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Outcomes of the National Literacy Strategy in Relation to DEIS in Early Childhood Education, Primary and Post-Primary

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Outcomes of the National Literacy Strategy in Relation to DEIS in Early Childhood Education, Primary and Post-Primary Settings

Introduction

This report examines the impact of the Delivering Equality of Opportunity in Schools Strategy (DEIS, DES, 2005- 2020) on the performance of pupils in primary and post-primary schools. First, however, reference is made to the provision of opportunities to develop literacy and numeracy among disadvantaged children in early childhood education and care settings.

Early Childhood Education and Care

Early childhood is a critical and sensitive period in setting the foundation for later life (UNICEF, 2019). Early childhood is a time of rapid development and neuroscience highlights that, by six years of age, a child's brain has reached about 90% of its adult volume (Shuey & Kankaras, 2018). At this crucial time in life, high-quality Early Childhood Education and Care (ECEC) plays a key role in supporting success in school and later life (UNICEF, 2019; Organisation for Economic Co-operation and Development, [OECD], 2008). Whilst high- quality ECEC benefits all children (Council of European Union, 2011), multiple studies demonstrate that, for those experiencing poverty and educational inequality, the impact of high quality ECEC is profound and can lead to better school achievement, higher cognitive scores and higher retention rates (OECD, 2018; Taggart et al., 2015). In the context of educational inequality, there is evidence that economic deprivation at a very young and sensitive time of development may disproportionally compromise children's life chances, and research highlights strong links between early poverty and subsequent educational outcomes (Duncan et al., 2011).

A substantial body of literature highlights the importance of literacy and numeracy across the life span (OECD, 2021). Indigenous research (Kennedy et al., 2012) attests to the correlation between poor literacy/numeracy outcomes and socio-economic demographics. Considerable policy attention has centred on literacy and numeracy (Department of Education and Science [DES], 2005; DES 2009; DES, 2017), over the past two decades as it relates to children in primary school. ECEC in Ireland has experienced rapid transformation since 2006. Consequently, the focus on literacy and numeracy as it relates to the younger age group is best

understood in the broader context of policy and practice developments to enhance the quality of children's experiences and their learning and development.

Early Childhood Education and Care (ECEC) Context

The late 1960s saw growing interest in the area of educational disadvantage or inequality. In 1969, with support from the Bernard van Leer Foundation, the Rutland Street Project was established in north inner-city Dublin. This was a pre-school intervention initiative that aimed to support the cognitive skills of young children between the ages of three and five years in preparation for the transition to primary school. The Rutland Street Project formed the blueprint for the later development of the Department of Education programme, Early Start, which remains a pilot to this day. Early Start is an educational initiative which commenced in 1994 and comprises 40 pre-schools in areas of urban disadvantage. The programme draws on earlier research (Barnett, 2001), which suggests that pre-school education supports large gains in reading achievement for children experiencing inequalities and disadvantage. Policy focus on early childhood education and literacy and numeracy in particular stagnated until the release of the *White Paper, Ready to Learn* (Government of Ireland, 1999), which foregrounded the detrimental long-term effects of educational disadvantage on children's learning and development and the importance of ECEC. The White Paper signalled Government intent to progress the development of high-quality preschool education for young children, with a special emphasis on those experiencing disadvantage. From the White Paper, *Síolta, the National Quality Framework* (Centre for Early Childhood Development & Education, [CECDE], 2006) and *Aistear*, the Early Childhood Curriculum Framework (National Council for Curriculum and Assessment, [NCCA], 2009) emerged, both of which guided early childhood educators in supporting learning.

Síolta (CECDE, 2006) was introduced to the sector through a limited national roll-out of awareness raising workshops (2006-2008), the development of a Quality Awareness Programme (QAP) (2009-2013) which incorporated mentor training along with professional development sessions, and a QAP Validation process (2012), which enabled settings to submit self-evaluation documentation and portfolios to achieve specific ratings against each Síolta Standard. *Aistear* (NCCA, 2009) was initially operationalised through the Aistear-in-Action programme with Early Childhood Ireland (ECI) (2011-2013). Subsequently, the Aistear Síolta Practice Guide (2015) was developed, which aimed to provide resources to the sector, some of which focused on supporting emergent literacy and numeracy. In addition to the quality (Síolta)

and curriculum (Aistear) frameworks, a third document, of relevance to diversity and equality, supports the development of quality professional practice in the Irish ECEC environment. The Diversity, Equality and Inclusion Charter and Guidelines for Early Childhood Education and Care (DCYA, 2016) are more broadly oriented towards equity through a comprehensive Anti-bias approach to ECEC practice, and the document makes reference to literacy in the context of diverse family backgrounds.

A national survey conducted in 2015 by the DES indicated educators' concerns in relation to the level of preparedness in implementing and delivering Síolta and Aistear (DES, 2018). The survey guided the development of the National Síolta Aistear Initiative (NSAI) in 2016, which aimed to target a more coordinated roll out of the national frameworks. A review of the NSAI (DES, 2018) highlighted that greater strategic direction and coherence with other quality related developments in the ECEC sector were required. From the perspective of educators in the settings, the issues of consistent access to support in implementing the frameworks and fragmentation in messaging needs to be addressed. Whilst there are a number of supports (e.g., Better Start mentoring support, Leadership for Inclusion programme and City and County Childcare Committees) available to the sector, it appears that consistent and accessible guidance is required for the effective implementation of the national frameworks which support children's learning and development.

The DEIS programme (Department of Education and Science [DES], 2005), was launched as a social inclusion action plan and it aimed to assist schools and their communities to achieve equality in educational participation and outcomes. Within the DEIS programme, emphasis was placed on the importance of early intervention in primary schools. Transitions have always been a key theme under DEIS, including the important transition into primary school from an early years setting or the home. Parents are encouraged to enrol their children in ECEC settings. The DEIS plan aimed to add value to preschool provision in communities with high concentrations of disadvantage but omitted to include ECEC within the implementation action or budgetary frame at that time. The revised Plan (Department of Education & Skills, [DES], 2017) signalled some further interest in early childhood education, committing to developing best practice and piloting new initiatives that could be mainstreamed over time in respect of ECEC. While the ECEC sector was identified in the context of strengthening links between preschools and primary schools, 'school readiness', interagency working and effective transitions, the revised Plan failed to include goals or actions that might

specifically support the ECEC sector. However, First 5 (GoI, 2019) has a strong commitment to the development and implementation of a DEIS-type model for the ECEC sector. DEIS has a significant focus on supporting literacy and numeracy and is a model of wrap-around supports, which will augur well when implemented in ECEC settings that work in the context of educational inequalities. A DEIS-type model would have a distinct advantage of being informed by the experiences and successes of the programme in Primary schools to date and may include additional funding to settings for small staff/child ratios, family liaison staff, additional parent support and the provision of food.

