Immersion in a minority language: The performance in English reading and mathematics of primary-level students in Irish-medium schools in areas of socioeconomic disadvantage[1]

Karen Ní Chlochasaigh, Gerry Shiel & Pádraig Ó Duibhir

University of Limerick | Educational Research Centre | Dublin City University

Abstract

When the earliest Irish language immersion schools outside Irish-speaking (Gaeltacht) areas were established, students were likely to come from relatively high socioeconomic backgrounds. While research has shown positive outcomes for these students, less is known about the outcomes of immersion education for students from areas of social disadvantage. Of 145 Irish immersion primary schools in the Republic of Ireland in 2016, 13 (8%) served low socioeconomic status (SES) communities. The current study examined the achievements of Grade 3 (n=283) and Grade 6 (n=235) students in these schools on nationally-standardised tests of English reading and mathematics. Their scores are compared to those of students attending schools in areas of disadvantage nationally. Immersion students in Grade 3 achieved lower mean scores on both English reading and mathematics when compared with their low-SES English-medium peers. However, Grade 6 students achieved at about the same level in mathematics and outperformed their low-SES peers nationally in English reading.

Keywords: low socioeconomic status, immersion education, Irish language, minoritised language, English reading, mathematics

[1] This is the author accepted manuscript of the following article: Ní Chlochasaigh, K., Shiel, G., & Ó Duibhir, P. (2021). Immersion in a minority language: The performance in English reading and mathematics of primary-level students in Irish-medium schools in areas of socioeconomic disadvantage. *Journal of Immersion and Content-Based Language Education*. https://doi.org/https://doi.org/10.1075/jicb.21003.nic. The article is under copyright and the publisher should be contacted for permission to re-use or reprint the material in any form.

1. Introduction

Immersion education, in Ireland and internationally, had initially been accessed mostly by relatively high socioeconomic status (SES) students (Genesee, 1976; Ó Riagáin & Ó Gliasáin, 1979). Although there is some evidence internationally to support the suitability of immersion education for a diverse range of students, more research is needed on the outcomes of immersion programmes for students from relatively low SES backgrounds, especially in light of the delayed introduction of English language arts in such programmes (Genesee & Fortune, 2014) where English is the students' first language (L1) or the dominant community language.

Initially, international studies on immersion education were concerned with its effect on academic performance and achievement and its suitability for all students (Bruck, 1982; Bruck et al., 1975; Genesee, 1976; Swain & Lapkin, 1982). Individual differences underlying academic achievement in immersion programmes have since become the focus of research, including studies that have considered factors associated with immersion students who exhibit low levels of achievement in reading (Genesee & Jared, 2008). Such factors include low academic ability, poor or impaired first language acquisition, lack of educational resources and supports in the home, learning difficulties, socioeconomic background, and ethnic and minority language status. Researchers have long challenged the idea that immersion education might place an extra burden on at-risk students, while also raising ethical considerations that arise when at-risk students are discouraged from attending an immersion programme (Genesee, 1992, 2007; Genesee & Fortune, 2014; see also the introduction to this special issue).

Early studies have consistently found that low-SES students in early French immersion programmes performed as well as their non-immersion counterparts in L1 reading and other domains of language; the early studies evaluated reading, writing, speaking and listening in English L1 as well as in some academic domains like mathematics (Caldas & Boudreaux, 1999; Genesee & Jared, 2008; Lambert & Tucker, 1972; Turnbull et al., 2001). This occurred despite the later introduction of English language arts in the curriculum and the attainment of greater competency in the target language (L2) (Bruck et al., 1975; Holobow et al., 1991). Due to the delayed introduction of English language arts in total immersion programmes, a short-term lag in English language performance has been identified in relation to certain linguistic skills but this achievement gap usually narrows for most students within one or two years after English language arts have been formally introduced in the curriculum (Genesee, 1976; Lambert & Tucker, 1972; Swain & Lapkin, 1982). There is some evidence to suggest that a transfer of linguistic skills from the immersion language to English (Cummins, 2016) and informal English language learning experiences outside of school may enable immersion students to achieve equivalence with non-immersion students in English language skills over time (Barik & Swain, 1976; Cashion & Eagan, 1990). In later learning years, no long-term detrimental effects on English language or literacy skills have been associated with early total immersion and the delayed introduction of English, with early immersion students typically achieving on par with students in English programmes in higher grades (Genesee, 2004).

In this article, we present findings from an investigative study of performance on English reading and mathematics in Irish immersion schools located in areas of social disadvantage. We first provide a review of the literature on the impact of SES on academic achievement and early language development in school in general. This is followed by an overview of Irish

language immersion education, also referred to as Irish-medium education (IME), and the diversification of the immersion model to provide a context for the study. We then discuss the methodology and assessment frameworks used in the study to gather data on academic achievement rates in IME schools in disadvantaged regions, referred to as IME-DEIS[2] schools. The results are presented in four parts: by average English reading achievement across schools; by average mathematics achievement across schools; by achievement in these areas for individual schools with varying levels of disadvantage; and by relative differences in English reading and mathematics performance across schools. Finally, we discuss the findings of the study and the implications for the IME and more generally for minority language immersion settings situated in areas of social disadvantage.

1.1. The impact of SES on educational outcomes and early language development

Parental occupation, income, and education have been identified as indicators of SES (Sirin, 2005), and these factors exert a considerable influence on children's early language development and subsequent educational attainment (Hills et al., 2010; van Druten-Frietman et al., 2015). Educational underachievement and consequent limitations for future life choices among students from low SES backgrounds in contrast with their peers from more privileged backgrounds is a concern for policy makers (Early et al., 2020). A study carried out by Chiu and McBride-Chang (2006) on reading performance drawing on data from PISA (the Programme for International Student Assessment) across 43 countries, reported significant positive correlations between SES of both a students' own family and

[2] DEIS is the acronym used for the Delivering Equality of Opportunity in Schools programme which was implemented to give extra teaching, planning and financial supports to schools located in areas with high concentrations of social disadvantage (Department of Education and Skills, 2005, 2017a).

that of co-students and reading performance. Underdeveloped language skills can be interpreted as a direct effect of low socioeconomic status (Hoff, 2006).

In Ireland, at the time of the current study, schools were designated as disadvantaged with reference to an index created in 2006 based on the proportion of students in a school, as reported by the school principal, for each of six equally-weighted factors: unemployment, lone parenthood, membership in the Traveller[3] community, family size, access to free book grants, and use of local authority accommodation (Archer & Sofroniou, 2008; Kavanagh et al., 2017).[4] Schools are allocated resources based on their scores on the index, including additional teaching staff, additional funding for resources, and access to supplementary programmes such as Reading Recovery. When allocation to DEIS schools was announced in 2006, 197 schools were allocated to Band 1 (the most disadvantaged schools, which received greater levels of support), and 141 to Band 2 (less-disadvantaged schools) (Department of Education and Skills, 2017b). While the disadvantaged status of schools in the current study was based on their designation in 2006, we also drew on a similar index established in 2014 that was prepared in conjunction with a model for the allocation of special needs resources in primary schools (4-12 yrs), based on many of the same variables used to establish school disadvantaged status, as well as achievement in reading and mathematics (Weir & Denner, 2013).[5] Scores from the 2014

[3] The Irish Traveller community are a nomadic indigenous ethnic group who are genetically distinct from the settled Irish.

[4] A new method of identifying schools as disadvantaged was introduced following the publication in 2017 of a new Action Plan for DEIS (Department of Education and Skills, 2017a). The new approach draws on small-area data collected in five-year national censuses of the population and defines school-level disadvantage in terms of the average level of socioeconomic disadvantage in the immediate area of each student's home. A consequence of the change in methodology is that some IME schools in the current study changed from Band 2 (less disadvantaged) to Band 1 (more disadvantaged) following the introduction of the new system. However, their designation as Band 1 or 2 in this article is based on their DEIS status at the beginning of the current study in autumn 2016.

[5] The average resources allocation index score of Band 1 schools nationally was 271.0, and 196.7 for Band 2 (a higher score indicates a greater level of need). For IME-DEIS schools, the corresponding averages were 284.7

model were used in this study to describe with greater precision the levels of disadvantage in individual schools labelled as DEIS Band 1 or Band 2. In summary then, the DEIS classification of each school was based on the 2006 index but the actual score assigned was based on the 2014 recalibration because the latter measure is more precise (see results section).

The social, economic, and cultural wealth in a child's experience and social class — a concept coined 'social capital' by Coleman (1988) – is an influencing factor in early language development. Bourdieu (1991) relates 'cultural capital' in educational contexts with societal financial capital outside of education. Some studies suggest that children from low SES families develop vocabulary more slowly than children from high SES families (Hart & Risley, 2003), with the latter benefitting from stronger linguistic input by family members, including the mother (Hoff, 2006). The speech of higher SES mothers has been shown to elicit conversation from children more frequently, while the speech of lower SES mothers is more often orientated to directing their children's behaviour (Hoff et al., 2002). Children from higher SES homes have been found to respond to adults with longer and more complex responses and to "use language to analyze and reflect, to reason and justify, or to predict and consider alternative possibilities" more often than children from lower SES homes (Hoff et al., 2002, p. 62). Neuman et al. (2018) discuss a 'double dose of disadvantage' where students come from a low SES background and attend a school in an area of social disadvantage, which can negatively impact on academic achievement.

and 195.5, indicating a greater level of need on average in IME-DEIS Band 1 schools compared to DEIS Band 1 schools nationally, and similar levels of need in IME-DEIS Band 2 schools and DEIS Band 2 schools nationally (see Figures 6 and 7).

1.2. Irish-medium education and its diversification

IME outside of the Gaeltacht (mainly Irish-speaking) regions has changed considerably since the early 1970s when this form of education became popular. As in other bilingual education systems, the interest in immersion education was driven by parents (Baker & Wright, 2017; Coady & Ó Laoire, 2002; Ó Duibhir, 2018). During these early years, Irish-medium schools gained a reputation as a form of education accessed predominantly by children from middle-class families whose parents had a reasonable competence in Irish (Ó Riagáin & Ó Gliasáin, 1979). IME experienced exceptional growth during the 1980s, becoming a mainstream popular choice among parents (Kavanagh & Hickey, 2013). Over time, the profile of families and students attending IME became notably more diverse (Ó Riagáin & Ó Gliasáin, 1979; Harris et al., 2006). The majority of schools in the population of IME-DEIS schools that took part in the study were founded in the 1980s (6 schools) and 1990s (4 schools). Two of the schools were founded during the 1970s at a time when IME schools known as *Gaelscoileanna*[6] were being established nationally. The remaining school was founded during the early 2000s. Hence, there was a gradual but steady growth of IME schools in areas of disadvantage from early 1970s to the early 2000s.

