a strong bond between PISA test scores and the percent of female class repeaters, $r_s(8) = -.756$, $p = .028$. The more the test scores vary among students, the less there are female repeaters. Again there is no direct explanation. One possible explanation is that the connection describes the school system. Perhaps smaller percentage of female repeaters represents a tighter inclusive character of the schools, which results in girls keeping more easily up to general standards. The correlation is congruent with the correlation in Figure 16 indicating that girls are important in unifying school performance. It is also worth noting that the same effect on boys was much smaller, $r_s(9) = -.261$, $p = .498$. Boys' repeating of the class does not represent the same unifying character.

Gender Parity Index (GPI) (UNESCO 2005, pp. 80-83) describes the ratio of the amount of females to the amount of males. A GPI of 1 indicates parity between sexes. The higher the ratio, the more there are girls in comparison to boys in secondary schools. In Figure 18 the relationship between test score differences (cf. Figure 15) and GPI ratio is shown.

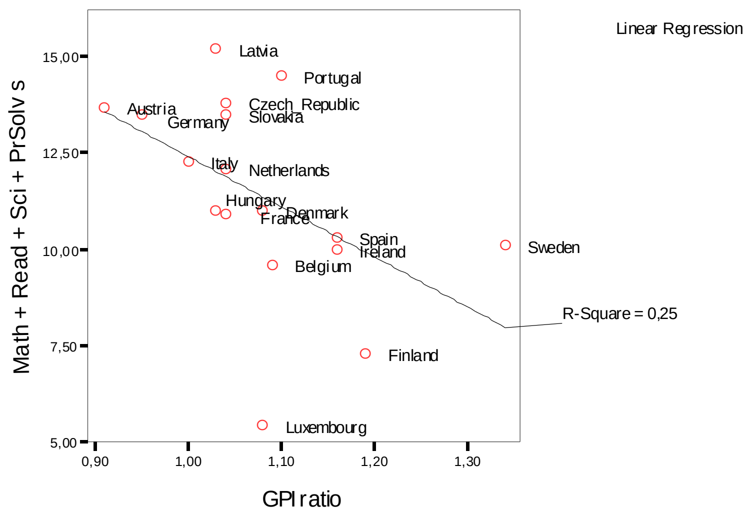


**Figure 18. Children's differences in PISA-test scores and the GPI (Gender Parity Index) in the lower secondary school**

The ratio of female students is again related to lesser differences in test scores, $r_s$ (17) = -.613, p = .009). In all indicators the larger percentage of girls is related to more unified test results. In the same way as we think of girls producing some kind of unifying effect, we should also think about the possible segregate effect of boys. In Figure 19 is presented the relationship between test differences (cf. Figure 15) and the entrance age to secondary school (UNESCO 2005, 80-83).

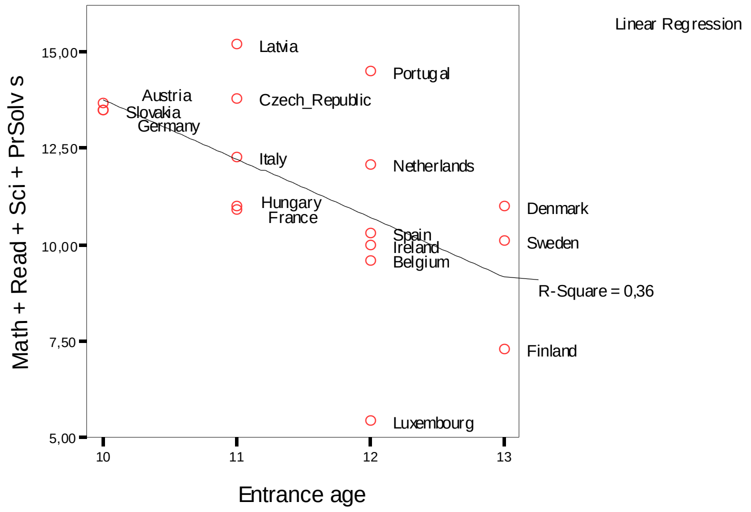


**Figure 19. The relation between PISA test differences and entrance age in secondary school**

The earlier the children enrol in the secondary school, the larger tend the differences between students' test scores be, $r_s$ (17) = -.613, p = .018. There seems to be a segregate element in early enrolment of secondary schools. The correlation needs closer studying in order to find out the dynamics behind the correlation. Perhaps early entrance reveals the segregate nature of secondary school itself. Early entrance to secondary school may mean early exposure to the secondary school factors leading to segregation.

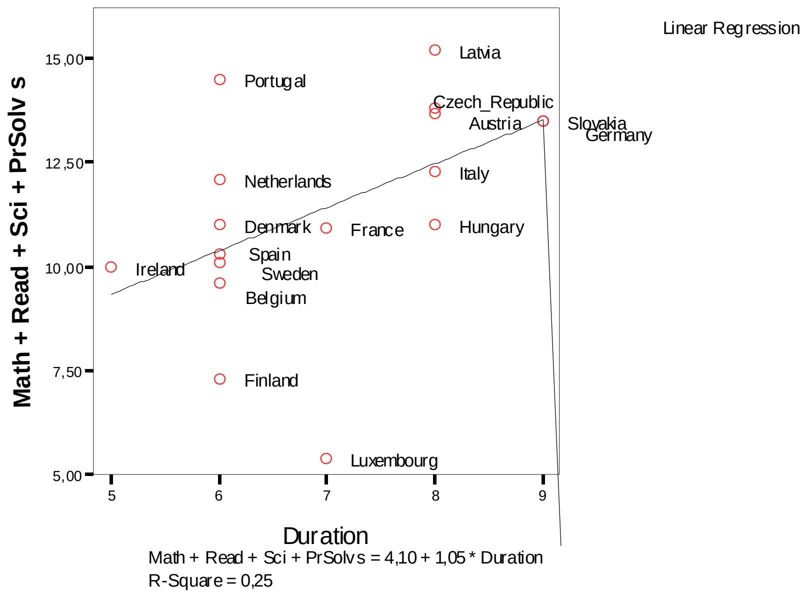


**Figure 20. Children's differences in PISA-test scores and the duration of the secondary school**

The correlation between children's test differences and the duration of the secondary school is $r_s$ (17) =.566, p = .018. This means that in countries that secondary school lasts longer the differences between students test performances increase. This correlation brings forward that there indeed is something segregating elements in secondary schools, although these elements differ between countries.