The NLNS (DES, 2011) explicitly acknowledged the important role of early childhood educators in fostering literacy and numeracy development alongside professional counterparts in primary and post-primary schools. Among the priorities emanating from the strategy were the need to prioritise literacy and numeracy in ECEC, to create a culture of continuous improvement and to support the pedagogical skills of those professionals working with young children. The strategy recognised the role of parents in supporting literacy and numeracy and paid particular attention to those families experiencing poverty, social exclusion and educational disadvantage.

The interim review and revised targets (DES, 2017) for the NLNS highlighted advancements in the ECEC sector. They include significant numbers of young children availing of the ECCE scheme, increased qualification levels amongst the workforce, a greater range of supports available to the sector and the introduction of education-focussed inspections, all of which position and enable ECEC settings to more effectively target and support literacy and numeracy. The Interim Strategy Review identified the key step-changes and targets included in the Strategy, some of which have been achieved to date (e.g., see A3.4 Early Childhood Education and Teacher Education in our main report) and which will impact positively on the pedagogical work with children in the area of literacy and numeracy.

In the absence of national literacy and numeracy programmes for ECEC, much significant work has been undertaken in locally implemented initiatives. First 5 commits to improving literacy and numeracy and to draw on learning accrued from these local initiatives for future plans, particularly in relation to the development of a DEIS-type model for ECEC. First 5 acknowledges that progress has been made in prevention and early intervention initiatives under the umbrella of Area Based Childhood (ABC) Initiatives, the National Early Years Access Initiative (NEYAI), and other developments rolled out through statutory,

voluntary and community organisations. The main purpose of these programmes is to improve outcomes for children and families living in areas designated as disadvantage in Ireland. The ABC Programme (2013-2017) was a prevention and early intervention initiative. The programme targeted investment in evidence-based/informed interventions. The NEYAI (2011-2014) had multiple aims relating to young children (birth-6 years). Of particular relevance is the focus on influencing practice and provision in early childhood settings. A number of projects supported by NEYAI and/or ABC focused on language, literacy and numeracy. In the absence of a developed body of literature, systematic reviews or meta-analyses emerging from the Irish context in relation to early childhood education (i.e., literacy and numeracy in areas of socio-economic inequality), these projects signpost valuable learning, which can inform future developments. Consequently, learning from these exemplars warrants some consideration. Some of the projects are outlined as follows.

Happy Talk is a project which adapted a community-based, targeted and universal approach to improving the speech and language outcomes of children (birth-6 years). Core to Happy Talk was a focus on engaging parents, supporting them as active participants in their children's language and literacy learning. Effective strategies that emerged through the final project evaluation (Exodea Consulting, 2014) included building relationships, coaching parents, developing interagency collaborations, training/educating early childhood educators, and enriching learning environments. Happy Talk identified that through working together and utilising community-based interventions, which focused on relationships and active learning interventions, measurable gains were made in children's language development.

Early Years Language and Learning Initiative, a project of the NEYAI, centred on a *Language Enrichment Programme* which included 'Teacher Talk' training sessions, parent and child education sessions called 'Chatter Matters' and a 'Listening Group'. The Programme focussed on the language, literacy and social experiences which are mainly mediated through interactions between early childhood educators, parents and children (French, 2014). Findings indicated that there were improved practices in participating early childhood settings across a number of areas, with educators having increased awareness of children's speech and language. The Programme resulted in increased scores on the Programme Quality Assessment (PQA) tool, across the areas of adult-child interaction, namely, 'support for child communication', 'encouragement of child initiatives', 'support for child learning at group times', 'opportunities for child exploration', 'encouragement for peer interaction', and 'independent problem

solving'. An evaluation of the programme also identified higher scores on the dimensions of environmental print, book and literacy areas, reading stories, emergent writing, counting, shape and space and simple numbers.

The Early Years Numeracy Project, National College of Ireland (NCI), is a project which set out to improve educational outcomes in numeracy for participating children and families in the Dockland area, a designated area of disadvantage. The project was underpinned by research that indicated low levels of numeracy in the Docklands area as well as the lack of support for parents in mathematics (Early Learning Initiative, [ELI], 2010). National reports also emphasised how young people in Ireland were poorly prepared for future mathematical needs as students and citizens (Eivers, et al., 2010). The Numeracy project worked directly with parents and children to foster greater mathematical awareness, competence and confidence in everyday life. The findings emanating from this project highlighted the power of community action research, the need for parental engagement, and for multiple strategies that enable parental involvement and a community-wide focus.

Doodle Den, an after-school programme designed to promote young children's literacy, was initiated in one designated area of social and economic inequality in west Dublin. The programme targeted young children aged 5-6 years (Junior/Senior Infant classes) and involved them in participating in 3 after-school sessions per week over a 3-year period. The programme was evaluated through a randomised control trial and a qualitative process evaluation focusing on implementation (Biggart et al., 2012). Findings indicated an improvement in children's comprehension, sentence structure and word recognition. There was also a positive impact on children's concentration and reading at home, in addition to increased family library activity. Given the positive outcomes from the programme, it was recommended that it should be further developed, expanded and re-evaluated to determine if benefits for children hold well over time.

Consistent indicators of success across the programme evaluations suggest the importance of collaboration at a community level, which centres on networking, building interagency collaborations and linking key stakeholders that include ECEC settings, primary schools and local voluntary agencies. Authentic engagement with parents was core to many programmes and included an element of coaching and supporting, while creating conditions that facilitate parental engagement. Finally, there was a common focus on professionally developing early childhood educators, affording them learning opportunities, specifically in relation to deepening interactions between adults/children and children/children; developing

literacy- and numeracy-rich pedagogical practices and creating enriching learning environments.

