
LES RAPPORTS DU LISER

PISA 2003-2012: persistence, changes and challenges

An overview of immigrant students and their
performance

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An overview of immigrant students and their
performance^{*,**}



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**The opinions expressed here are those of the authors and do not necessarily reflect the views and the position of the Ministry of Education of Luxembourg

Table of Contents

SUMMARY	8
INTRODUCTION.....	9
1. AN OVERVIEW OF THE STUDENT POPULATION CHANGE	10
1.1 BORN OUTSIDE OR IN LUXEMBOURG – 1 ST AND 2 ND GENERATION IMMIGRANTS	12
1.2 A CLOSER LOOK AT THE 1 ST GENERATION	14
1.3 DIFFERENCES IN SOCIO-ECONOMIC STATUS AT STUDENT AND SCHOOL LEVEL.....	15
1.3.1 AT THE FAMILY LEVEL.....	15
1.3.2 AT THE SCHOOL LEVEL	17
1.4 DIFFERENCES IN STUDY PROGRAMMES	19
2. CHANGES IN THE OECD PISA TEST RESULTS OVER TIME.....	22
2.1 RESULTS IN MATHEMATICS	22
2.2 RESULTS IN READING.....	24
2.3 AGE AT ARRIVAL AND SCHOOL PERFORMANCE	27
2.4 DIFFERENCE IN PERFORMANCE ACROSS STUDY PROGRAMMES.....	28
3. STUDENTS’ ENGAGEMENT AT SCHOOL.....	32
3.1 SENSE OF BELONGING AT SCHOOL.....	33
3.2 ATTITUDES TOWARDS SCHOOL	34
3.3 DISCIPLINARY CLIMATE	35
3.4 TEACHER’S SUPPORT.....	36
3.5 STUDENT-TEACHER RELATIONS	37
3.6 ON THE ASSOCIATION BETWEEN STUDENTS’ ENGAGEMENT AND TEST OUTCOMES	38
CONCLUSIONS AND FUTURE RESEARCH.....	41
REFERENCES.....	43

Abbreviations

ADEM - l'Agence pour le développement de l'emploi

ES - Enseignement secondaire

ESCS - Index of economic, social and cultural status

EST - Enseignement secondaire technique

IGSS – l'Inspection générale de la sécurité sociale

NEETs - Not in education, employment, or training

OECD - Organisation for economic co-operation and development

PISA - Programme for international student assessment

PREP - Régime préparatoire des enseignement secondaire technique

TEVA - Transition école - Vie active

Tables

TABLE 1. NATIVE AND IMMIGRANT-ORIGIN STUDENTS _____	11
TABLE 2. 1 ST AND 2 ND GENERATION STUDENTS IN PISA _____	12
TABLE 3. 1 ST AND 2 ND GENERATION STUDENTS IN PISA, BY ORIGIN AND YEAR _____	14
TABLE 4. 1 ST AND 2 ND GENERATION STUDENTS IN PISA _____	14
TABLE 5. AGE AT ARRIVAL IN LUXEMBOURG BY KEY AGE BRACKETS _____	15
TABLE 6. AGE AT ARRIVAL IN LUXEMBOURG AMONG GROUPS BY KEY AGE BRACKETS (%) _____	15
TABLE 7. DISTRIBUTION OF STUDENTS ACROSS STUDY PROGRAMMES BY ORIGIN _____	19
TABLE 8. DISTRIBUTION OF STUDENTS ACROSS STUDY PROGRAMMES BY ORIGIN AND YEAR _____	20
TABLE 9. DISTRIBUTION OF STUDENTS ACROSS STUDY PROGRAMMES BY GENERATION _____	21
TABLE 10. AVERAGE CHANGE IN MATHEMATICS TEST RESULTS SINCE 2003 BY ORIGIN _____	23
TABLE 11. PISA TEST RESULTS IN MATHEMATICS BY GENERATIONS AND YEAR _____	24
TABLE 12. AVERAGE CHANGE IN READING TEST RESULTS SINCE 2003 BY ORIGIN _____	25
TABLE 13. AVERAGE CHANGE IN READING TEST RESULTS SINCE 2003 BY GENERATION _____	26
TABLE 14. AGE AT ARRIVAL AND TEST RESULTS _____	27
TABLE 15. PISA TEST RESULTS IN MATHEMATICS BY SCHOOL PROGRAMME AND ORIGIN _____	28
TABLE 16. AVERAGE GAP IN MATHEMATICS TESTS BY SCHOOL PROGRAMME AND ORIGIN _____	29
TABLE 17. PISA TEST RESULTS IN MATHEMATICS BY SCHOOL PROGRAMME AND GENERATION _____	29
TABLE 18. AVERAGE GAP IN MATHEMATICS TESTS BY SCHOOL PROGRAMME AND GENERATION _____	29
TABLE 19. PISA TEST RESULTS IN READING BY STUDY PROGRAMME AND ORIGIN _____	30
TABLE 20. AVERAGE GAP IN READING TESTS BY SCHOOL PROGRAMME AND ORIGIN _____	30
TABLE 21. PISA TEST RESULTS IN READING BY STUDY PROGRAMME AND GENERATION _____	31
TABLE 22. AVERAGE GAP IN READING TESTS BY SCHOOL PROGRAMME AND GENERATION _____	31
TABLE 23. OLS REGRESSION RESULTS FOR MATHEMATICS AND STUDENT'S SCHOOL ENGAGEMENT _____	38
TABLE 24. OLS REGRESSION RESULTS FOR READING AND STUDENT'S SCHOOL ENGAGEMENT _____	39

TABLE 25. OLS REGRESSION RESULTS FOR MATHEMATICS AND STUDENT'S SCHOOL ENGAGEMENT
WITHIN GROUPS _____ 40

TABLE 26. OLS REGRESSION RESULTS FOR READING AND STUDENT'S SCHOOL ENGAGEMENT WITHIN
GROUPS _____ 40

Figures

FIGURE 1. NATIVE AND IMMIGRANT-ORIGIN STUDENTS _____ 11

FIGURE 2. 1ST AND 2ND GENERATION STUDENTS IN PISA POOLED SAMPLE, BY ORIGIN _____ 13

FIGURE 3. AVERAGE SOCIO-ECONOMIC AND CULTURAL CAPITAL OF FAMILIES BY ORIGIN _____ 16

FIGURE 4. AVERAGE SOCIO-ECONOMIC AND CULTURAL CAPITAL OF FAMILIES BY GENERATION _ 17

FIGURE 5. AVERAGE SOCIO-ECONOMIC AND CULTURAL CAPITAL OF SCHOOLS BY ORIGIN _____ 18

FIGURE 6. AVERAGE SOCIO-ECONOMIC AND CULTURAL CAPITAL OF SCHOOLS BY GENERATION _ 18

FIGURE 7. PISA TEST RESULTS IN MATHEMATICS BY ORIGIN AND YEAR _____ 22

FIGURE 8. PISA TEST RESULTS IN MATHEMATICS BY GENERATIONS _____ 23

FIGURE 9. PISA TEST RESULTS IN READING BY ORIGIN AND YEAR _____ 25

FIGURE 10. PISA TEST RESULTS IN READING BY GENERATIONS _____ 26

FIGURE 11. FEELING OF BELONGING BY ORIGIN OVER TIME _____ 33

FIGURE 12. ATTITUDES TOWARDS SCHOOL BY ORIGIN OVER TIME _____ 34

FIGURE 13. DISCIPLINARY CLIMATE BY ORIGIN OVER TIME _____ 35

FIGURE 14. TEACHER SUPPORT BY ORIGIN OVER TIME _____ 36

FIGURE 15. PERCEPTION OF TEACHER-STUDENT RELATIONS BY ORIGIN OVER TIME _____ 37

Summary

The aim of this study is to provide an overview of immigrant students' profile, academic performances, social integration and well-being in secondary schools in Luxembourg, and to analyse changes of these between 2003 and 2012. The analyses are based on the OECD PISA data of 15-year old students collected in 2003, 2006, 2009 and 2012 and contain both student-level and school-level information.

Luxembourg's school population changed rapidly – between 2003 and 2012 the proportion of immigrant-origin students among 15-year olds has grown by nearly 20 percentage points, from 35% to 54%. The major increase took place among EU-origin students, and 2nd generation immigrant students – those born in Luxembourg, while parents were born abroad.

Analysis of changes in test results across surveys was performed separately for Portuguese, ex-Yugoslavian, Cape-Verdean, EU, non-EU, as well as Luxembourgish-origin students. We find that the most recent cohorts of Portuguese, ex-Yugoslavian, Cape-Verdean and EU-origin students show better results in reading compared to 2003. Results for mathematics tests remained stable, with the only exception being ex-Yugoslavian students, where the most recent cohort of 2012 had higher scores compared to their national peers from the previous cohorts.

8

Results also show that large differences remain between school programmes: the « Enseignement Secondaire » (ES), « Enseignement Secondaire Technique » (EST), and « Régime Préparatoire des Enseignement Secondaire Technique » (PREP). These patterns persist across time and for each national group, including native Luxembourgish students. The gap in test results between students attending ES and EST or ES and PREP is comparable in magnitude between, for example, Portuguese and native students.

Results reveal an important association between wellbeing at school, classroom discipline and the academic performance of students. While data limitations do not allow testing the causal direction of the link, international empirical evidence suggests that factors like classroom discipline have a positive impact on performance.

Public and academic debates about the PISA study, and the predictive power of standardised test scores on outcomes later in adulthood, periodically reappear after each new round of testing, including Luxembourg. To provide direction as to how these questions could be answered, we conclude with a brief description of how one could look at the life trajectories of PISA participants, similarly to what has been done in countries like Australia, Canada, Denmark and Switzerland.

Introduction

The decision to migrate, regardless of its motivation, is most commonly taken by adults, while children will most likely be left out of the decision-making process¹. Yet it is their life that will be very profoundly shaped by this decision. Immigration, and the integration that follows it, will place lots of new demands and challenges on children and adolescents on an almost equal par with the adults. Success at school is the most frequently cited indicator of their successful integration in the new society and rightfully so. Not only is it the determinant factor for future individual economic independence (Hanushek, Schwerdt, Wiederhold and Woessmann, 2013; Oreopoulos, 2006) but also for better health outcomes and healthy lifestyles (Conti, Heckman, and Urzua, 2010; Kemptner, Jürges, and Reynolds, 2010; Lochner, 2011; 2008), pro-environmental behaviour (Newman and Fernandes, 2015), political participation and interest in politics (Lochner, 2011; Milligan, Moretti, and Oreopoulos, 2004), more efficient parenting skills (Lareau, 2003), lower levels of crime (Lochner, 2011), and many others. The school performance of immigrant offspring has received significant attention across many European countries. Luxembourg has made progress in this regard as well: many projects are currently running in leading research centres and the university. They cover a wide range of topics, such as teacher education and training, language learning and cognitive development, education-related social indicators at the community level, mental health of school dropouts, their transition into the labour market, NEETs (Not in Education, Employment or Training), and many others.

The aim of this study is to look at the academic performance of immigrant students in Luxembourg over the last decade, together with their integration and wellbeing at school. Luxembourg is among countries that participated in the OECD PISA study from the start back in 2000. Today there is rich data, both at the student and school level, for the years 2003, 2006, 2009 and 2012². It is of relevance, from both an academic and a policy perspective, to look at the changes that took place during these years:

1. How the school population has evolved in recent years and what are the main socio-economic profiles of immigrant student population today;
2. How the performance in mathematics and reading has changed since 2003 among the main groups of interest – Portuguese, ex-Yugoslavian, Cape-Verdean, EU and non-EU origin students;
3. To what extent immigrant students feel well in schools and receive support and whether these factors affect their performances.

The concluding part summarises the main findings and offers several recommendations.

¹ There are, of course, certain exceptions to this such as unaccompanied minors among refugees seeking safety.