### 3.2.4. Factors related to school differences in mathematics test scores

In chapter 3.2.3 the individual differences between students were studied. Nevertheless, in PISA also the differences between schools were studied. If some schools score better than others, the phenomenon is a possible seed for exclusion. Factors that lead to a selection of a certain school become a segregate indicator. The largest and most often found connections with other indicators were with mathematics test scores, which are studied more closely on this chapter. In Figure 21 the mathematics test scores variance that can be explained as differences between schools is presented (cf. Välijärvi and Malin 2004, 142).

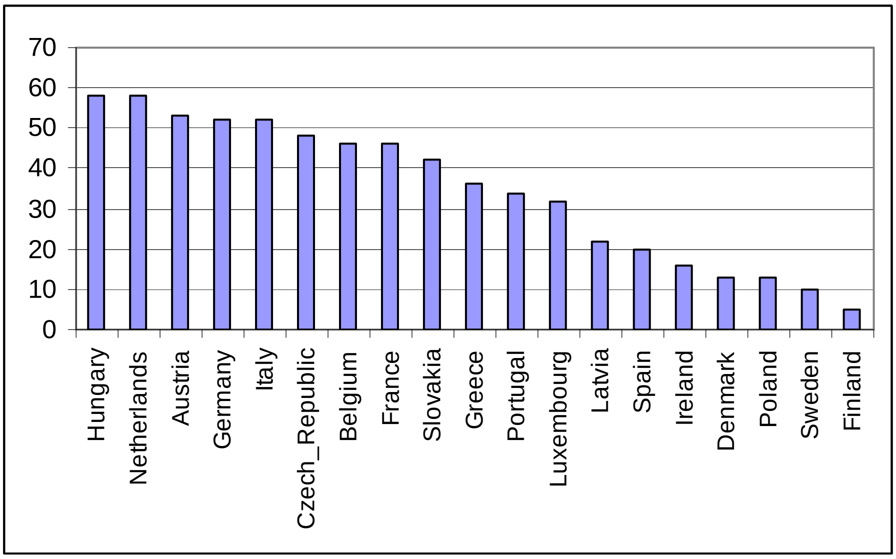


**Figure 21. The mathematics test score variance explained by the differences between schools**

No less than 58% of the student variation can be explained by school differences in Hungary and Netherlands. This means that the countries with large percentages describing school influence, it is important for the students to be admitted to the right school. On the other hand, in Finland only 5% and in Sweden 10% of the variation could be explained by school differences.

The mathematics test variance (cf. Figure 21) explained by school is related to the GPI ratio (UNESCO 2005, 80-83), as we can see in Figure 22. GPI describes the ratio between boys and girls. If the ratio is above one, there are more girls than boys attending secondary school.

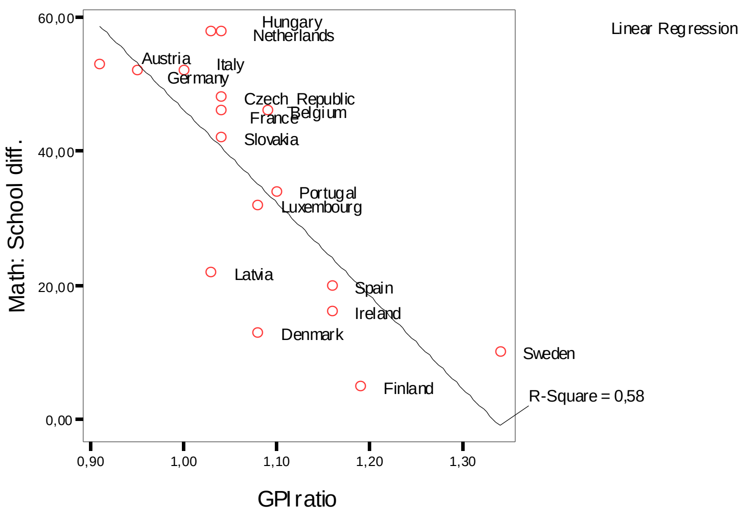


**Figure 22. The mathematics variance explained by school and GPI ratio (Gender Parity Index) in lower secondary school**

The correlation between school differences in the math test and percentage of girls in lower secondary schools is striking, $r_s$ (17) = -.787, p = .000. The larger the number of girls in relation to the number of boys the less are the school differences in PISA math test scores. In Austria the GPI is .91 and in Germany .95 which means that there are fewer girls than boys in lower secondary schools. They are also high on the school difference scale. On the other hand, in Sweden (1.34) and Finland the amount of girls in relation to boys is larger. Finland (5%) and Sweden (5%) have also the smallest school differences. It is hard to explain the obvious connection. As the number of girls attending secondary school has been rising, maybe the number of the girls presents the conservative and traditional way to conduct secondary school. Maybe the number of girls in secondary school has something to do with the school climate. Figure 22 describes the situation in the lower secondary school, but the relationship is similar in the upper secondary school (not presented in this report).

In PISA study the student related factors affecting the school climate were studied (OECD 2004, pp. 216). These factors were absenteeism, disruption, skipping classes, lack of respect, alcohol & drugs and bullying. The percentage of explained variance in student variance in mathematics performance shows the relationship between student's actions and the mathematics performance. Change in mathematics performance per unit of the index of student-related factors affecting school climate describes students' actions' impact on the mathematics score. This percentage correlated statistically significantly with school differences (cf. Figure 21) as can be seen in Figure 23.