Conclusion (Early Childhood)

A robust international body of literature accepts the importance of young children as confident and competent readers, writers and mathematicians. The challenges for young children experiencing poverty, inequality or marginalisation are well documented. In considering literacy and numeracy with a strong focus on education, there is also a need to tackle food poverty, to extend the network of parental and community supports and to ensure child health measures from the start, which are part of the First 5 programme. Early childhood education is on the national agenda and, while significant gaps continue to exist in relation to educational inequality and literacy and numeracy in ECEC, First 5 has committed to addressing these issues, drawing on evidence-based research and taking lessons from local project initiatives which have demonstrated success.

Early childhood is a sector and profession, which has and continues to undergo significant changes in policy and practice, with First 5 setting out an overarching blueprint for sectoral development (2019-2028). Within the commitments made in First 5, the National Childcare Scheme (NCS) will substantially improve the affordability of ECEC and School Aged Childcare for families. *Nurturing Skills* (DCEDIY, 2022) maps out a vision and implementation plan to meet workforce-related targets (2022-2024) and the introduction of a new Core Funding Scheme aims to support pay and conditions in the sector, thus providing for stability and sustainability into the future. The commitment of an additional €403 million announced in Budget 2023 (O'Gorman, 2022) brings current investment in the sector to more than €1billion. The system currently under development, when realised, will enable a concerted and coherent commitment to improving educational outcomes for all children, particularly those experiencing inequalities. The rate and pace of change for all participant stakeholders within, and associated with, the ECEC sector has not been without its challenges and hence the focus on literacy and numeracy in early childhood can only be examined in the broader context of policy and practice developments. As suggested by Bleach (2015, p.32), arising out of the NEYAI Numeracy Project in the Docklands, 'change cannot happen in a vacuum' and central to improving children's literacy and numeracy outcomes will be the ability of First 5 to meet its actioned commitments in the coming years'.

Impact of DEIS at Primary Level on Literacy and Numeracy

Introduction

As noted above, the *Rutland Street Project* (Department of Education [DE], 1969) and *Early Start* (DES, 1994) delivered early intervention to a small number of early years' settings. They were followed by the *Breaking the Cycle* initiative (DES, 1996), which provided increased funding, improved staffing and lower teacher-pupil ratios (15:1 in junior classes; 20:1 senior classes) in the 33 primary schools identified as the most disadvantaged in the country. While such investment was critical in helping schools compensate for the high levels of poverty often experienced by their pupils, it was not sufficient to radically change educational outcomes for pupils (Archer & Weir 2004; Weir, 2003; Eivers et al., 2004). Hence, the DES[1] embarked on the large-scale ambitious initiative, *Delivering Equality of Opportunity in Schools* (DES, 2005a), targeting *all* schools (urban and rural) designated as disadvantaged. Under new guidelines, urban schools were further divided into bands according to levels of disadvantage and location, with Band One identified as most disadvantaged urban band. Features of earlier initiatives were retained including provision for lower class sizes (20:1 in Junior classes and 24: 1 in senior classes of DEIS Band One schools) and greater funding and staffing allocations based on level of disadvantage.

The DEIS strategy also differed from earlier initiatives in a number of ways. First, schools were asked to create three-year action plans to include: (a) specific literacy and numeracy achievement targets and development plans for how progress toward achieving the targets would be monitored; (b) strategies to improve attendance; and (c) strategies to enhance parental involvement. Second, in line with national research recommendations (DES, 2005b; Eivers et al., 2004), school-based professional development for literacy was provided under the newly formed Professional Development Service for Teachers (PDST) and included guidance on whole school planning for literacy. In addition, training in relation to *Reading Recovery* (e.g., Clay, 1993) and *First Steps* (Education Department of Western Australia, 1994) was offered to Band One schools in year one and extended further over the next few years.

Other supports provided within the strategy included access to: (a) homework clubs and summer camps designed to assist literacy and numeracy development; (b) Home-School-Community Liaison (HSCL) services (including literacy and numeracy initiatives involving

[1] In 2020, the Department of Education and Skills (DES) reverted to the Department of Education (DE), as originally named in 1921.

parents and family members, such as paired reading, paired maths, *Reading for Fun, and Maths for Fun*); and (c) transfer programmes supporting progression from primary to post-primary.

As noted above, other supports for the DEIS context have come via the 10-year National Literacy and Numeracy Strategy for Children and Young People (NLNS, DES, 2011) first introduced in 2011 and reviewed and revised in 2017 (DES, 2017). Six key pillars of the NLNS set out policy, implementation actions and timelines for delivery across the continuum of schooling in relation to parental involvement, reform of teacher education, school leadership, inclusion, curriculum reform and accountability (see Kennedy, 2013 for discussion). While the six pillars were designed to impact positively on the literacy and numeracy development of *all* children regardless of socio- economic status, a particular emphasis was put on DEIS in Pillar 5: Addressing the Needs of Diverse Learners. In addition, guidelines on School Self-Evaluation (DES, 2012, 2016) were issued to all schools to support them in identifying areas for improvement and in developing three-year action plans.

The DEIS strategy has been externally evaluated by the Educational Research Centre at regular intervals since its inception. A number of reports have been published on the progress of both urban schools (Weir et al., 2011; Weir & Denner, 2013; Kavanagh, Weir & Moran, 2017; Weir et al., 2018; Kavanagh & Weir, 2018) and rural DEIS schools (Weir, Archer & Millar, 2009; Weir et al., 2015; Weir & McAvinue, 2013). It has also been possible to compare the progress of DEIS schools with non-DEIS schools, drawing on data from the National Assessments of Mathematics and English Reading (NAMER, Shiel et al., 2014; Kavanagh et al, 2016) which includes a representative sample of DEIS schools. Additionally, the impact of the HSCL coordinators has been examined through analysis of questionnaires administered to all primary and post-primary HSCL coordinators (Weir et al., 2018), with comparisons made with previous studies of the scheme (e.g., Archer et al., 2003). As well as these external reports, the Inspectorate of the DE has compiled a number of reports based on their inspection visits to DEIS schools (e.g., Inspectorate, Department of Education and Skills, 2015a, 2015b).

