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Inequality, segregation and poor performance: the education system in Northern Ireland

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Abstract

Northern Ireland is now a post-conflict society but one of the legacies of the 'troubles' is an education system which is defined by religion. A parallel system of schools continues to exist where Catholics largely attend 'maintained' schools and Protestants 'controlled' or state schools. While segregation along religious grounds is the most obvious fault line in Northern Ireland schools, more insidious problems of access and performance inequalities exist which has been overshadowed by efforts to improve community relations between children and promote integrated education. This paper uses school leavers' data to examine the nature of inequality in schools and consider an alternative policy option for tackling inequality and segregation, respectively.

Introduction and context

The system of primary and secondary level education in Northern Ireland is, to the outside observer, a structural morass serving approximately 330,000 school children in 1,180 schools during the school year 2014/15 (Department of Education, Northern Ireland, 2015a). If, for example, one considers the post-primary sector where 208 schools serve 142,553 pupils, there is a bewildering array of schools influenced by the role played by churches in the management and delivery of education. The post-primary pupil cohort is disaggregated according to a number of variables: selective and non-selective schools (grammar and secondary schools); co-education and single sex schools; controlled (*de facto* Protestant) schools and Catholic maintained schools; integrated schools comprising Catholic and Protestant children, those of other faiths or none; and, Irish medium schools where the curriculum is taught through the Irish language. This complex fragmentation is also reflected in a range of school management structures. Controlled schools are under the management of the schools' board of governors and the employing authority (the Education Authority, which replaced five Education and Library Boards in April 2015). Maintained schools are under the management of the board of governors and the employing authority is the Council for Catholic Maintained Schools (CCMS); and, each voluntary grammar school and integrated school is under the management of a board of governors.

In November 2014, the Chief Inspector of Schools in Northern Ireland published her report on pre-school settings, schools, and learning organisations for the period 2012-14 (Education and Training Inspectorate, 2014). She identified a number of key challenges for education and training which included, inter alia, the need to:

- Improve outcomes for young people; almost 40% of post-primary pupils do not achieve 5 GCSEs (or equivalents) at grades A*-C including English and mathematics, rising to 66% for those entitled to free school meals¹.
- Improve outcomes in literacy and numeracy particularly at age 15 and for adults where we compare less favourably with many other countries in international studies (OECD: PISA, 2012).
- Reduce the variability in the life chances of children and young people which is too dependent on whether they have access to a good pre-school, school, further education college or training provider.

She concluded her report by stating ‘the education system across Northern Ireland has unacceptable variations and persistent shortcomings, which need to be addressed if we are to improve our provision and outcomes from average to world-class’ (Education and Training Inspectorate, 2014: 3). It is not possible, given the different educational systems across the four nations of the United Kingdom, to provide comparable regional data on GCSE performance but 17.2% of Northern Ireland’s population aged 16 to 64 has no qualifications, compared to 10.6% in Wales; 10.3% in Scotland; and, 9.1% in England (Office of National Statistics, 2014a). In the same vein, London has the highest share of 16-64 year olds with NVQ level 4 or above (49.1%), and Northern Ireland and the North East has the joint lowest share (28.1%) (Office for National Statistics, 2014). Northern Ireland has high end achievers and a long tail of under-achievement: 94.8% of grammar school pupils attained 5GCSEs A*-C, including English and Maths in 2012/13 compared to 39.2% of non-grammar pupils, reducing to 25% for Protestant males on free schools meals (DENI, 2015a).

Another significant feature of the education system in Northern Ireland is that it is ‘segregated’ although this is contested since both maintained and controlled schools will argue that they are open to all pupils, the latter being state schools (Gallagher, 2004). *De facto*, however, pupil attendance profiles indicate a parallel system of schooling defined by religious affiliation (see table 1). School segregation in Northern Ireland, it should be emphasised, is the result of choice – even though the choice may be heavily constrained by social pressure to conform – and is very different from legally enforced segregation as in apartheid South Africa or in the southern states of the USA prior to the desegregation engendered in 1964 by the Civil Rights Movement. In that sense, school segregation in Northern Ireland could be compared to that in, say, New York where public schools are reputedly among the most segregated in the USA with 85 percent of black and 75 percent of Hispanic pupils attending schools that are less than 10 percent white; at the other end of

¹ In 2013/14, for example, 65.2% of all post-primary school pupils obtained 5+ GCSEs at grades A* - C, including English and Maths. However, if one disaggregates the data further, only 38.7% of pupils entitled to free school meals obtained the same level of qualifications – a performance gap of 26.5%.

the spectrum, half of white children are clustered in just 11 percent of New York’s public schools.²

Table 1: Segregated Schools in Northern Ireland 2014/15				
School type	Catholics (%)	Protestants (%)	Others³ (%)	Total (%)
Primary Schools				
Controlled	6.7	68.3	25.0	100
Maintained	96.1	1.1	2.8	100
Integrated	37.9	35.3	26.8	100
Secondary (non-grammar)				
Controlled	3.1	81.4	15.5	100
Maintained	97.0	1.2	1.8	100
Integrated	35.6	47.2	17.2	100
Secondary grammar				
Controlled	8.5	75.8	15.7	100
Voluntary Catholic	97.3	0.9	1.8	100
Voluntary Other	12.2	65.0	22.8	100

Source: Calculated from Department of Education School Statistics 2014/15

<http://www.deni.gov.uk/>

As the Department of Education statistics (2014/15) show:

- In the primary sector: 6.7% of Catholics attend controlled primary schools; 1.1% of Protestants attend maintained primary schools; and 5.7% of all primary school children attend integrated schools.
- In the secondary (non-grammar) sector: 3.1% of Catholics attend controlled secondary schools; 1.2% of Protestants attend maintained secondary schools; and 15% of all secondary (non-grammar) pupils attend integrated schools
- In the secondary (grammar) sector: 8.5% of Catholics attend controlled grammar schools; and 0.9% of Protestants attend voluntary Catholic grammar schools.
- Overall, 6.9% of primary and post-primary pupils attend integrated schools.

Catholics are therefore much more willing to go to schools in the controlled sector than Protestants are to attend maintained schools. The greatest movement by Catholics is into controlled grammar schools (8.5%) or voluntary grammar schools under ‘other management’ (12.2%). Many young people in Northern Ireland never experience cross community education until they attend university. The segregated school system has resulted in ethno-religious isolation which reinforces ‘intra-sectoral bias, stereotyping and prejudice’ (Hughes, 2010: 829).

² Nikole Hannah-Jones, “Choosing a School for my Daughter”, *The New York Times* (Magazine), 12 June 2016.

³ ‘Others’ include: other Christians; non-Christians; and, no religion/not recorded.

So, at the headline level we know that the Northern Ireland education system is highly differentiated in terms of school performance (high performing grammar schools but a long tail of underachievement in secondary non-grammars) and shapely divided by religious affiliation. This paper attempts to move beyond these macro descriptions and look in some detail at two issues. First, we are interested in examining the factors which impact on pupils' performance and second, flowing from this analysis, we consider the policy responses to schools' improvement aimed at addressing the inequalities and segregation that characterise Northern Ireland's education system.

