

Policy Briefing: The Effects of Upper Secondary Education and Training Systems on Skills Inequality

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Inequalities in adult skills in England are high by comparison with other OECD countries, particularly in numeracy and with younger age groups. This matters because skills inequalities are one of the drivers of wage inequalities and can undermine social cohesion. Where do these inequalities come from?

We know from previous research, using data from PISA, that more unequal skills at age 15 are likely to occur in countries where there is early selection, a high proportion of privately funded schools, a lack of standardization in curricula and assessment, and in federal systems where funding is devolved to the regional level (Hanushek and Woßmann, 2006, 2010; Schütz et al., 2008; OECD, 2010).

But what part does upper secondary education and training (for 16 to 19-year-olds) play in increasing or reducing literacy and numeracy skills inequality? And what upper secondary system characteristics might help mitigate inequality?

New research from the LLAKES Centre using data from the OECD's Survey of Adult Skills (SAS) shows that:

- there are substantial changes in levels of skills inequality between ages 15 and 27;
- countries vary considerably in how far skills inequalities are reduced or increased during this phase;
- The post-16 systems in England and other English-speaking countries mitigate skills inequality less than most other countries.
- The skills gaps close most substantially in countries which have Dual Systems of Apprenticeship (three-year apprenticeships combining workplace training with education) and/or high completion rates of full-time (two or more years) upper secondary education and training. Greater parity of esteem between general and vocational tracks also seems to be conducive to reduction in skills inequality.

We conclude that, to reduce its serious skills gap, England needs more standardised pathways through upper secondary education for all 16 to 18-year-olds, with high expectations for all, and mandatory learning of Maths and English to a high standard.

Research Methods

Our research adopts a ‘difference-in-difference’ statistical approach, using the data on numeracy and literacy skills from the PISA and SAS surveys to assess changes in skills inequality over the life course. This method enables us to compare the 15-year-old sample from PISA 2000 and the 25 to 29-year-old SAS sample (which was conducted in 2011/12 when the 15 year olds in 2000 would have been 27 years old).ⁱ This allows comparison across countries of the changes in skills inequality which occur between the end of lower secondary education and the age at which most people have completed their highest level of formal education. Using aggregate country-level data, the research then analyses the relationships across countries between changes in skills inequality and different types of upper secondary education and training system, and the characteristics of these systems.

Changes in Skills Inequality between 15 and 27 Years of Age

The research finds that there are substantial changes in skills inequality over this phase of the life course and that the extent and direction of changes, both in skills opportunities and outcomes, vary considerably across countries.

Inequality of Skills Outcomes (distributions) is measured by computing ‘Skills Gini Coefficients’, where a value of 0 would mean that everyone had the same level of skills and 1 that all the skills were held by one person. Figures 1 and 2 show the changes in skills outcomes for literacy and numeracy respectively.

In literacy, all countries manage to narrow the distribution of skills outcomes after the lower secondary phase - with some countries, like Germany, reducing the Gini Coefficient by almost a third. But the scale of the inequality reduction varies significantly across countries. In numeracy, there is less consistent mitigation of inequality. There are six countries where inequality increases during this phase, but in the remainder of countries it is mitigated, again to varying degrees.

- The countries in the sample with Dual Systems of Apprenticeship (including Austria, Belgium and Germany) and the central and eastern European (CEE) countries (Russian Federation; Poland; Czech Republic) are relatively good at reducing inequalities in both literacy and numeracy (although from quite an unequal start in some cases).
- The Anglophone countries (including Canada, England, Ireland, Northern Ireland and the USA) all exhibit increases in numeracy inequality and their literacy gaps close only slightly.