The external evaluations of the DEIS strategy have predominantly focused on monitoring achievement in literacy and numeracy as measured by national standardised tests of reading and mathematics achievement. Other quantitative measures include questionnaires to principals, teachers, parents and, children which have shed light on classroom practices, expectations, future aspirations, factors enabling and constraining progress, resourcing issues and affective dimensions of literacy and numeracy such as motivation, engagement and sense

of self-efficacy known to impact on achievement. Qualitative data derived from focus group interviews with principals of DEIS Band One schools, many of whom participated in the evaluations on four occasions, have contributed to a more nuanced understanding of the impact of the DEIS strategy beyond the outcomes based on achievement data. Finally, ESRI research (Smyth et al., 2013) commissioned by the DES, synthesised DEIS evaluations to 2013, and drew on a wider range of research including the *Growing up in Ireland* (GUI) study to make recommendations for the sector. A synthesis of findings from this body of research completed as part of the NLNS tender (see Shiel et al., 2022a) is summarised here to highlight key achievements under the DEIS strategy and NLNS and continued challenges.

First, a brief summary of the views of HSCL coordinators in relation to the impact of the scheme are presented with reference to the nature of their role and the successes and challenges encountered, as reported in Weir et al., (2018). The second section outlines achievement outcomes in literacy and numeracy at primary level and reference is made to differential outcomes for DEIS Band One, Band Two and Rural DEIS. Where relevant, comparisons are made with results of the NAMER (2014). Additionally, the influence of motivational and self-efficacy factors on achievement are highlighted. The third section summarises the achievement outcomes in literacy and numeracy at post-primary level in relation to PISA and state exams.

Implementation and Impact of the Home-School-Community Scheme

The HSCL scheme was first established as a pilot project in designated areas of disadvantage in 1990. Thirty-one teachers were appointed as HSCL coordinators in 55 primary schools and the programme was later extended to 13 post-primary schools serving concentrations of students from the original 55 primary schools (Archer & Shortt, 2003).

In 2005, with the introduction of the DEIS strategy, all urban primary schools and post-primary schools participating in the School Support Programme were entitled to have access to the HSCL scheme. While rural schools were entitled to a HSCL coordinator shared between a cluster of schools, that aspect was discontinued in 2011 (Weir et al., 2018). Since 2014, services under the HSCL scheme and the National Educational Welfare Board are administered by Tusla (the child and family agency). Since 2013 teachers appointed to the role serve a term of five years. The HSCL role is a key dimension of the DEIS strategy and is intended to maximise the participation of the children in school, while enhancing links between home, school and relevant community agencies to best serve the needs of children. It also seeks to raise parental awareness of their capacity to support their child's school progress and to support

them in developing their skills to do so. Additionally at post-primary level, it aims to enhance children's participation and retention in school and their uptake of further education after compulsory schooling. An essential dimension of the role is visits to the home.

Previous evaluations of the HSCL scheme occurred in 1991/1992 and 2000/2001. In 2017, questionnaires were sent to all HSCL coordinators (413 in 2016-2017) and in the region of three quarters were returned (e.g., 77.1% primary level, 77.5% post-primary level). In each evaluation, the HSCL scheme has been highly valued and has been identified as a key support to DEIS schools in creating and maintaining home school links and interagency cooperation.

In 2016-17, questionnaires investigated how coordinators spend their time, their views on levels of parental involvement in schools, their relationships with families, difficulties encountered in the role, issues faced by families and their views on the success of the scheme and levels of satisfaction with the support provided to them under the scheme. Findings from the survey were organised around six themes and, where possible, comparisons were drawn with previous studies of the scheme conducted in 1991/1992, 2000/2001. The themes included how coordinators use their time, their perception of the nature and extent of parental involvement, perceptions of problems facing families, level of collaboration with other agencies, the impact of the HSCL scheme on families, communities and schools and coordinators' level of satisfaction with the supports available to them under the scheme.

The largest proportion of HSCL coordinators' time (21%) was spent on home school visits though it varied somewhat by sector (18% primary; 22% post-primary). It is noteworthy that the percentage of time allocated to home visits was well below the percentage advocated by TUSLA and the DES (33%) and had decreased since 1991/1992 and 2000/2001 (when it was 26% and 30%, respectively). Weir et al. (2018) surmise that the reduction may be due to *'issues such as homelessness, crime and substance misuse, issues which most coordinators indicated were prevalent among families served by their schools*' (p.50). This interpretation is borne out by the findings in relation to the range of issues facing families which coordinators highlighted. Factors which a high percentage of primary coordinators (particularly those in Band One schools), reported impacted to a great extent included poor oral language/vocabulary of pupils (79%), emotional/behavioural difficulties (74.7%), unemployment in the community (63.4%), general family dysfunction (61.9%), and literacy and numeracy problems among parents (53.4%). They were also more likely to identify homelessness (23.6%), poor housing quality (32.6%) and substance abuse among families (33.3%) compared to post-primary

coordinators (5.7%, 11.4%, 17.2% respectively). The factors most often identified by post-primary coordinators were emotional/behavioural difficulties (75.8%), ongoing student absenteeism (69.1%), and effects of general dysfunction (45.1%). Other factors also highlighted by smaller proportions of coordinators included poor diet, bullying, domestic violence and organised crime. Such factors underscore the need for policy to address the wider social and inequality issues at the root of literacy and numeracy difficulties.

There was evidence that interagency collaboration and contact with community partners and organisations was facilitated and supported by the HSCL coordinators, with about half reporting that time spent on such activities had increased over time. High proportions of coordinators highlighted a wide range of activities that parents were involved in at school (e.g., recruiting participants for courses and activities, extra-curricular activities, fundraising) and the majority were of the opinion that parental involvement in their schools had increased as a result of the HSCL scheme. At primary level there were greater proportions of parents involved in in-school activities than at post-primary. Other benefits of the HSCL scheme highlighted by coordinators included improved home-school relationships, greater participation of parents in educational activities and improved parental self-confidence and self-esteem. Overall, HSCL coordinators were satisfied with supports (e.g., funding, access to advice, principal support) available to them in their role. However, they highlighted the need for greater access to professional development. which 29% indicated had impacted to some extent the success of the scheme.