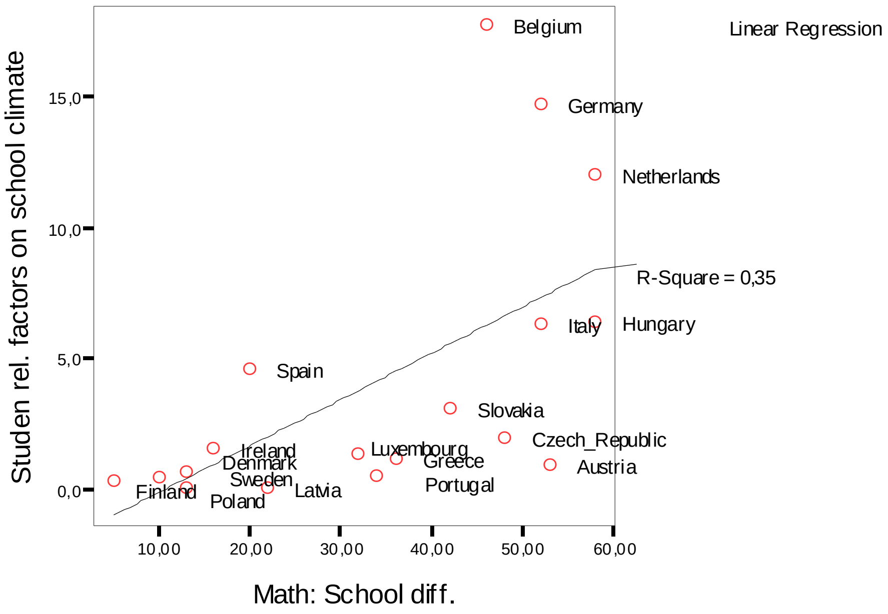


**Figure 23. The school differences in Pisa mathematics test scores and students' behaviors' impact on mathematics test scores**

The more students' negative behaviour affected the mathematics test score, the more the schools tend to differ from each other, $r_s$ (18) = .710, p = .001. The correlation means that the effects of students' disruptive behaviour occurs often in countries with larger school differences. On reverse, in countries where students' disruptive behaviour has little impact on mathematic test scores, schools tend to differ less. This relation shows the robustness of the school system. In Finland schools differ least from each other and Finnish schools are not easily affected by disruptive behaviour. In Belgium, Germany and Netherlands students' behaviour affects the mathematics scores the most and in the same time schools differ considerably from each other. Maybe this is an indication of disruptive behaviour concentrating on certain problem schools. Where the students' negative behaviour can not be controlled, the mathematics learning tends to cease rapidly. The role of gender in class repeating (UNESCO 2005, 80-83) seems crucial to the school differences in mathematics test scores (cf. Figure 21), as can be seen in Figure 24.

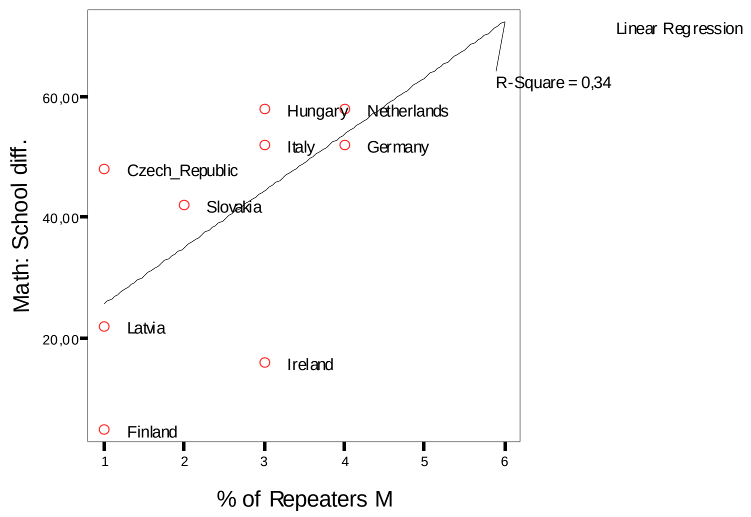


**Figure 24. School differences in mathematics test scores and the percent of male repeaters in secondary school**

The more there are male repeaters in secondary school, the larger is the difference between schools in mathematics test scores, $r_s$ (9) = .673, p = .047. Male students' repeating classes is an indicator of school differences. It is important to notice that male and female students seem to have very different roles in the differentiation of the test score. As we saw in Figure 17, the percent of female repeaters was an indicator of less variance between students' overall test scores. More male class repeaters, on the other hand, seem to be an indicator for bigger school differences in mathematical test scores. These gender differences are troublesome and need further attention. Perhaps a big amount of girl repeaters is an indicator of a tendency to keep everyone involved. Perhaps a large amount of boy repeaters is an indicator of asocial tendencies. Anyway it is worth noting that there can be many reasons for class repeating. There is also a, perhaps surprising, connection between school differentiation (cf. Figure 21) and the country's population, which is manifested in Figure 25.

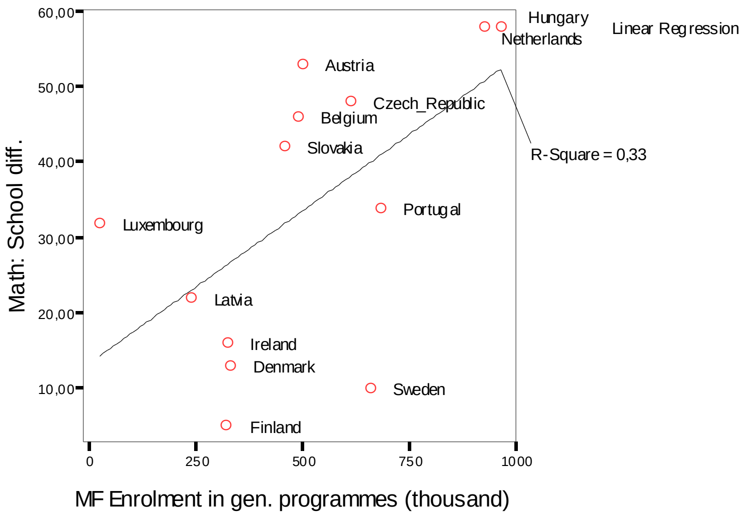


**Figure 25. School differences in mathematics test scores and the amount of enrolment (in thousands) in general secondary school education**