Data, methodology and empirical analysis

The first part of the paper draws on the annual data base of 22,764 school leavers in the school year 2012-13 provided to the authors by the Department of Education Northern Ireland (DENI) under strict information sharing arrangements to protect the identity of pupils. School leavers are defined as pupils who leave secondary school after completing their GCSE examinations or those who leave school, two years after GCSEs, following their A-level examinations.

We hypothesise that the likelihood of a school leaver exiting with 'good' GCSE or A-level passes (defined below) will depend upon six factors: gender; religion; recipient of free school meals [FSM]; whether s(he) has special education needs [SEN]; the management type of the school attended; and, the nature of the area in which s(he) resides (defined by the variable super output area [SOA])⁴. The Northern Ireland Statistics and Research Agency (NISRA) provided a multiple deprivation index (MDI) so that there was a MDI value associated with each SOA. Using these values we created quintiles of deprivation and placed each SOA in one of these five quintiles ranging from the most deprived to the least deprived SOA.

Estimating and Predicting the Probability of Leaving School with 'Good' Qualifications

We estimated a two-equation probit model using the sample of 2012-13 school leavers in Northern Ireland. The first equation related to GCSE results: the dependent variable in this equation took the value 1 if the school leaver obtained 'good' GCSEs (that is, five or more passes at A*-C grades, including English and Mathematics) and zero if he/she did not. The second equation related to A level results: the dependent variable in this equation took the value 1 if the school leaver obtained 'good' A-levels (that is, three or more passes at A*-C grades) and zero if he/she did not.

⁴ According to the Northern Ireland Statistics and Research Agency (NISRA), the 5,022 Census Output Areas represent the smallest geographic units for which robust statistics could be produced while protecting the confidentiality of individual Census returns (2011).

This system of two probit equations (*bivariate probit*) is the discrete choice analogue of the *Seemingly Unrelated Regression Equations* (SURE) method of estimation with continuous dependent variables (Greene, 2012: 738–752). Like SURE estimates, the estimates from the bivariate probit system are more efficient than those obtained from estimating each equation as a single equation because the correlation between the error terms of the two equations is explicitly taken into account.⁵ In addition, the fact that the equations are estimated as a system allows hypotheses to be tested *between* equations rather than just *within* individual equations.

Following the advice contained in Long and Freese (2014), the results from the estimated equation are presented in Tables 2 and 3 (see appendix 1) in the form of the *predicted probabilities* from the estimated probit coefficients and not in terms of the estimates themselves.⁶ This is because the probit estimates themselves do not have a natural interpretation – they exist mainly as a basis for computing more meaningful statistics and, in this case, these are the predicted probabilities.

Interaction effects were used to model whether the effect of a control variable varied according to values of another variable. In the context of this study, a natural question to ask is whether the effects of some of the conditioning variables (religion, SEN status, school management type, and deprivation status of area of residence) varied according to the gender and the FSM status of the school leavers. In order to answer this question we estimated a general model in which the conditioning variables were allowed to interact with the FSM status and the gender variable. By virtue of this characteristic, this model is referred to in this paper as the *general interaction model* (GIM) and this can be written as:

$$F[\Pr(Y_i = 1)] = \beta_0 + \beta_1 \times FEM_i + \beta_2 \times FSM_i + \beta_3 \times FEM_i \times FSM_i + \beta_4 \times X_i + \beta_5 \times X_i \times FEM_i + \beta_6 \times X_i \times FSM_i + \beta_7 \times X_i \times FEM_i \times FSM_i + \varepsilon_i \quad (1)$$

Where:

1. $\Pr(Y_i=1)$ is the probability of school leaver i getting a ‘good’ examination result and $F(.)$ is a non-linear function of this probability to reflect the fact that a non-linear (probit) model is being estimated.
2. $FEM_i=1$, if school leaver i is female, $FEM_i=0$, if school leaver i is male.
3. $FSM_i=1$, if school leaver i was a ‘free school meal’ pupil, $FSM_i=0$, if school leaver i was not.
4. X_i is a control variable. In this study there were four control variables: religion; SEN status; school management type; and the multiple deprivation quintile of the super output area in which the school leaver lived.

⁵ The value of the correlation test between the errors in the two equations was 0.82 and a Wald test decisively rejected the null hypothesis that it was equal to zero.

⁶ These may be obtained on request from the authors.

5. The coefficient β_0 is an intercept term which operates *regardless* of the gender or FSM status of the school leaver.
6. The coefficients β_1 and β_2 measure the *additional* effects of being, respectively, female and FSM and the coefficient β_3 measures the *additional* effect of being *both* female and FSM.
7. The coefficients β_4 measures the effect of the control variable, *regardless* of the gender or FSM status of the school leaver.
8. The coefficients β_5 measures the *additional* effect of the control variable when the school leaver is female
9. The coefficients β_6 measures the *additional* effect of the control variable when the school leaver is FSM
10. The coefficients β_7 measures the *additional* effect of the control variable when the school leaver is both female and FSM.

The results from the estimated bivariate probit model are shown in Table 2 for GCSE results, and in Table 3 for A-level results, in terms of the probabilities (column 2), and the marginal probabilities (column 3), of getting a 'good' result. For example, columns 2 of Tables 2 and 3 show that the predicted probabilities of a female school leaver getting a good GCSE and A-level result was, respectively, 66.1% and 42.7%. This probability was obtained by setting *female=1* for all the 22,764 school leavers over which the system was estimated (that is, treating all school leavers as female) but leaving the values of the other variables for each school leaver unchanged (that is, as observed in the sample). Applying the probit estimates to these revised values yielded estimated probabilities of getting a good GCSE (Table 2) and a good A-level (Table 3) result for each of the 22,764 school leavers. The average of these predicted probabilities was 66.1% and 42.7% for, respectively, GCSE and A-level results. The predicted probabilities of a good result by school leavers grouped differently - by religion, SEN, management type, area deprivation - were computed similarly.

The *marginal probability* associated with a variable refers to the *change* in the outcome probability consequent upon a unit change in the value of the variable, *the values of the other variables remaining unchanged*. For discrete variables (as, indeed, are all the variables reported above), a unit change in the value of a variable refers to a move *from the reference category to the category in question*, the values of the other variables remaining unchanged. So, the *marginal probability* associated with female school leavers is defined as the *difference* between female and male (the reference category) school leavers in their predicted probabilities of getting a 'good' examination result.

So, from Table 2, the marginal probability associated with female school leavers for GCSE results is 66.1% - 58.4%=7.7 percentage points (pp), and from Table 3, the marginal probability associated with female school leavers for A-level results is 42.7% - 29.3%=13.4 pp. This is shown (against the Female row) in column 3 of Table 2 as -0.077 and in column 3 of Table 3 as 0.134. Dividing this marginal probability (in column 3) by its standard error

(column 4) yields the z-value associated with this marginal probability (column 5). For female school leavers this is 14.41 for GCSE results (Table 2) and 24.49 for A-level results (Table 3) and, as the *p*-value in column 6 of Tables 2 and 3 suggests, both marginal probabilities were significantly different from zero: the probability of female school leavers getting good GCSE and A-level results was significantly higher than that for their male counterparts. These tables allow one to answer a number of questions, detailed below, relating to the performance of different types of school leavers.