Figure 1: Change in Literacy Skills Ginis between 15 and 27

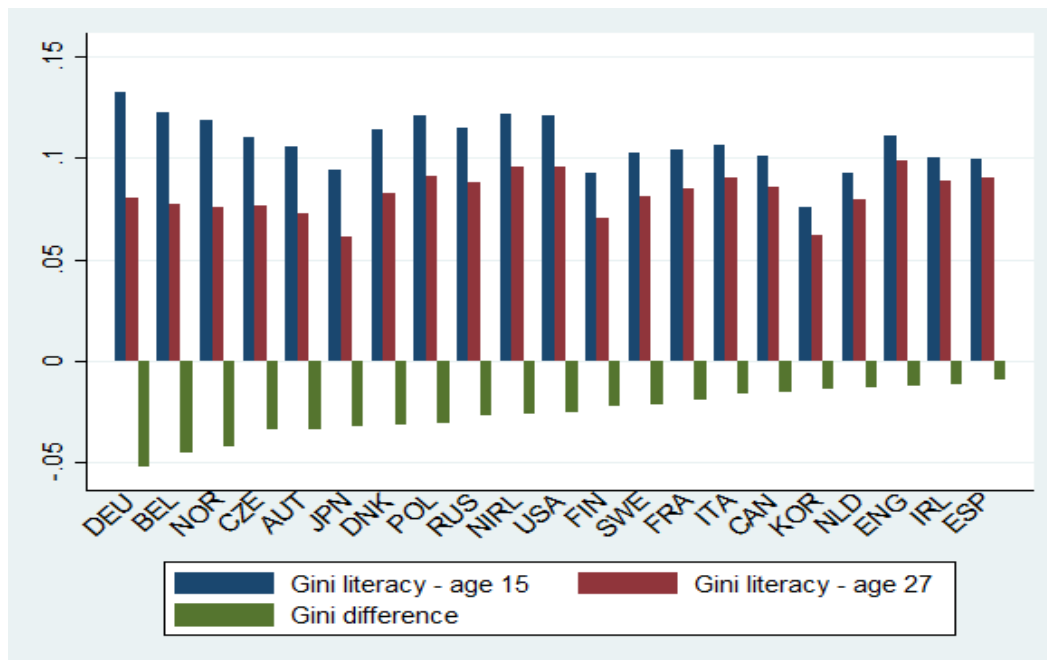
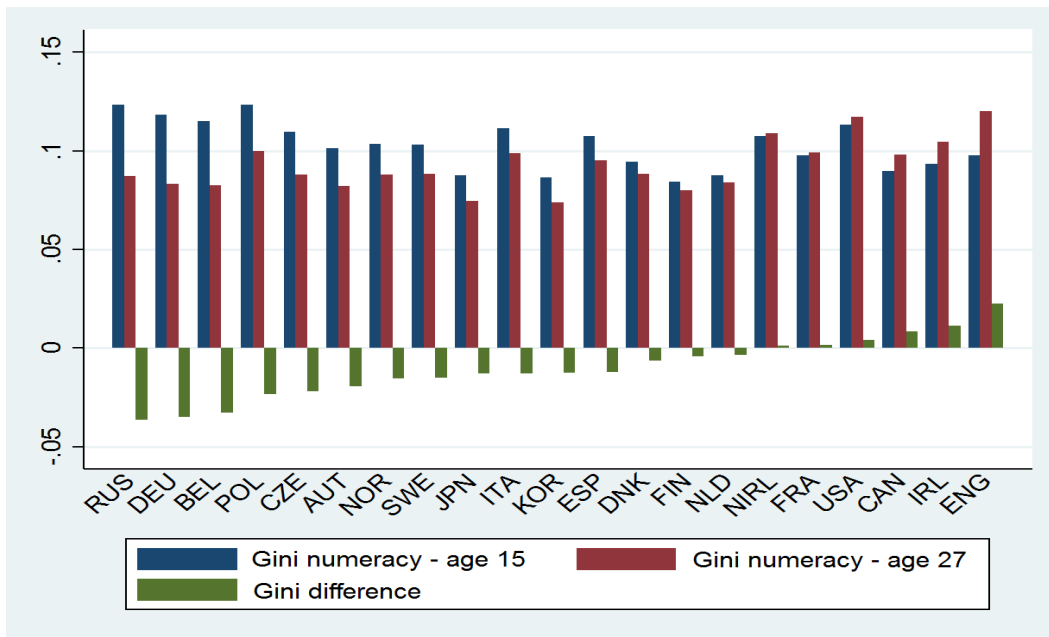


Figure 2: Change in Numeracy Skills Ginis between 15 and 27



The consequence of this is that by age 27 skills inequalities are considerably higher in English-speaking countries than elsewhere, with the score gap between the highest and lowest achieving 20 percent, for instance, being 140-162 points (out of 500). The relatively wide spread of scores is due mainly to the so-called 'long tail of underachievers'. In England, 19 percent of 25-34 year olds score below level two in numeracy on the OECD's six level scale, compared with 11-13 percent in German-speaking, Nordic and CEE countries, and only seven percent in East Asian Countries.