The immersion model employed in IME schools is one-way early total immersion where no English is taught until the second or third year of school, age 6-7 years. From that point until the end of Grade 6, English language arts are taught through the medium of English and all other subjects are taught through Irish, representing approximately 85% of instructional time in all primary school grades (see Figure 1). This contrasts with many one-

[6] National (primary) schools outside of Gaeltacht areas (Irish heartland areas where Irish is spoken as a first language) in which Irish is used as the medium of instruction and communication apart from the teaching of English.

way immersion programmes in other contexts such as the US, Canada, and Wales which gradually increase instruction through the L1 moving to a 50:50 model in senior grades of primary school. As Irish is an endangered language, student exposure to Irish in the school is maximised. This model is similar to some of the indigenous Hawaiian immersion programmes in the US (Wilson & Kamanā, 2011). All IME primary schools in the Republic of Ireland are 'all-Irish' schools or immersion centres as opposed to immersion tracks, streams, or units (Ó Duibhir, 2018). The same teachers are responsible for teaching all subjects, including English, to their classes.

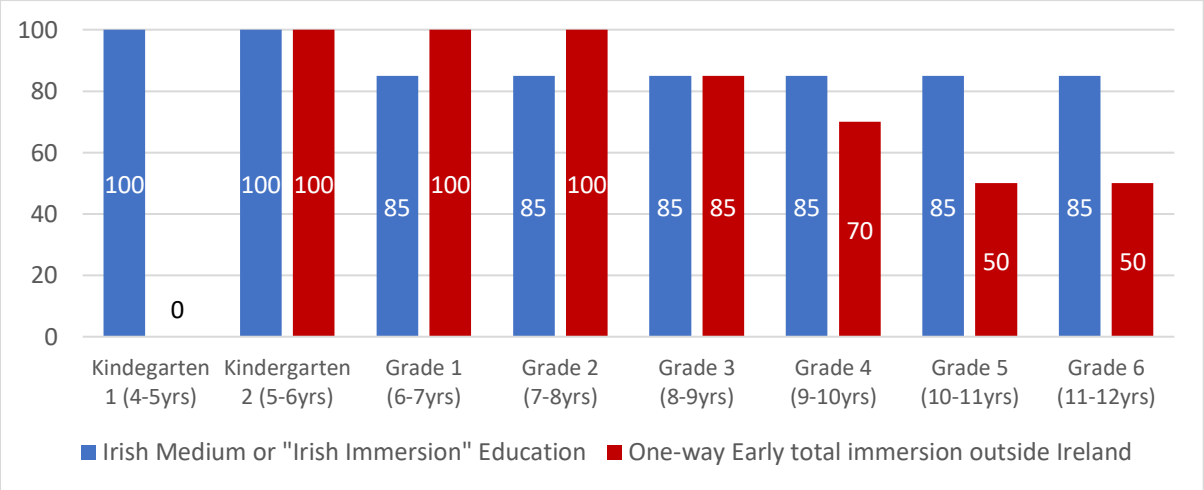


Figure 1. Percentage of Instructional Time in the Target Language in IME Schools Compared to One-way Early Total Immersion Programmes (Source: Ó Duibhir, 2018, p. 19)

Provision is made in the Primary School Curriculum (Department of Education and Skills, 2019) for a two-year total immersion period from 4 to 6 years of age. The delayed introduction of English language arts in this model is seen as a dilemma by many IME-DEIS teachers, given the underdeveloped English language skills of their students upon commencement of school. Teachers see a tension between developing the target language through a total immersion phase and delaying the development of their students' English

language skills. As a result, many IME schools, not just IME-DEIS schools, introduce English in the latter half of Kindergarten 2 (5-6 years of age) for 30 minutes per day.

As noted above, students from diverse backgrounds, including those from disadvantaged backgrounds who are deemed at risk due to poor L1 attainment and lack of resources and supports in the home, now form part of the IME student profile. In 2016, 13 out of a total of 145 (8.9%) IME schools outside of Gaeltacht areas in the Republic of Ireland were situated in designated areas of disadvantage and formed part of the DEIS plan. There were 2,200 students enrolled in these schools in 2016, with six of these schools allocated to Band 1, and seven to Band 2 (see above).

The main evidence on achievement in the Irish immersion context has come from national surveys and assessments showing higher levels of academic achievement in Irish (Harris et al., 2006) and in English reading and mathematics (Shiel et al., 2011) among students in IME schools (including IME-DEIS) compared to students in English-medium schools nationally. In the case of English reading and mathematics, however, when the overall higher SES of students in IME schools in general is taken into account, IME students are found to perform at a similar level to their English-medium peers (Gileece et al., 2012; Shiel et al. 2010;). Nonetheless, no previous study has focused specifically on the attainment of students in IME-DEIS schools and compared them to non-IME students in DEIS schools elsewhere in Ireland. The results of the current study are important in informing policy makers, teachers, and parents on appropriate expectations for students in IME-DEIS schools in English reading and mathematics, which may, in turn, impact on pedagogy, including decisions around the timing of the introduction of the English language arts, and the nature and extent of the supports that students may need in English reading and mathematics.

Since the inception of DEIS in 2006, significant progress has been made in narrowing the achievement gap between students in DEIS schools in general and in other schools nationally. National assessments in DEIS schools have shown improvements in average scores in English reading and mathematics and a decrease in the achievement gap between students in DEIS schools and schools nationally when compared to studies in previous cycles (Kavanagh et al., 2017; Weir & Denner, 2013). Despite these improvements, a gap still exists between the achievement of students in DEIS schools in general and students nationally (Department of Education and Skills, 2017a). These studies raise questions in relation to the performance of students who attend IME-DEIS schools and their achievements in English reading and mathematics in comparison to their non-immersion peers in DEIS schools and in schools nationally. While previous studies of DEIS students in general included some students from immersion programmes, the representation of these students in the samples (fewer than 2%) was insufficient to make meaningful comparisons. The current study addresses this issue by comparing the attainment of all Grade 3 and Grade 6 IME-DEIS students with their counterparts in DEIS schools in general as measured in the 2016 DEIS evaluation study involving national samples of students in DEIS schools (Kavanagh et al., 2017).

A further aspect which we wished to examine, as captured in research question 3 below, was to compare the relative performance of students in IME-DEIS schools in English reading and mathematics. A relative difference in performance between English Reading and mathematics could indicate to schools the need to place a stronger emphasis on extra support in one area over the other.

2. Methodology and Assessment Frameworks

2.1 Research Questions

This study aimed to examine the attainment of Grade 3 and Grade 6 students in IME-DEIS schools in English reading and mathematics in comparison to students in DEIS schools nationally and to examine attainment scores at an individual school level. Our research questions were:

1. How do students in Grades 3 and 6 in IME-DEIS schools perform in English reading and mathematics compared to their peers in DEIS schools nationally, as measured by standardised tests?
2. What is the relationship between the level of disadvantage at school level and student performance in IME-DEIS schools?
3. Do students in IME-DEIS schools perform relatively better in English reading or in mathematics?

2.2 Participants

All 13 IME-DEIS schools agreed to participate in the study. The total student population of these schools was 2,554. Students from Grade 3 (8-9 years) and Grade 6 (11-12 years) were selected to take part as national level data on performance in DEIS schools were available for these grade levels. A total of 283 students in Grade 3 and 235 in Grade 6 in IME-DEIS students completed standardised tests of English reading and mathematics. We administered the same standardised nationally-normed assessments in English reading and mathematics that had been used in the evaluation of the comparison group of DEIS schools in 2016 (Kavanagh et al., 2017) and in earlier evaluation studies. The comparison group

comprised students at the same grade levels in a representative sample of 118 urban DEIS schools nationally, of which all but three were non-IME schools. Given the very small proportion IME schools in the national sample, it is unlikely their inclusion affected the results significantly. In these schools, 4290 students in Grade 3, and 4155 in Grade 6 completed the English reading and mathematics tests in 2016. Data used in this article in respect of the comparison group (i.e., mean scores, standard deviations) were drawn from published data in Kavanagh et al. (2017).

2.3 Assessment Instruments

The standardized tests used in the current study in 2017, and in the national evaluation of DEIS in 2016, were the Drumcondra Sentence Reading Test and a shortened version of the Drumcondra Primary Mathematics Test. Both tests were designed by the Educational Research Centre, Dublin. Both were originally standardised on national samples that included both students in disadvantaged and non-disadvantaged schools, and in IME- and non-IME schools in line with their representation in the population (Educational Research Centre, 2005; Kavanagh et al., 2017).

The Drumcondra Sentence Reading Test (DSRT) is designed for Primary schools in Ireland and is divided into six levels for 1st to 6th Grades. The test has 40 items at each grade level drawn from English language arts textbooks used at those levels. Using a cloze procedure, it assesses students' ability to understand sets of sentences of gradually increasing difficulty – a skill that is associated with ability to read longer continuous texts (e.g., Clifton & Duffy, 2001). Students respond to multiple-choice items representing missing words in the target sentences, and record their answers on a machine-scorable answer sheet (see sample items in Appendix A). Twenty minutes is allowed for completion.

Raw scores can be transformed to standard scores and percentile ranks using the tables of norms in the test manual (Educational Research Centre, 2005). Reliabilities (measures of internal consistency) of .92 at Grade 3 and .89 at Grade 6 were reported by Kavanagh et al. (2017) for disadvantaged samples.