² For reasons related to the data quality, data from 2000 will not be used in this study.

1. An overview of the student population change

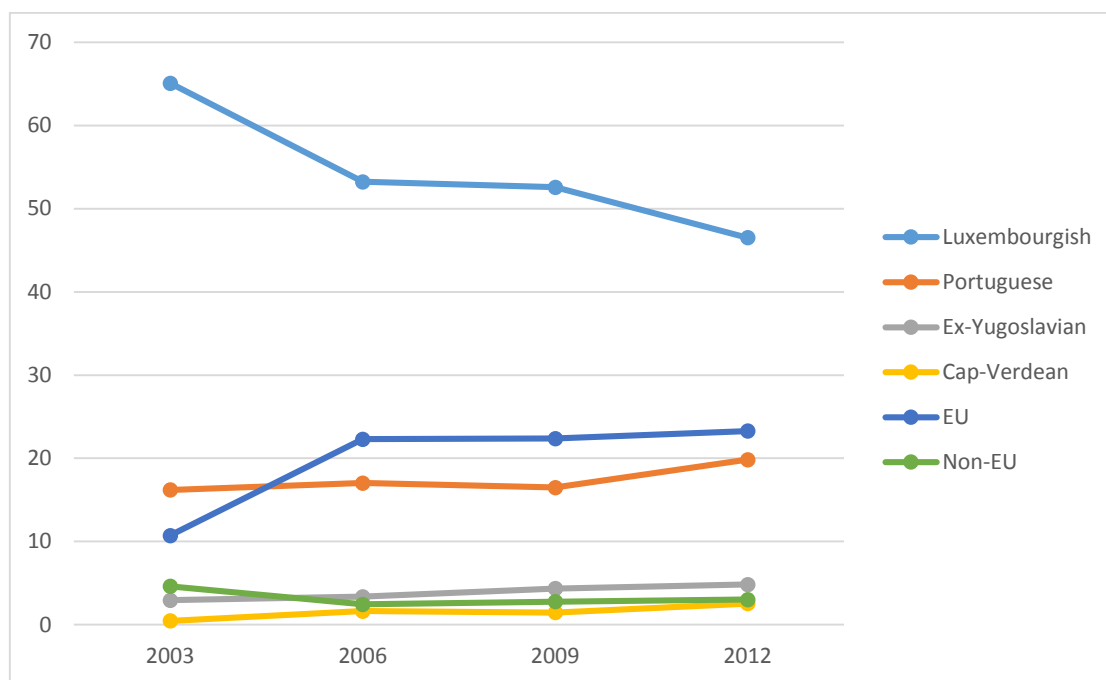
The student population in Luxembourg is changing rapidly. In the school year 2003-2004 36.4% of the total school population of students were not Luxembourgish nationals, while in the year 2012-2013 they reached 43.2% (MEN 2005, 2014). The increase in the number of non-Luxembourgish school children is, furthermore, obvious in the distribution of children in primary school: in “*Fondamental cycle 2-4*” (children aged 6-11) they make up 50% of pupils (ibid.). Data at the level of the education system corresponds to the overall trend observed in the population but also supersedes this trend and shows that 1 in 2 in the upcoming generation will be a foreign national.

In OECD PISA data there are several identifiers for a student’s background. Questions are asked separately whether a student or his or her mother and father were born in Luxembourg; if not in Luxembourg, in which country they were born, again in three separate questions; and how old a student was when they arrived in Luxembourg. There is additionally a question on whether or not a student speaks the language of the test at home. In a Luxembourgish context this question is not well adapted: the PISA test is available in either German or French. Hence, this question can only be helpful for identifying those whose native tongue is either German (e.g. German, Austrian or Swiss students) or French (e.g. French, Belgian Canadian, or other French-speaking students). Native Luxembourgish students will answer “no” to this question, as the language they speak at home is Luxembourgish. One of the disadvantages of the PISA data is the lack of any information regarding the nationality or citizenship of a pupil and parents³. In the context of our work, we use a term “*immigrant origin*” to characterise those students who have any immigration history: born outside of Luxembourg, having parents born outside of Luxembourg or being of foreign nationality. Based on the available information major groups of origin were created: Luxembourgish, Portuguese, former Yugoslavian, Cape-Verdean, EU and non-EU.

Figure 1 and Table 1 below demonstrate what has been discussed previously: between 2003 and 2012 the percentage of native Luxembourgish students has slowly decreased by almost 20 percentage points. The most rapid growth of immigrant students has been among EU-origin students; between 2003 and 2006 they have gone up by 11 percentage points - from 11% to 22%. Portuguese students make up the second largest non-native group - their growth has been going on steadily from 16% to almost 20% in 2012. Other groups have experienced a very modest increase: the former Yugoslavian group grew by 2 percentage points and reached nearly 5%; Cape-Verdean also grew by 2 percentage points from 0.5% to 2.5%. The last group, including non-EU students, has fluctuated between 4% and 3%.

³ Information regarding a student’s nationality was provided by the SCRIPT/MEN in a fully anonymous way.

Figure 1. Native and immigrant-origin students



Source: PISA 2003, 2006, 2009, 2012 (weighted)

Table 1. Native and immigrant-origin students

Origin	2003	2006	2009	2012
Luxembourgish	65.08	53.24	52.58	46.51
Portuguese	16.19	17.02	16.48	19.84
Ex-Yugoslavian	2.94	3.36	4.34	4.83
Cape-Verdean	0.46	1.63	1.45	2.53
EU	10.72	22.30	22.37	23.27
Non-EU	4.61	2.45	2.77	3.02
Total	100.00	100.00	100.00	100.00

Source: PISA 2003, 2006, 2009, 2012 (weighted)

1.1 Born outside or in Luxembourg – 1st and 2nd generation immigrants

Immigration into Luxembourg has been a continuing phenomenon throughout the past two centuries. It implies that students who participated in the PISA study are different also with respect to the length of their residence in Luxembourg: some arrived recently, while others were already born here. It is not possible to trace immigrants to their 3rd generation – i.e. starting with the grandparents who arrived in Luxembourg several decades ago. We identify the following groups of students⁴:

- *2nd generation* - those who were already born in Luxembourg while their parents were born elsewhere.

- *1st generation* – those who, together with their parents, were born outside of Luxembourg.

These two groups can be compared to the native students, who, according to our definition, are Luxembourgish. Table 2 reveals that it is the 2nd generation students who are today the fastest growing population segment in Luxembourg. It is not an unexpected finding in the light of the ongoing and high rate of migration into Luxembourg over the last decades.

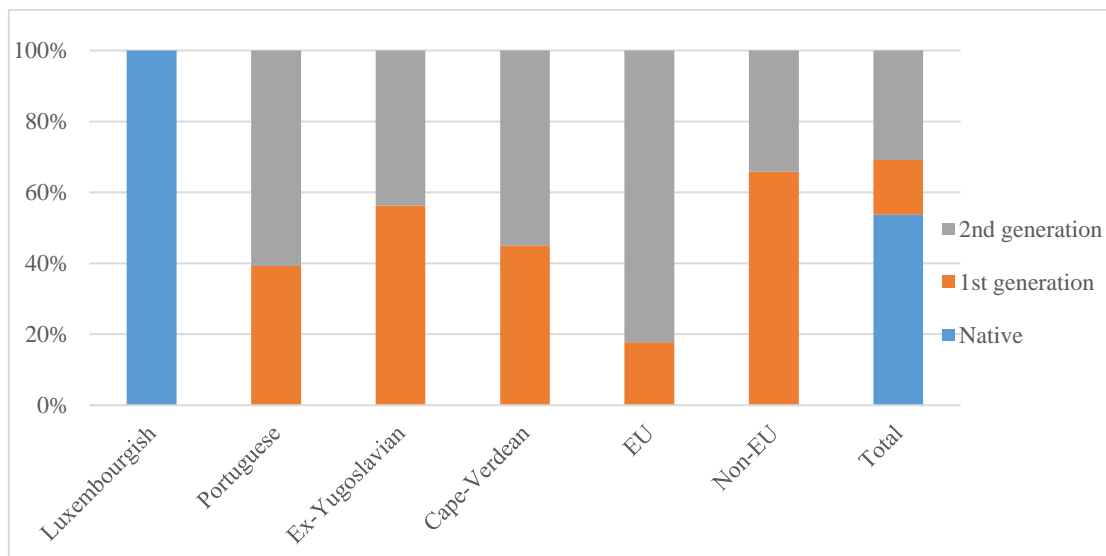
Table 2. *1st and 2nd generation students in PISA*

	2003	2006	2009	2012
Native	65.08	53.10	52.58	46.49
1 st generation	17.24	16.38	15.18	16.05
2 nd generation	17.68	30.52	32.24	37.46
Total	100.00	100.00	100.00	100.00

Source: PISA 2003, 2006, 2009, 2012 (weighted)

⁴ This definition of the 2nd and 1st generation is most commonly used in the academic literature. Some variations exist within this definition: e.g. those who were born outside of their country of residence but immigrated after having reached adolescence are considered by some authors as 1.5 generation. The definition used here is different from the one used by OECD in their publications: "...first-generation" students (those born in the country of assessment but whose parents were born in another country); and "non-native" students (those born outside the country of assessment and whose parents were also born in another country) (PISA 2003: 309).

Figure 2. 1st and 2nd generation students in PISA pooled sample, by origin



Source: PISA 2003, 2006, 2009, 2012 (weighted)

The breakdown by major groups of origin (Table 3) shows that the increase of the 2nd generation group occurs in nearly all groups, but faster in some than others. In the Portuguese-origin group the percentage of the 2nd generation has grown by 25 percentage points between 2003 and 2012, in other words nearly 70% of students with a Portuguese background interviewed in 2012 were already born in Luxembourg.

Among ex-Yugoslavian-origin students the situation has changed at an even higher speed: in 2003 a mere 7% of students were born in Luxembourg, while by 2013 this proportion reached 62%. Similar to the ex-Yugoslavian students, the Cape-Verdean-origin students also predominantly belonged to the 1st generation in 2003. Their situation is currently changing as well, and in 2012 54% of them were born in Luxembourg. The group that until now remains predominantly 1st generation is the non-EU group – only 19% in 2012 were of 2nd generation⁵.

Finally, the group that remained unchanged is that of the students of EU-origin. In 2003 77% were already of the 2nd generation, and this grew by 4 percentage points to reach 81% in 2012. These results are not surprising, given the long-term established immigration from EU countries to Luxembourg.

⁵ Data for Non-EU immigrants in 2003 should be interpreted with caution - it might likely be due to the population fluctuation which is very common in this group (e.g. higher rates of in- and out-migration).

Table 3. 1st and 2nd generation students in PISA, by origin and year

	Portuguese	Ex-Yugoslavian	Cape-Verdean	EU	Non-EU
PISA 2003					
1 st generation	56.70	92.78	82.00	22.55	55.06
2 nd generation	43.30	7.22	18.00	77.45	44.94
Total (N=3731)	100	100	100	100	100
PISA 2006					
1 st generation	40.80	81.43	47.58	16.79	83.25
2 nd generation	59.20	18.57	52.42	83.21	16.75
Total (N=4373)	100	100	100	100	100
PISA 2009					
1 st generation	35.95	40.69	35.60	20.24	88.14
2 nd generation	64.05	59.31	64.40	79.76	11.86
Total (N=4330)	100	100	100	100	100
PISA 2012					
1 st generation	31.21	38.20	45.83	18.87	81.07
2 nd generation	68.79	61.80	54.17	81.13	18.93
Total (N=4887)	100	100	100	100	100

Source: PISA 2003, 2006, 2009, 2012 (weighted)

Second generation students are also likely to become Luxembourgish nationals. In the overall sample one finds 43% of the 2nd generation students who are Luxembourgish (see Table 4).