**Table 2: Predicted and Marginal Probabilities of a ‘Good’ GCSE Result, 2012-13:
22,764 school leavers***

1	2	3	4	5	6
Conditioning Variable	Probability	Marginal Probability	SE	z value	Pr> z
Gender					
Female	0.661	0.077	0.005	14.41	0.00
Male [Reference]	0.584				
Female, non-FSM	0.695	0.086	0.006	13.56	0.00
Male, non-FSM [Reference]	0.609				
Female, FSM	0.502	0.028	0.016	1.78	0.08
Male, FSM [Reference]	0.474				
FSM					
FSM	0.489	-0.163	0.008	-19.60	0.00
Non-FSM [Reference]	0.652				
FSM, Male	0.474	-0.135	0.012	-11.34	0.00
Non-FSM, Male [Reference]	0.609				
FSM, Female	0.502	-0.193	0.012	-16.32	0.00
Non-FSM, Female [Reference]	0.695	0.077	0.005	14.41	0.00
Religion					
Protestant [Reference]	0.583				
Catholic	0.671	0.088	0.009	9.67	0.00
Other	0.560	-0.023	0.009	-2.49	0.01
Protestant, Male, non-FSM [Reference]	0.574				
Catholic, Male, non-FSM	0.654	0.079	0.014	5.50	0.00
Other, Male, non-FSM	0.554	-0.021	0.014	-1.44	0.15
Protestant, Female, non-FSM [Reference]	0.648				
Catholic, Female, non-FSM	0.751	0.102	0.014	7.18	0.00
Other, Female, non-FSM	0.616	-0.032	0.015	-2.16	0.03
Protestant, Male, FSM [Reference]	0.454				
Catholic, Male, FSM	0.497	0.043	0.036	1.21	0.23
Other, Male, FSM	0.458	0.003	0.032	0.11	0.92
Protestant, Female, FSM [Reference]	0.442				
Catholic, Female, FSM	0.580	0.138	0.034	4.04	0.00
Other, Female, FSM	0.418	-0.024	0.032	-0.75	0.45
Special Educational Needs					
SEN	0.431	-0.237	0.008	-30.9	0.00
No SEN [Reference]	0.668				
SEN, Male, non-FSM	0.416	-0.241	0.011	-21.34	0.00
No SEN, Male, non-FSM [Reference]	0.657				
SEN, Female, non-FSM	0.498	-0.249	0.014	-17.73	0.00
No SEN, Female, non-FSM [Reference]	0.747				
SEN, Male, FSM	0.311	-0.201	0.019	-10.52	0.00
No SEN, Male, FSM [Reference]	0.512				
SEN, Female, FSM	0.305	-0.243	0.022	-11.15	0.00
No SEN, Female, FSM [Reference]	0.548				

* Note that 237 school leavers without an associated super output area were dropped from the estimation. ‘Good’ GCSEs are five or more passes at A*-C grades, including English and Mathematics.

Table 2 (Continued)

1	2	3	4	5	6
Conditioning Variable	Probability	Marginal Probability	SE	z value	Pr> z
Super Output Area Deprivation					
Highest Quintile of Deprivation [Reference]	0.535				
Fourth Quintile of Deprivation	0.594	0.059	0.009	6.60	0.00
Third Quintile of Deprivation	0.637	0.102	0.009	11.36	0.00
Second Quintile of Deprivation	0.651	0.116	0.009	12.41	0.00
Lowest Quintile of Deprivation	0.686	0.150	0.010	14.87	0.00
Highest QD, Male, non-FSM [Reference]	0.523				
Fourth QD, Male, non-FSM	0.577	0.054	0.015	3.53	0.00
Third QD, Male, non-FSM	0.625	0.086	0.015	5.81	0.00
Second QD, Male, non-FSM	0.646	0.014	0.021	0.68	0.50
Lowest QD, Male, non-FSM	0.692	0.025	0.022	1.14	0.25
Highest QD, Female, non-FSM [Reference]	0.592				
Fourth QD, Female, non-FSM	0.678	0.102	0.015	6.85	0.00
Third QD, Female, non-FSM	0.723	0.131	0.015	8.99	0.00
Second QD, Female, non-FSM	0.729	0.043	0.025	1.69	0.09
Lowest QD, Female, non-FSM	0.777	0.061	0.025	2.43	0.02
Highest QD, Male, FSM [Reference]	0.431				
Fourth QD, Male, FSM	0.445	0.123	0.015	8.13	0.00
Third QD, Male, FSM	0.473	0.137	0.015	9.33	0.00
Second QD, Male, FSM	0.506	0.075	0.031	2.42	0.02
Lowest QD, Male, FSM	0.522	0.065	0.029	2.25	0.02
Highest QD, Female, FSM [Reference]	0.466				
Fourth QD, Female, FSM	0.491	0.169	0.015	10.91	0.00
Third QD, Female, FSM	0.528	0.185	0.015	12.38	0.00
Second QD, Female, FSM	0.531	0.028	0.039	0.73	0.47
Lowest QD, Female, FSM	0.495	0.028	0.039	0.73	0.47

**Table 3: Predicted and Marginal Probabilities of a ‘Good’ A-level Result, 2012-13:
22,764 school leavers***

1	2	3	4	5	6
Conditioning Variable	Probability	Marginal Probability	SE	z value	Pr> z
Gender					
Female	0.427	0.134	0.005	24.490	0.00
Male [Reference]	0.293				
Female, non-FSM	0.452	0.145	0.006	23.20	0.00
Male, non-FSM [Reference]	0.307				
Female, FSM	0.275	0.073	0.018	4.01	0.00
Male, FSM [Reference]	0.203				
FSM					
FSM	0.239	-0.142	0.010	-14.750	0.00
Non-FSM [Reference]	0.381				
FSM, Male	0.203	-0.105	0.014	-7.56	0.00
Non-FSM, Male [Reference]	0.307				
FSM, Female	0.275	-0.177	0.013	-13.30	0.00
Non-FSM, Female [Reference]	0.452				
Religion					
Protestant [Reference]	0.316				
Catholic	0.416	0.100	0.008	11.79	0.00
Other	0.297	-0.019	0.009	-2.13	0.03
Protestant, Male, non-FSM	0.271				
Catholic, Male, non-FSM	0.354	0.083	0.012	6.73	0.00
Other, Male, non-FSM	0.258	-0.012	0.013	-0.96	0.34
Protestant, Female, non-FSM [Reference]	0.399				
Catholic, Female, non-FSM	0.523	0.124	0.014	8.89	0.00
Other, Female, non-FSM	0.361	-0.037	0.015	-2.42	0.02
Protestant, Male, FSM [Reference]	0.179				
Catholic, Male, FSM	0.216	0.038	0.033	1.14	0.25
Other, Male, FSM	0.219	0.041	0.034	1.20	0.23
Protestant, Female, FSM [Reference]	0.209				
Catholic, Female, FSM	0.349	0.140	0.034	4.18	0.00
Other, Female, FSM	0.195	-0.014	0.032	-0.43	0.67
Special Educational Needs					
SEN	0.219	-0.166	0.007	-22.32	0.00
No SEN [Reference]	0.385				
SEN, Male, non-FSM	0.193	-0.136	0.010	-13.39	0.00
No SEN, Male, non-FSM [Reference]	0.329				
SEN, Female, non-FSM	0.277	-0.213	0.014	-15.27	0.00
No SEN, Female, non-FSM [Reference]	0.490				
SEN, Male, FSM	0.083	-0.139	0.016	-8.64	0.00
No SEN, Male, FSM [Reference]	0.222				
SEN, Female, FSM	0.151	-0.148	0.019	-7.64	0.00
No SEN, Female, FSM [Reference]	0.299				

* Note that 237 school leavers without an associated super output area were dropped from the estimation. ‘Good’ A-Levels are three A-level passes at A -C grades.