The versions of the Drumcondra Primary Mathematics Test-Revised used in this study were abbreviated forms of a standardized test used in primary schools in Ireland in Grades 1-6 (see Educational Research Centre, 2007). It is based on the mathematics curriculum for primary schools and comprises 25 items at each grade level. Items are multiple-choice or short answer. At Grade 3, the test assesses such skills as basic computation (subtraction, multiplication), reading time (analogue and digital), identifying fractions, reading tables and charts, identifying 2-D and 3-D shapes and their properties, and solving basic problems involving computation. At Grade 6, it assesses equivalence of fractions and percentages, measurement of area, multiplication of decimal numbers, ratio, positive and negative integers, ability to read tables and graphs, and solving problems involving computation, area, capacity and proportion (see sample items in Appendix B). Thirty minutes are allowed for completion at Grades 3 and 6, and students record their responses in their booklets. Students may use a calculator on selected items. Bilingual versions of the mathematics test, with Irish on one page and English on the facing page, were used for the study so that students could access the test items in either language. As students are being taught the concepts in Irish it was deemed important to provide the items in English as well, thereby reducing the risk that the test was really an assessment of language proficiency rather than mathematical competence. Raw scores were transformed to standard scores and percentile ranks based on a rescaling of national norms to accommodate the reduced numbers of items. Reliabilities of .87 and .89 at Grade 3 and 6

respectively have been reported by Kavanagh et al. (2017) for students from socioeconomically disadvantaged backgrounds.

2.4 Procedure

A representative from the research team visited each IME-DEIS school to administer the standardised tests as part of the research project. All materials were returned to the Educational Research Centre. English Reading answer sheets were scanned and scored electronically. Mathematics test booklets were corrected by trained markers and test scores were entered into a database. Raw scores on both tests were converted to scale scores and percentile ranks based on national standards. When the tests were originally scaled (or rescaled in the case of the mathematics test),[7] national mean scores and standard deviations were set to 100 and 15 respectively. Statistical analyses performed on the data included computation of mean scores and standard deviations, application of tests of statistical significance for independent or matched samples,[8] and the computation of effect sizes. Where t-tests for independent samples were conducted, mean scores from the current study implemented in all IME-DEIS schools in spring 2017 and from the 2016 DEIS national evaluation were compared. Cohen's d values were computed to estimate effect sizes, using Cohen's (1988) alternative formula for calculating pooled standard deviations.

Checks were conducted to verify that the data met the assumptions required for conducting t-tests, as described by Tabachnick and Fidell (2013). For example, although the distributions for Grades 3 and 6 in reading for IME-DEIS schools were skewed, the estimates

[7] The rescaling, based on original standardisation data, was necessary because the number of test items at each of Grades 3 and 6 was reduced from 75 to 25 for the DEIS evaluation study (Kavanagh et al., 2017).
[8] Where students' relative performance in English reading and mathematics were compared, matched pairs t-tests were used.

of skewness (-.254 at Band 1 in Third Grade, .862 at Band 1 in Sixth Grade) were within the acceptable range of -1 to +1. The proportions of low-achieving students, i.e., those performing at or below the 10th percentile on the score distribution, representing low achievers, and those performing at or above the 90th percentile, representing high achievers, were also compared for IME-DEIS schools and the national DEIS 2016 sample. Notwithstanding differences in the numbers of students in these datasets, it was important to provide an indication of variation in performance, other than that provided by standard deviations.

3. Results

This section reports on the performance of students in IME-DEIS schools on English reading and mathematics compared to the performance of students in DEIS schools nationally. It also looks at proportions of high- and low-achieving students in both groups of schools, and describes associations between level of disadvantage and average performance at school level in IME-DEIS schools. The section concludes with a comparison of performance between English reading and mathematics in IME-DEIS schools.

3.1. English reading achievement

As noted above, differences in mean scores between the two groups of interest – students in IME-DEIS schools and students in DEIS schools nationally – were compared using independent sample t-tests. Comparisons between IME-DEIS and DEIS national results were carried out separately for Band 1 and Band 2 schools. Students in Band 1 IME-DEIS schools (those with the highest levels of deprivation – see above) achieved a mean score (93.1) in

Grade 3 that is not significantly different from the mean score of students in Band 1 DEIS schools nationally (94.3) (t(2495) = -0.97, p. =.34) (Table 1). Students in Band 2 IME-DEIS schools (those with more moderate levels of deprivation) achieved a significantly higher mean score in Grade 3 compared with students in DEIS schools nationally (101.0 vs. 97.6) (t(2047) = 3.296, p. = .001). In Grade 6, IME-DEIS students in Band 1 schools also significantly outperformed their counterparts in DEIS schools nationally, (95.3 vs. 92.5) (t(2466) = 1.920, p. = .047). The results for Band 2 were not significant (98.3 vs. 96.9) (t(1.214) = 1.214, p. =.225). As per Table 1, differences in performance, where they are significant, were small, with the largest Cohen's d value (0.27) in the small to medium range.[9]

Table 1. Mean Scores and Standard Deviations in English Reading by Grade and DEIS Band – IME-DEIS Schools and DEIS Schools Nationally

	IME-DEIS 2017			DEIS National Evaluation 2016			Analysis of differences				
	n	M	SD	n	M	SD	Diff	df.	t	p.	Cohen's d
Grade 3, Band 1	119	93.1	14.15	2378	94.3	13.19	-1.2	2495	-.965	.335	-0.09
Grade 6, Band 1	88	95.3	12.50	2230	92.5	12.97	1.90	2466	1.920	.047*	0.15
Grade 3, Band 2	164	101.0	13.44	1912	97.6	12.61	3.4	2047	3.296	.001***	0.27
Grade 6, Band 2	147	98.3	13.46	1925	96.9	13.48	1.4	2070	1.214	.225	0.10

Note. * $p \leq 0.05$, *** $p \leq 0.001$

[9] According to Cohen (1988), effect sizes (d values) of 0.2 can be described as small, 0.5 as medium, 0.8 as large.

Further analyses of achievement levels involved comparing the percentages of students in each programme type who were struggling and those who were doing very well. Although a higher percentage of students performed at or below the 10th percentile in Grade 3 IME-DEIS schools (20.2%) than in DEIS schools nationally (17.3%) (Figure 2), by Grade 6 the percentage of students performing at or below the 10th percentile not only dropped substantially (10.1%) in IME-DEIS schools but was also lower compared with DEIS schools nationally at Grade 6 (20.4%). This suggests that an initial lag affecting students in Grade 3 in Band 1 IME schools was ameliorated to some degree by Grade 6. It also supports the view that immersion education does not have a detrimental effect on overall English reading attainment for students attending DEIS schools. While there were fewer students in Band 2 IME-DEIS schools performing at or below the 10th percentile at Grade 3 than in DEIS schools nationally in this band, the proportion in Grade 6 in Band 2 schools increased marginally, from 7.9% to 10.2%, between these grade levels, perhaps suggesting that the lowest achievers in DEIS Band 2 schools are more at risk as they progress through the grade levels.

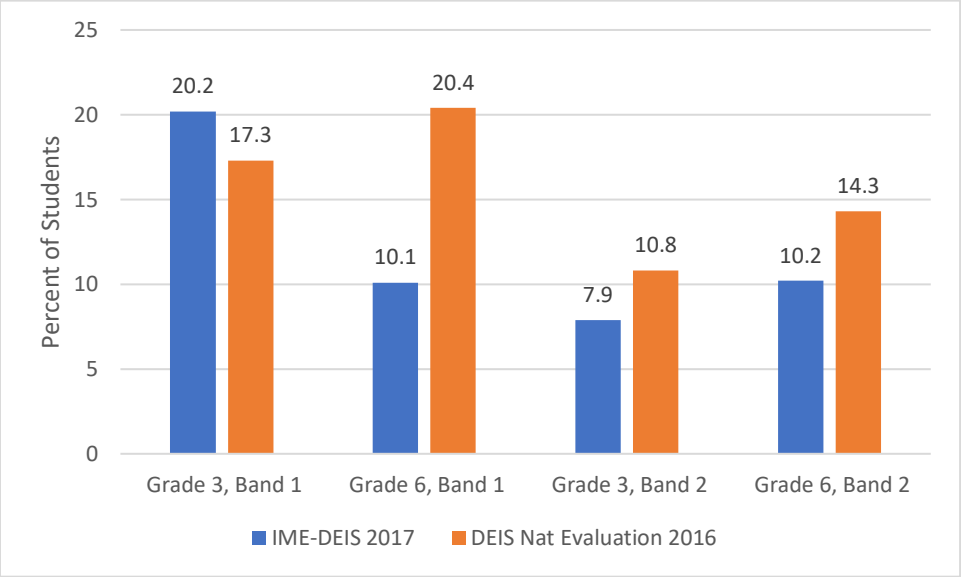
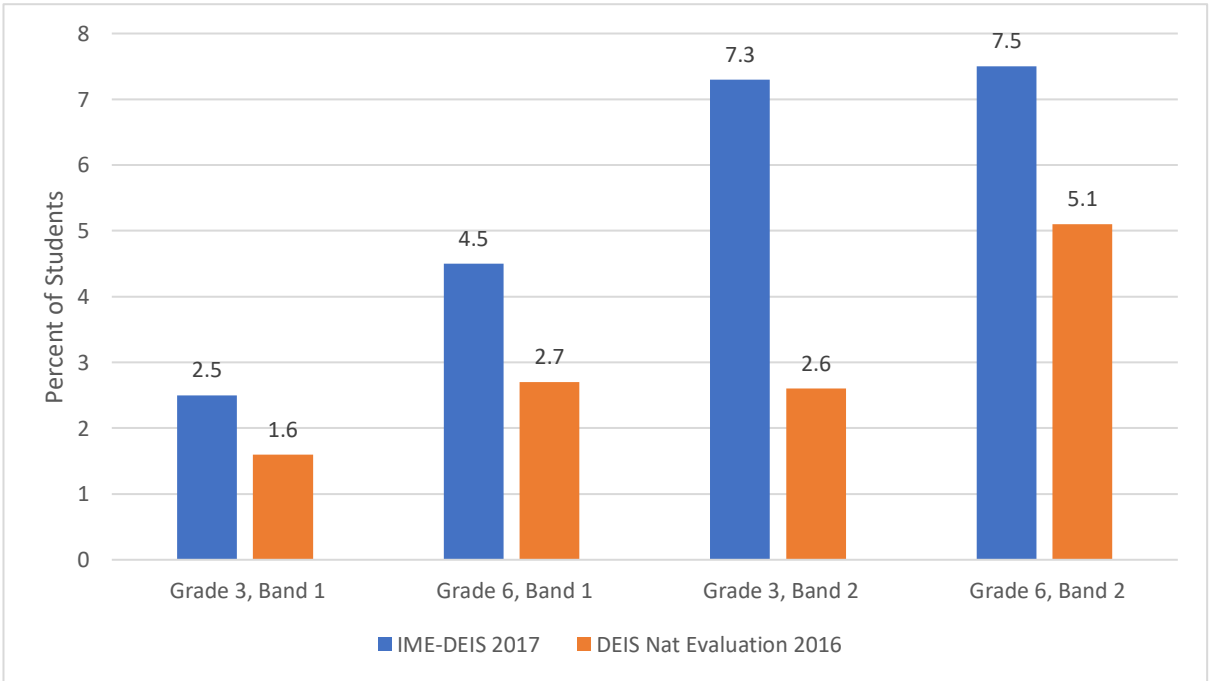