Table 4. 1st and 2nd generation students in PISA

	Native	1 st generation	2 nd generation
Foreign		83.05	56.63
Luxembourgish	100	16.95	43.37
Total	100	100	100

Source: PISA 2003, 2006, 2009, 2012 (weighted)

1.2 A closer look at the 1st generation

Table 2 above showed that less than 20% pupils in each PISA survey were born outside of Luxembourg, i.e. that they belong to the 1st generation. Up to 50% of them arrived before the start of their primary education and 8% to 16% during their secondary education. The remaining proportion entered pre-primary and primary schools. Research evidence shows that children who arrived before the start of

compulsory schooling have longer-term exposure to the language of the host country, its education system, culture and society, which in turn positively affects their school results.

Table 5. Age at arrival in Luxembourg by key age brackets

Age at arrival	2003	2006	2009	2012	Total
0-3	42.46	51.74	41.84	41.42	44.59
4-5	22.02	12.08	15.99	12.58	15.33
6-11	28.00	25.79	26.58	30.20	27.64
12-15	7.53	10.39	15.59	15.79	12.44
Total	100.00	100.00	100.00	100.00	100.00

Source: PISA 2003, 2006, 2009, 2012 (N= 2742, weighted)

We expect to see differences between immigrant groups. Table 6 shows the Cape-Verdean are more likely to have arrived at a later age – in a pooled sample more than 70% were shown to have migrated to Luxembourg during primary or secondary school education. Results also show that EU-origin and former-Yugoslavian students have the lowest percentage points in the age bracket of 12-15 year-olds.

Table 6. Age at arrival in Luxembourg among groups by key age brackets (%)

Origin	0-3	4-5	6-11	12-15	Total
Portuguese	39.07	14.77	32.24	13.92	100.00
Ex-Yugoslavian	40.00	21.93	28.25	9.81	100.00
Cape-Verdean	19.44	5.92	39.48	35.16	100.00
EU	51.07	16.60	22.74	9.59	100.00
Non-EU	33.80	17.53	32.76	15.91	100.00
Total	44.59	15.33	27.64	12.44	100.00

Source: PISA 2003, 2006, 2009, 2012 (N=2742, weighted)

1.3 Differences in socio-economic status at student and school level

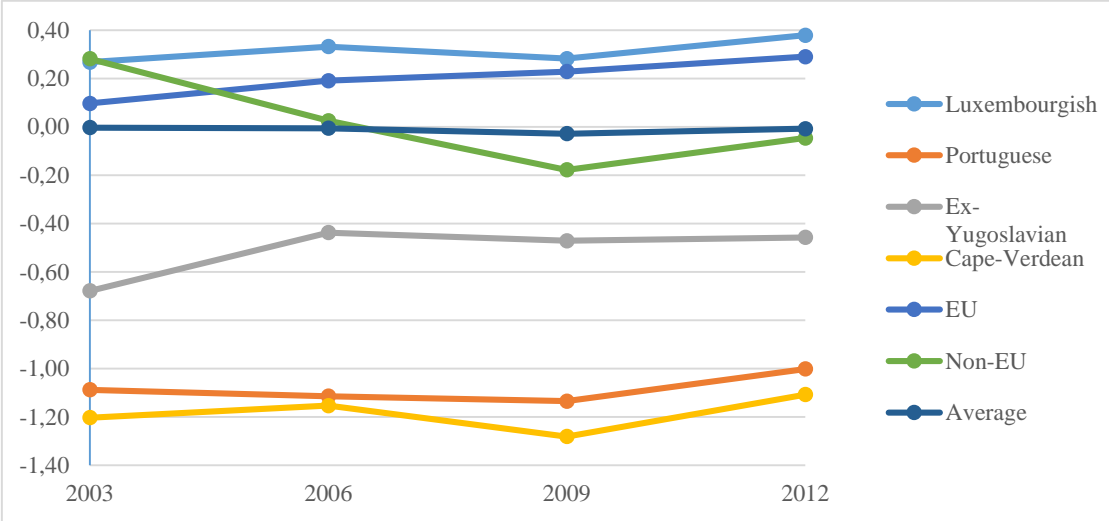
1.3.1 At the family level

Figure 3 reconfirms our knowledge about the profile of immigrant groups with respect to their socio-economic position in Luxembourg. Native and EU-origin students come from the families with the highest social, economic and cultural capital (cumulative measure available in PISA data). They are persistently above the country average rate in all PISA studies. On the other hand, two groups, Portuguese and Cape-Verdean, are among the least advantaged when it comes to their socio-economic status. Students from ex-Yugoslavia are somewhat better off than the two previous groups, but are still below the average

country level. The situation with non-EU immigrants is fairly close to the national average, except for those students who took part in the survey in 2003 who appear to be of higher socio-economic status than those in most recent years. In the overall population, the non-EU group is slowly growing and remains highly heterogeneous with respect to their region of origin (e.g. North America, Africa, Asia, etc.) as well as their economic and educational capital.

Both policy and the academic literature across all EU countries have uniformly confirmed that family background is among the most significant factors in explaining the unsatisfactory test results of immigrant students in PISA (OECD 2006, 2012). Findings for Luxembourg were in line with these studies. In the context of this paper, we look at the socio-economic differences between groups as a partial explanatory factor behind differences in test outcomes.

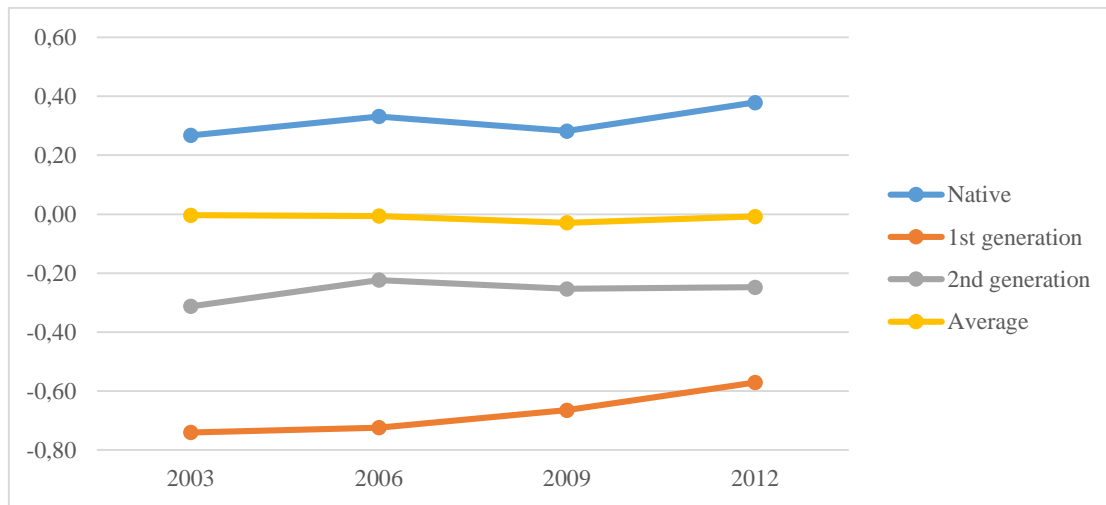
Figure 3. Average socio-economic and cultural capital of families by origin



Source: PISA 2003, 2006, 2009, 2012

There are also significant differences in socio-economic position between the 1st and 2nd generation of immigrants in Luxembourg. The 1st generation is the most disadvantaged compared both to the native and the 2nd generation. While the 2nd generation has a better standing and as such is closer to the average level, the gap with native students remains quite large. Ideally, one would want to know at which generation the gap between native and immigrant population will close. However, data that would cover several generations of immigrants are not available in Luxembourg.

Figure 4. Average socio-economic and cultural capital of families by generation

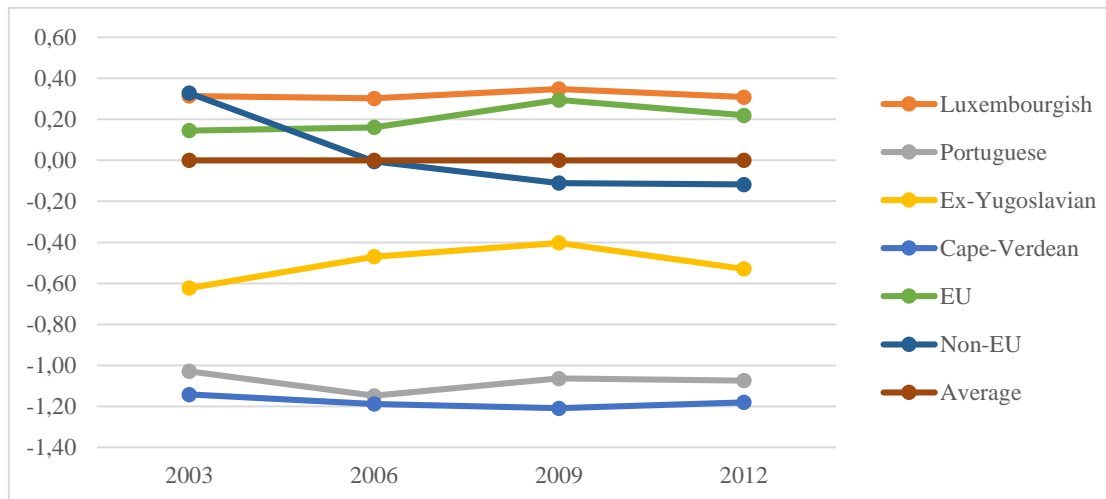


Source: PISA 2003, 2006, 2009, 2012

1.3.2 At the school level

School/class-level socio-economic segregation plays an additional important role in the schooling results of disadvantaged youth. Below is the measurement of socio-economic status for a school that students attend – it is computed by averaging the socio-economic and cultural capital index of students attending the same school. Figure 5 shows that socio-economic school segregation is evident and it is rather unfortunate that the most vulnerable groups such as the Portuguese-, ex-Yugoslavian- and Cape-Verdean-origin students attend the least favourable schools in terms of their socio-economic composition. In other words, they are more often concentrated in poorer schools. Such a situation does not occur due to a deliberate policy but stems from the core feature of the secondary education system in Luxembourg, referred to as *academic tracking*. The tracking of students into varying school programmes takes place during the transition from primary to secondary education around the age of 11-12. The placement decision has to take several parameters into account, but is mostly centred on prior academic record and the main tests that take place before the end of “Cycle 4” of primary school. The tested subjects are French and German and mathematics. Immigrant-origin students, by the end of primary school, have weak results in reading in French and German (Berg *et al.* 2009), which reflects their lower level of (foreign) language mastery. Due to such results immigrant-origin students are more likely to be placed into technical and preparatory programmes.

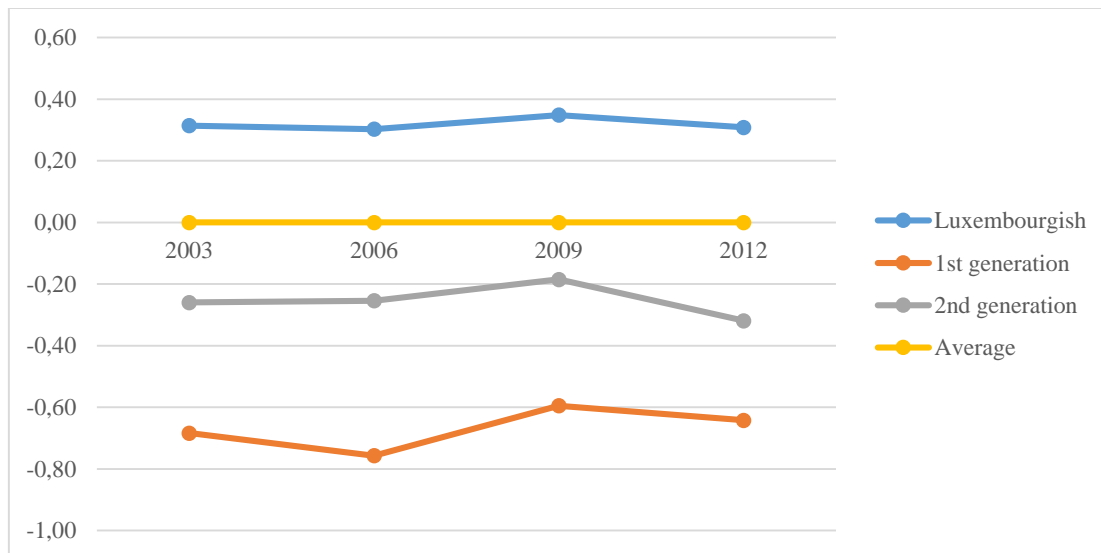
Figure 5. Average socio-economic and cultural capital of schools by origin



Source: PISA 2003, 2006, 2009, 2012 (weighted)

Figure 6 below offers both positive and negative results. On the one hand, the situation has improved for the students of the 2nd generation and they are more likely to attend schools with a socio-economic profile closer to the national average, albeit still very different from those that the native students attend. On the other hand, the situation of the 1st generation seems to be changing in the opposite direction. The students appear to be segregated in low-SES schools.