Literacy Achievement Outcomes

Achievement in literacy in DEIS evaluations has been measured using the Drumcondra Sentence Reading Test (ERC, 2007), a protected 40 item multiple choice test which requires children to choose an appropriate vocabulary word to suit a particular context presented in a single sentence. Though vocabulary is a key factor in reading comprehension, it is used here as a proxy for comprehension which in reality is multi-faceted and more complex than can be captured at the sentence level. The test was first administered in May 2007 to students in Second, Third and Sixth classes and at three-year intervals thereafter (May 2010, 2013 and 2016), with Fifth class included from 2010. Between 118 and 120 DEIS urban schools participated in each round of testing. The data collected permitted both cross-sectional and longitudinal comparisons. Relatively small numbers of children were exempted from taking the test (2^{nd} class 2.3% in 2007; 1.5% in 2016; 6^{th} class 1.7% in 2007; 0.9% in 2016). Children

could be exempted based on three criteria (a) they had a diagnosed moderate to severe general learning disability; (b) a physical disability that would prevent them from participating; and/or (c) their English proficiency was not sufficient to allow them to attempt the test. Additionally, the rate of absenteeism reduced from 10.8% in 2007 to 7% in 2016.

Cross-sectional results across class levels

Relatively small statistically significant gains in achievement (less than a one-point gain on standardised tests) were reported in the first DEIS evaluation (Weir et al., 2011) which reduced the numbers in 6th class performing below the 10th percentile from 28% to 25.6%. Of the cohorts tested in 2007, Second classes had the highest average standard scores (92 SS) and improved to 94.6 in 2010 resulting in a reduction of the numbers performing below the 10th percentile from 22% to 15.9%.

Somewhat larger and statistically significant gains were achieved across 2nd, 3rd,5th and 6th classes between 2010 and 2013 (Kavanagh et al., 2017) with average standard scores showing growth (Table 1). Thereafter, between 2013 and 2016, the average rate of growth slowed, with less than one standard point change (0.4 SS increase in 2nd to 0.8 SS increase in 6th) indicating a levelling off of gains. However, for the lowest-achieving children between 2013 and 2016 (Table 2) - with the exception of 2nd class where there was a slight increase in the percentage of children performing below the 10th percentile (from 11% to 11.9%) - the numbers below the tenth percentile reduced across the other class levels. This reduction in lower-performing students brought the proportions performing at this level in Second and Fifth classes close to the national norm of 10%.

Table 1: Mean reading standard scores at each class level in 2007, 2010, 2013, 2016

Grade Level	2007	2010	2013	2016	Norm group average
2nd class	92.4	94.6	97.2	97.6	100
3rd class	90.7	91.6	94.6	95.7	100
5th class	--	93.0	95.6	96.7	100
6th class	90.4	91.2	93.2	94.6	100

Source: Kavanagh et al., 2017, Table 3.2

Table 2: Percentages of children at each class level performing at or below the 10th percentile on reading in 2007, 2010, 2013, 2016

Grade Level	2007	2010	2013	2016	Norm group average
2nd class	22.0	15.9	11.0	11.9	10%
3rd class	26.4	23.0	16.8	14.4	10%
5th class	--	20.6	13.6	12.3	10%
6th class	28.0	25.6	20.2	17.6	10%

Source: Kavanagh et al., 2017, Table 3.3

At the opposite end of the scale, the proportion performing at or above the 90th percentile remained relatively stagnant at 2nd class (2.2 in 2007, 2010; 4.1% in 2013; 4.2% in 2016) while at other class levels there were small increases (e.g., 2.3% in 2007 to 3.9% in 2016), though they remained well below the national average of ten per cent (Table 3). Fifth class had the highest proportions at 5.4% in 2016 and third class had the lowest proportion of high achievers (2.1%).

Table 3: Percentages of children at each class level performing at or above the 90th percentile on reading in 2007, 2010, 2013, 2016

Grade Level	2007	2010	2013	2016	Norm group average
2nd class	2.2	2.2	4.1	4.2	10%
3rd class	1.6	1.1	1.6	2.1	10%
5th class	--	3.3	4.8	5.4	10%
6th class	2.3	2.5	3.1	3.9	10%

Source: Kavanagh et al., 2017, Table 3.4

Longitudinal comparisons of reading achievement over time

The DEIS evaluation design also made it possible to track the same children over time and ascertain what growth, if any, had occurred. Longitudinal comparisons on each of the testing occasions (2007 – 2010; 2010 – 2013) revealed increases in average scores. However, further evidence of a levelling off of gains between 2013-2016 was reported with average reading achievement of pupils who participated in both rounds of testing found not to change at all (see Table 4). The standard score (97.9 SS) of the children who were in 2nd class in 2013, remained the same when those same children were in 5th class in 2016; a similar result was observed for children in 3rd in 2013 who were in 6th in 2016 (95.2 SS).

Table 4: Mean reading standard scores of Second- and Third-class pupils in 2013 and their follow up scores in 5th and 5th classes in 2016

Cohort	2013	2016	Norm Group Average
2nd-5th (n=2247)	97.9	97.9	100
3rd – 6th (n=3464)	95.2	95.2	100

Source: Kavanagh et al., 2017, Table 3.5

Differences in literacy achievement between DEIS Band One and DEIS Band Two

The DEIS evaluations have also allowed performance comparisons between DEIS Band One and DEIS Band Two schools. As noted earlier, overall performance shows an upward trajectory for DEIS schools regardless of level of disadvantage. Not surprisingly, given the association between levels of poverty and academic achievement (Buckingham et al., 2013), at each class level, clear differences in achievement exist between DEIS Band One and Band Two schools. It is notable that for children in Second and Fifth classes in DEIS Band Two schools, performance (99 SS) is close to the national norm (100 SS).

Additionally, for Second and Third classes in 2016, the mean standard scores for children in DEIS Band One schools is similar to that of children in the same classes in DEIS Band Two in 2007. Similarly, for children in Fifth and Sixth classes in DEIS Band One schools, performance is below that of DEIS Band Two children at those class levels in 2007. These findings underscore the challenges involved in changing outcomes for children in DEIS Band One schools.