Figure 2. Percentages of Students Performing at or below the 10th Percentile in English Reading in IME-DEIS Study and DEIS National Evaluation, by DEIS Band and Grade Level

The percentages of students performing at or above the 90th percentile in English reading (an indicator of high achievement) were higher across bands and grades in IME-DEIS schools than in DEIS schools nationally (Figure 3). For example, at Grade 6 in IME-DEIS Band 1 schools, 4.5% of students performed at this level, compared with 2.7% in DEIS schools in general. As might be expected, there were proportionately more students in Band



2 IME-DEIS schools scoring at this level than Band 1 IME-DEIS schools, but this is also true for DEIS schools in general. The data show that more students in Band 2 IME-DEIS schools achieved higher scores on English reading at both grade levels (7.3% in Third, 7.5% in Sixth) than their peers in Band 2 DEIS schools in general (2.6% and 5.1% respectively), at the same time as they availed of bilingualism and biliteracy.

Figure 3. Percentages of Students Performing at or above the 90th Percentile in English Reading in IME-DEIS Schools and in the DEIS National Evaluation, by DEIS Band and Grade *Level*

It is important to note, however, that the percentage of students at or above the 90th percentile in DEIS schools is well below the national figure in schools in general (10%), particularly in Band 1 schools.

It could be argued that the differences in achievement between Grades 3 and 6 presented here are due to selection factors, relating to enrolment patterns in IME-DEIS schools. However, although not identical, the profiles of students with respect to such factors as parental education, employment status, and access to free medical care in Grades 3 and 6 are broadly similar in both IME-DEIS schools and in DEIS schools more generally (see Kavanagh & Weir, 2018, p. 42; Ní Chlochasaigh et al., 2020, p. 29) and students at both grade levels are exposed to similar challenges associated with a disadvantaged context.

3.2. Mathematics achievement

Comparison of the mathematics scores of students in IME-DEIS schools and in DEIS schools nationally again involved the application of independent sample t-tests. The analyses revealed differences in achievement by school type and band. In Grade 3 in Band 1 schools, the respective mean scores were 89.6 and 96.9, with performance in DEIS schools nationally

significantly higher, by 7 score points (t(2494) = -4.29, p. < .001) (Table 2). In Grade 6, students in Band 1 IME-DEIS schools were marginally ahead of students in DEIS schools nationally (by 0.5 score points), but the difference was not statistically significant (94.0 vs. 93.5) (t(2327) = 3.30, p. =.759). Students in IME-DEIS Band 2 schools also showed non-significant differences in achievement when compared with students in DEIS schools nationally at Grade 3 (difference = -0.5, t(1909) = 3.30, p. =.380) and at Grade 6 (difference = -1.0, t(2059 = -.383, p. = .702).

Table 2. Mean Scores and Standard Deviations in Mathematics by School Band and Grade – by Grade and DEIS Band – IME-DEIS Schools and DEIS Schools Nationally

	IME-DEIS 2017			DEIS National Evaluation 2016			Comparison				
	n	M	SD	n	M	SD	Diff	df.	t	p.	Cohen's d
Grade 3, Band 1	120	89.6	15.51	2376	96.9	15.91	-7.3	2494	-4.91	.000***	-0.46
Grade 6, Band 1	88	94.0	13.40	2241	93.5	15.05	-0.5	2327	.331	.759	-0.03
Grade 3, Band 2	165	98.5	15.84	1909	99.5	13.89	-1.0	2072	-.887	.380	-0.07
Grade 6, Band 2	148	98.2	13.71	1913	98.7	15.43	-0.5	2059	-.383	.702	-0.03

Note. *** $p \leq 0.001$

Due to the similar SES profiles of students in IME-DEIS schools and in DEIS schools nationally, the challenge facing immersion students to learn content (mathematics) through the language of immersion (Irish) could explain the initial achievement lag in IME-DEIS Band 1 schools at Grade 3, which dissipates by Grade 6, where mean scores (98.5 in IME-DEIS schools, 99.5 in DEIS schools nationally) are not significantly different from one another

(Table 2). The same lag did not seem to apply to Band 2 schools where the challenges associated with educational disadvantage are likely less severe. Nevertheless, unlike English reading, students in Grade 3 in IME-DEIS Band 2 schools did not perform at a higher average level in mathematics than students in DEIS Band 2 schools nationally (respective mean scores are 98.2 and 98.7).

The proportions at or below the 10th percentile, however, are relatively high across grades and bands in IME-DEIS schools (Figure 4). Almost one-third of students (32.5%) in Grade 3 IME-DEIS Band 1 schools performed at or below the 10th percentile in comparison with 15.7% in DEIS schools nationally. Students in Grade 6 in IME-DEIS Band 1 schools and at Grades 3 and 6 in IME-DEIS Band 2 schools also presented higher percentages than DEIS schools nationally although the differences were not as large, and proportions were almost identical in Grade 6, Band 2 (11.5% and 11.2% respectively).

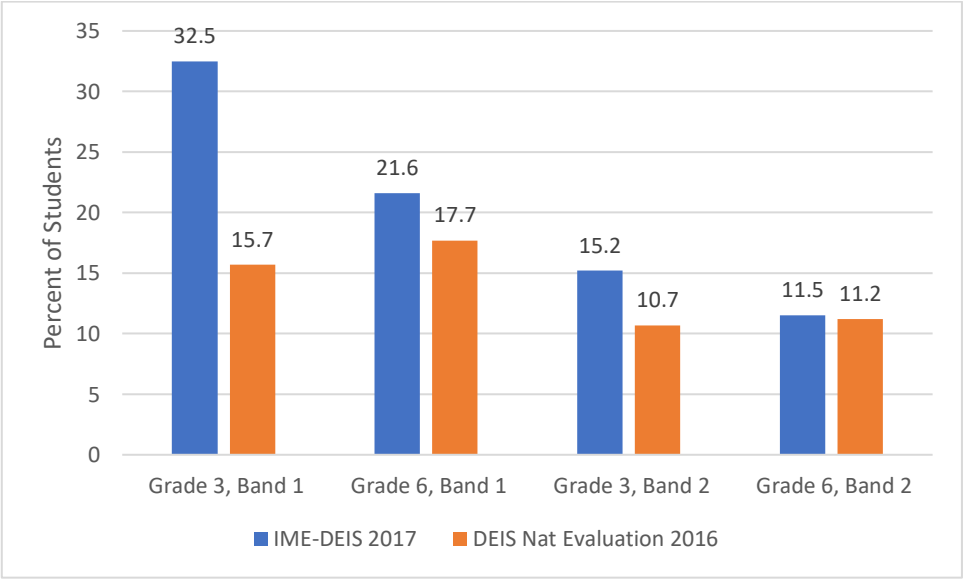


Figure 4. Percentage of Students Performing at or below the 10th Percentile in Mathematics in IME-DEIS and in DEIS Schools Nationally, by DEIS Band and Grade Level

Fewer than 1% of Grade 3 students in IME-DEIS Band 1 schools performed at or above the 90th percentile compared with 11.1% in DEIS schools nationally (Figure 5). In Grade 6, that figure rose to 2.3% but was still lower than the proportion (7.2%) in DEIS schools nationally.

In Band 2 schools, the percentages of students performing at or above the 90th percentile in IME-DEIS schools were also lower than in DEIS schools nationally (Figure 5). At Grade 3, 11.0% of students in IME-DEIS schools performed at or above the 90th percentile compared to 15.4% in DEIS schools nationally. There is a similar but slightly larger difference at Grade 6, where 7.4% of students in IME-DEIS schools are high performers, compared to 12.5% in DEIS schools nationally. The lower achievement levels at Grade 3 may also mitigate concerns of a self-selection bias among IME-DEIS students as students not wishing to continue to study in an IME are likely to transfer to an English-medium school before Grade 3.