Figure 6. Average socio-economic and cultural capital of schools by generation



Source: PISA 2003, 2006, 2009, 2012 (weighted)

1.4 Differences in study programmes

As briefly discussed earlier, the Luxembourgish system is characterised by differentiated secondary school education, where students are directed into different study programmes at the start of secondary school. The decision about their placement is based on their grades and the recommendations of the teacher and a specialised team. The *ES* programme of the classical lycées in Luxembourg provide an academically oriented curriculum and high school diplomas that allow the student access to higher education. *EST* programmes are the technical lycées and include a number of programmes. Graduation from more advanced ones – *régime technique* - allows students to apply for tertiary degrees, mostly technical universities and institutes. The majority of graduates from technical schools are being prepared for entry into the labour market. They can continue their education and follow occupation-specific, non-tertiary studies. *PREP* programmes are focused on students who experience significant difficulties at school: grade repetition, poor school results.

Slightly more than 55% of PISA participants study in *EST* programmes – the results are very similar across 2003-2012 surveys (Table 7). The distribution of immigrant students across programmes corresponds to the known official statistics: they are prevalent in *EST* and *PREP* programmes. Only 6% of Cape-Verdean, 13% of Portuguese and 18% of former Yugoslavian students are enrolled in *ES* programmes, in contrast to 46% of Luxembourgish and 35% of EU students. Across all ethnic groups, Cape-Verdean-origin students have the highest proportion enrolled in *PREP* programme (nearly 29%). While such decisions are driven by factual grades and the achievement of students, recent experimental studies carried out at the University of Luxembourg have shown that teachers' tracking decisions are biased towards students with a migratory background (Glock, *et al.* 2013). In other words, among students with very similar profiles in terms of grades and behaviour notes, fewer immigrant students were recommended to *ES* programmes than natives.

Table 7. Distribution of students across study programmes by origin

		ES	EST	PREP	Total
Luxembourgish	N	4,309	4,704	379	9,392
	%	45.88	50.09	4.04	100.00
Portuguese	N	383	2,142	454	2,979
	%	12.86	71.90	15.24	100.00
Ex-Yugoslavian	N	120	457	90	667
	%	17.99	68.52	13.49	100.00
Cape-Verdean	N	16	177	78	271
	%	5.90	65.31	28.78	100.00
EU	N	1,382	1,912	175	3,469
	%	39.84	55.12	5.04	100.00
Non-EU	N	194	276	73	543
	%	35.73	50.83	13.44	100.00
Total	N	6,404	9,668	1,249	17,321
	%	36.97	55.82	7.21	100.00

Source: PISA 2003, 2006, 2009, 2012 (weighted)

Results across time (Table 8) show a slow increase of Portuguese students (by 2 percentage points) and Cape-Verdean students (4 percentage points) in ES programme, and a more rapid increase among ex-Yugoslavian students (by some 7 percentage points). Results for Luxembourgish students in ES programmes show a growth by 4 percentage points from 2003 to 2012, while their share in EST programmes have decreased by exactly the same proportion. EU students have also increased their participation in ES programmes (by 4 points). The group of non-EU students fluctuates the most: their share in PREP programme went up by 8 percentage points while their share in ES programme decreased by 5 points.

Table 8. Distribution of students across study programmes by origin and year

	ES	EST	PREP
PISA 2003			
Luxembourgish	42.18	52.58	5.24
Portuguese	10.82	72.83	16.34
Ex-Yugoslavian	13.64	62.01	24.35
Cape-Verdean	0.00	70.67	29.33
EU	35.79	59.60	4.61
Non-EU	37.82	53.20	8.98
Total	35.19	57.00	7.81
PISA 2006			
Luxembourgish	45.36	51.38	3.26
Portuguese	11.90	69.86	18.23
Ex-Yugoslavian	12.14	64.12	23.74
Cape-Verdean	2.76	72.89	24.35
EU	38.04	55.11	6.85
Non-EU	29.50	50.32	20.19
Total	35.83	56.11	8.06
PISA 2009			
Luxembourgish	46.59	50.23	3.19
Portuguese	13.95	72.46	13.59
Ex-Yugoslavian	20.46	73.03	6.51
Cape-Verdean	7.42	62.47	30.11
EU	38.37	57.80	3.84
Non-EU	37.59	52.98	9.43
Total	37.42	56.83	5.76
PISA 2012			
Luxembourgish	46.51	48.85	4.63
Portuguese	12.74	74.45	12.80
Ex-Yugoslavian	20.06	72.61	7.32
Cape-Verdean	7.20	63.36	29.44
EU	40.74	54.57	4.69
Non-EU	32.48	50.48	17.04
Total	35.77	56.83	7.40

Source: PISA 2003, 2006, 2009, 2012 (weighted)

Results across generations show some positive development for some immigrant students. The 2nd generation offspring is entering ES programmes at a significantly higher rate: 30% vs 19% for the 1st generation. But they are still below the level of Luxembourgish students (46%). The 2nd generation is also less likely to attend PREP programmes – only slightly more than 6% were enrolled, against 19% of the 1st generation.

Table 9. Distribution of students across study programmes by generation

		ES	EST	PREP	Total
Native	N	4,308	4,699	378	9,385
	%	45.90	50.07	4.03	100.00
1 st generation	N	522	1,710	530	2,762
	%	18.90	61.91	19.19	100.00
2 nd generation	N	1,574	3,259	341	5,174
	%	30.42	62.99	6.59	100.00
Total	N	6,404	9,668	1,249	17,321
	%	36.97	55.82	7.21	100.00

Source: PISA 2003, 2006, 2009, 2012 (weighted)

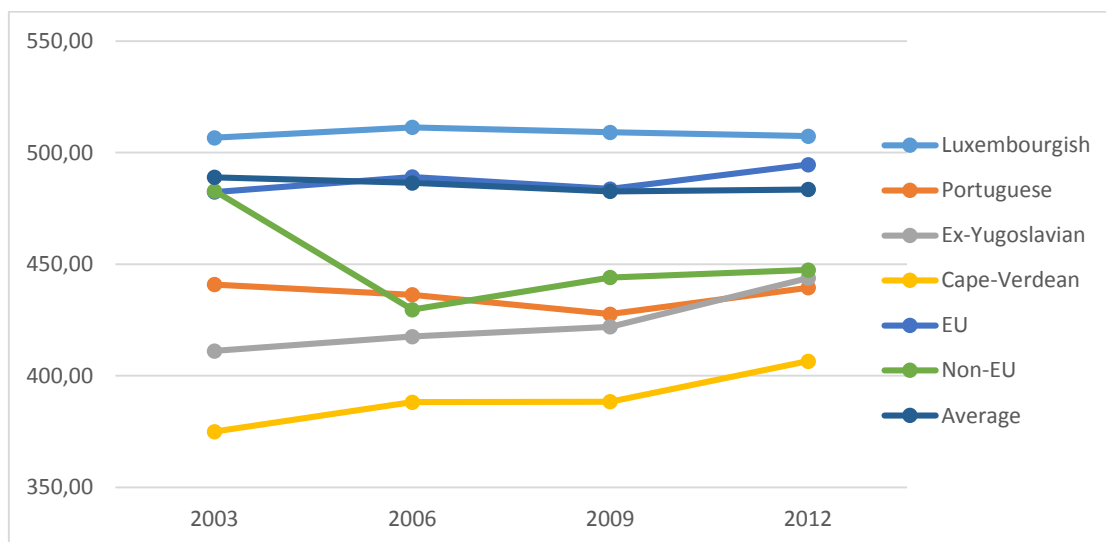
2. Changes in the OECD PISA test results over time

We now look at the actual test results and focus on two major domains that were repeatedly tested across all PISA studies: reading and mathematics skills. As our focus is on Luxembourgish schools, we omitted all international private schools from the analysis. Results presented here differ slightly from those published in the National PISA 2012 report (SCRIPT/MENJE & EMACS/University of Luxembourg, 2013: 55)

2.1 Results in mathematics

Between 2003 and 2012 there has been a very small drop (of 5 points) in the national average result in mathematics. On the positive side, there is a very significant improvement among Yugoslavian-origin students, who increased their average maths results by 31 points. Cape-Verdean students had an even bigger improvement, however, the results are not statistically significant. Other groups have had some fluctuations between the surveys, however, no big or significant changes were observed in 2012 (see Table 10).

Figure 7. PISA test results in mathematics by origin and year



Source: PISA 2003, 2006, 2009, 2012 (weighted)

Table 10. Average change in mathematics test results since 2003 by origin

	Luxembourgish	Portuguese	Ex-	Cape-	EU	Non-EU
2003	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2006	4.90*	-4.43	1.75	25.02	7.39	-45.13***
2009	0.66	-13.54**	6.77	23.54	-4.36	-18.72
2012	0.51	-1.13	30.62**	39.96	9.12	-16.45
ESCS	31.93***	4.77**	14.28***	10.00	35.28***	28.13***
Gender	19.91***	12.43***	23.06***	1.03	19.15***	19.48*
Constant	464.44***	428.04***	387.37***	376.54***	445.79***	439.26***
R2	0.12	0.01	0.06	0.03	0.16	0.16
N	9208	2930	655	262	3420	513

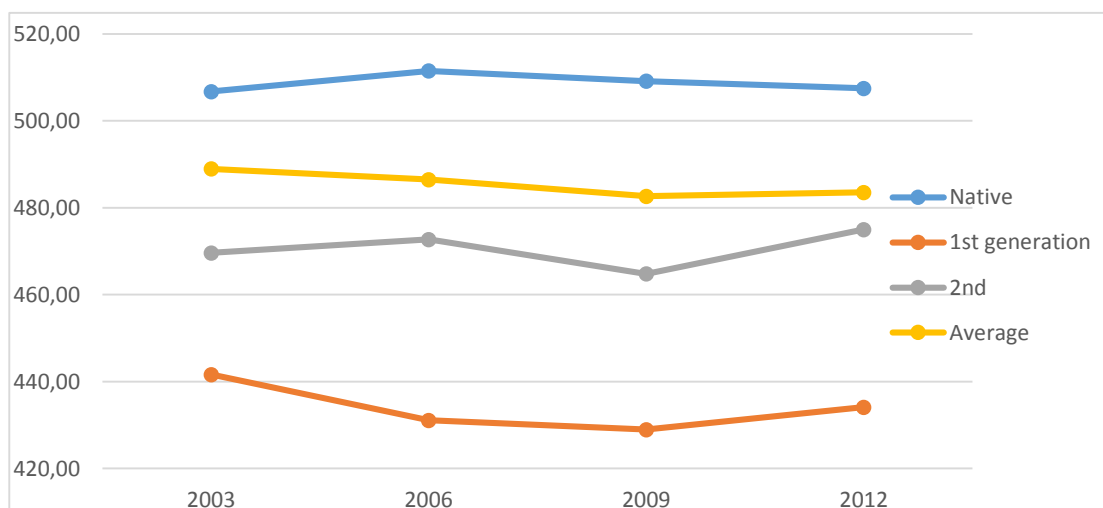
Source: PISA 2003, 2006, 2009, 2012 (weighted)

*significant at $p < 0.05$; ** significant at $p < 0.005$; *** significant at $p < 0.001$

ESCS – index of socio-economic and cultural status

The results broken down by generations show that the 2nd generation performs better by far than the 1st generation, but their results still remain below the national average (Figure 8). Results over time for both generations have remained stable since 2003. While there was some drop in performance among 1st generation students in 2006 and 2009 compared to 2003, a follow-up study in 2012 revealed that the latest results were similar to those of 2003. Native Luxembourgish students scored persistently above the national average but without any significant change since 2003.