The amount of enrolments (in thousands, UNESCO 2005, 80-83) is almost directly related to the population of the country. The bigger the enrolments figure, the bigger the population of children of the enrolment age. Thus the correlation describes the relation between school differences and countries' population, $r_s$ (13) = .613, p = .026. It is important to notice though that the enrolment figures for the biggest European Union countries Germany, United Kingdom, France and Italy were not available. To get a complete picture, we must include also the biggest countries enrolment figures to the analysis. Anyway, there is a tendency that school differences increase hand in hand with the population increase. In countries with bigger population the different parts of country can have different school systems. It is also easier to make choices among schools when there are more possible alternatives. In countries with bigger population there is also more room for the population segregation as a whole as minorities and people with different social status live in different areas and subcultures. Perhaps a different kind of factor for early segregation can be seen in Figure 26.

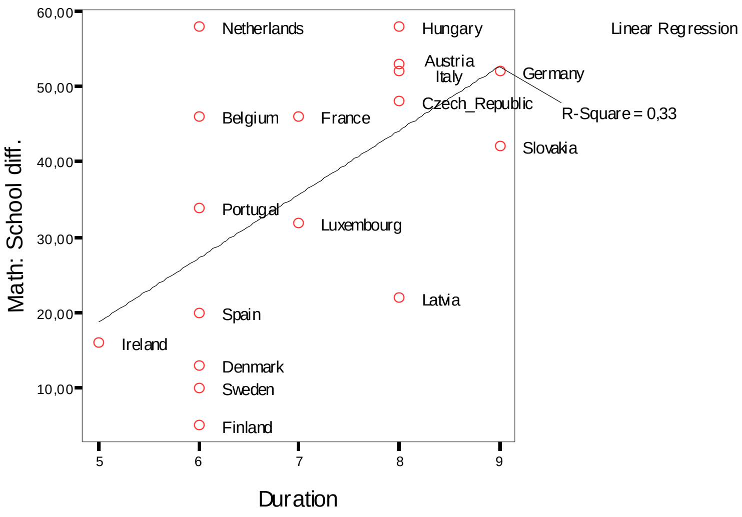


**Figure 26. The school differences on mathematics test scores and the duration of the secondary school**

The longer the secondary education lasts (UNESCO 2005, pp. 80-83), the larger the differences between schools in mathematics test scores (cf. Figure 21), $r_s$ (17) = .551, p =.022. It seems that the longer the segregate effects of secondary schools last, the bigger are the differences between schools. The school differences seem to cumulate in time. This connection is highlighted when we look at the relation between school differences in mathematic test scores and children's entrance age in Figure 27.

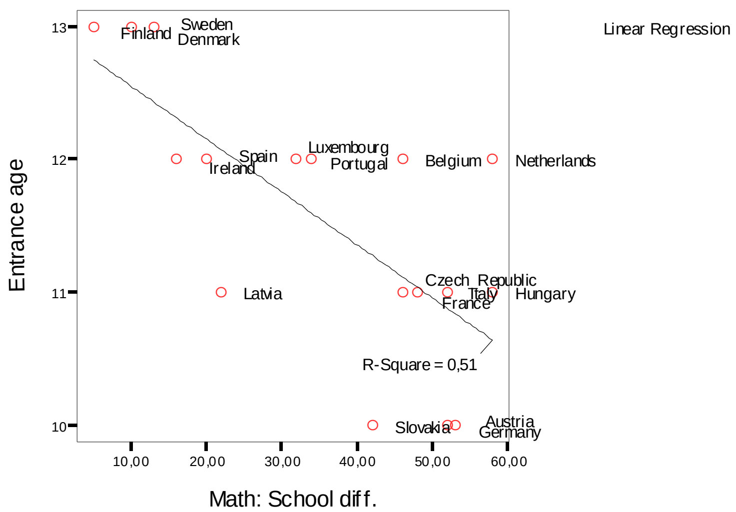


**Figure 27. The correlation between school differences in PISA test in mathematics and secondary school entrance age**

PISA test score differences between schools (cf. Figure 21) in mathematics and entrance age in secondary school (UNESCO 2005, 80-83) are strongly correlated, $r_s$ (17) = -.686, p = .002. In Finland, Sweden and Denmark the entrance age is the highest and the school differences are the lowest. By contrast, Slovakia, Austria and Germany have a secondary school attendance age of ten and all of these countries have high variance in mathematics scores among students. The early entrance and long duration of the secondary school increase school differences. The school differences are reflected also on the impact the socio-economic status (Kupari 2004, 117). Its relation to mathematic result differences (cf. Figure 21) is presented in Figure 28.

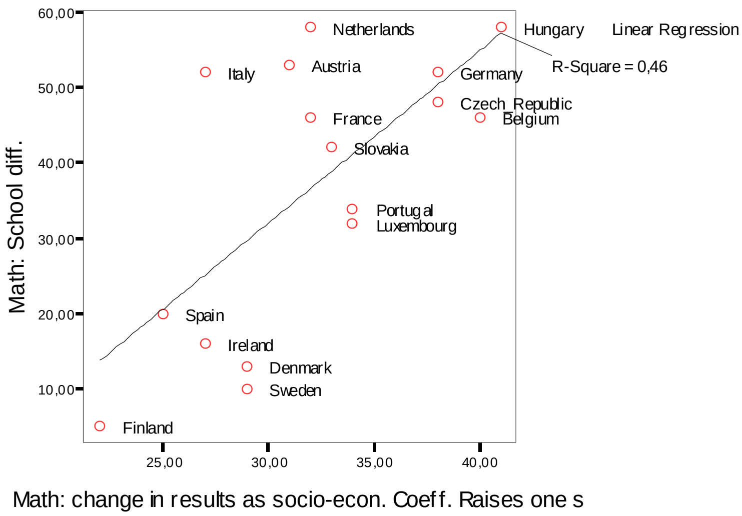


**Figure 28.School test differences and change in mathematic test results as the socio-economic status coefficient raises one standard deviation**