Mathematics Achievement Outcomes

Achievement in mathematics was assessed using a shorted version of the Drumcondra Primary Mathematics Test Revised (DPMT-R, ERC, 2006). One-third of the 75 item test was selected for Third, Fifth and Sixth classes and 30 items were administered at Second class level. Items were selected to cover a broad range of mathematics content or processes. A limitation of testing is that there were too few items in each area to ascertain development in particular aspects of mathematics. As in the case of reading, the tests were administered in 2007, 2010, 2013 and 2016 (Fifth was included from 2010).

Cross-sectional results across class levels

At all class levels, children in urban DEIS schools performed closer to the national norms in mathematics than in reading (Table 5). In 2007, achievement was lowest at 6th class level (10.2 score points below the national norm) and improved to 4.1 points below in 2016.

Table 5: Mean mathematics standard scores at each class level in 2007, 2010, 2013, 2016

Class Level	2007	2010	2013	2016	Norm group average
2nd class	91.5	93.9	96.7	97.2	100
3rd class	91.1	92.6	97.2	98.5	100
5th class	--	92.3	95.8	98.0	100
6th class	89.8	91.2	93.6	95.9	100

Source: Kavanagh et al., 2017, Table 3.7

Improvements across all class levels were also seen in the proportions performing at or below the 10th percentile (Table 6) which more than halved at 6th class level from a high of 31.1% in 2007 to 14.7% in 2016. Second class had the lowest percentages of children performing at or below the 10th percentile at each time of testing. The biggest reductions in 2nd class occurred between 2007 and 2010, with a further reduction in 2013 before rising slightly in 2016

Table 6: Percentages of children at each class level performing at or below the 10th percentile in mathematics in 2007, 2010, 2013, 2016

Class Level	2007	2010	2013	2016	Norm group average
2nd class	21.8	16.8	12.7	14.3	10%
3rd class	24.1	21.0	13.8	13.4	10%
5th class	--	25.1	18.8	16.3	10%
6th class	31.1	28.3	22.6	14.7	10%

Source: Kavanagh et al., 2017, Table 3.8

Table 7: Percentages of children at each class level performing at or above the 90th percentile in mathematics in 2007, 2010, 2013, 2016

Class Level	2007	2010	2013	2016	Norm group average
2nd class	2.8	4.5	6.1	7.4	10%
3rd class	5.4	7.3	11.2	12.9	10%
5th class	--	4.7	8.3	10.8	10%
6th class	4.1	5.5	7.3	9.6	10%

Source: Kavanagh et al., 2017, Table 3.9

At the other end of the spectrum, the proportions of children performing at or above the 90th percentile had more than doubled at each class level by 2016 and increased at each round of testing in between (Table 7). This is in contrast to reading, where there was very modest growth. Third and Fifth classes had the highest proportions of children at this level in 2016 (12.9% and 10.8% respectively) and Second class had the lowest (7.4%).

Longitudinal comparisons of mathematics achievement over time

As with reading, it was possible to track the same children over time and ascertain what growth, if any, had occurred over the 10 years. Longitudinal comparisons revealed a mixed picture. Children in Second class in 2013 who were in Fifth class in 2016 demonstrated a small but significant increase in average achievement scores, moving from 96.9 to 98.7. However, for children in Third Class in 2013, there was a small decline in achievement for those same

children in 6th class in 2016, reducing from 97.8 to 96.3 – a drop of 1.5 SS points. As noted earlier, between 2013 and 2016 there was no change to standard scores in reading.

Differences in mathematics achievement between DEIS Band One and DEIS Band Two

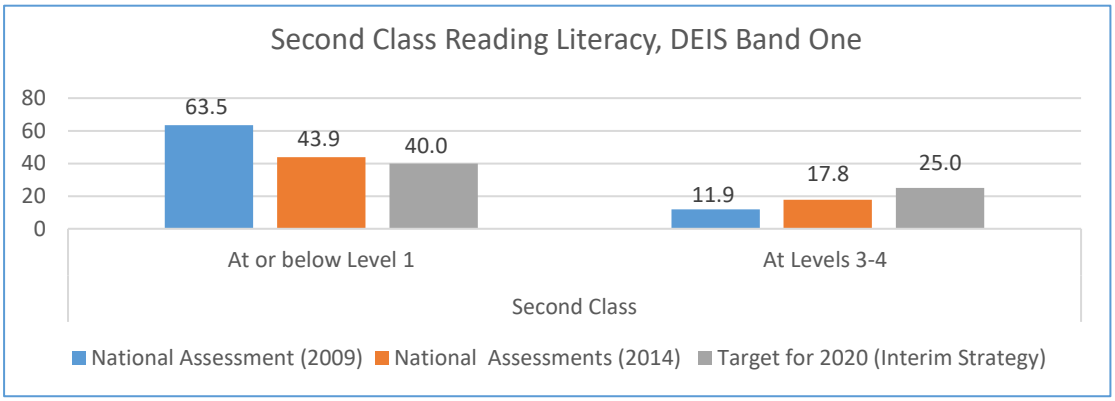
As was the case in relation to reading achievement, children in DEIS Band Two schools significantly outperformed their peers in DEIS Band One across each class level and at each round of testing. Furthermore, the performance of children in Third and Fifth classes in DEIS Band Two schools exceeded national norms and was approaching national norms at Second and Sixth classes. Achievement differences at Third and Sixth class have narrowed over time between DEIS Band One and Two, with the biggest reduction apparent at Third class. While achievement continued on an upward trajectory at Fifth class, it appears to have levelled off at Second class between 2013 and 2016.

Though it is notable that for the first time in the Irish context an initiative targeted at DEIS has demonstrated growth and improved learning outcomes for children, given that a control group was not utilised in the study design, it is not possible to ascertain if the gains observed were attributable to the DEIS strategy itself. Further insights can be gained from the National Assessments of English Reading and Mathematics (NAMER) which overlapped with the DEIS evaluations on two occasions (2009, 2014). NAMER[2] has been conducted at five-yearly intervals since 1972, allowing trends in national achievement to be tracked.

Comparison with the National Assessments of Mathematics and English Reading

In 2012, specific reading and mathematics targets were set as part of the National Literacy and Numeracy Strategy (DES, 2011), though targets for DEIS schools were not issued until 2017.