Figure 8. PISA test results in mathematics by generations



Source: PISA 2003, 2006, 2009, 2012 (weighted)

Table 11. PISA test results in mathematics by generations and year

	Native	1st generation	2 nd generation
2003	<i>Ref.</i>	<i>Ref.</i>	<i>Ref.</i>
2006	4.94*	-8.72	3.22
2009	0.66	-14.50**	-6.56
2012	0.53	-6.91	6.89
ESCS	31.92***	24.53***	26.87***
Gender	19.91***	12.02***	16.30***
Constant	464.45***	439.37***	451.31***
R2	0.12	0.11	0.12
N	9201	2681	5106

Source: PISA 2003, 2006, 2009, 2012 (weighted)

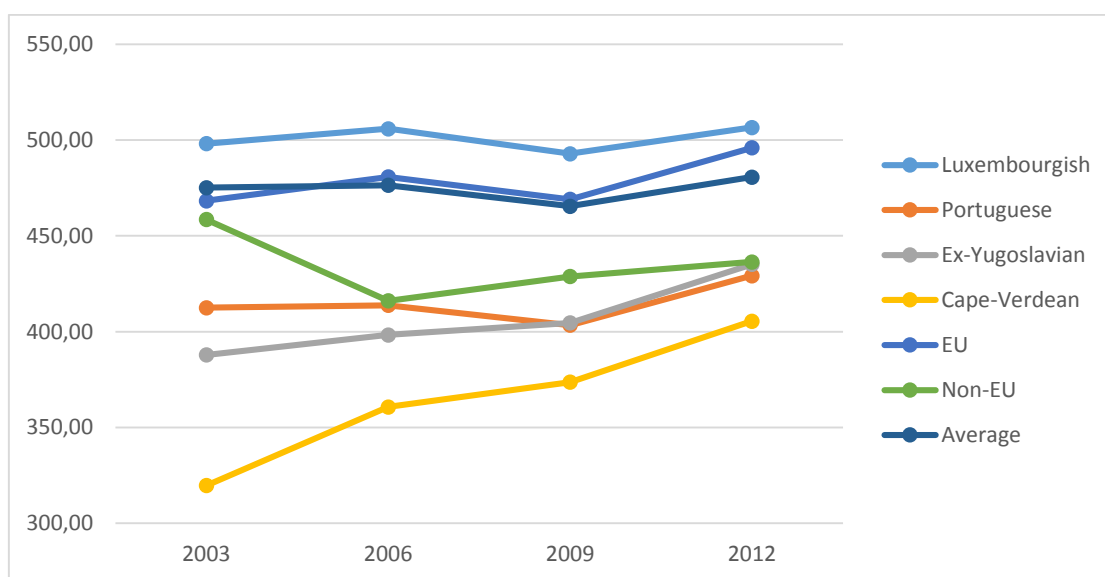
*significant at $p < 0.05$; ** significant at $p < 0.005$; *** significant at $p < 0.001$

ESCS – index of socio-economic and cultural status

2.2 Results in reading

As with mathematics, we observe Portuguese, Cape-Verdean, EU and ex-Yugoslavian origin students performing below the national average in PISA reading tests (Figure 8). However, in contrast to the results in mathematical tests, there has been a significant increase since 2003 among all immigrant origin groups, except for the non-EU (Table 12). Results have also statistically improved among native Luxembourgish students (by an average of 10 points) between 2003 and 2012. The largest, as well as the most surprising change since 2003 in any immigrant population group, took place among ex-Yugoslavian (by 47 points) and Cape-Verdean students (by 86 points). More moderate changes took place among Portuguese (15 points) and EU-origin students (26 points). As with the results in mathematics, EU-origin students receive better test scores in reading and are relatively close to the native Luxembourgish students.

Figure 9. PISA test results in reading by origin and year



Source: PISA 2003, 2006, 2009, 2012 (weighted)

Table 12. Average change in reading test results since 2003 by origin

	Luxembourgish	Portuguese	Ex-Yugoslavian	Cape-Verdean	EU	Non-EU
2003	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2006	10.06***	-0.60	8.12	46.15	13.28*	-45.72***
2009	-5.44*	-10.90*	15.69	49.92	-3.77	-15.77
2012	10.10***	14.83**	46.87***	85.98**	25.80**	-9.35
ESCS	32.70***	8.88***	16.79***	10.15	37.37**	31.18***
Gender	-32.90***	-40.03***	-37.44***	-58.87***	-	-44.09***
Constant	533.75***	484.88***	453.79***	420.96***	509.36*	519.16**
R2	0.13	0.06	0.09	0.14	0.19	0.17
N	9208	2930	655	262	3420	513

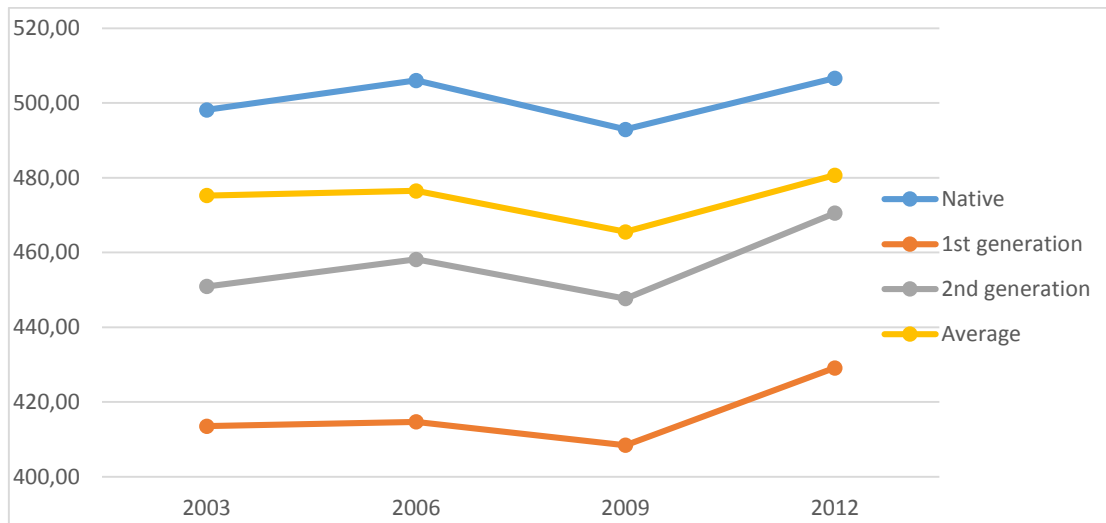
Source: PISA 2003, 2006, 2009, 2012 (weighted)

*significant at $p < 0.05$; ** significant at $p < 0.005$; *** significant at $p < 0.001$

ESCS – index of socio-economic and cultural status

Reading results classed by generation show that, similarly to mathematics results, the 2nd generation students deliver at a consistently higher level than the 1st generation (Figure 10). Their results are slowly approaching the average national level. Table 13 shows that each of the groups had improved their results, in particular between 2009 and 2012. The overall performance change from 2003 to 2013 was 11 points among the 1st generation and 22 points among the 2nd generation.

Figure 10. PISA test results in reading by generations



Source: PISA 2003, 2006, 2009, 2012 (weighted)

Table 13. Average change in reading test results since 2003 by generation

	Native	1st generation	2 nd generation
2003	(Ref.)	(Ref.)	(Ref.)
2006	10.12***	-2.36	7.42
2009	-5.44*	-10.06	-5.03
2012	10.11***	11.39*	22.20***
ESCS	32.68***	28.15***	31.71***
Gender	-32.89***	-44.88***	-36.78***
Constant	533.74***	502.99***	512.94***
R2	0.13	0.14	0.17
N	9201	2681	5106

Source: PISA 2003, 2006, 2009, 2012 (weighted)

*significant at $p < 0.05$; ** significant at $p < 0.005$; *** significant at $p < 0.001$

ESCS – index of socio-economic and cultural status

2.3 Age at arrival and school performance

There is a large body of international empirical evidence to show that the older students are at the moment of arrival, the harder it is for them to perform at higher level. This also holds true for students born outside of Luxembourg: those who arrived during their secondary schooling studies score on average 41 points lower in mathematics and 48 points in reading, compared to those who were 0-3 years old when they arrived in Luxembourg. Results also show that having arrived during primary school (age 6-11) has a penalty of on average 20 points, both in reading and mathematics. No differences in test results are, however, noted between the reference group and those who were between 4-5 years old at the moment of arrival.

Table 14. Age at arrival and test results

Age at arrival	Mathematics	Reading
0-3	Ref.	Ref.
4-5	-3.66	-5.71
6-11	-20.03***	-19.95***
12+	-41.33***	-48.04***
ESCS	26.48***	31.04***
Gender	15.59***	-40.96***
Constant	443.77***	518.02***
R2	0.17	0.20
N	2900	2900

Source: PISA 2003, 2006, 2009, 2012 (weighted)

*significant at $p < 0.05$; ** significant at $p < 0.005$; *** significant at $p < 0.001$

ESCS – index of socio-economic and cultural status

2.4 Difference in performance across study programmes

As expected, there are significant variations in results across the school programmes: with the highest scores being achieved by students in ES programmes and the lowest at the PREP programmes. Across all origins, the tendency is identical. The gap in achievement is large – on average 200 points. The gap between EST and ES is also significantly large: almost 100 points.

Table 15. PISA test results in mathematics by school programme and origin

	ES	EST	PREP
Luxembourgish	561.7	473.45	360.25
Portuguese	528.35	439.22	344.04
Ex-Yugoslavian	513.82	423.46	329.33
Cape-Verdean	517.37	411.27	334.59
EU	552.12	457.62	344.61
Non-EU	534.46	432.27	331.02
Average	556.27	459.45	346.73

Source: PISA 2003, 2006, 2009, 2012 (weighted)

An important and less explored finding refers to an observed gap in PISA scores across the three school programmes for each of the groups of origin (Table 16). In other words, students of e.g. Luxembourgish origin in ES programme have an average advantage of 84 points compared to Luxembourgish students in EST programme, after controlling for the basic set of individual background and the year of survey. Within the same Luxembourgish group, the advantage of someone in an ES programme over a student on the PREP track is on average 193 points. One notable finding is that this pattern is identical within each group of origin. In such a setting, the migratory background in itself does not determine the observed gap, nor does belonging to a different migratory generation (1st vs 2nd) – see Table 18.