Table 3 (Continued)

1	2	3	4	5	6
Conditioning Variable	Probability	Marginal Probability	SE	z value	Pr> z
Management Type*					
Voluntary	0.616	0.432	0.011	39.51	0.00
Controlled	0.295	0.111	0.010	10.56	0.00
Catholic	0.196	0.011	0.011	1.06	0.29
Integrated [Reference]	0.185				
Voluntary, Male, non-FSM	0.560	0.397	0.016	24.99	0.00
Controlled, Male, non-FSM	0.237	0.074	0.016	4.70	0.00
Catholic, Male, non-FSM	0.143	-0.021	0.016	-1.34	0.18
Integrated, Male, non-FSM [Reference]	0.164				
Voluntary, Female, non-FSM	0.714	0.475	0.018	26.72	0.00
Controlled, Female, non-FSM	0.414	0.175	0.018	9.64	0.00
Catholic, Female, non-FSM	0.281	0.041	0.019	2.14	0.03
Integrated, Female, non-FSM [Reference]	0.239				
Voluntary, Male, FSM	0.452	0.368	0.040	9.18	
Controlled, Male, FSM	0.082	-0.003	0.025	-0.11	0.91
Catholic, Male, FSM	0.077	-0.007	0.024	-0.31	0.75
Integrated, Male, FSM [Reference]	0.084				
Voluntary, Female, FSM	0.562	0.473	0.039	12.21	0.00
Controlled, Female, FSM	0.174	0.086	0.028	3.05	0.00
Catholic, Female, FSM	0.126	0.037	0.024	1.56	0.12
Integrated, Female, FSM [Reference]	0.088				
Super Output Area Deprivation					
Highest Quintile of Deprivation [Reference]	0.289				
Fourth Quintile of Deprivation	0.337	0.048	0.009	5.23	0.00
Third Quintile of Deprivation	0.373	0.083	0.009	9.07	0.00
Second Quintile of Deprivation	0.363	0.074	0.009	7.86	0.00
Lowest Quintile of Deprivation	0.407	0.118	0.010	11.78	0.00
Highest QD, Male, non-FSM [Reference]	0.240				
Fourth QD, Male, non-FSM	0.275	0.036	0.01	2.51	0.01
Third QD, Male, non-FSM	0.327	0.087	0.01	6.15	0.00
Second QD, Male, non-FSM	0.320	0.080	0.01	5.62	0.00
Lowest QD, Male, non-FSM	0.363	0.124	0.01	8.36	0.00
Highest QD, Female, non-FSM [Reference]	0.367				
Fourth QD, Female, non-FSM	0.437	0.070	0.02	4.42	0.00
Third QD, Female, non-FSM	0.477	0.110	0.02	6.99	0.00
Second QD, Female, non-FSM	0.457	0.090	0.02	5.72	0.00
Lowest QD, Female, non-FSM	0.522	0.155	0.02	9.52	0.00
Highest QD, Male, FSM [Reference]	0.200				
Fourth QD, Male, FSM	0.182	-0.018	0.02	-0.82	0.41
Third QD, Male, FSM	0.194	-0.006	0.02	-0.24	0.81
Second QD, Male, FSM	0.207	0.007	0.03	0.22	0.83
Lowest QD, Male, FSM	0.224	0.024	0.04	0.60	0.55
Highest QD, Female, FSM [Reference]	0.249				
Fourth QD, Female, FSM	0.312	0.063	0.02	2.90	0.00
Third QD, Female, FSM	0.272	0.022	0.02	0.90	0.37
Second QD, Female, FSM	0.280	0.030	0.03	1.04	0.30
Lowest QD, Female, FSM	0.264	0.015	0.04	0.38	0.70

Note: the Voluntary sector is entirely grammar (selective) schools; the Controlled sector is partly secondary (non-selective) and partly grammar (selective): 17 of the 68 grammar schools in Northern Ireland are controlled; the Catholic sector is entirely secondary since all Catholic grammar schools are in the Voluntary sector.

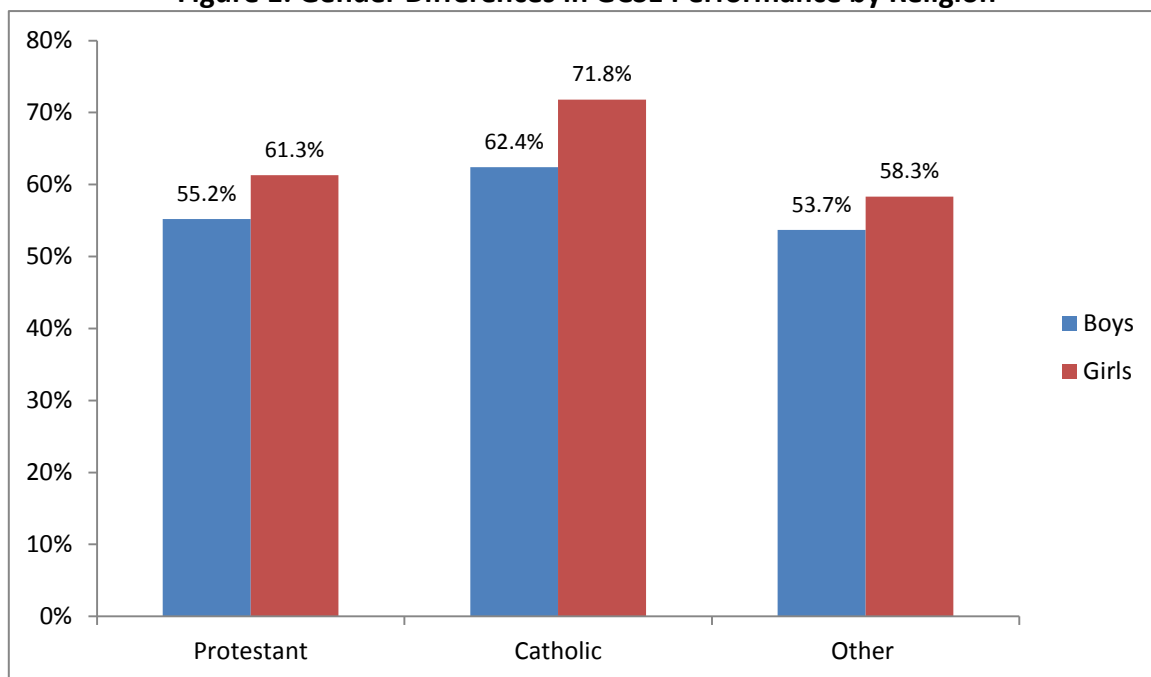
Question 1: Is there a 'gender effect' to performance?