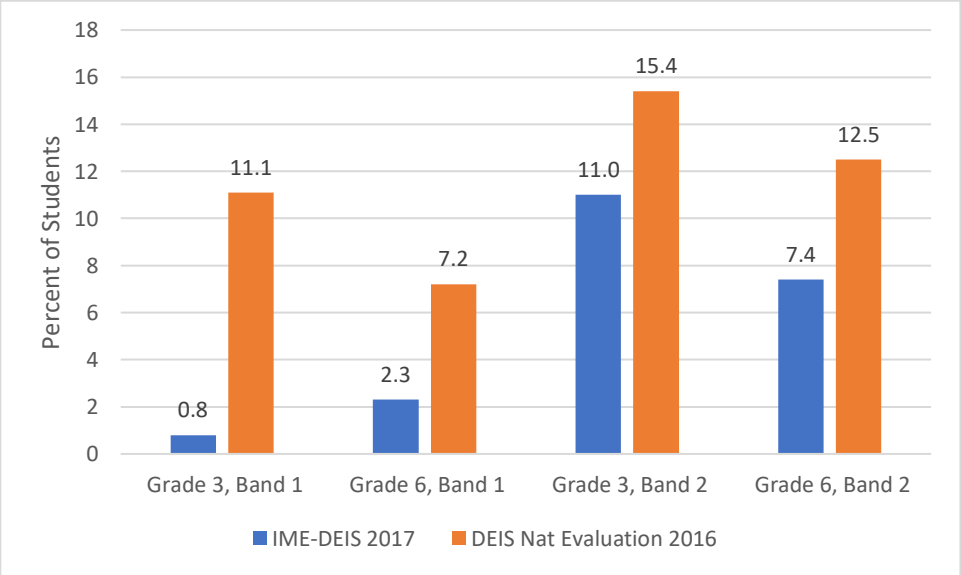


Figure 5. Percentage of Students Performing at or above the 90th Percentile in IME-DEIS schools and in DEIS Schools Nationally in Mathematics, by DEIS Band and Grade Level

3.3. Performance in English reading by school and level of disadvantage

Analyses were performed on achievement rates at the school level to identify if individual schools might need targeted supports due to lower-than-expected academic achievement, based on the level of disadvantage associated with the school. Figures 6 and 7 place individual schools on graphs for English reading and mathematics according to whether they are DEIS Band 1 or Band 2 schools (based on their allocation at the time of the study) alongside their scores on the 2014 special needs resources allocation index described earlier, which provides a more precise measure of current levels of disadvantage (individual school scores on the DEIS measure, dating from 2006, are not available). Data in relation to Grade 3 are presented here since performance at this level was especially low in IME-DEIS Band 1 schools. The average resources allocation index score for Band 1 schools nationally was 271.0 (shown by blue line on the figures), while for Band 2 schools it was at 196.7 (shown by red line). If the index score of an individual school in a given Band is higher than the national average for DEIS schools in that Band, it might be expected that the mean scores in reading and mathematics would be lower and vice versa. Grade 6 graphs are similar to those for Grade 3, though mean scores are closer to the regression lines.

For Grade 3 reading, it can be seen in Figure 6 that two schools in particular that are situated to the far right of the average index score for Band 1 DEIS schools (blue line) have high levels of disadvantage and low school-level mean scores on English reading achievement (92.3 and 87.2), as would be expected. However, another school situated closer to the index average for Band 1 schools achieved a lower-than-expected mean reading score (86.7), given its level of need. The two Band 1 schools with the highest

achievement scores (101.3 and 100.3) performed as might be expected based on their (lower) index scores. In the case of Band 2 schools, school-level mean reading scores are higher than in Band 1 for the most part, as would be expected based on their index scores, though the average reading score for the least disadvantaged school (103.7) is lower than those of a number of schools with somewhat higher index scores.

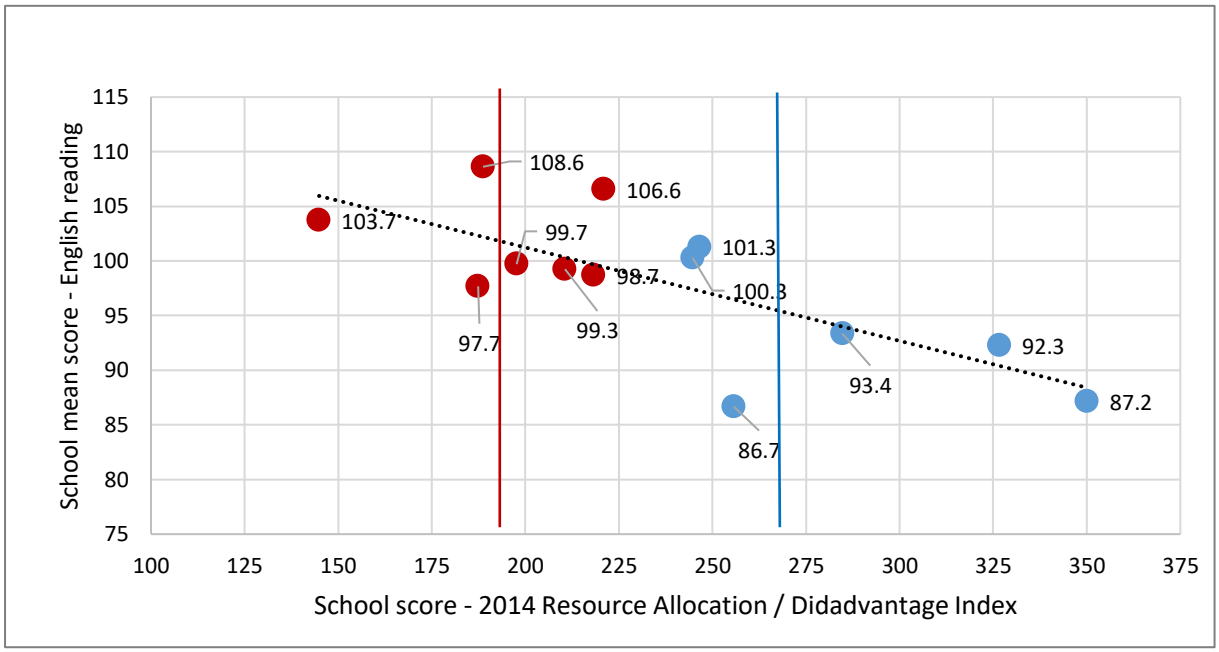


Figure 6. Relationship between the Scores of Individual IME-DEIS Band 1 and 2 Schools on the 2014 Resource Allocation Index and Their Mean Scores in English Reading – Grade 3

Note. Red dots – Band 2 schools; Blue dots: Band 1 schools. Red line – average index score – Band 2 schools; Blue line - Average index score for Band 1 schools

Figure 7 shows mean school-level mathematics scores as a function of each school's resource allocation index score. It shows a diverse display of mean scores for mathematical achievement at Grade 3, where school-level mean scores range from 78.8 to 100.1 for Band 1 schools and from 93.5 to 108.2 for Band 2 schools. The school with the lowest mean score in mathematics in Grade 3 (78.8) has a similar level of disadvantage to two schools with higher mean scores (100.1 and 85.3). The highest-performing Band 2 school (108.2) has a

higher level of disadvantage than a number of schools with similar or lower levels of mathematics achievement, suggesting again that high average levels of achievement can be attained in individual schools with relatively high levels of disadvantage. This finding suggests that there may be other factors associated with low achievement in mathematics in addition to the low SES of the school that warrant further investigation.

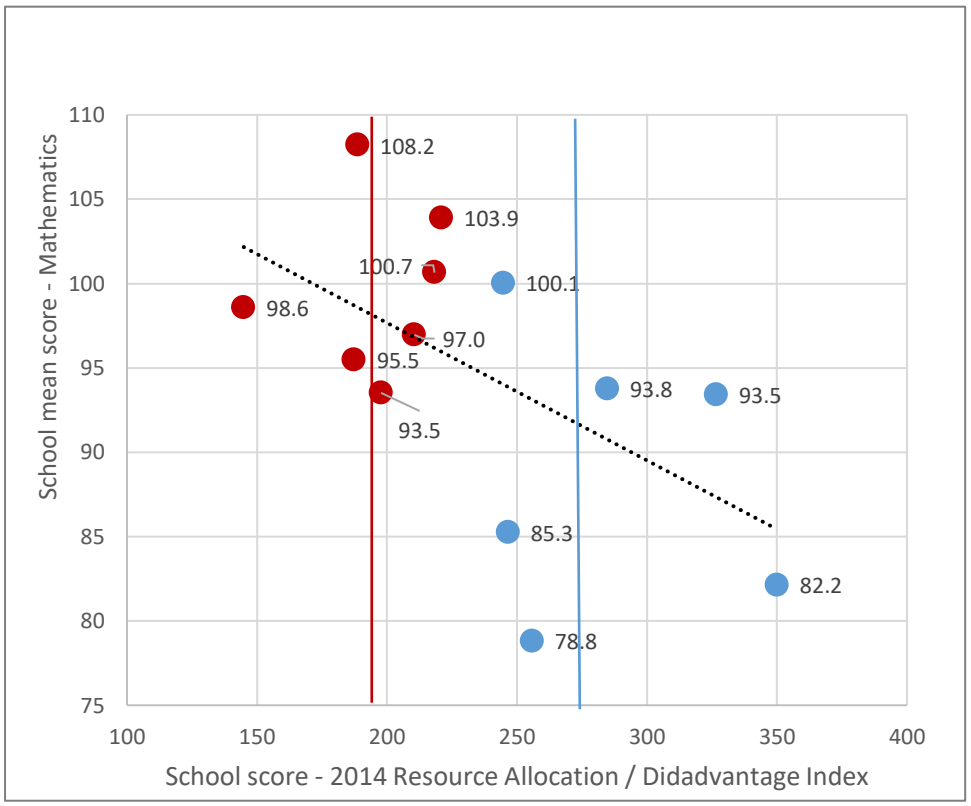


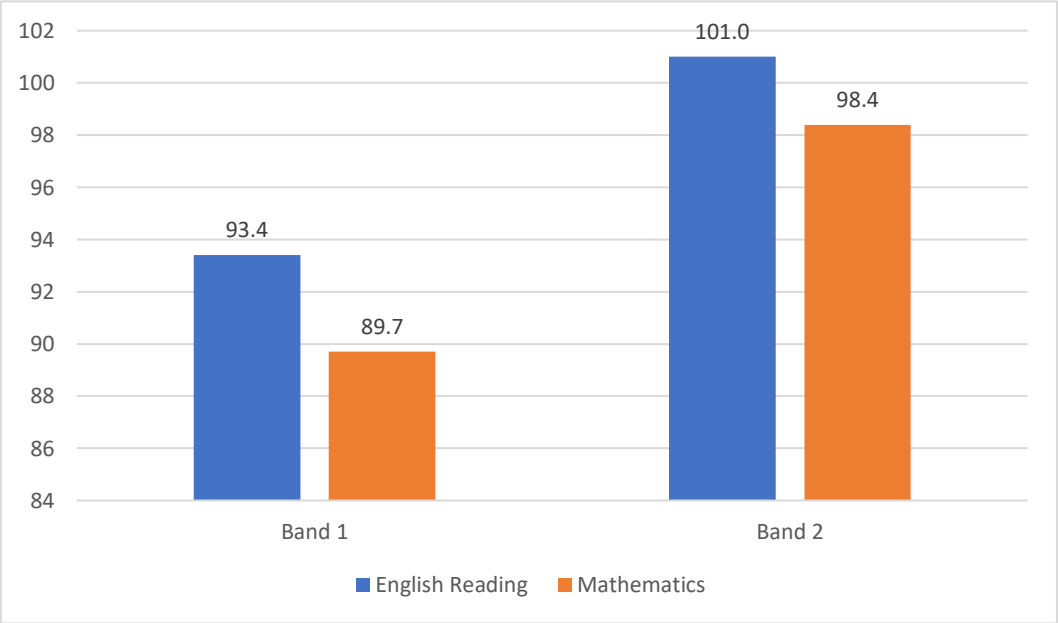
Figure 7. Relationship between the Scores of Individual IME-DEIS Band 1 and 2 Schools on the 2014 Resource Allocation Index and Mean Scores of in Mathematics – Grade 3