Table 16. Average gap in mathematics tests by school programme and origin

	Luxembourgish	Portuguese	Ex-Yugoslavian	Cape-Verdean	EU	Non-EU
ES	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
EST	-84.22***	-91.19***	-93.91***	-99.64***	-86.65***	-93.14***
PREP	-193.27***	-191.43***	-196.07***	-177.35***	-195.43***	-188.29***
2003	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2006	-0.70	-3.45	5.19	13.10	7.51	-30.70***
2009	-4.37*	-18.68***	-13.83	12.32	-4.61	-27.56**
2012	-4.29*	-6.00	9.03	28.69	6.28	-15.23
ESCS	8.97***	-0.71	2.36	1.00	12.60***	8.87**
Gender	28.75***	25.04***	37.75***	7.89	28.67***	27.30***
Constant	514.93***	500.32***	463.46***	481.90***	498.00***	502.01***
R2	0.39	0.37	0.40	0.30	0.42	0.51
N	9208.00	2930.00	655.00	262.00	3420.00	513.00

Source: PISA 2003, 2006, 2009, 2012 (weighted)

*significant at $p < 0.05$; ** significant at $p < 0.005$; *** significant at $p < 0.001$

ESCS – index of socio-economic and cultural status

Table 17. PISA test results in mathematics by school programme and generation

	ES	EST	PREP
Luxembourgish	561.70	473.47	360.03
1 st generation	532.45	433.73	338.30
2 nd generation	547.37	448.57	344.70

Source: PISA 2003, 2006, 2009, 2012 (weighted)

Table 18. Average gap in mathematics tests by school programme and generation

	Luxembourgish	1 st generation	2 nd generation
ES	Ref.	Ref.	Ref.
EST	-84.19***	-92.67***	-92.19***
PREP	-193.48***	-189.90***	-198.63***
2003	Ref.	Ref.	Ref.
2006	-0.74	-3.27	1.78
2009	-4.37*	-17.66***	-10.79**
2012	-4.28*	-6.26	1.32
ESCS	8.99***	6.01***	9.19***
Gender (male)	28.73***	25.28***	27.96***
Constant	514.94***	501.30***	505.41***
R2	0.39	0.44	0.42
N	9201.00	2681.00	5106.00

Source: PISA 2003, 2006, 2009, 2012 (weighted)

*significant at $p < 0.05$; ** significant at $p < 0.005$; *** significant at $p < 0.001$

ESCS – index of socio-economic and cultural status

The trend in reading results is similar to that in mathematics, except that the gap between PREP and ES students is even larger – more than 230 points, while the gap between EST and ES students is around 130 points.

Table 19. PISA test results in reading by study programme and origin

	ES	EST	PREP
Luxembourgish	557.18	463.76	336.99
Portuguese	524.11	421.42	299.18
Ex-Yugoslavian	514.10	408.95	286.28
Cape-Verdean	518.87	407.11	293.41
EU	550.70	447.45	316.64
Non-EU	527.05	412.12	304.24
Average	551.95	115.85	312.11

Source: PISA 2003, 2006, 2009, 2012 (weighted)

Again, the pattern of the gap between programmes is identical with the one observed in mathematics. Within each of the groups of origin, students in ES have higher scores in reading than their peers in EST and PREP. These differences are comparable in magnitude across the groups.

Table 20. Average gap in reading tests by school programme and origin

	Luxembourgish	Portuguese	Ex-Yugoslavian	Cape-Verdean	EU	Non-EU
ES	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
EST	-85.18***	-101.65***	-101.79***	-105.85***	-90.00***	-100.79***
PREP	-206.50***	-218.84***	-221.59***	-217.92***	-213.30***	-207.33***
2003	Ref.	Ref.	Ref.	Ref.	Ref.	Ref.
2006	4.17*	0.64	11.93	30.03	13.62**	-29.78**
2009	-10.71***	-16.76***	-8.05	36.69	-4.05	-25.41**
2012	5.16*	9.24*	22.02*	72.23***	22.89***	-7.94
ESCS	9.03***	2.68	3.45	-2.00	13.35***	10.07**
Gender (male)	-23.81***	-25.49***	-20.80***	-48.71***	-23.66***	-35.54***
Constant	585.34***	565.47***	537.08***	535.64***	563.85***	587.37***
R2	0.40	0.41	0.43	0.47	0.45	0.51
N	9208.00	2930.00	655.00	262.00	3420.00	513.00

Source: PISA 2003, 2006, 2009, 2012 (weighted)

*significant at $p < 0.05$; ** significant at $p < 0.005$; *** significant at $p < 0.001$

ESCS – index of socio-economic and cultural status

Findings in Tables 21 and 22 display the patterns in reading results that are similar to those observed in mathematics for students of the 1st and 2nd immigrant generation. Regardless of the fact of being born in Luxembourg, or having immigrated afterwards, those in ES programmes have a reading advantage over their peers in EST and PREP tracks.

Table 21. PISA test results in reading by study programme and generation

	ES	EST	PREP
Luxembourgish	557.19	463.75	336.94
1 st generation	530.34	419.21	299.28
2 nd generation	544.90	434.60	304.50
Average	551.95	115.85	312.11

Source: PISA 2003, 2006, 2009, 2012 (weighted)

Table 22. Average gap in reading tests by school programme and generation

	Luxembourgish	1st generation	2 nd generation
ES	Ref.	Ref.	Ref.
EST	-85.19***	-101.58***	-96.66***
PREP	-206.60***	-218.12***	-219.10***
2003	Ref.	Ref.	Ref.
2006	4.15*	4.34	5.87
2009	-10.72***	-13.56**	-9.73**
2012	5.16*	12.29**	16.11***
ESCS	9.05***	7.18***	12.85***
Gender	-23.81***	-29.50***	-24.08***
Constant	585.34***	570.82***	569.77***
R2	0.40	0.48	0.45
N	9201.00	2681.00	5106.00

Source: PISA 2003, 2006, 2009, 2012 (weighted)

*significant at $p < 0.05$; ** significant at $p < 0.005$; *** significant at $p < 0.001$

ESCS – index of socio-economic and cultural status

3. Students' engagement at school

One of the primary aims of the OECD PISA project is to offer data and analytical resources for a better understanding of the extent to which today's young people are prepared for an active role in society as they reach adulthood. Apart from the traditional test results, OECD PISA collects additional information that can assist both research and policy actors. In the context of our work, we use some of these data to understand whether students of immigrant background feel good in Luxembourg – accepted, supported by their teachers, and whether they have a school environment that is conducive to learning.

Throughout the different years of surveys (however, not repeatedly in every survey), participants answered a number of questions, which were used for building the following indices:

- Sense of belonging at school – available in PISA 2003 and 2009;
- Attitudes towards school – available in PISA 2003, 2009 and 2009;
- Disciplinary climate during the lessons – available in PISA 2003, 2009 and 2009;
- Teacher's support - available in PISA 2003 and 2009;
- Student-teacher relations - available in PISA 2009 and 2012

32

International research offers evidence that positive perceptions of school, their peers and their teachers are either directly linked with better results in PISA tests, or help to mediate the effect of low socio-economic background on achievement. Importantly, it has been argued that these conditions at school can be more easily changed than e.g. students' socio-economic backgrounds. It is, thus, of significant value for any educational system to look closely at these factors.

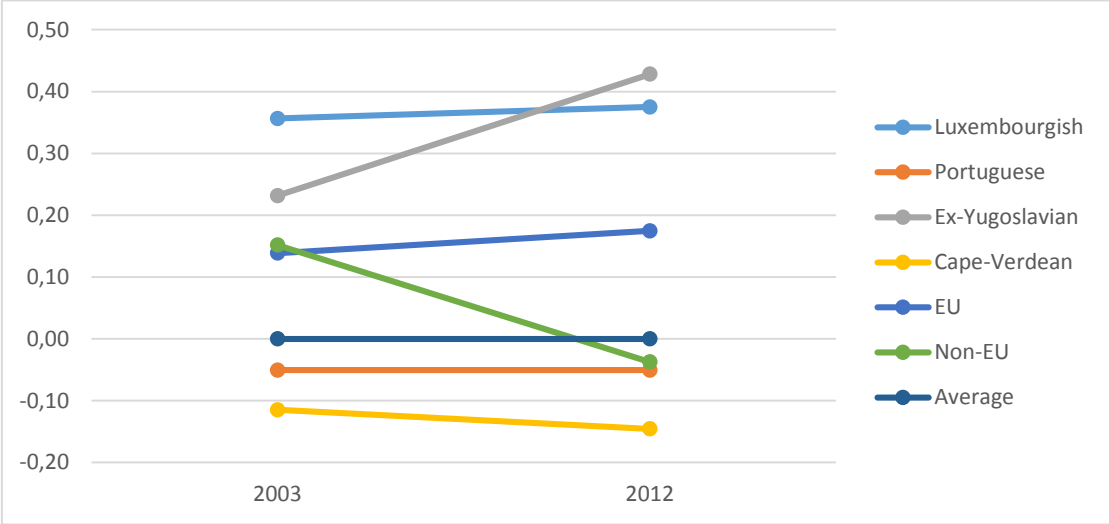
There is no separate study in Luxembourg on how immigrant children adapt to schools: how they build friendships with peers, interact with teachers, how good they feel within their new environment, etc. While PISA does not allow us to study the social integration of immigrant children in greater depth, some indicators can be derived from the data which could be helpful for teachers and school principals in general. For the purpose of ease of interpretation and comparison across the years, the national average values are centred around zero. All positive values point to a higher than the national average level, and negative values point to a lower than the national average level.

3.1 Sense of belonging at school

Students were asked about their perception of themselves in the school context, such as whether their school was a place where they felt like an outsider, made friends easily, felt like they belonged, felt awkward and out of place or felt lonely. These questions were asked in 2003 and later in 2012.

Results in Figure 11 show different tendencies among immigrant groups: while ex-Yugoslavian and EU-origin students have reported a higher level of feeling of belonging in 2012 compared to 2003, other groups such as Portuguese and Cape-Verdean, which are very vulnerable in terms of their socio-economic position and school performances, reported below-average level feeling of belonging. Luxembourgish students have very strong feelings of belonging – much above the national average.

Figure 11. Feeling of belonging by origin over time



Source: PISA 2003, 2012 (weighted)

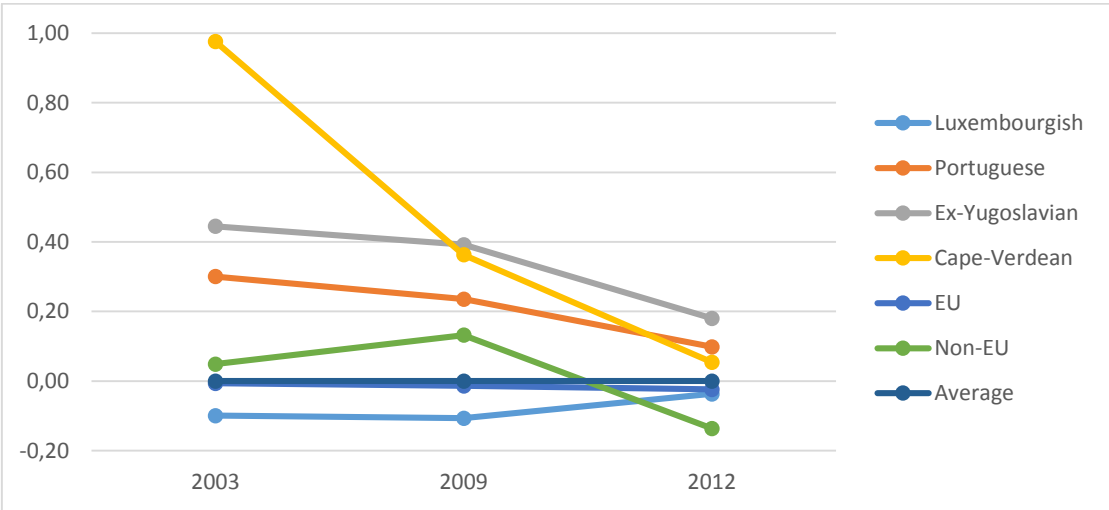
3.2 Attitudes towards school

PISA participants were asked if, in their opinion, school prepared them for adult life, gave them confidence to make decisions, taught them things that could be useful in their job, or whether it had been a waste of time. Their answers were used together to analyse their attitudes towards schools.