The results in Tables 2 and 3 show unambiguously that, compared to boys, girls leave school with a better examination performance, both at GCSE and at A-levels: 66.1% of girls, compared to 58.4% of boys, left school with 'good' GCSE passes and 42.7% of girls, compared to 29.3% of boys, left school with 'good' A-level passes. In both cases the gender difference was significantly different from zero.

Not only that, non-FSM girls significantly outperformed non-FSM boys - and FSM girls significantly outperformed FSM boys - at GCSE (non-FSM: 69.5% versus 60.9%; FSM: 50.2% versus 47.4%) and at A-level (non-FSM: 45.2% versus 30.7%; FSM: 27.5% versus 20.3%).

Furthermore, as Figures 1 shows, Catholic girls significantly outperformed Catholic boys at GCSE level; Protestant girls significantly outperformed Protestant boys; and girls from 'other religions' significantly outperformed their male counterparts. The same conclusion is also true at A-level.

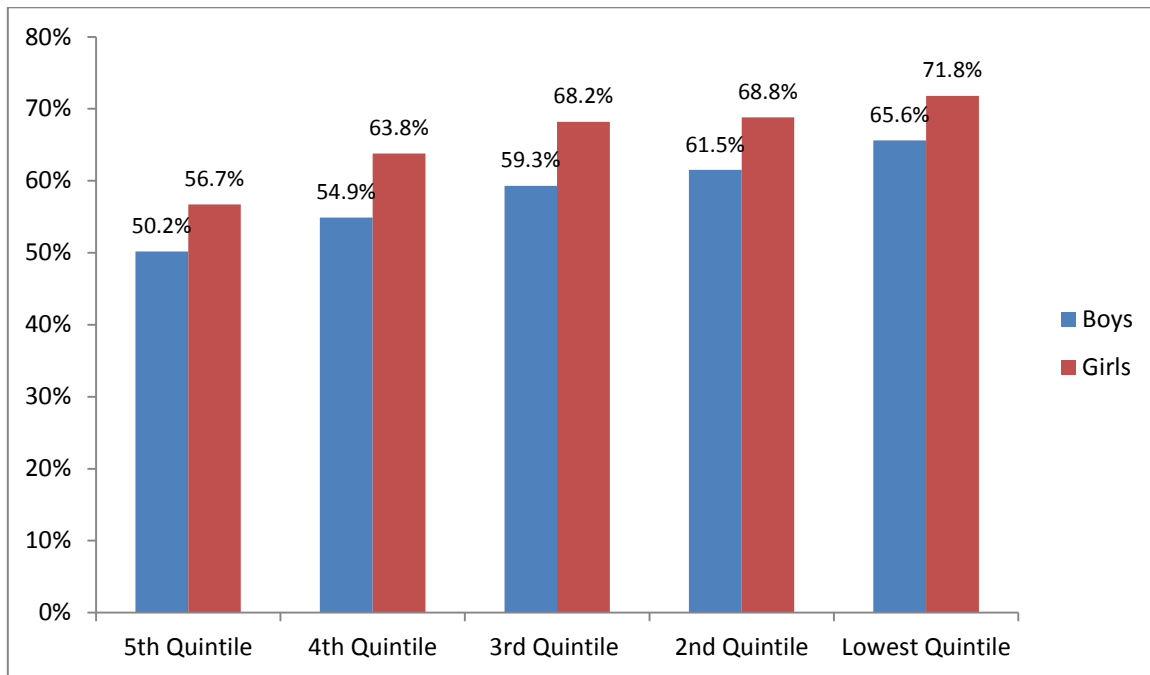
Figure 1: Gender Differences in GCSE Performance by Religion



Note: Predicted probabilities from equation (1) estimates; all the differences were significantly different from zero.

Figure 2 shows, regardless of the deprivation level of the area in which they lived, girls significantly outperformed boys at GCSEs in that area. The same conclusion is also true at A-level.

Figure 2: Gender Differences in GCSE Performance by Multiple Deprivation Quintile of 'Super Output Area' of Residence



Note: Predicted probabilities from equation (1) estimates; all the differences were significantly different from zero.

Question 2: Is there a 'religion effect' to performance?

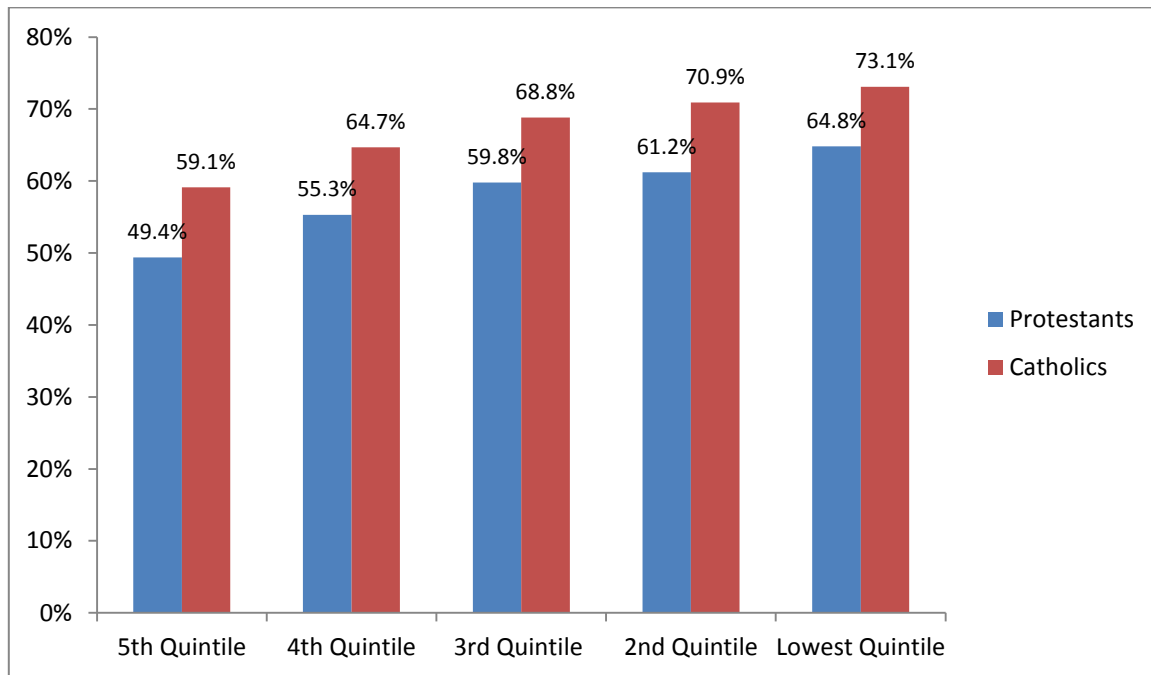
The results in tables 2 & 3 unambiguously show that, compared to leavers from Protestant school, those from Catholic schools (hereafter, simply by way of short hand, simply 'Protestant' and 'Catholic' school leavers) depart with a better examination performance, both at GCSE and at A-level: 67.1% of *all* Catholic school leavers, compared to 58.3% of *all* Protestant school leavers, left school with 'good' GCSE passes and 41.6% of *all* Catholic school leavers, compared to 31.6% of *all* Protestant school leavers, left school with 'good' A-level passes. In both cases, the difference based on religion was significantly different from zero.⁷

Not only that, non-FSM Catholic boys significantly outperformed non-FSM Protestant boys (GCSE: 65.4% versus 57.4%; A-level: 35.4% versus 27.1%) and non-FSM Catholic girls significantly outperformed non-FSM Protestant girls (GCSE: 75.1% versus 64.8%; A-level: 52.3% versus 39.9%). Similarly, FSM Catholic girls significantly outperformed FSM Protestant girls (GCSE: 58.0% versus 44.2%; A-level: 34.9% versus 20.9%). It was *only* with respect to FSM males that there was no significant difference in educational performance, either at GCSE or at A-level, between Catholics and Protestants.