Note. Red dots – Band 2 schools; Blue dots – Band 1 schools. Red line – Average index score for Band 2 schools; Blue line: average index score for Band 1 schools

3.4. Relative differences in performance on English reading and mathematics

Since performance on reading and mathematics are both described on scales where the mean scores nationally (across all schools) had been set to 100, and the standard deviations to 15 based on representative samples of students (see above), it is of interest to examine

whether performance in IME-DEIS schools is relatively better in English reading or mathematics. This could inform schools on which subjects they might need to place a stronger emphasis in the future. The analyses were conducted using matched-pairs t-tests. Figure 8 shows the means scores of students in Grade 3 in IME-DEIS Band 1 and 2 schools on both English reading and mathematics.[10] The mean score of Band 1 students in Grade 3 in English is 93.4 score points, while their mean score in mathematics is 89.7. The difference, 3.7 score points, is statistically significant ($t(117) = 3.71$, $p. < .001$, $d = 0.25$). Similarly, the means for English reading and mathematics in Band 2 are 101.0 and 98.4 respectively, and the difference of 2.6 score points in favour of English reading is statistically significant ($t(163) = 2.80$, $p. < .001$, $d = 0.18$). The data indicate that performance in IME-DEIS schools at this grade level is significantly stronger in English reading than in mathematics.



[10] The mean scores in Figures 8 and 9 differ slightly from those in Tables 1 and 2 as the figures include only those students who had valid scores in both subjects.

Figure 8. Mean Scores in English Reading and Mathematics in Band 1 and 2 IME-DEIS Schools, Grade 3

At Grade 6, on the other hand, the difference of 1.0 score points between the mean scores of students in Band 1 on English reading (95.1) and mathematics (94.1) is not significantly different (t (86) = 0.74, p. = .23, d = 0.08) (see Figure 9). Similarly, at Band 2, the mean score difference of 0.5 score points in favour of English reading is not statistically significant (t(146) = 0.52, p. =.30, d = 0.04). At Band 1, mean scores for both English reading and mathematics are higher in Grade 6 than in Grade 3, with a larger increase in mathematics, compared with reading. At Band 2, reading has dropped a little since Grade 3, while mathematics is about the same.

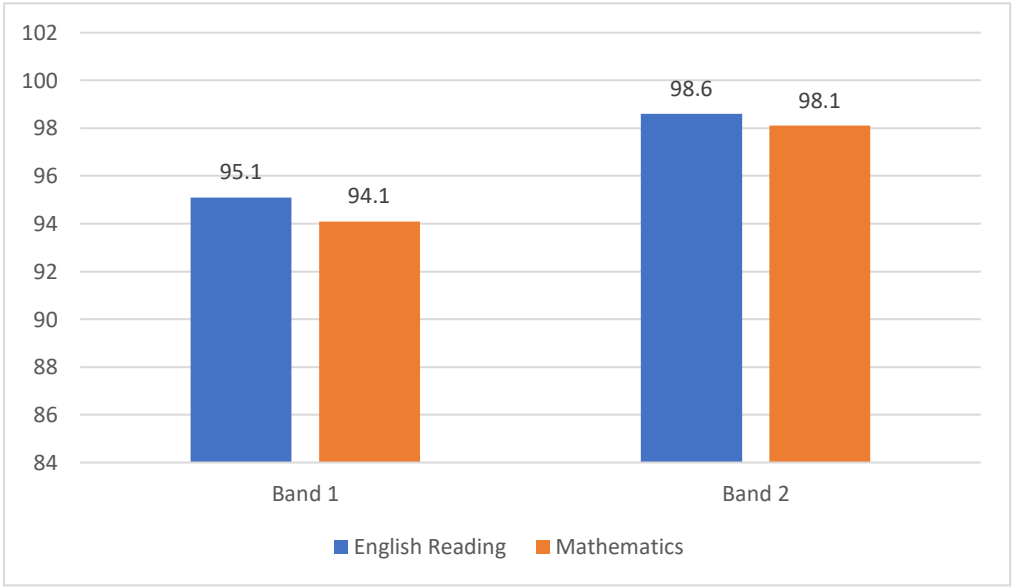


Figure 9. Mean Scores in English Reading and Mathematics in Band 1 and 2 IME-DEIS Schools, Grade 6

The data indicate that performance on English reading at Grade 3 is relatively stronger among students in IME-DEIS Band 1 and 2 schools, compared to mathematics,

whereas at Grade 6, the difference between Band 1 and 2 scores is not statistically significant.

4. Discussion of Results and Recommendations

This section discusses findings in terms of how they can further inform policy and pedagogical practice in a disadvantaged immersion setting. We commence with a discussion of achievement in English followed by achievement in mathematics. We then consider achievement in individual schools followed by differences in performance between English reading and mathematics.

4.1. Achievement in English reading

Students in Grade 3 in IME-DEIS Band 1 schools achieved a lower mean score in English reading than their counterparts in DEIS schools nationally, though the difference was not statistically significant. Earlier in their schooling, these students may have experienced a delay in the development of their English reading skills due to the emphasis on Irish language instruction, with the introduction of English language arts in Grade 1 and supports somewhat delayed at the start of schooling (Barik & Swain, 1976; Genesee, 1976; Lambert & Tucker, 1972; Swain & Lapkin, 1982; Tucker et al., 1972). The relatively stronger performance of IME-DEIS students in Grade 6 Band 1 schools may be explained by the development of bilingualism and the transfer of literacy skills from Irish to English where immersion students may become more competent in reading in both languages. Students in Grade 6 Band 2 schools did not differ significantly from their peers in DEIS schools nationally.

It could be posited that the improved mean scores of the IME-DEIS students between Grades 3 and 6 are the result of attrition by weaker students. Findings from previous research studies indicate very low rates of attrition through the primary school years (Ó Duibhir et al., 2017). In fact, other research, using a stratified random sample of IME schools, found a small increase in the number of students in three of the five most reported sub-groups of special education needs (SEN) across class groupings from Grades 3 to 6, indicating that students with SEN are remaining within the IME sector (Nic Aindriú, et al., 2017).

It might be noted that the mean scores in English reading of students in DEIS schools in general and in IME-DEIS schools in particular are below overall national standards (i.e., an average score of 100), with the exception of Grade 3, Band 2 (where it is slightly higher), highlighting the continuing impact of socioeconomic status on performance in DEIS schools, including those in the IME-DEIS sector. A high percentage of students in Grade 3 IME-DEIS Band 1 schools performed at or below the 10^{th} percentile (20.2%) in English reading, compared with DEIS Band 1 schools nationally. However, this had halved (to 10.1%) by Grade 6. This suggests that lower-achieving IME-DEIS students in particular struggle with English reading in the early years of schooling, with some of these students improving by Grade 6. It is also noteworthy that, in Grade 6, there were half as many students in Band 2 IME-DEIS schools (10.1%) performing at or below the 10th percentile, compared with DEIS schools nationally (20.4%). Given that levels of disadvantage were similar in both IME-DEIS schools and in DEIS schools nationally, this may suggest that some of the lower-achieving IME-DEIS students catch up and outperform their counterparts in DEIS schools nationally due to their engagement with literacy in two languages and cross linguistic transfer.

Another notable finding relates to the higher percentages of students who performed at the 90th percentile or above at both grades in IME-DEIS schools when compared to DEIS schools nationally, considering the delayed introduction of English language arts in the immersion setting. This might be explained by the benefits of biliteracy referred to above. Nevertheless, it is also a matter of concern that fewer than 5% of students perform at this level in Band 1 IME-DEIS schools at both grade levels. The dearth of higher-achieving students may have an impact on depth and pace of instruction that can be offered in classrooms.

These results suggest that, over time, immersion education and the delayed introduction of English language arts do not impact negatively on the reading achievement of children in IME-DEIS schools by the time students reach the end of primary school. The results may reflect the effects of bilingualism, particularly relating to transferable skills in literacy between Irish and English. As discussed above, practices surrounding the timing of the introduction of English language arts can vary in IME-DEIS schools, compared with IME non-DEIS schools that implement total immersion for the first two years. IME-DEIS teachers may be apprehensive about putting a total immersion model in place because of the poor acquisition of English sometimes observed in students in IME-DEIS schools at school entry. An implication of this is that the slower acquisition of English may impact on performance in English reading by Grade 3. The current study points to relatively positive outcomes in English reading achievement by the end of primary school. These may allay the concerns of teachers about providing a total immersion model in the first two years of schooling, before introducing English language arts for the first time in Grade 1. It might be argued that IME-DEIS students should not be introduced to English language arts too early so that they can gain a better mastery of Irish which, in turn, will facilitate a transfer of skills to English.

However, concern must be expressed about the low mean score in English reading among students in IME-DEIS Band 1 schools at Grade 3 and the large proportion of students with low achievement in such schools. While some low-achieving students in this setting advance between Grade 3 and 6, others continue to struggle, making it important to differentiate between 'garden-variety poor readers' (Stanovich, 1988) whose difficulties are primarily likely to be associated with social and/or language factors, and those with more complex learning difficulties. There is a clear need to identify and support IME-DEIS students who have learning difficulties in English while also addressing the challenges associated with high levels of deprivation in dual language programmes, as early as possible.