Inequality of skills opportunity is measured using social gradients of skills. Both PISA and SAS

record the highest educational qualifications of parents. The social gradient of skills is the ratio of average skills levels of young people whose parents have no more than upper secondary education and the average skills levels of those who have a graduate parent. Here again we find significant differences across countries in changes between ages 15 and 27. As Figures 3 and 4 show we can identify significant differences for literacy between the top six or seven and the bottom six in the rankings; for numeracy three groups can be roughly distinguished: the top seven countries, the bottom five ones and the five countries in the middle of the rank ordering (from Sweden to Canada).

Figure 3. Changes in Inequality of Opportunity: Literacy (95% CI)

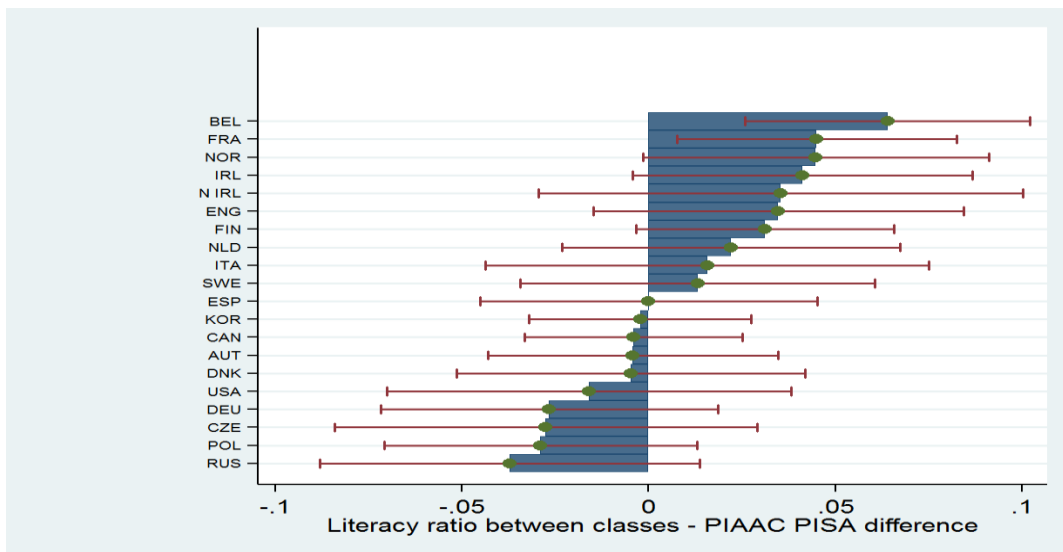
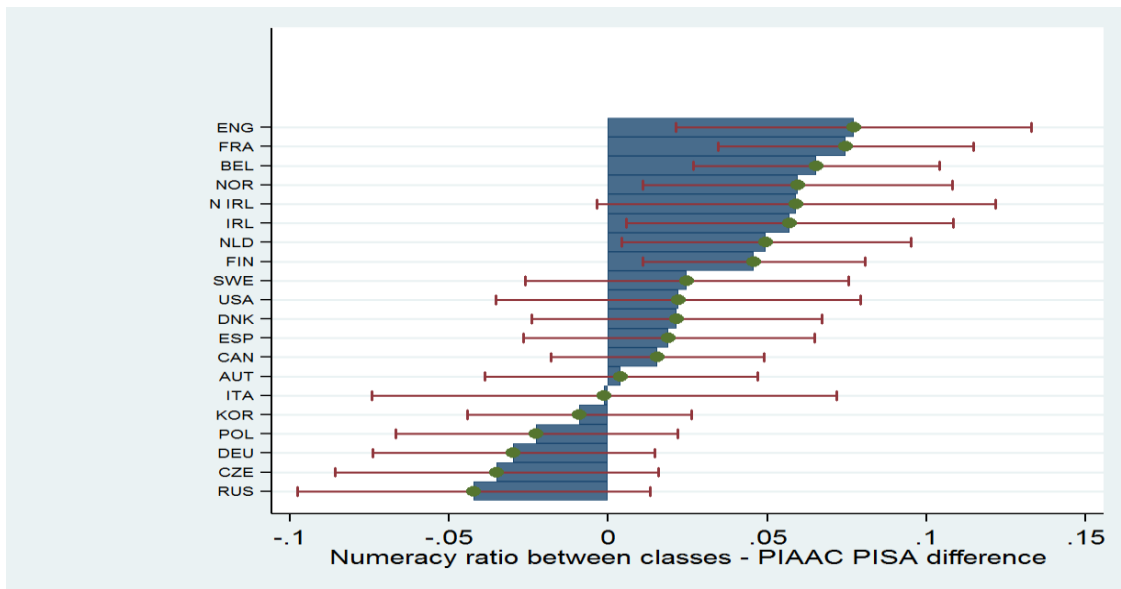