⁷ Most, *but not all*, leavers from Protestant and Catholic schools will themselves be, respectively, Protestant or Catholic.

Lastly, as figure 3 shows, regardless of the deprivation level of the area in which they lived, Catholic school leavers significantly outperformed their Protestant counterparts at GCSE. The same conclusion is also true at A-level.

Figure 3: Catholic-Protestant in GCSE Performance by Multiple Deprivation Quintile of 'Super Output Area' of Residence



Note: Predicted probabilities from equation (1) estimates; all the differences were significantly different from zero.

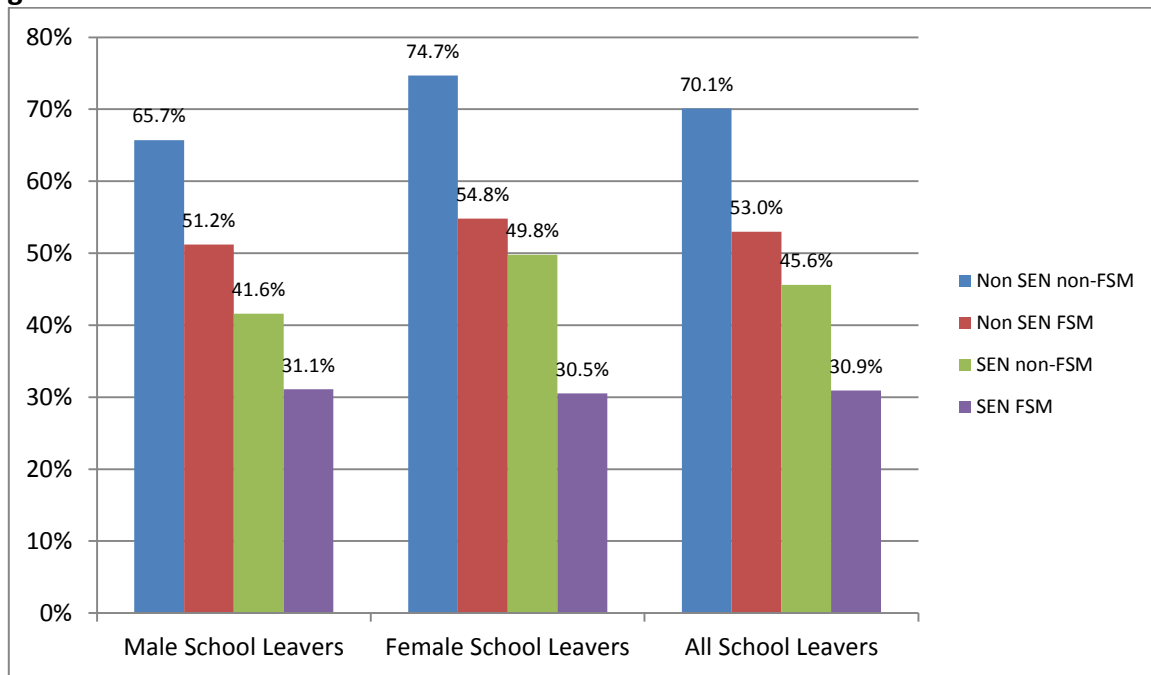
Question 3: What are the relative sizes of SEN and FSM effects on educational performance?

Figure 4 shows that the proportions of *non-FSM, non-SEN* persons leaving school with good GCSEs (and also good A-levels) were, respectively, 65.7% and 32.9%. The predicted proportions for *non-FSM, SEN* school leavers 41.6% for GCSEs and 19.3% for A-levels, while the predicted proportions for *FSM, non-SEN* school leavers 51.2% for GCSEs and 22.2% for A-levels. So, changing the SEN component of the *non-SEN, non-FSM* scenario resulted in 41.6% of school leavers obtaining good GCSEs while changing the FSM component of the *non-SEN, non-FSM* scenario resulted in 51.2 % of school leavers obtaining good GCSEs. Since this difference was significantly different from zero, we conclude that, starting from a *non-SEN, non-FSM* position, SEN status depresses the likelihood of good GCSEs by significantly more than FSM status.

On the other hand, changing the SEN component of the *non-SEN non-FSM* scenario resulted in 19.3% of school leavers obtaining good A-levels while changing the FSM component of the *non-SEN non-FSM* scenario resulted in 22.2 % of school leavers obtaining good A-levels. Since this difference was not significantly different from zero, we conclude that, starting

from a *non-SEN non-FSM* position, there was no significant difference in the effects of SEN and FSM status in reducing the likelihood of good A-levels.

Figure 4: The Effects of SEN and FSM Status on GCSE Performance



Note: Predicted probabilities from equation (1) estimates

Question 4: Is there a ‘neighbourhood effect’ to performance?

The results in Tables 2 and 3 unambiguously show that, after controlling for gender, FSM status, SEN status, religion, and school management type, super output areas in the highest quintile of multiple-deprivation had the lowest level of educational performance and that educational performance progressively improved for areas in successively lower quintiles of deprivation. So, school leavers from areas in the highest deprivation quintile had a 53.5% chance of obtaining good GCSE passes, and a 28.9% chance of getting good A-level passes, compared to 68.6% and 40.7%, respectively, for school leavers from areas in the lowest deprivation quintile.

Neighbourhood effects were particularly marked for the GCSE performance of FSM male school leavers. For this group, the likelihood of a good GCSE result rose from 43.1% in the highest quintile of deprivation to 52.2% in the lowest quintile. However, as Table 3 shows, there were no neighbourhood effects for FSM males with respect to A-level results. The likelihood of a good A-level result for FSM males did not vary significantly between the quintiles of multiple-deprivation.

Ideal Types

The predicted probabilities from Tables 2 and 3 allow one to identify “ideal types” where ideal types represent *hypothetical* cases with *specified* characteristics. For example, a school leaver *most* likely to obtain good GCSE passes would be a non-FSM, non-SEN Catholic female from an area of low deprivation (Ideal Type A); conversely, the school leaver who was *least* likely to obtain good GCSE passes would be a FSM, SEN Protestant male from an area of high deprivation (Ideal Type B). Table 4 shows the results from comparing these types.