Although findings suggest that students in Band 1 IME-DEIS schools perform better on average in English reading than students in DEIS Band 1 schools nationally by the end of primary schooling, it must be recognised that outcomes in IME-DEIS schools are still lower than the national average performance in schools in general. An intensive and carefully planned approach to English language literacy instruction alongside the introduction of English language arts in Grade 1 in immersion schools with low SES is required. Due to the early emphasis on Irish language instruction, including, in many cases, a delay in introducing English language instruction, and students' weak L1 acquisition associated with socioeconomic disadvantage, a greater emphasis may need to be placed on the transfer of linguistic and literacy skills from Irish to English. Delaying the introduction of English even longer might be advisable to develop strong reading skills in Irish that could then transfer to and support the acquisition of English reading skills.

4.2. Achievement in mathematics

Findings relating to mathematics achievement in IME-DEIS schools followed a broadly similar pattern to those for English reading. A statistically significant gap in mathematics achievement was found in Grade 3 IME-DEIS schools compared to DEIS Band 1 schools nationally, with students in the former achieving a mean score that was almost one-half of a standard deviation lower. The gap may be explained by the initial challenges associated with acquiring or learning content through the immersion language if appropriate learning supports are not used during instruction and the increased and integrated role of literacy in the assessment of mathematics, where the emphasis on 'real-life' problems (which require more reading) is greater in recent years (e.g., Dunphy et al., 2014). These challenges appear to dissipate to some extent by Grade 6 when mean score differences between IME-DEIS schools and DEIS schools in general are no longer significant at Band 1 or Band 2. However, concern must be expressed about the large proportions of students performing at or below the 10th percentile in Band 1 and Band 2 IME-DEIS schools at both grades, and the relatively low proportions performing at or above the 90th percentile. A particular concern is the finding that 22% of students in Grade 6 in Band 1 schools still perform poorly (albeit lower than the 32.5% in Grade 3). This points to an urgent need for numeracy supports and interventions for the promotion of numeracy through Irish, in order to reduce the proportion of students performing at the lower end of the achievement distribution, while also providing enrichment that would enhance the number of students performing at the higher end.

These findings provide insights into the challenges associated with learning mathematics through a minority or second language in IME-DEIS settings. Learning

mathematics through Irish could account for some of the observed performance patterns, especially at Grade 3. Shiel et al. (2012) also found lower levels of performance in mathematics, compared with English reading, in IME schools nationally (mainly schools without DEIS status). The data in the current study suggest a need for additional support with mathematics in IME-DEIS schools and specific language supports in Irish to build IME-DEIS students' linguistic capacity to learn content through language. Such methods could include supporting IME teachers in integrating language and content instruction in IME schools (Cammarata & Ó Ceallaigh, 2020; Lyster, 2007; Tedick & Lyster, 2020) in order to provide planned opportunities and a scaffold for the acquisition of the targeted language required to learn mathematics effectively through Irish. A more integrated emphasis on specific mathematical terminology, together with Irish syntax and grammar, in the immersion language in mathematics lessons could support students in building the linguistic proficiency necessary to learn the content of mathematics.

While research on balancing content and language in the Irish education system and teacher education is growing, there remains a dearth of research on how to teach language and content through an L2 in immersion contexts where students come from disadvantaged backgrounds. Teacher education and professional development in Ireland need to reflect the challenges of teaching and learning content through a second/additional language in immersion schools in areas of social disadvantage to build 'teacher language awareness' in content teaching (He & Lin, 2018), while also acknowledging the increased reading load associated with real-life problem solving.

4.3. Achievement in individual schools

Analysis of mean achievement scores according to disadvantage levels associated with individual schools showed variation in performance among schools with similar levels of disadvantage. For example, a number of Band 1 schools with relatively high levels of disadvantage (based on the 2014 survey on special needs resourcing) had relatively low mean scores in English reading and mathematics at Grade 3, while other schools with lower levels of disadvantage were also struggling. The evidence indicates a need for intervention strategies that are targeted at individual schools. Targeted interventions in IME-DEIS settings could be made more effective by considering factors such as the number of students with learning difficulties in the school, learning supports provided, the literacy and numeracy interventions that have been implemented and whole school evaluation and planning for promoting literacy and numeracy relevant to the disadvantaged immersion setting.

4.4. Differences in performance between English reading and mathematics

Although students in IME-DEIS schools had higher average scores in English reading than in mathematics in Grades 3 and 6, in both Band 1 and Band 2 schools, only students in Grade 3 had significantly higher mean scores in English reading. This finding underlines the difficulty some students in Grade 3 encounter as they acquire mathematics through Irish and the impact of disadvantage. It supports the recommendation that intensive support should be provided for children in the earliest years of immersion, to ensure that they acquire mathematical content knowledge and the academic language, including vocabulary and grammar, associated with mathematics, combined with the more general language and literacy skills that will enable them to learn mathematics through Irish.

5. Conclusion

Findings reported here suggest and provide some support for the suitability of immersion education for students from low SES backgrounds and suggest that immersion education does not place an undue burden in the long run on at-risk students' reading and mathematics, arising from their participation in immersion education, compared with their counterparts who attend English-medium schools serving disadvantaged communities. The findings also indicate that immersion is not a panacea; that is, it cannot overcome all of the challenges of teaching and learning in socioeconomically disadvantaged contexts. The data show that average levels of performance among students are low relative to schools nationally and, further, that more intensive supports and interventions are required for children availing of immersion education in areas of socioeconomic disadvantage. This might take the form of strong literacy interventions to identify and support struggling students coinciding with the introduction of English language arts. Furthermore, specific language supports in Irish and the implementation of context-based models on how to teach language and content through an L2 in immersion contexts where students come from disadvantaged backgrounds would be beneficial and might be expected to improve mathematics performance. In order to best serve students from low SES backgrounds, additional supports to those linked to immersion education are needed to directly address the needs of low SES immersion students and enhance their performance. Following the introduction of English language arts, there should be a planned approach to drawing the students' attention to the similarities and differences between Irish and English. This bilingual pedagogy could support the students' development in both literacy and mathematics.

Acknowledgements

The authors are grateful to An Chomhairle um Oideachas Gaeltachta agus Gaelscolaíocht for the funding which made this research possible.

6. References

Archer, P., & Sofroniou, N. (2008). *The assessment of levels of disadvantage in primary schools for DEIS*. Educational Research Centre. https://www.erc.ie/documents/deis_assess_disadv_prim_sch.pdf

Baker, C., & Wright, W. E. (2017). *Foundations of bilingual education and bilingualism* (6th ed.). Multilingual Matters. http://capitadiscovery.co.uk/dcu/items/809497

Barik, H. C., & Swain, M. (1976). A longitudinal study of bilingual and cognitive development. *International Journal of Psychology*, *11*(4), 251–263. https://doi.org/10.1080/00207597608247361

Bourdieu, P. (1991). *Language and symbolic power*. Polity Press.

Bruck, M. (1982). Language impaired children's performance in an additive bilingual education program. *Applied Psycholinguistics*, *3*(1), 45–60. https://doi.org/10.1017/S014271640000415X

Bruck, M., Jakimik, J., & Tucker, G. R. (1975). Are French immersion programs suitable for working-class children? A follow-up investigation. *Word*, *27*, 311–341. https://doi.org/10.1080/00437956.1971.11435629

Caldas, S., & Boudreaux, N. (1999). Poverty, race, and foreign language immersion: Predictors of math and English language arts performance. *Learning Languages*, *5*(1), 4–14.

Cammarata, L., & Ó Ceallaigh, T. J. (Eds.). (2020). *Teacher development for immersion and content-based instruction*. John Benjamins.

Cashion, M., & Eagan, R. (1990). Spontaneous reading and writing in English by students in total French immersion: Summary of final report. *English Quarterly*, *22*(1), 30–44.

Chiu, M. M., & McBride-Chang, C. (2006). Gender, context, and reading: A comparison of students in 43 countries. *Scientific Studies of Reading*, *10*(4), 331–362. https://doi.org/10.1207/s1532799xssr1004_1

Clifton C., & Duffy S. (2001). Sentence comprehension: Roles of linguistic structure. *Annual Review of Psychology, 52*, 167–196. https://doi.org/10.1146/annurev.psych.52.1.167

Coady, M. R., & Ó Laoire, M. (2002). Mismatches in language policy and practice in education: The case of Gaelscoileanna in the Republic of Ireland. *Language Policy*, *1*, 143–158.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Routledge.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, *94*, S95–S120. www.jstor.org/stable/2780243

Cummins, J. (2016). Teaching for transfer in multilingual school contexts. In O. Garcia, A. M. Y. Lin, & S. May (Eds.), *Bilingual and multilingual education* (pp. 103–115). Springer International Publishing. https://doi.org/10.1007/978-3-319-02324-3_4-1

Department of Education and Skills. (2005). *DEIS (Delivering equality of opportunity in schools): An action plan for educational inclusion*. Stationery Office.

Department of Education and Skills. (2017a). *DEIS plan 2017*. Social Inclusion Unit, Department of Education and Skills. https://www.education.ie/en/Publications/Policy-Reports/DEIS-Plan-2017.pdf

Department of Education and Skills. (2017b). *Report on the review of DEIS*. Social Inclusion Unit, Department of Education and Skills. https://www.education.ie/en/Schools-Colleges/Services/DEIS-Delivering-Equality-of-Opportunity-in-Schools-/DEIS-Review-Report.pdf

Department of Education and Skills. (2019). *Primary language curriculum: Irish-medium schools*. National Council for Curriculum and Assessment. https://curriculumonline.ie/getmedia/fc8c86b9-9c77-46a7-a7d8-a7b9abfb2013/PLC-Document_Irish.pdf

Dunphy, E., Dooley, T., Shiel, G., Butler, D., Corcoran, D., Ryan, M., & Travers, J. (2014). *Mathematics in early childhood and primary education (children aged 3–8 years). Research Report No.17: Definitions, theories, stages of development and progression*. National Council for Curriculum and Assessment. http://www.ncca.ie/en/Publications/Reports/NCCA_Research_Report_17.pdf

Early, E., Miller, S., Dunne, L., Thurston, A., & Filiz, M. (2020). Context and implications document for: The influence of socio-economic background and gender on PISA attainment in the United Kingdom: A systematic review. *Review of Education*, *8*(1), 153–155. https://doi.org/10.1002/rev3.3176

Educational Research Centre. (2005). *Drumcondra Sentence Reading Test. Manual*. Author.