The variable describing the effect of the socio-economic variable describes the change in mathematic scores when the socio-economic status rises by one standard deviation (Kupari 2004, 117). School differences in mathematics test scores tend to rise as the socio-economic background has a larger effect on the mathematic test scores, $r_s$ (18) = .479, p = .044. According to OECD report (2004), attending a school which students are from more advantages socio-economic backgrounds makes a difference. Regardless of their own socio-economic background, students attending schools in which the average socio-economic background is high tend to perform better than when they are enrolled in a school with a below average socio-economic intake (see OECD 2004, 188-189.)

One factor in the development of exclusion is students' morale and commitment to school work. Its relationship with school differences in mathematics can be studied in Figure 29.

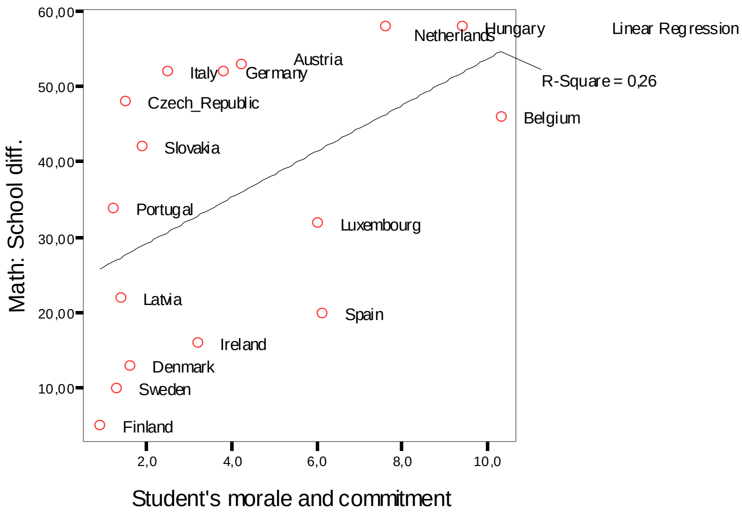


**Figure 29. School differences in mathematics and students' morale & commitment**

The "morality" variable describes the percentage of students in schools where the principals agree or strongly agree with statements about the students in the school. The statements were about enjoyment in school, work enthusiasm, pride in this school, valuing academic achievement and students' cooperation and respect. The data values describe the percentage of explained variance in student performance in mathematics test scores. (cf. OECD 2004, 224). In other words, the higher the score, the more students' evaluated morale is shown on the mathematic test results. The more students' morale shows on the mathematics test variance (cf. Figure 21), the more schools differ in their results, $r_s$ (16) = .618, p = .006. In Scandinavia students' morale and commitment do not seem to be affect interfere with the school differences. On the other hand, in Netherland and Hungary students' morale and commitment go hand in hand with the larger school differences. The "strength" of the students' commitment and morale across countries does not explain the differences (OECD 2004, 224). It is specifically the *effect* of students' morality to the test results. The moral and commitment differences *within* the country explain the differences in schools.

### 3.2.5. Segregative tendencies according to PISA 2003 report (2004)

This chapter is a summary of the OECD (2004) report describing the segregate elements of education. According to the report (OECD 2004, pp. 165), parental occupational status is often closely interrelated with other attributes of socio-economic status and has a strong association with student performance. The average performance gap in mathematics between students in the top quarter of the PISA index of occupational status (whose parents have occupations in fields such as medicine, university teaching and law) and those in the bottom quarter (with occupations such as small-scale farming, truck-driving and serving in restaurants), amounts to an average of 93 score points, or more than one-and-a-half proficiency levels in mathematics. The effect of occupational status on the mathematic test scores (OECD 2004, 385) in each country is presented in Figure 30.

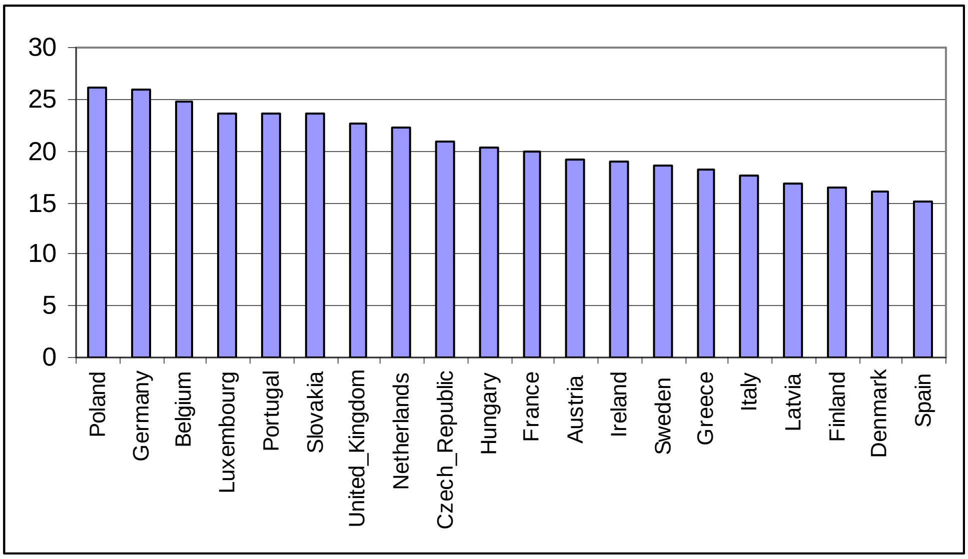


**Figure 30. The effect of parents' highest occupational status of on PISA mathematic test scores (unique effects after accounting for the other factors)**

According to OECD report (2004) in Belgium, France, Germany, Hungary, Luxembourg and the Slovak Republic the differences in performance are particularly large. In these countries, students whose parents have the highest-status jobs score on average about as well as the average student in Finland, the best performing country in PISA 2003 across mathematics, reading and science. In contrast, students whose parents have the lowest-status jobs score little higher than students in the lowest performing OECD countries. Looked at differently, in Belgium, Germany, Luxembourg and the partner country Liechtenstein, students in the lowest quarter of the distribution of parental occupations are 2.3 times or more likely to be among the bottom quarter of performers in mathematics. (OECD 2004, pp. 165.) As we look at the Figure 30, we must add Poland to the European Union countries where parents' occupational status has a large impact on mathematics test scores. In Spain the effect is the lowest.