Table 4: Outcome Probabilities for ‘Ideal Types, GCSE and A-level passes

	Probabilities (%)		Difference	Test Statistics		
	Type A	Type B	Type A - Type B	SE	Z value	Pr> z
Good GCSE Passes	87.3	25.5	61.8	0.028	22.0	0.0
Good A-level passes	63.7	6.7	57.0	0.023	24.5	0.0

In summary, the empirical analysis based on data from 22,764 school leavers in 2012/13 tells us the following:

- Girl school leavers significantly out-perform boys regardless of how deprived the areas in which they live.
- Catholic school leavers significantly out-perform Protestants regardless of how deprived the areas in which they live.
- Areas suffering from high levels of multiple deprivation have the lowest levels of educational performance, particularly marked amongst FSM male school leavers.
- The likelihood of good examination performance is highest amongst non-FSM school leavers.
- The school leaver most likely to obtain good GCSEs is a non-FSM, non-SEN, Catholic female from an area with low levels of deprivation.
- The school leaver least likely to obtain good GCSEs is a FSM, SEN Protestant male from an area with high levels of deprivation.

In addition, the Northern Ireland education system remains highly (self) segregated by religious affiliation. The remainder of the paper addresses the education policy responses to these findings.

Education Policy Responses

The analysis above identified three important factors which affect the likelihood of a pupil leaving school with good GCSE/A levels: FSM status, religion and gender. How then has the Department of Education sought to address the performance gap between schools differentiated by these three variables? The key education policy responses to the identified weaknesses are school improvement policies. The DENI’s approach to schools improvement

is based on their policy document *Every School a Good School: A Policy for School Improvement* (ESaGS) [Department of Education, Northern Ireland, 2009]. The policy aims to support schools and teachers in their work to raise standards and overcome barriers to learning that some pupils may face.

Every School a Good School policy was seen to be at the centre of the (then) Education Minister's reform agenda. Her vision was for 'schools as vibrant, self-improving communities of good practice, meeting the needs and aspirations of individual pupils through high quality teaching and learning' (DENI, 2009: i). Therein, the Minister outlined the characteristics of a good school as: child-centred provision; high quality teaching and learning; effective leadership; and a school connected to its local community.

Central to the ESaGS policy is the process of self-evaluation and self-improvement. Specifically the policy document notes:

School self-evaluation and self-improvement (with support) are at the heart of the policy. We believe that schools themselves, through honest and open engagement in self-evaluation, using effectively the wide range of data and information available to them, are best placed to identify areas for improvement and to implement changes that can bring about better outcomes for pupils (Department of Education, Northern Ireland, 2009: 1).

The ESaGS policy is based on a number of principles which include, *inter alia*:

- The interests of pupils rather than institutions must be at the centre of efforts to improve educational attainment and tackling underachievement.
- Equity of access and equity of provision as well as a continuum of provision for a diversity of need.
- A recognition that every school is capable of improvement; that the school is best placed to identify areas for improvement; and that sustained improvement comes from within the school.

(Department of Education, Northern Ireland, 2009: 5).

To operationalise the ESaGS approach of self-evaluation and self-improvement, data at, pupil, class, year group, key stage and whole-school levels are collated, from which schools (by legislation) set their own targets for improvements, including targets for literacy and numeracy, and incorporate these into their school development plans. The targets set should be challenging and based on performance trends and plans for improvement. When setting targets, schools are asked to take into account:

- trends in performance by the school over previous years;
- the prior attainment of each year group;
- the likelihood that levels of progression will be more challenging;
- the context within which the school is operating and how it compares to schools in similar circumstances; and,

- the priorities set in the school development plan.

All schools are provided annually with benchmarking data to enable them to compare their performance in assessment and public examinations with schools in similar circumstances, in terms of enrolment bands, and proportions of pupils with free school meal entitlement (Northern Ireland Statistics and Research Agency, 2014). Effective self-evaluation and the actions that flow from this process should, according to DENI, deliver educational improvement for all pupils. Yet as the empirical evidence above attests, this policy to improve schools has, thus far, had limited impact on inequalities and reducing the performance gap between pupils from deprived and affluent backgrounds

A new approach

Given the performance differentials identified by the empirical analysis above, a new approach has been adopted by DENI entitled 'shared education', at the centre of which is a move away from schools operating as independent learning units to one where collaborative learning through a network of schools is encouraged and incentivised (Borooah and Knox, 2015). Shared education is a concept pioneered by an external philanthropy in Northern Ireland (Atlantic Philanthropies) and is defined as follows:

Shared education involves two or more schools or other educational institutions from different sectors working in collaboration with the aim of delivering educational benefits to learners, promoting the efficient and effective use of resources, and promoting equality of opportunity, good relations, equality of identity, respect for diversity and community cohesion (Connolly et al, 2013: xiii).

Shared education is distinct from integrated education. The essential point is that shared education involves collaboration to improve educational outcomes while preserving community identity: pupils sit together in a class room to study while remaining Catholic or Protestant pupils. Integrated education on the other hand has a specific focus on reconciliation outcomes with children being educated together. The focus of shared education is therefore delivering core curriculum activities where teachers and pupils work together across schools to achieve higher quality educational experiences. Shared education recognises that schools have interdependent or collaborative relationships and promotes positive collaboration to support the common good.

Much of the theoretical and research underpinnings for collaborative or shared learning draw on the extensive literature on how collaboration and networking between schools in Great Britain can enhance school effectiveness and improvement. Work by Lindsay et al (2005), Chapman and Allen (2005), and Chapman and Hadfield (2010) examined the potential for stronger schools being matched with weaker schools to help improve their performance. Muijs et al (2010) argued that networking is differentially effective in meeting

educational goals and set out the circumstances under which it is more likely to enhance school effectiveness and improvement:

Where improvements in pupil performance have been seen, this is often where more effective schools have paired with less effective schools to help them to improve, where leadership has been strong and supportive of networking, and where the number of schools involved has been limited. External support may also be helpful in cases where internal capacity or trust between schools may be lacking (Muijs et al: 2010: 24).

Chapman's research (2008; see also Chapman and Harris, 2004; and West, 2010) highlighted key levers for improvement where networking takes place in a context of challenging circumstances which he argued should include: generating positive relationships; focusing on teaching and learning; understanding, leading and managing changes; committing to continuous professional development; building community; and, drawing on external support.