Educational Research Centre. (2007). *Drumcondra Primary Mathematics Test – Revised (Levels 3–6). Technical and administration manual*. Author.

Genesee, F. (1976). The suitability of immersion programs for all children. *The Canadian Modern Language Review*, *32*(5), 494–515. https://doi.org/10.3138/cmlr.32.5.494

Genesee, F. (1992). Second/foreign language immersion and at-risk English-speaking children. *Foreign Language Annals*, *25*(3), 199–213. https://doi.org/10.1111/j.1944-9720.1992.tb00529.x

Genesee, F. (2004). What we know about bilingual education for majority-language students. In T. K. Bhatia & W. C. Ritchie (Eds.), *The handbook of bilingualism* (pp. 547–576). Blackwell.

Genesee, F. (2007). French immersion and at-risk students: A review of research evidence. *The Canadian Modern Language Review*, *63*(5), 655–687. https://doi.org/10.3138/cmlr.63.5.655

Genesee, F., & Fortune, T. W. (2014). Bilingual education and at-risk students. *Journal of Immersion and Content-Based Language Education*, *2*(2), 196–209. https://doi.org/https://doi.org/10.1075/jicb.2.2.03gen

Genesee, F., & Jared, D. (2008). Literacy development in early French immersion programs. *Canadian Psychology/Psychologie canadienne*, *49*(2), 140–147. https://doi.org/10.1037/0708-5591.49.2.140

Gilleece, L., Shiel, G., Clerkin, A., & Millar, D. (2012). *Measúnachtaí Náisiúnta 2010 ar léitheoireacht Bhéarla agus ar mhatamaitic i scoileanna a bhíonn ag teagasc trí*

mheán na Gaeilge. Príomhthuarascáil [The 2010 National Assessments of English reading and mathematics in Irish-medium schools. Main report]. Educational Research Centre.

Harris, J., Forde, P., Archer, P., Nic Fhearaile, S., & O'Gorman, M. (2006). *Irish in primary schools: Long-term national trends in achievement*. Department of Education and Science.

Hart, B., & Risley, T. R. (2003). The early catastrophe: The 30 million word gap by age 3. *American Educator*, *27*(1), 4–9.

He, P., & Lin, A. M. Y. (2018). Becoming a "language-aware" content teacher: Content and language integrated learning (CLIL) teacher professional development as a collaborative, dynamic, and dialogic process. *Journal of Immersion and Content-Based Language Education*, *6*(2), 162–188. https://doi.org/https://doi.org/10.1075/jicb.17009.he

Hills, J., Brewer, M., Jenkins, S. P., Lister, R., Lupton, R., Machin, S., Mills, C., Modood, T., Rees, T., & Riddell, S. (2010). *An anatomy of economic inequality in the UK: Report of the National Equality Panel*. Centre for Analysis of Social Exclusion. https://eprints.lse.ac.uk/28344/1/CASEreport60.pdf

Hoff, E. (2006). How social contexts support and shape language development. *Developmental Review*, *26*, 55–88. https://doi.org/10.1016/j.dr.2005.11.002

Hoff, E., Laursen, B., & Tardif, T. (2002). Socioeconomic status and parenting. In M. H. Bornstein (Ed.), *Handbook of parenting: Ecology and biology of parenting* (Vol. II, pp. 161–188). Lawrence Erlbaum.

Holobow, N. E., Genesee, F., & Lambert, W. E. (1991). The effectiveness of a foreign language immersion program for children from different ethnic and social class backgrounds: Report 2. *Applied Psycholinguistics*, *12*(2), 179–198. https://doi.org/10.1017/S0142716400009139

Kavanagh, L., & Hickey, T. M. (2013). 'You're looking at this different language and it freezes you out straight away': identifying challenges to parental involvement among immersion parents. *Language and Education*, *27*(5), 432–450. https://doi.org/10.1080/09500782.2012.714388

Kavanagh, L., Weir, S., & Moran, E. (Eds.). (2017). *The evaluation of DEIS: Monitoring achievement and attitudes among urban primary school pupils from 2007 to 2016*. Educational Research Centre. http://www.erc.ie/wp-content/uploads/2017/06/DEIS-report-2017.pdf.

Kavanagh, L., & Weir, S. (2018). *The evaluation of DEIS: The lives and learning of urban primary school pupils, 2007–2016*. Educational Research Centre.

Lambert, W. E., & Tucker, G. R. (1972). *Bilingual education of children: The St. Lambert experiment*. Newbury House.

Lyster, R. (2007). *Learning and teaching languages through content: A counterbalanced approach*. John Benjamins.

Neuman, S. B., Kaefer, T., & Pinkham, A. M. (2018). A double dose of disadvantage: Language experiences for low-income children in home and school. *Journal of Educational Psychology*, *110*(1), 102–118. https://doi.org/https://doi.org/10.1037/edu0000201

Nic Aindriú, S., Ó Duibhir, P., & Travers, J. (2020). The prevalence and types of special educational needs in Irish immersion primary schools in the Republic of Ireland.

European Journal of Special Needs Education, 1–17. https://doi.org/10.1080/08856257.2020.1732109

Ní Chlochasaigh, K., Shiel, G., & Ó Duibhir, P. (2020). *Iniúchadh ar an tumoideachas do dhaltaí i scoileanna lán-Ghaeilge i gceantair mhíbhuntáiste* [An investigation of immersion education for students in Irish-medium schools in areas of disadvantage]. An Chomhairle um Oideachas Gaeltachta agus Gaelscolaíochta. https://www.cogg.ie/wp-content/uploads/Taighde_Sealbh%C3%BA-1.pdf

Ó Duibhir, P. (2018). *Immersion education: Lessons from a minority language context*. Multilingual Matters.

Ó Duibhir, P., Ó Cathalláin, S., NigUidhir, G., Ní Thuairisg, L., & Cosgrove, J. (2017). *An analysis of models of provision for Irish-medium education*. An Coiste Seasta Thuaidh Theas ar an nGaeloideachas. https://www.forasnagaeilge.ie/analysis-models-provision-irish-medium-education/?lang=en

Ó Riagáin, P., & Ó Gliasáin, M. (1979). *All-Irish primary schools in the Dublin area*. Institiúid Teangeolaíochta Éireann.

Shiel, G., Gilleece, L., Clerkin, A., & Millar, D. (2011). *The 2010 National Assessments of English reading and mathematics in Irish-medium schools: Summary Report*. Educational Research Centre.

Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research*, *75*(3), 417–453. https://doi.org/10.3102/00346543075003417

Stanovich, K. E. (1988). Explaining the differences between the dyslexic and the Garden-variety poor reader: The phonological-core variable-difference model. *Journal of Learning Disabilities*, *21*(10), 590–604. https://doi.org/10.1177/002221948802101003

Swain, M., & Lapkin, S. (1982). *Evaluating bilingual education: A Canadian case study*. Multilingual Matters.

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Pearson Education.

Tedick, D. J., & Lyster, R. (2020). *Scaffolding language development in immersion and dual language classrooms*. Routledge.

Tucker, G. R., Lambert, W. E., & d'Anglejan, A. (1972). *Are French immersion programs suitable for working class children? A pilot investigation*. McGill University.

Turnbull, M., Lapkin, S., & Hart, D. (2001). Grade 3 immersion students' performance in literacy and mathematics: Province-wide results from Ontario (1998–99). *The Canadian Modern Language Review*, *58*(1), 9–26.

van Druten-Frietman, L., Denessen, E., Gijsel, M., & Verhoeven, L. (2015). Child, home and institutional predictors of preschool vocabulary growth. *Learning and Individual Differences*, *43*, 92–99. https://doi.org/https://doi.org/10.1016/j.lindif.2015.08.032

Weir, S., & Denner, S. (2013). *The evaluation of the school support programme under DEIS: Changes in pupil achievement in urban primary schools between 2007 and 2013*. Educational Research Centre. http://www.erc.ie/documents/deis2013_bulletinreport.pdf

Wilson, W. H., & Kamanā, K. (2011). Insights from indigenous language immersion in Hawai'i. In D. J. Tedick, D. Christian, & T. W. Fortune (Eds.), *Immersion education: Practices, policies, possibilities* (pp. 36–57). Multilingual Matters.

Appendix A

Sample items from the Drumcondra Sentence Reading Test used in Grade 6

1. The film _____ at half-past seven, and ended at ten o'clock.

   a) commented b) commenced c) completed d) concluded

2. During the famine, many people could not get _____ food.

   a) nutritious b) famous c) honest d) self

3. They _____ two seats for the play.

   a) alerted b) riveted c) reserved d) respected

4. The possibility that that man might have been murdered was _____.

   a) suspicious b) disturbed c) undeniable d) disturbed

5. The travellers were _____ on a long journey into the unknown.

   a) embarking b) intending c) examining d) exceeding

Appendix B

Sample items from the Drumcondra Primary Mathematics Test-Revised used in Grade 3

1.

41 + 28 + 29 = ☐

2. 180 people went to a concert on the first night, 46 on the second night, and 120 on the third night. How many people altogether went to the concert?

	people

3. Ten children in Third Grade were asked if they had a brother or a sister.

Look at the table of their answers.

	Sue	Ben	Jan	Ann	Joe	Jon	Pat	Tom	Zoe	Jim
Has a Brother	✓		✓	✓	✓	✓	✓	✓		✓
Has a Sister	✓	✓	✓	✓			✓	✓	✓	✓

How many children have a brother and a sister?

4. **A** 4 **B** 5 **C** 6 **D** 10

5. There were 856 people at a local football final. 287 people left before the end. How many people stayed until the game ended?

	people

Address for correspondence

Karen Ní Chlochasaigh
Department of Language and Literacy Education
Mary Immaculate College, University of Limerick
South Circular Road
Limerick
Ireland
karen.nichlochasaigh@mic.ul.ie

Co-author information

Gerry Shiel
Educational Research Centre, Dublin
gerry.shiel@erc.ie

Pádraig Ó Duibhir
DCU Institute of Education, Dublin City University
padraig.oduibhir@dcu.ie