According to OECD (2004), parental education may also be of significant educational benefit for children. The effect of parents' education to the mathematic test in different European Union countries is described in Figure 31.

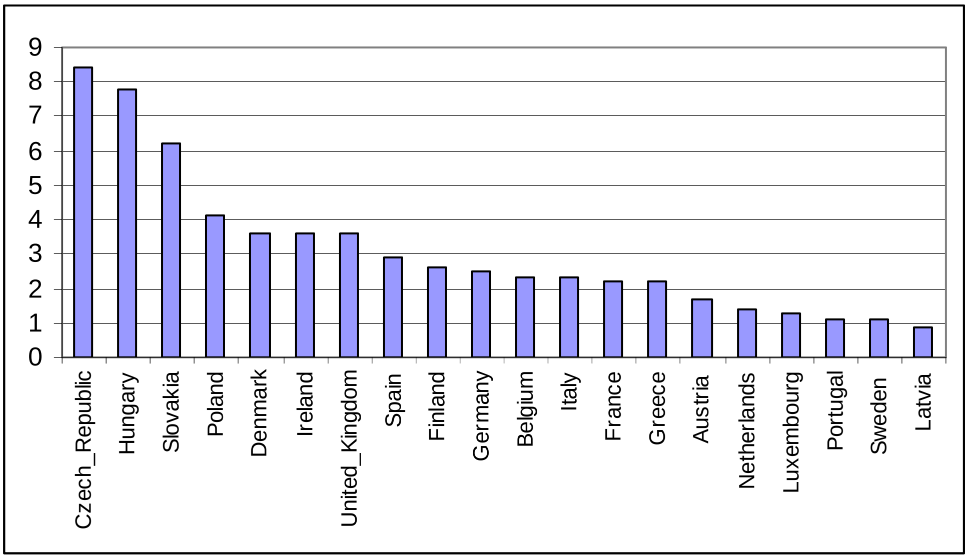


**Figure 31. The effect of the highest level of parents' education on the PISA mathematic test scores (unique effects after accounting for the other factors)**

Parents' education has the largest impact on the mathematic test in Czech Republic, Hungary and Slovakia. According to OECD (2004), the relationship between mothers' educational attainments and students' performance in mathematics is shown to be positive and significant in all participating countries. In Germany, the students whose mothers or fathers did not complete upper secondary education are three times more likely to be in the bottom quarter of mathematics performers than the average student. OECD (2004, pp. 165-166.) (The effect of parent education in Germany must concern only parents whose mothers or fathers did not complete upper secondary school, as the effect in general is not large.)

According to OECD (2004), PISA 2000 demonstrated the important relationship between parental involvement and children's academic success. It also suggested that educational success may be related to patterns of communication between parents and children. An important objective for public policy may therefore be to support parents, particularly those whose own educational attainment is limited, in order to facilitate their interactions both with their children and with their children's schools in ways that enhance their children's learning. (OECD 2004, pp. 166.)

OECD report (2004) emphasizes the possessions and activities related to "classical" culture (e.g., classic literature, books of poetry or works of art) also tend to be closely related to performance. The effect of classical culture in European Union is presented in Figure 32.

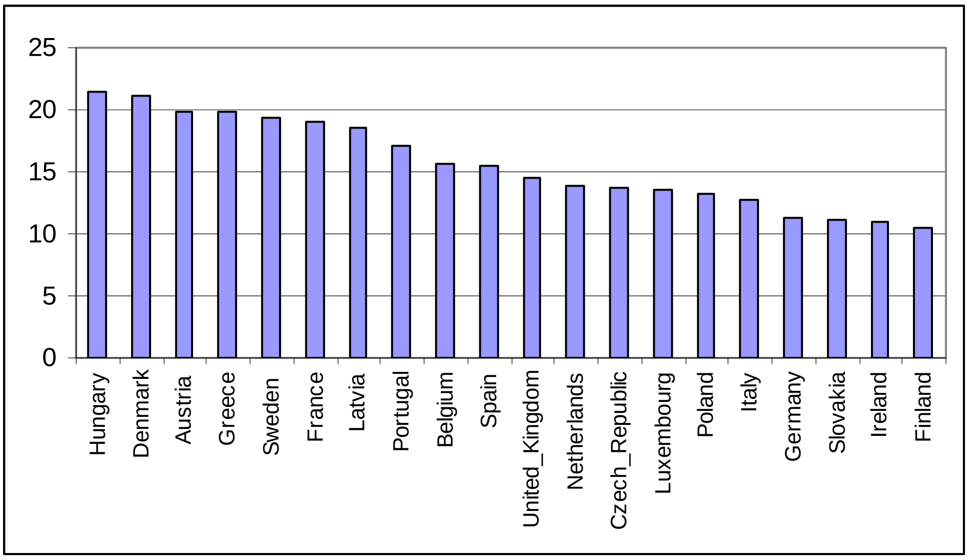


**Figure 32. The effect of possessions related to classical culture on the PISA mathematic test scores (unique effects after accounting for the other factors)**

The impact of classical culture is the largest in Hungary and Denmark and the smallest in Finland. According to OECD report (2004), the possession of the kind of cultural capital on which school curricula often tend to build, and which examinations and tests assess, appears closely related to student performance in mathematics. While advantages of cultural possessions are related to other home background characteristics, their effects in isolation are generally strong. Even when controlling for other socioeconomic background factors, one unit on the PISA index of cultural possessions is associated with an average score difference of 12 score points on the PISA mathematics scale, an association that is almost as strong as the association with parental occupation. (OECD 2004, pp. 166.) It must be acknowledged that the effect of classical culture in on the test scores describes the effects *within* countries. Finland for example, with the best in PISA mathematic test scores has the lowest effect on possessions related to classical culture.