In their latest research on using collaboration and networking as a means of school improvement, Chapman and Muijs (2014) conducted a large quantitative study (122 federations and 264 comparator schools) which examined the relationships between school federations and student outcomes. They developed a typology of federations used to describe the nature of collaborative relationships and structural arrangements between two or more schools. One category was described as 'performance federations' consisting of two or more schools, some of which were low and others high performing schools. The study concluded:

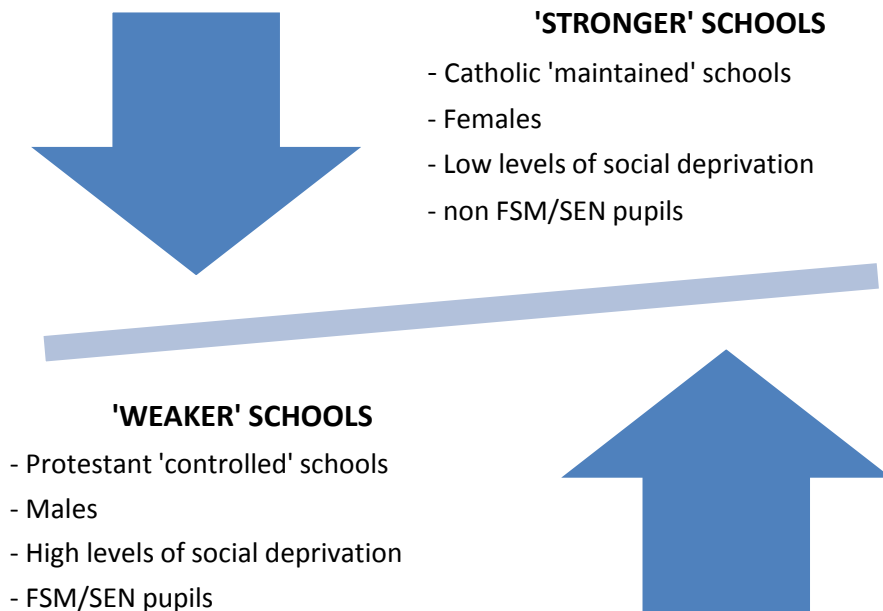
Federations can have a positive impact on student outcomes and federation impact is strongest where the aim of the federation is to raise educational standards by federating higher and lower attaining schools. Our study therefore primarily suggests that school improvement may result when a strong school works with a weaker school to improve the latter, and that it is this rather than a generic "collaboration effect" that may lead to improvement (Chapman and Muijs, 2014:385).

The researchers reference key features associated with successful partnerships involving 'stronger' and 'weaker' schools from previous work. These include: the successful transfer of cultural norms and management systems into the 'weaker' school; the movement of staff between the schools to build shared understanding of, and approaches to, teaching and learning; and, the streamlining of financial mechanisms to achieve economies of scale (Chapman et al, 2008; Lindsay et al 2007).

Using the evidence from this paper, 'stronger' schools are characterised as: Catholic schools, females, with low number of FSM/SEN pupils in more affluent areas at one end of the spectrum through to 'weaker' Protestant schools, males, a high number of FSM/SEN pupils, in areas of social deprivation. School collaboration is therefore used across the spectrum to

raise educational standards and tackle segregation simultaneously. We summarise the new approach taken to reduce the performance gap between schools and, in so doing, to tackle segregation in Northern Ireland in figure 5 below.

Figure 5: Raising standards and tackling segregation through school collaboration



Shared Education and School Improvement

The practical outworking of this new schools networking approach to school improvement has been the *Shared Education Signature Project*. This is a £25m project being delivered over a 4 year period (2014/15 – 2017/18) with combined funding from three sources: Atlantic Philanthropies (£10m); the Office of the First Minister and Deputy First Minister (£10m); and, the Department of Education (NI) (£5m). The programme is targeted at 65% of all schools in Northern Ireland (approximately 760 schools from nursery to post-primary levels) ranging from schools which previously had irregular cross-community contact with each other (sporting events, joint school trips) through those with extensive collaboration arrangements in place (joint curriculum arrangements, shared teaching, combined staff development days). The remaining 35% of schools who have been working in isolation, sometimes by dint of their rural geography and/or single identity areas, will be targeted by a European Peace IV initiative launched in Spring 2015 of which shared education is one component (with an estimated budget of €45m).

The aims of the *Shared Education Signature Project* (SESP) are:

- (i) To scale-up the level of shared education across Northern Ireland, drawing on externally funded pilot programmes which has been running since 2007.

- (ii) To mainstream shared education using a monetary shared education incentive which could become of part of the revised funding formula for schools in the future.
- (iii) To improve education and reconciliation outcomes in schools working collaboratively.

At the same time as the implementation of the *Shared Education Signature Project*, the Department of Education launched a consultation document entitled: *Sharing Works: A Policy for Shared Education* (DENI, 2015b). The Minister's aim is to embed shared education into education policy in Northern Ireland. As the consultation policy document points out:

Whilst a significant number of pilot projects have taken place with external funding support, the Department wants, in the longer term, to see shared education not as an 'add on' or optional enrichment activity but as a normal and common experience for all young people firmly embedded within the ethos of each school (DENI, 2015b: 17).

The Minister has also pledged to bring forward a Shared Education Bill. The draft Bill offers a definition of shared education as 'the education together of (a) those of different religious belief or political opinion, and (b) those who are experiencing significant socio-economic deprivation and those who are not, which is secured by the working together and co-operation of two or more relevant providers'. The Bill also proposes that named bodies⁸ are given the statutory power to 'encourage and facilitate shared education' (Shared Education Bill, 9/12/2014 12:20:9).

Conclusions

This paper has examined two key themes. First, using school leavers' data, we have uncovered within the Northern Ireland school system the factors that impact on inequality, differential performance, a high level of self-segregation, and a stubborn performance gap for low-income pupils. Second, we have examined the policy responses to these systemic issues by considering the Department of Education's (NI) school improvement policies thus far. Given the limited success of pre-existing policies to impact on inequality and segregation as acknowledged by the Chief Inspector of School, we set out the new approach being adopted by DENI known as shared education. The key question, given the evidence from this paper of the factors which impact on pupil performance, is how this new initiative can be maximised to address the seemingly intractable weaknesses in the Northern Ireland school system? One early policy consideration is whether the *Shared Education Signature Project* could be more effectively implemented, based on the findings of this study. Thus far the Minister of Education has announced funding for the first tranche of shared education partnership schools involving 31 partnerships (66 schools) and noted 'I am confident this

⁸ The Department of Education (NI); the Education Authority; the Council for Catholic Maintained Schools (CCMS); the Youth Council for Northern Ireland; and the Northern Ireland Council for the Curriculum, Examinations and Assessment.

programme will deliver improved outcomes for our children, young people and wider society' (O'Dowd, 2015: 1). Yet, the successful schools have self-selected the constituency of their partnerships and applied for funding on that basis.

The empirical evidence from this study identifies the characteristics of pupils (and therefore their schools) who/which have most to offer and those who/which have most to gain in terms of educational improvement. Existing research also tells us that the combination of higher and lower attaining schools creates the best circumstances for school improvement. The implementation of the *Shared Education Signature Project* should therefore be informed by a process which identifies two key factors: schools which are geographically and educationally proximate. In the case of the former, schools which are in close proximity will ensure limited travelling and time out of class to engage in shared education. By dint of the sectarian geography of Northern Ireland, it is also likely to mean that these schools meet the cross-community feature of shared education (partnerships must involve two or more schools from different sectors working in collaboration). In the case of education proximity, the research in this paper could be extended to identify those schools which add more or less education value to their pupils and could, in partnership, collectively benefit from shared education. In short, the research in this paper offers the basis for a more rational clustering of schools (mindful of those factors which impact on education performance) under the new shared education initiative and the potential, through an innovative schools improvement process, to address inequalities and segregation in the Northern Ireland education system.

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