Figure 4: Changes in Inequality of Opportunity: Numeracy (95% CI)



The same two patterns across countries stand out again. Significant reductions in inequality of skills opportunities in both literacy and numeracy are exhibited by the CEE countries and by Germany and Austria (in literacy). Anglophone countries tend to be less successful in reducing inequality relative to most other countries. All of the English-speaking countries see increases in numeracy inequality, with some (England, Ireland, Northern Ireland) also seeing increases in literacy inequality.

Our difference-in-difference analysis shows some significant relationships between upper secondary system types and changes in inequality. We distinguish primarily between countries with 1) high enrolments in Dual Systems of Apprenticeship (Austria and Germany) and 2) 'Mixed Systems', which have dominant general tracks and a wide variety of vocational programmes of varying duration and quality (Australia, England, Northern Ireland, Ireland, Spain and New Zealand).

Compared to the reference group of countries:

- countries with Dual Systems are significantlyⁱⁱ more likely to have declines in inequality of outcomes in literacy and numeracy.
- 'Mixed' systems are significantly more likely to have increases in inequality of outcomes in both literacyⁱⁱⁱ and numeracy and increases in inequality of skills opportunities in both literacy and numeracy.^{iv}

Why do some types of system perform differently from others?

Upper Secondary System Characteristics and the Mitigation of Skills Inequality

We tested for the effects of a number of system characteristics on skills inequality, based on the existing research on upper secondary systems. There were two main hypotheses: 1) systems with greater 'parity of esteem' between the general and vocational tracks are more successful in reducing inequality; and 2) systems with high rates of completion from long cycle (two or three years) upper secondary courses narrow skills gaps.

We measured 'parity of esteem' by: a) the proportion of participants in upper secondary who gained qualifications from vocational programmes (vocational prevalence); and b) the social mix of participants (by parental education level) in the vocational track. Completion rates in long cycle upper secondary education were measured by the proportion of the sample in SAS whose highest qualification was at ISCED 3 A, B, C (long) or above (UNESCO's International Standard Classification of Education).^v

The strongest relationships we find are between rates of ISCED 3 completion and mitigation of inequalities of skills outcomes and opportunities. As Figures 5 and 6 illustrate, countries with higher completion rates at ISCED Level 3 tend to mitigate inequalities in skills outcomes between the ages of 15 and 27 more than other countries, both in literacy and numeracy.^{vi} These countries also mitigate inequality of skills opportunities more, with significant negative relationships between completion rates and changes in the social gradient of skills for both literacy and numeracy.^{vii}