Literature on youth and education shows that young people do not possess all the information and advice needed to make the most optimal choices and decisions that influence their education and future occupation. This holds especially true for youth with a disadvantaged background: parents with low education, poor households, as well as youth with migratory backgrounds whose parents cannot offer advice or support due to their own lack of knowledge of e.g. educational options available to their children, structure of the labour market, etc. As a result immigrant youth become disillusioned about education and its potential value. One of the educational experts in Luxembourg interviewed in 2012 for another study shared a similar observation about the 1st generation students whose parents have none, or at most, primary education.

The data below shows that all immigrant groups, except for EU students, have had higher than average positive attitudes towards education in 2003. Cohorts in 2009 and 2012 were moved closer to the average level. In 2012 it was non-EU students who had the least positive opinion about the role of education compared to others.

Figure 12. Attitudes towards school by origin over time



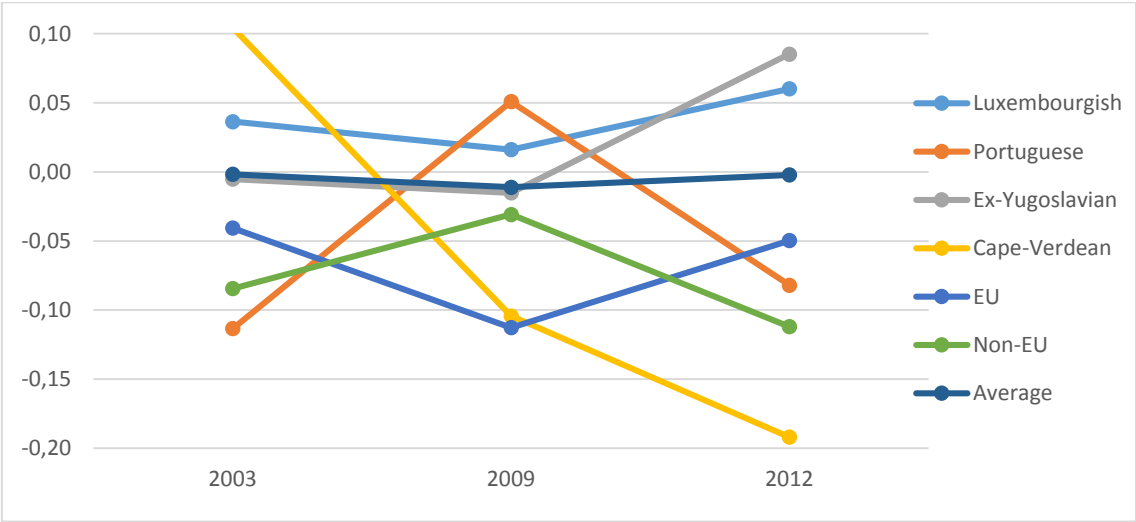
Source: PISA 2003, 2009, 2012 (weighted)

3.3 Disciplinary climate

The PISA index of disciplinary climate was derived from students' answers about: the frequency with which students do not listen to what the teacher says during lessons; there is noise and disorder; the teacher has to wait a long time for students to be quiet; students cannot work well due to noise and disorder; and students do not start working for a long time after the lesson begins.

Disciplinary climate is found to have a positive effect on individual and class-level results in various studies. It benefits the educational outcome not only of the disadvantaged students, but of all students in general. Results in Figure 13 do not allow one to draw a clear conclusion on whether the disciplinary climate is improving or is deteriorating further. Native and ex-Yugoslavian immigrant groups gave more positive, above country average, impressions about classroom discipline in 2012. On the other hand, we also observe a drastic decline in the perception of this climate among Portuguese, Cape-Verdean and non-EU students.

Figure 13. Disciplinary climate by origin over time



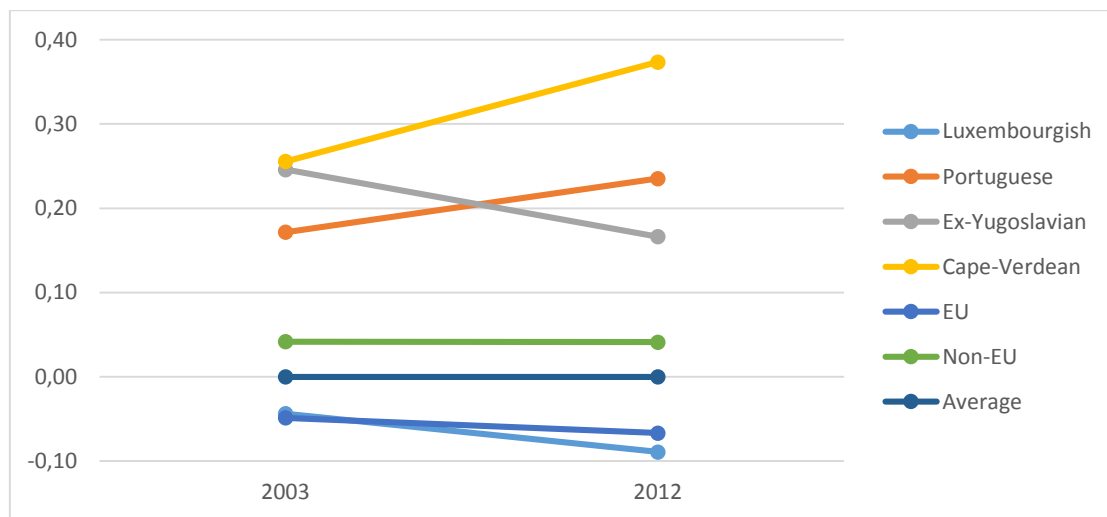
Source: PISA 2003, 2009, 2012 (weighted)

3.4 Teacher's support

The PISA index of teacher support was derived from students' reports on the frequency with which: the teacher shows an interest in every student's learning; the teacher gives extra help when students need it; the teacher helps students with their learning; the teacher continues teaching until the students understand; and the teacher gives students an opportunity to express opinions.

More vulnerable immigrant students – Portuguese, Cape-Verdean and ex-Yugoslavian, - are perceived as receiving more support from teachers than other groups. Their reported level of perceived support is significantly above the national average. However, it appears that there is no positive relation between teacher support and student's output in PISA studies in other countries (Mathematics Teaching and Learning Strategies in PISA 2010:129).

Figure 14. Teacher support by origin over time



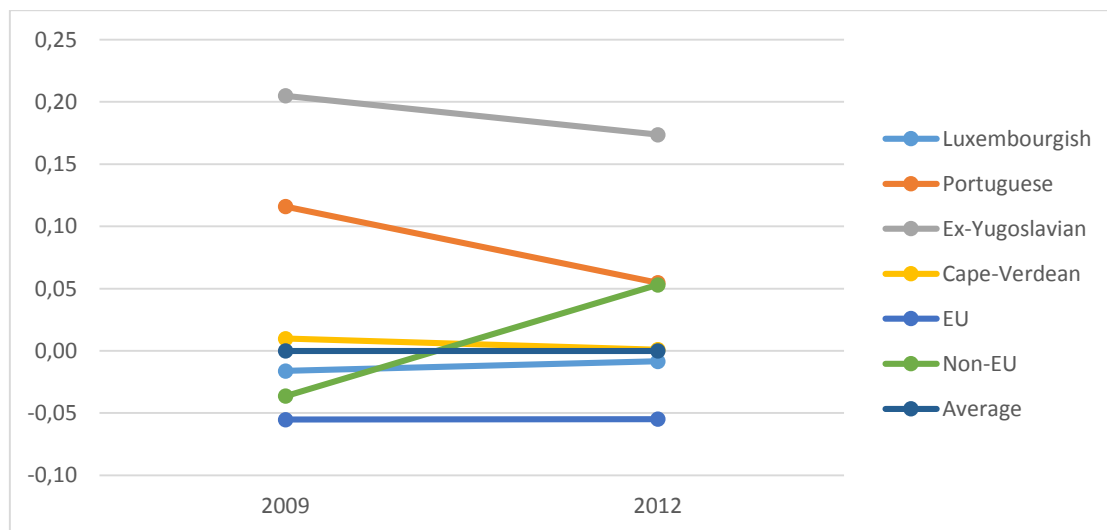
Source: PISA 2003, 2012 (weighted)

3.5 Student-teacher relations

Apart from the perception of teacher's support, PISA asked students whether students got along with their teachers, whether teachers were interested in students' personal well-being, whether teachers took the students seriously, whether teachers were a source of support if the students needed extra help, and whether teachers treated students fairly.

The data shows that Portuguese and Yugoslavian-origin students reported significantly better perception of student-teacher relations than the national average in 2009. The situation appears to have changed strongly for these two groups: their perception of the quality of relations with teachers, while is still above the national level, has decreased in 2012. EU-origin students appear to have lower than average perception of relations with the teachers.

Figure 15. Perception of teacher-student relations by origin over time



Source: PISA 2009, 2012 (weighted)

3.6 On the association between students' engagement and test outcomes

PISA data does not observe the same individual over time like a panel study would do, hence no conclusion about the causal relationship between level of school engagement and test results can be drawn. In other words, we cannot argue that e.g. a higher level of belonging has a positive effect on mathematics or reading results, or the other way around. Therefore, in this section we describe the association between school engagement and test outcomes.

Results in Tables 23 and 24 reveal that a higher feeling of belonging, positive attitude towards school, better disciplinary climate, positive perception of teacher-student interaction are all positively associated with the test results of students in mathematics and reading. The disciplinary climate appears to have a stronger association with both test outcomes and these findings are consistent with findings reported for other countries. Teacher support, on the other hand, has a negative value for both test results. It does not mean that the teacher's support has negative effect on results, but that a lower level of perceived help is on average higher among students who perform at the lower levels.

Table 23. OLS regression results for mathematics and student's school engagement

	Model 1	Model 2	Model 3	Model 4	Model 5
Feeling of belonging	6.25***				
Attitudes towards school		2.35**			
Disciplinary climate			11.30***		
Teacher support				-6.43***	
Teacher-student relations					3.98***
ESCS	25.99***	26.54***	26.47***	25.57***	26.34***
Gender	19.59***	19.60***	19.74***	20.45***	18.80***
Luxembourgish	Ref.	Ref.	Ref.	Ref.	Ref.
Portuguese	-24.51***	-30.12***	-30.67***	-26.02***	-34.21***
Ex-Yugoslavian	-48.84***	-53.82***	-52.57***	-45.21***	-48.58***
Cape-Verdean	-52.70***	-57.31***	-57.85***	-56.56***	-52.99***
EU	-13.22***	-18.56***	-17.44***	-14.72***	-18.29***
Non-EN	-31.74***	-35.51***	-33.93***	-30.22***	-44.59***
Constant	464.91***	468.97***	469.49***	463.72***	469.11***
R2	0.19	0.18	0.20	0.18	0.18
N	6762	10736	1080	6727	7335

Source: PISA 2003, 2006, 2009, 2012 (weighted)

*significant at $p < 0.05$; ** significant at $p < 0.005$; *** significant at $p < 0.001$

ESCS – index of socio-economic and cultural status

Table 24. OLS regression results for reading and student's school engagement

	Model 1	Model 2	Model 3	Model 4	Model 5
Feeling of belonging	8.01***				
Attitudes towards school		3.37***			
Disciplinary climate			12.11***		
Teacher support				-7.71***	
Teacher-student relations					1.94*
ESCS	25.09***	27.23***	26.88***	24.59***	27.43***
Gender	-33.73***	-35.33***	-34.90***	-32.45***	-38.97***
Luxembourgish	Ref.	Ref.	Ref.	Ref.	Ref.
Portuguese	-37.20***	-39.37***	-39.80***	-38.64***	-39.73***
Ex-Yugoslavian	-57.04***	-58.49***	-57.57***	-54.40***	-48.74***
Cape-Verdean	-52.87***	-57.13***	-58.22***	-56.16***	-48.29***
EU	-10.73***	-17.56***	-16.38***	-12.70***	-15.69***
Non-EN	-38.13***	-37.13***	-35.84***	-36.73***	-44.20***
Constant	539.16***	542.15***	542.51***	537.70***	545.80***
R2	0.20	0.20	0.22	0.20	0.20
N	6762	10736	10805	6727	7335

Source: PISA 2003, 2006, 2009, 2012 (weighted)

*significant at $p < 0.05$; ** significant at $p < 0.005$; *** significant at $p < 0.001$

ESCS – index of socio-economic and cultural status

If we look at the results within each national group, we see that the association between various aspects of school integration and test outcomes vary. Among native Luxembourgish students, we observe a stronger association between the disciplinary climate and test outcomes. Weaker, but statistically significant positive association is observed for the feeling of belonging at school and a positive perception of student-teacher relations and PISA results. Portuguese-origin students have a positive correlation between both test outcomes and the feeling of belonging, attitude towards school and disciplinary climate. Ex-Yugoslavian students' results are positively linked with the feeling of belonging and negatively with the perceived level of teacher support. Other dimensions are statistically insignificant. There are no statistically significant associations between school integration and PISA results in both mathematics and reading among Cape-Verdean students. The results for EU-origin students reveal the opposite picture, as all dimensions of school integration are correlated with the test results (with the exception of reading and teacher-student relations). Among the non-EU students, the feeling of belonging is positively correlated with the reading test results as is the disciplinary climate. For all the groups teacher support is negatively associated with the test results (albeit insignificant for Cape-Verdean and reading results for ex-Yugoslavian students).