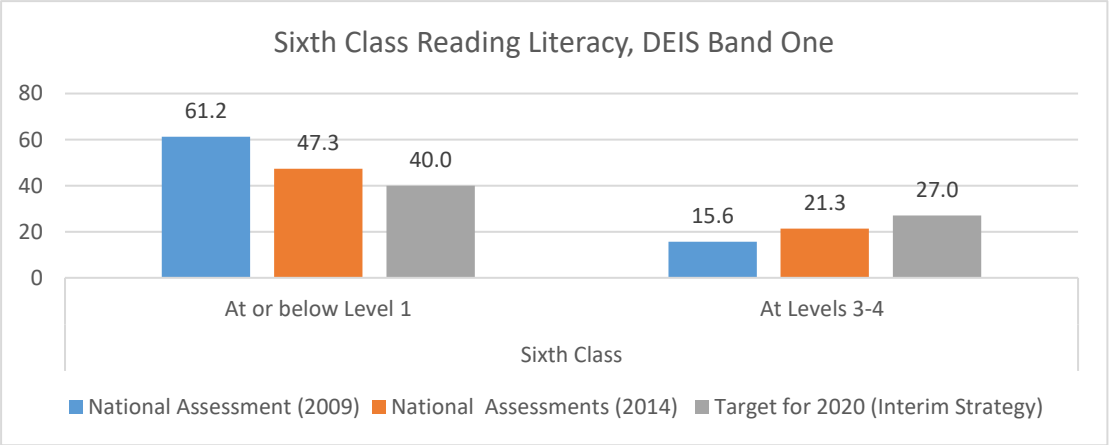
Figure 1: Percentages of Second-Class Pupils Achieving at Various Proficiency Levels on the Reading Scale, NA '09, NA '14, and 2020 Interim Strategy DEIS Targets



[2] The format of the test changed in 2009 so direct comparisons with data prior to that are not possible

In 2014, although each of the national reading achievement targets set in the NLNS strategy (DES, 2011) had been met (five years ahead of time) and overall national results showed an increase in standards for the first time since 1972, the gap between children in high- and low-SES schools remained. Shiel et al. (2015, p. xvi) concluded *'there has been no real reduction in the gap between pupils in DEIS urban schools and in other school types, except at Second class in Band Two schools'*. Significantly, in 2014, almost twice as many children in 2nd class (43.9%) and 6th class (47.3%) in DEIS Band One schools performed at or below Level 1 in reading compared to peers nationally (21.6%, 24.8% respectively) (Figures 1 and 2). Additionally, though achievement in DEIS Band One schools improved substantially between 2009 and 2014, the 2020 targets set in the Interim Review (DE, 2017) have yet to be met (Figures 1 and 2).

Figure 2: Percentages of Sixth class pupils achieving at various proficiency levels on the reading scale, NA '09, NA '14, and 2020 Interim DEIS strategy targets



Percentages of children performing at the highest level in reading (Level 4 only) were lower at both Second class (Band One: 1.7%; Band Two: 9.5%) and Sixth class (Band One: 3.4%; Band Two: 9.0%) when compared to figures for non-DEIS urban (Second: 15.2%; Sixth: 15.6%). Furthermore, while overall substantive gains were made, '*at the higher grade levels in reading, average Band One scores in 2014 remain below the 2007 average scores of Band Two schools' and significantly below the national average'* (Shiel et al., 2015 p. xvi).

A similar picture emerged in relation to Mathematics. In 2014, although each of the national mathematics achievement targets set in the NLNS strategy for the school population as a whole (DES, 2011) were met five years early, the performance of children in DEIS Band One remained significantly below the national average levels. In Second class, 51.9% of children in urban DEIS Band One schools performed at or below Level One compared to 26.5%

in DEIS Band Two schools and just 21.1% in urban non-DEIS schools. However, the percentage of very low achievers (14.3% below Level One only) was almost halved in 2014 when compared with 2009 (27.1%) (Shiel et al., 2014). Likewise, at Sixth class, 49.9% of children in urban DEIS Band One schools performed at or below Level One in 2014, compared to 41.8% in DEIS Band Two schools and just 24.1% nationally.

Figure 3: Percentages of Second-class pupils achieving at various proficiency levels on the mathematics scale, NA '09, NA '14, and 2020 targets

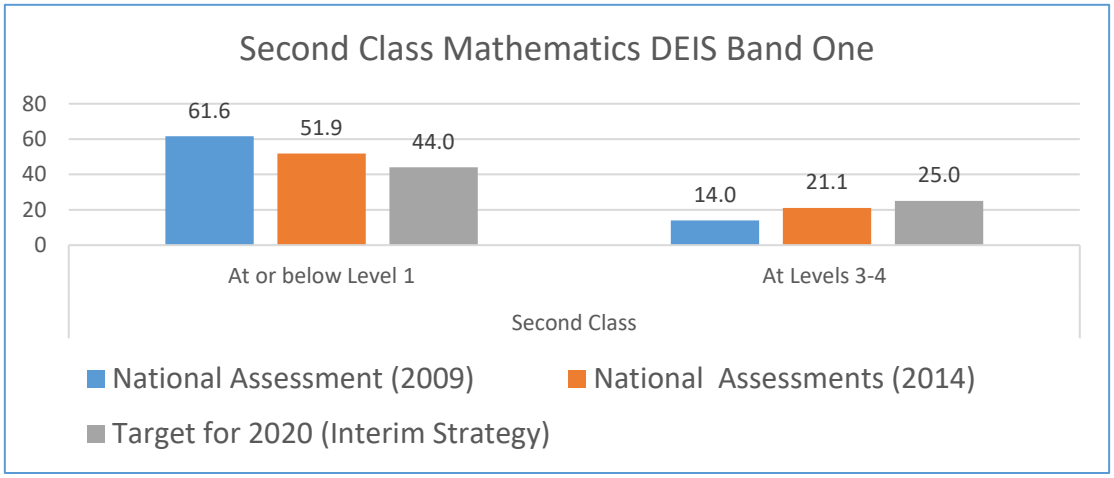
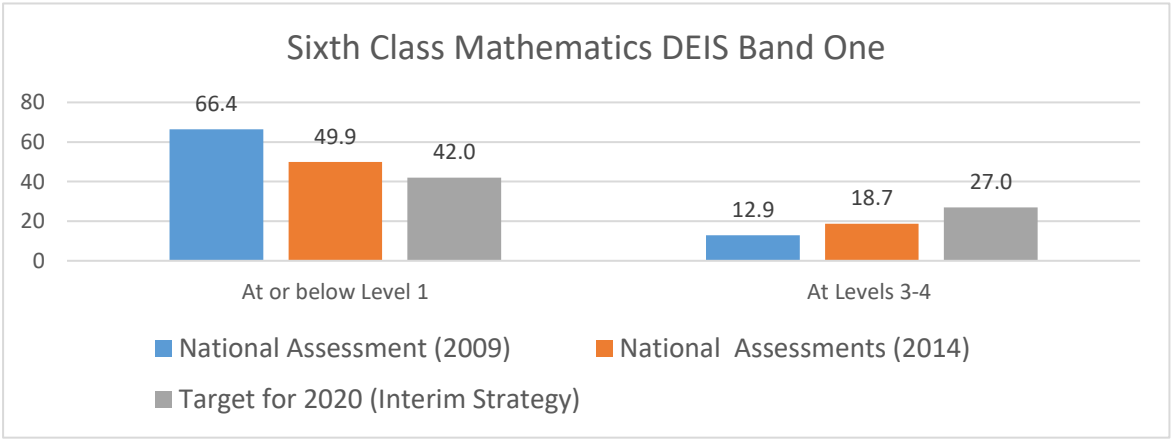