The PISA results (OECD 2004) suggest a large performance gap for students from single-parent families. In Belgium, Ireland, the Netherlands and Sweden students from single-parent families are 1.5 times or more likely to be among the bottom quarter of mathematics performers than the average student that lives with both parents. Even when controlling for the influence of other socio-economic factors, an average gap of 18 score points remains between students from single parent and other types of families. This gap is between 25 and 30 score points in Belgium and Ireland. (OECD 2004, pp. 166-167.)

PISA results (OECD 2004) show, that in countries in which first-generation students represent at least 3 per cent of the students assessed in PISA 2003, a comparison of the mathematics performance of first-generation students with that of native students tends to show large and statistically significant differences in favour of native students. Concern about such differences is especially justified in those countries where significant performance gaps are combined with comparatively large percentages of first-generation students, such as France, Germany, Luxembourg and the Netherlands. In Germany, the country with the largest such disparities, the performance gap amounts to 93 score points on the mathematics scale, equivalent to an average performance difference of over two grade levels. Non-native students tend to lag even further behind native students than do first-generation students, with the largest performance gap, 109 score points, found in Belgium. Being a non-native student or speaking a language at home that is different from the language of assessment have a negative impact on mathematics performance of, on average across OECD countries, 19 and 9 score points respectively. In countries where the educational and socio-economic status of immigrant families is comparatively low, the performance gaps between students with and without migrant backgrounds tends to be larger. (OECD 2004, pp. 167-171)

According to OECD (2004), across the OECD countries, the combined influence of student-level socio-economic variables (parental occupational status; parents' level of education converted into years of schooling; possessions related to "classical" culture; family structure; students' nationality and that of their parents; and the language spoken at home) explain 17 per cent of the variance in mathematics performance. In Belgium, Germany, Hungary and Portugal it explains more than 20 per cent. The poorer performing students will often be the ones least likely to obtain the employment opportunities that offer the promise of economic mobility. This is a loss not just for individuals, but also for societies increasingly dependent on the many effects of human capital. (OECD 2004, pp. 174.)

According to the OECD report (2004), students with progressively more advantaged socioeconomic backgrounds perform progressively better in mathematics on average but also that many students perform much better or worse than predicted. The strength of this relationship differs across countries. There are countries in which students tend to perform well (Finland, Latvia, Italy and Spain), irrespective of their socio-economic background as well as countries with below-average performance and large socio-economic disparities (Hungary, Belgium, Germany and Slovak Republik). PISA suggests that maximising overall performance and securing similar levels of performance among students from different socio-economic backgrounds can be achieved simultaneously. The results suggest therefore that quality and equity need not be considered as competing policy objectives. (OECD 2004, pp. 178-183.)

The PISA results (OECD 2004) show, that countries in which the student population is very heterogeneous, similar socio-economic gradients will have a much larger impact on the performances gap than in countries that have socio-economically more homogeneous student populations. For example, Germany and Poland have socio-economic gradients with similar slopes: i.e., in both countries a given socio-economic difference is associated with a similar difference in performance. Since the distribution of socio-economic characteristics is much more heterogeneous in Germany than in Poland, the performance gap among students in the top and bottom quarters of the PISA index of economic, social and cultural background is much larger in Germany than in Poland. (OECD 2004, 186.)

### *3.3. Main information gaps*

It would have been useful to include the data describing the primary education to the database, which now consisted of the UNESCO's global educational Digest (2005) and OECD's PISA-report (2004) combined. By including primary education to the analysis the deep and tacit factors of exclusion that grow slowly could have perhaps been better exposed.

Even pre-primary data would have been important to include in the analysis. Growth trajectories for children from differing socio-economic backgrounds begin to differ early on (OECD 2004, 174). Variables describing the education system, enrolment, gross enrolment ratio, net enrolment ratio, teaching staff, the percentage of trained staff and pupil/teacher ratio in pre-primary education were readily available.

Also data from ethnic minorities would have been necessary to include in the analysis. The role of ethnic minorities is shortly described in chapter 3.2.5., but a more comprehensive and specifically towards European Union targeted analysis is needed.

The role of special education is now omitted, although it may have an important role in prohibiting exclusion. As PISA report (2004) acknowledges, raising performance levels critically relies on effective support systems that provide professional advice and assistance to students, teachers and school management. Countries pursue different strategies to this end. Some seek primarily to address heterogeneity in the student body with services directed towards students on a needs basis, including services for students requiring special educational or social assistance, or educational and career counselling. Some relate to networks between individual schools and between schools and other institutions aimed at facilitating performance improvement of teachers and schools. Yet others relate to the school system as a whole and often include external agencies. Some countries provide independent professional support structures while others have integrated support systems into school administration, school inspection or the academic sector. (OECD 2004, 211.)

To include other important variable in the analysis on more wholesome analysis would have been possible.. Unfortunately the deadline was tight. Hopefully the data can be further elaborated in the future as a more comprehensive report.

It is also important to keep in mind that the found averages, standard deviations and correlations are secondary data not derived from the original data. This prohibits extensive investigation of overlapping and missing information. The omitting of certain groups from the descriptive statistics was not possible.