Figure 5: ISCED 3 Completion and Mitigation of Inequality in Numeracy Skills

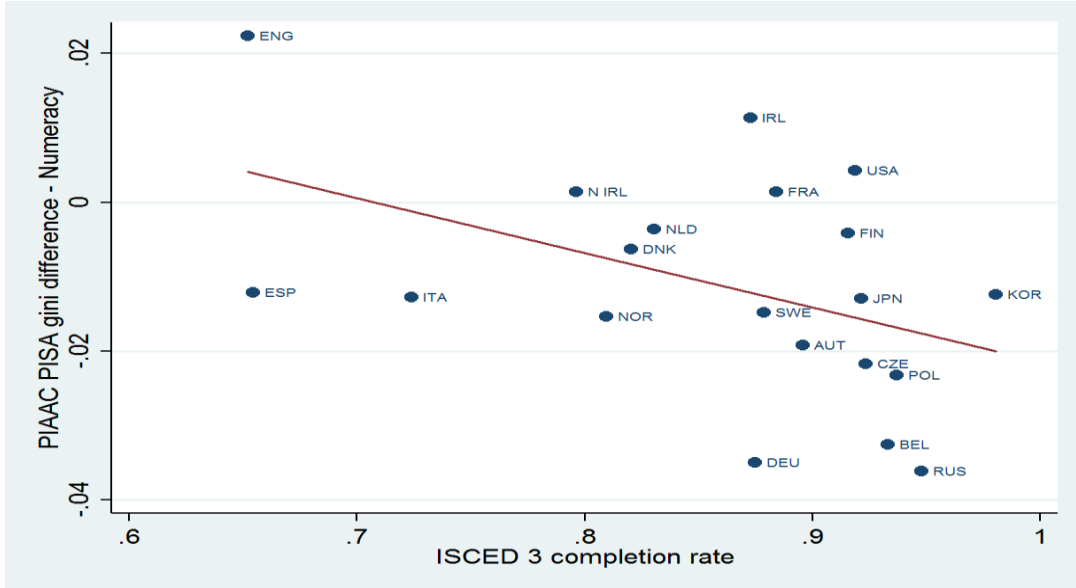
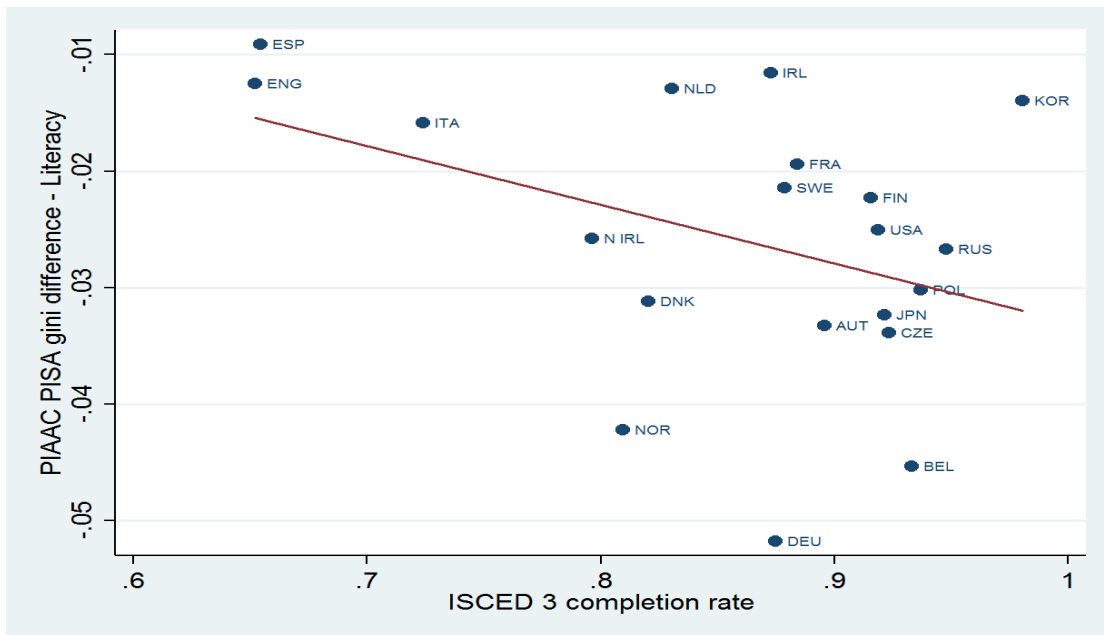