Table 25. OLS regression results for mathematics and student's school engagement within groups

	Luxembourgish	Portuguese	Ex-Yugoslavian	Cape-Verdean	EU	Non-EU
Feeling of belonging	4.80***	6.16**	14.81**	15.07	8.23***	7.52
Attitudes towards school	0.75	5.31**	1.17	3.27	4.37*	-2.70
Disciplinary climate	11.02***	9.50***	6.27	-4.23	12.92***	12.13**
Teacher support	-5.62***	-5.75**	-9.71*	-9.53	-6.45**	-12.67*
Teacher-student relations	5.53***	0.08	-2.55	-7.37	4.70*	6.49

Source: PISA 2003, 2006, 2009, 2012 (weighted); partial output - full results are available on request
*significant at $p<0.05$; ** significant at $p<0.005$; *** significant at $p<0.001$

Table 26. OLS regression results for reading and student's school engagement within groups

	Luxembourgish	Portuguese	Ex-Yugoslavian	Cape-Verdean	EU	Non-EU
Feeling of belonging	5.80***	10.72***	17.02**	22.02	8.62***	14.24**
Attitudes towards school	2.03	5.82**	6.44	-6.62	4.89*	-1.45
Disciplinary climate	11.84***	10.69***	5.94	-4.61	13.90***	13.76**
Teacher	-6.78***	-9.61***	-7.73	-5.00	-7.26**	-12.52*
Teacher-student	3.43**	-2.31	0.33	-3.22	1.50	4.87

Source: PISA 2003, 2006, 2009, 2012 (weighted); partial output - full results are available on request
*significant at $p<0.05$; ** significant at $p<0.005$; *** significant at $p<0.001$

As a summary, we see that different immigrant groups demonstrate different correlation patterns between overall achievement and the variables related to the wellbeing and integration at school. While the causality cannot be proved based solely on the PISA survey, existing research (Van de Werfhorst *et al.* 2013) provides evidence that some of factors, e.g. better classroom discipline, positively affect student learning.

Conclusions and future research

This overview of the performance of immigrant-origin students in Luxembourg in PISA 2003, 2006, 2009 and 2012 has led to several relevant findings.

The school population is changing rapidly – within ten years the proportion of immigrant-origin students among 15-year olds has grown by 20 percentage points. The major growth took place in the group of EU-origin students – the percentage of these students grew from 11% to 23%. The percentage of 2nd generation students – those who were born in Luxembourg, while their parents were born abroad – has doubled from 18% to 37% during this period. Within all immigrant groups who took part in PISA 2012 the majority of students are already of the 2nd generation, except for the non-EU students. Nearly half of all the 2nd generation students became Luxembourgish nationals. The 1st generation students remain a smaller-sized group in each PISA survey – approximately 16%. The majority of the students have immigrated into Luxembourg either before the start of, or during, primary school.

The socio-economic composition of immigrant groups remains persistently different: EU-origin students are similar to the native Luxembourgish students in their profile. The most vulnerable in this regard are Portuguese- and Cape-Verdean-origin families. Ex-Yugoslavian families have a better set-up, yet remain under the national average. The 2nd generation shows better socio-economic standing than the 1st generation. Next to their families' vulnerable socio-economic position, immigrant-origin children also attend schools with higher concentrations of poorer students. This is especially true for the 1st generation students.

An overview of the PISA test results over time (for each national group separately) shows no significant changes in mathematics. The only immigrant group that has improved its results is ex-Yugoslavian-origin students. Results are more positive in reading tests – from 2003 to 2012 all groups appear to have improved their performance, with the exception of the non-EU students. This improvement is particularly impressive among Cape-Verdean and ex-Yugoslavian students. Results across the generations show a similar tendency – both 1st and 2nd generation students in 2012 received significantly better scores compared to the scores in 2003.

The expected differences in test scores are observed in the Luxembourgish system between PREP, EST and ES programmes. A gap of some 200-250 points exists between students in PREP and ES in mathematics and reading, and of 100-130 points between EST and ES students. The observed differences between school tracks are comparable over various years of PISA surveys. Interestingly, the average gap observed between these tracks within each of the national groups is highly similar, including for the native Luxembourgish.

Understanding student commitment levels and their views and perceptions of schools and teachers, especially of immigrant students, has the potential of offering a better understanding of given academic performance together with their wellbeing. Results reveal that two factors, feeling of belonging and classroom discipline, are positively related with performance, while teacher support is negatively related. The negative correlation with teacher support is not entirely surprising: more help is likely to be offered by teachers to those students who (severely) struggle with the academic curriculum. Despite varying levels of correlation among groups, these three factors are likely to hold for almost all groups.

Growing attention to the situation of young people in Luxembourg follows from the reported lower levels of educational attainment, higher dropout rates and growing unemployment rate (from 14.6% to 21.2% between 2005 and 2014 as reported by EUROSTAT). As a result, there are a number of national research projects, such as NEETs (Not in Education, Employment, or Training) and TEVA (Transition École-Vie Active), as well as policy measures, such as the Guarantee for Youth. PISA data, coupled with existing administrative information, could be exploited to improve our knowledge and understanding of this important period in people's lives. The central idea of is to create a longitudinal study of the PISA participants in Luxembourg and follow them through their lives. For instance, the cohort of 15-year olds that participated in PISA 2003 have turned 25 in 2013 and are making an entry into the labour market or going through tertiary education. We would like to know about their paths during the past 10 years (using available information from the administrative records) and follow them up in their future. Such data can be created for each of the following PISA cohorts - 2006, 2009, 2012). Australia, Canada, Denmark and Switzerland are pioneers in establishing follow-up projects of PISA participants. Comparing Luxembourgish youth with similar peers in the countries mentioned above (especially to multilingual and multinational Switzerland) may help to better understand how PISA scores affect different kind of outcomes in adulthood in different societal and policy contexts.

References

1. Conti, G., Heckman, J., Urzua, S. (2010). The Education-Health gradient American Economic Review: Papers & Proceedings 100: 234–238.
2. Hanushek, E., Schwerdt, G., Wiederhold, S., Woessmann, L. (2013). Returns to Skills Around the World: Evidence from PIAAC. NBER Working Paper No. 19762.
3. Horner, K., Weber J.J. (2008). The Language Situation in Luxembourg. *Current Issues in Language Planning*, 9 (1): 69-128.
4. European Commission (2008). *Education and Migration: Strategies for Integrating Immigrant Children in European Schools and Societies. A synthesis of research findings for policy-makers.*
5. Fischbach, A., Baudson, T.G., Preckel, F., Martin, R., Brunner, M. (2013). Do teacher judgments of student intelligence predict life outcomes? *Learning and Individual Differences*, 27: 109-119.
6. Fischbach, A., Keller, U., Preckel, F., Brunner, M. (2013). PISA proficiency scores predict educational outcomes. *Learning and Individual Differences*, 24 (63-72).
7. Glock, S., Krolak-Schwerdt, S., Klapproth, F., Boehmer, M. (2013). Beyond judgment bias: How students' ethnicity and academic profile consistency influence teachers' tracking judgments. *Social Psychology of Education*, 16:555-573.
8. Kemptner, D., Jürges, H., Reynolds, S. (2011). Changes in Compulsory Schooling and the Causal Effect of Education on Health: Evidence from Germany. *Journal of Health Economics*, 30(2):340-354.
9. Lareau, A. (2003). *Unequal Childhoods: Class, Race, and Family Life.* Berkley and Los Angeles: University of California Press
10. Lochner L. (2011). Nonproduction Benefits of Education: Crime, Health and Good Citizenship. In Hanushek, E.A., Machin, S., Woessmann, L. (eds.) *Handbook of the Economics of Education. Volume 4.* Amsterdam: Elsevier: 183-282.
11. Martin, R., Dierendonck Ch., Meyers Ch., Noesen M. (2008). *La place de l'école dans la société luxembourgeoise de demain.* Bruxelles : Groupe de Boeck s.a.
12. Milligan, K., Moretti, E., Oreopoulos, P., (2004). Does Education Improve Citizenship? Evidence from the United States and United Kingdom. *Journal of Public Economics*, 88 (9-10): 1667-1695.
13. Ministère de l'Éducation nationale et de la Formation professionnelle. (2004). *PISA 2003 Rapport Nationale.* Luxembourg
14. Ministère de l'Éducation nationale et de la Formation professionnelle, Université du Luxembourg. 2007. *PISA 2006 - Nationaler Bericht Luxembourg*
15. Ministère de l'Éducation nationale et de la Formation professionnelle, Université du Luxembourg. 2010. *PISA 2009 - Nationaler Bericht Luxembourg*
16. Ministère de l'Éducation nationale et de la Formation professionnelle, Université du Luxembourg. 2013. *PISA 2012 - Nationaler Bericht Luxembourg*
17. Newman, T.P. & Fernandes R. (2015). A re-assessment of factors associated with environmental concern and behaviour using the 2010 General Social Survey. *Environmental Education Research.* Published online: 26 Jan 2015; DOI: 10.1080/13504622.2014.999227
18. OECD (2004). *Learning for Tomorrow's World – First Results from PISA 2003*
19. OECD (2010). *PISA Mathematics Teaching and Learning Strategies in PISA 2010*
20. OECD (2012). *Untapped Skills: Realising the Potential of Immigrant Students.* OECD Publishing. <http://dx.doi.org/10.1787/9789264172470-en>
21. OECD (2013). *PISA 2012 Results: Excellence Through Equity: Giving Every Student the Chance to Succeed (Volume II),* OECD Publishing. <http://dx.doi.org/10.1787/9789264201132>
22. Oreopoulos, P. (2006). The Compelling Effects of Compulsory Schooling: Evidence from Canada. *Canadian Journal of Economics*, 39(1): 22-52.
23. Oreopoulos, P. (2007). Do Dropouts Drop Out Too Soon? Wealth, Health, and Happiness from Compulsory Schooling. *Journal of Public Economics*, 91 (11-12): 2213-2229.

24. Shewbrige, C., Ehren M., Santiago P., Tamassia C. (2012). OECD Reviews of Evaluation and Assessment in Education. Luxembourg.
25. Van de Werfhorst, H., Bergstra, M., Veenstra, R. (2012). School Disciplinary Climate, Behavioural Problems, and Academic Achievement in the Netherlands in Arum, R., Velez, M. (eds.) Improving Learning Environments: School Discipline and Student Achievement in Comparative Perspective. Stanford University Press. <http://dx.doi.org/10.11126/stanford/9780804778039.003.0007>