## 4. Discussion

Almost every child enrols both in lower and upper secondary schools in Europe. The entrance age to the secondary school varies from 10 to 13 years of age, the average being 11,5 years. The duration of secondary school varies from five to nine years and the average duration is seven years. Most of the students enrol on the general programmes of secondary education. Enrolment in technical and vocational programmes varies from 7% to 59% in European Union.

The differences between male and female students' enrolments in Europe are small. The differences start to show in the PISA test scores. Boys perform better in mathematics. Girls perform better on reading. In sciences test scores the results are mixed. In total test scores boys' and girls' performances vary across countries, across country average being equal. The amount of girls seems to be important for the student differences; the more there are girls attending secondary schools, the smaller tends the variance between students' test scores in that country be. Further, the more the test scores vary among students, the less there are female repeaters in secondary school. Smaller percentage of female repeaters may represent a tight inclusive character of the school. Boys' repeating of the class was much smaller. In fact, a large amount of boys repeating classes in secondary school is an indicator of large school differences in the country.

The secondary school itself may reflect segregate tendencies. The earlier the secondary school starts and the longer it lasts, the larger the differences between students' total test scores.

The school differences within countries represent segregate tendencies. The school differences explain from 5 percent to 58 percent of the mathematics test score variation in different European Union countries. The mathematics learning tends to differentiate between schools where the students' negative behaviour can not be controlled. The larger the population of the country, the larger tends to be the school differences in the mathematics test in the country. The early entrance age and the duration of the secondary school seem to enhance the school differences further. Also the students' socio-economic background seems to make the school differences larger. Students' moral and commitment differences within the country explain the school differences. The question is not about students' moral strength, rather it is about the morality showing in the mathematics test results.

Across the OECD countries, some socio-economic variables explain large amount of the variance in mathematics performance. All in all, parental occupational status; parents' level of education converted into years of schooling; possessions related to "classical" culture; family structure; students' nationality and that of their parents; and the language spoken at home explain 17 per cent of the variance in mathematics performance.

The PISA report (OECD 2004) seeks implications for policy in different countries. Experiences at school too often reinforce rather than mitigate home background. Policies trying to live up to these international benchmarks can take several forms. Some try to help students with low performance by providing them with extra instructional resources or with economic resources helping to improve their circumstances. Others try to raise performance for everyone while yet others aim at integrating disadvantaged students, including through a reduction in socioeconomic segregation. Countries with relatively gradual socio-economic gradients may benefit for the policy targeted toward low student performance. Targeting socio-economic disadvantage might be more effective, however, in countries where low performance and disadvantaged background are more closely associated. Improvement strategies can focus on individual students or on schools, depending on the extent to which performance varies among schools. Policy considerations need to take account of long-term influences on 15-year-olds' performance and to take a broad view, including the early childhood years and families. (OECD 2004, 191-203.)

# References

OECD. (2004). Learning for Tomorrow's World. First Results from PISA 2003. Retrieved January 25th 2007, from http://www.oecd.org/dataoecd/1/60/34002216.pdf .

Kupari, P., Välijärvi, J., Linnakylä, P., Reinikainen, P., Brunell, V., Leino, K., Sulkunen, S., Törnroos, J., Malin, A. & Puhakka, E.. (2004). Nuoret osaajat. PISA 2003 –tutkimuksen ensituloksia. [Young and skilful. First results from PISA 2003.] University of Jyväskylä, Koulutuksen tutkimuslaitos. Retrieved February 5th, 2007, from http://ktl.jyu.fi/pisa/PISA_2003_-KIRJA_press.pdf .

Kupari, P. (2004). Kotitausta näkyy oppimistuloksissa. [Home backgroun shows in the learning results]. In Kupari, P., Välijärvi, J., Linnakylä, P., Reinikainen, P., Brunell, V., Leino, K., Sulkunen, S., Törnroos, J., Malin, A. & Puhakka, E.. (2004). Nuoret osaajat. PISA 2003 –tutkimuksen ensituloksia. [Young and skilful. First results from PISA 2003.] University of Jyväskylä, Koulutuksen tutkimuslaitos. Retrieved February 5th, 2007, from http://ktl.jyu.fi/pisa/PISA_2003_-KIRJA_press.pdf , pp. 115-127.

Pisa. Home page. http://www.oecd.org/pages/0,2966,en_32252351_32235731_1_1_1_1_1,00.html .

UNESCO. (2005). Global education digest. Retrieved January 25th 2007, from http://www.uis.unesco.org/template/pdf/ged/2005/ged2005_en.pdf .

Reinikainen, P. (2004). Ongelmanratkaisutaidot uutena alueena. [Problem solving as a new topic]. In Kupari, P., Välijärvi, J., Linnakylä, P., Reinikainen, P., Brunell, V., Leino, K., Sulkunen, S., Törnroos, J., Malin, A. & Puhakka, E.. (2004). Nuoret osaajat. PISA 2003 –tutkimuksen ensituloksia. [Young and skilful. First results from PISA 2003.] University of Jyväskylä, Koulutuksen tutkimuslaitos. Retrieved February 5th, 2007, from http://ktl.jyu.fi/pisa/PISA_2003_-KIRJA_press.pdf , pp. 115-127.

UNESCO institute for statistics. Web page. http://www.uis.unesco.org/ev.php?ID=6086_201&ID2=DO_TOPIC .

Välijärvi, J. & Malin, A. (2004). Koulutuspalvelujen laatu jakautuu Suomessa tasaisesti. [The quality of Educational services is distributed evenly in Finland]. In Kupari, P., Välijärvi, J., Linnakylä, P., Reinikainen, P., Brunell, V., Leino, K., Sulkunen, S., Törnroos, J., Malin, A. & Puhakka, E.. (2004). Nuoret osaajat. PISA 2003 –tutkimuksen ensituloksia. [Young and skilful. First results from PISA 2003.] University of Jyväskylä, Koulutuksen tutkimuslaitos. Retrieved February 5th, 2007, from http://ktl.jyu.fi/pisa/PISA_2003_-KIRJA_press.pdf, pp. 141-150.