Figure 6: ISCED 3 Completion and Mitigation of Inequality in Literacy Skills

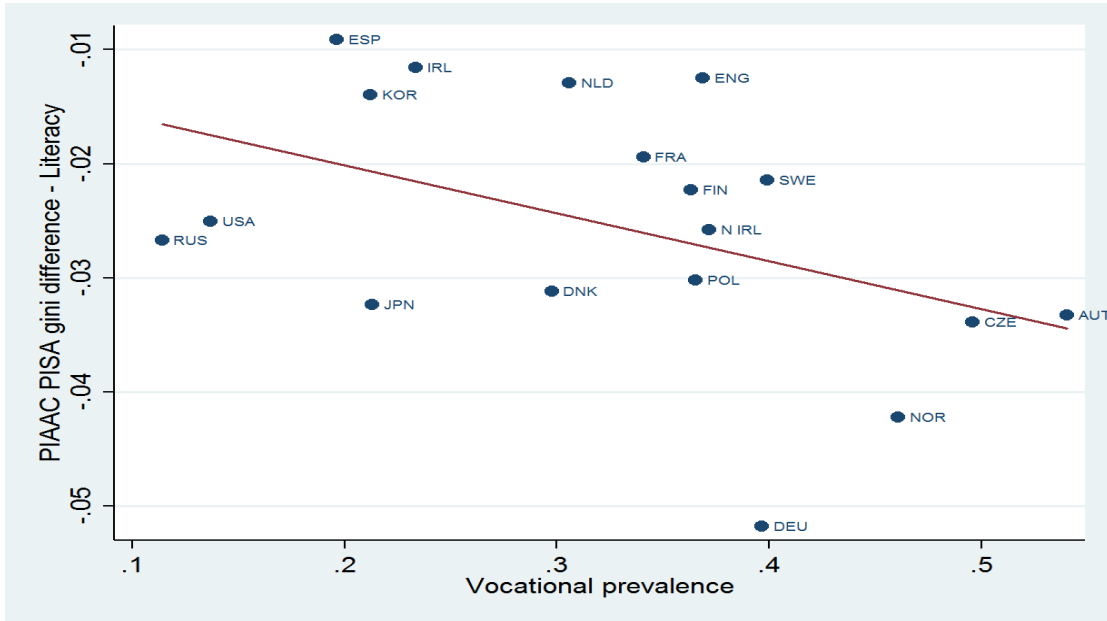


Parity of esteem between general and vocational tracks also seems to have an effect, if less consistently so.

As Figure 7 illustrates, those countries in which the proportion of students in vocational upper secondary programmes is higher tend to see greater mitigation in inequality of literacy skills outcomes, as, for

instance, in Austria, Czech Republic, Germany and Norway. For numeracy the relationship has the same sign but is not significant. On the other hand, our DID regression analyses suggests a negative relationship between vocational prevalence and mitigation of inequality of skills opportunity in both literacy and numeracy, although this is not significant.

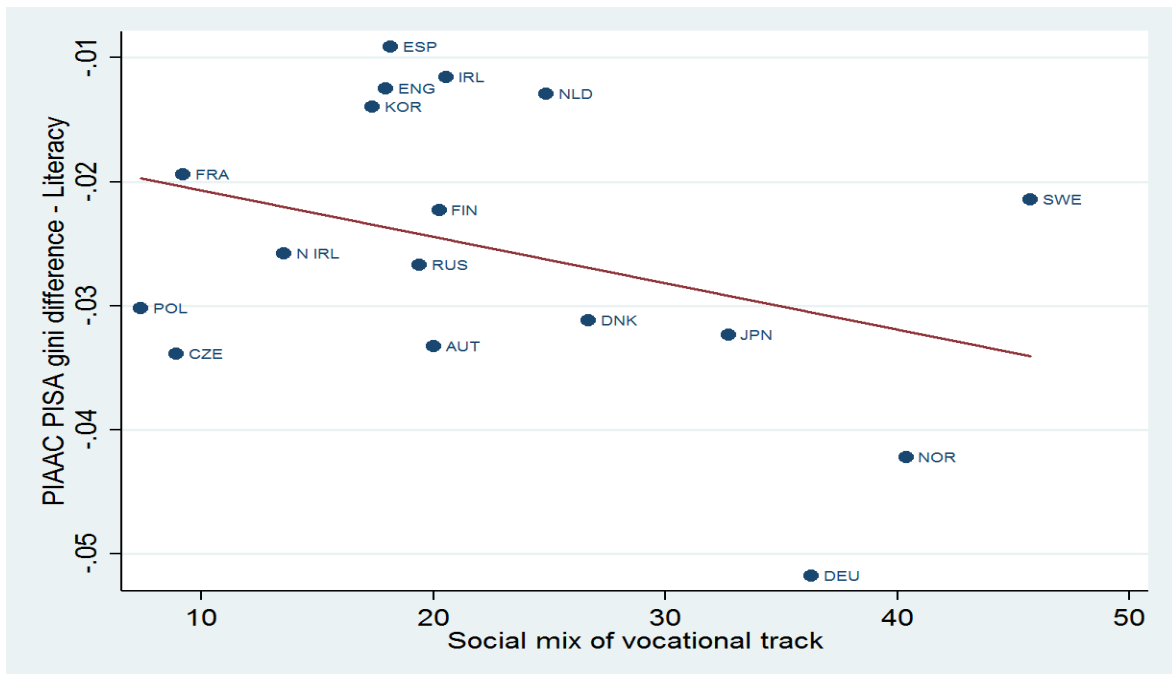
Figure 7: Vocational Prevalence and Changes in Inequality of Literacy Skills



The social mix of the vocational track also has some impact on inequality mitigation in literacy and numeracy skills. As Figure 8 shows, countries where vocational tracks are more prone to include children of graduate parents, such as Germany, Japan and the Scandinavian countries (except Sweden), do

tend to show greater inequality mitigation in literacy skills. Anglophone countries with less social mixing tend to mitigate inequalities less. However, the CEE countries tend to mitigate skills inequalities despite having relatively large social gaps in the composition of general and vocational tracks.^{viii}

Figure 8: The Social Mix of Vocational Programmes



Policy Implications for England

It has been widely observed that England has particularly high levels of inequality in educational attainments and adult skills (Green, Green and Pensiero, 2014). Most discussion about how to ameliorate this situation has revolved around reforms that could be made in education prior to the end of lower secondary schooling. However, the research here shows that we should be equally concerned about the role that upper secondary education and training plays in exacerbating skills inequalities.

It has been argued for many years that we need to reduce the gaps in esteem between the general and vocational tracks in England and that this could best be achieved by developing either a version of the Dual System of Apprenticeship or an integrated school-based upper secondary system as found in some Scandinavian countries. However, we do not have the institutional foundations (strong social partnership institutions) or the political culture (strongly egalitarian ethos) required for either option to be successfully achieved. Our research points to a more pragmatic way forward.

It shows that a major factor in reducing inequality through upper secondary education is ensuring near universal participation in long cycle general and

vocational programmes of similar duration and substantial content. Where the vast majority of young people continue in full-time general or vocational education for two or more years, as in the CEE countries, this seems to mitigate skills inequalities, whatever the other attributes of systems. There are two plausible reasons for this.

First, more standardised upper secondary pathways are likely to promote an inclusive expectation of achievement for all. This helps to raise performance among lower attainers and so narrows skills differences. Second, this type of upper secondary participation involves the mandatory learning of maths and the national language over a sustained period. This is likely to help those with lower skills in numeracy and literacy to close the gaps with their more skilled peers.

The raising of the 'participation age' in England to 18 in 2015 is a step forward, but it still allows young people to do a hotch-potch of short courses of general or vocational education (including part-time) and work-based training. Furthermore, 16 to 19-year-olds are only required to reach or be working towards achieving Level 2 in Maths and English.

England remains a long way from establishing an upper secondary system capable of closing the inequality gap.

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LLAKES

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Endnotes:

ⁱ SAS and PISA do not ask identical questions, but they test skills in literacy and numeracy based on the same principles of practical competence used by the OECD and compute scores based on the principles of item response theory in order to take into account both the number of correct answers and the difficulty of the items. Comparing the distribution of scores across the two tests therefore seems a legitimate strategy. As Hanushek and Wößmann argue (2010) even '(t)ests with very different foci and perspectives tend to be highly related, suggesting that they are measuring a common dimension of skills.' (Hanushek and Wößmann, 2010: 9).

ⁱⁱ Literacy: $p < 0.05$ and numeracy: $p < 0.1$.

ⁱⁱⁱ Literacy: $p < 0.1$ and numeracy: $p < 0.05$.

^{iv} Literacy and Numeracy: $p < 0.05$.

^v SAS record the proportions qualifying at different levels and how qualifications are attributed to levels. In the case of England, we exclude those whose highest qualification has been classified as ISCED 3C (≥ 2), since this category includes many qualifications, like GCSEs, GNVQ Intermediate, BTEC First, NVQ 2 and City and Guilds Level 2, which can either be taken during lower secondary education, or require less than two years of full upper secondary education. For other countries in the survey, qualifications classified to ISEC 3 C (≥ 2) include only those for which the earliest age of completion is 17 or 18 years, whereas for England the minimum age at which the above qualification can be gained is noted (correctly) as 16 years.

^{vi} Literacy: $p < 0.05$ and numeracy: $p < 0.1$.

^{vii} Literacy: $p < 0.1$ and numeracy: $p < 0.1$.

^{viii} The relationship is only significant at the $p < 0.3$ level for literacy, while it is non-significant for numeracy. The indicator shows no significant overall relationships with mitigation of inequality of opportunity in literacy and numeracy skills.

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