Figure 4: Percentages of Sixth class pupils achieving various proficiency levels on the mathematics scale, NA '09, NA '14, and 2020 targets



Higher-achievers (Level 4 only) on the other hand were under-represented at Second and Sixth classes in both DEIS Band One (2.1%) and DEIS Band Two (10.0%) when compared to figures for non-DEIS urban (17.3%). Additionally, though achievement in mathematics in DEIS Band One schools had improved (though not as strongly as in reading) between 2009 and 2014, the 2020 targets remained to be met (Figures 3 and 4).

In examining overall differences in achievement between 2009 and 2014, in DEIS Band One while the mean scale scores increased in both reading and mathematics, they were only statistically significant for Second class in reading. However, effect sizes indicate that the growth though not statistically significant, was substantive. There were greater levels of improvement in DEIS Band Two compared to 2009 with statistically significant differences found for reading at Second and Sixth class and in mathematics at Second class. In contrast to 2009, Band Two pupils significantly outperformed pupils in Band One in reading at both class levels and in mathematics at Second class.

Clearly, though children in DEIS schools have made progress, it is not accelerated enough to narrow the gap, particularly among children in the Senior classes in DEIS Band One schools as achievement has also risen in non-DEIS schools. The more complex needs, school context and community factors also contribute to the challenges. The next section explores differences in achievement between rural and urban DEIS schools in literacy and mathematics.

Comparison of Achievement in Literacy and Mathematics between Rural and Urban DEIS

Educational disadvantage has been found to be both quantitatively and qualitatively different in urban and rural areas and may partly explain differences in achievement between children in rural and urban disadvantaged schools (Weir et al., 2009; Weir & McAvinue, 2013; Weir et al., 2015). The DEIS evaluation in rural schools involved 238 schools and focused on two class levels (Third and Sixth classes) between 2007 and 2010 only.

Table 8: The reading achievements (average raw score, average standard score and percentages scoring at or below the 10th percentile and at or above the 90th percentile) of rural pupils in 2007 and 2010, by grade level

	3rd class		6th class	
	2007	**2010**	**2007**	**2010**
	N=2,077	*N= 2,074*	*N=1975*	*N=2,101*
Raw score mean (SD)	25.7 (9)	26.7 (8.4)	21.0 (7.9)	22.4 (7.7)
Standard score mean (SD)	96.3 (14.4)	97.7 (13.3)	95.5 (13.7)	98.1 (13.3)
At or below 10th percentile	16%	12.2%	16.4%	11.8%
At or above 90th percentile	4.3%	3.3%	4.3%	6.3%

Source: Weir & McAvinue, 2013, Table 2

As can be seen in Table 8 children in Third and Sixth class in rural DEIS schools increased their raw and standard scores in reading between 2007 and 2010, and these increases were found to be statistically significant. Additionally, statistically significant improvements were found at both class levels in the reduction of children performing at or below the 10th

percentile. In relation to higher-achievers performing at or above the 90th percentile, there was a small non-significant decrease at 3rd class and a significant increase at 6th class levels.

When compared with children at similar grade levels in DEIS urban settings (Table 1 and 2 above), it is clear that children in 3rd and 6th classes in rural DEIS contexts performed significantly better than their urban counterparts in literacy at both baseline (2007) and at the second point of testing in 2010 (Weir & McAvinue, 2013). Though Kavanagh et al. (2017) did not report separate DEIS Band One and Two figures for the percentages of children perfoming at or below the 10th percentile or at or above the 90th percentile, it is likely that children in rural DEIS are perfoming better at these benchmarks (see discussion below in relation to the national assessments (Shiel et al., 2015) which reported disagregated scores according to DEIS and non-DEIS status (Figures 7-10 below).

Longitudinal comparisons of the achievement of children who were in Third class in 2007 and in Sixth class in 2010 indicate a very small but statistically signficant gain. This contrasts with the findings in relation to urban DEIS where no changes in longitudinal scores occurred for cohorts of children present at both testing points.

It can be seen in Table 9 below that increases also occurred in mathematics in both raw and standard scores in Third class (99.4 in 2010) and Sixth class (99.9 in the same year), bringing achievement broadly in line with the national average (100) in 2010. Additionally,the numbers performing at or below the 10th percentile reduced significantly (10% in 3rd; 11.5% in 6th). Furthermore, the percentages performing at or above the 90th percentile exceeded national norms (12.8% in 3rd; 13.0% in 6th).

Table 9: The mathematics achievements (average raw score, average standard score and percentages scoring at or below the 10th percentile and at or above the 90th percentile) of rural pupils in 2007 and 2010, by grade level

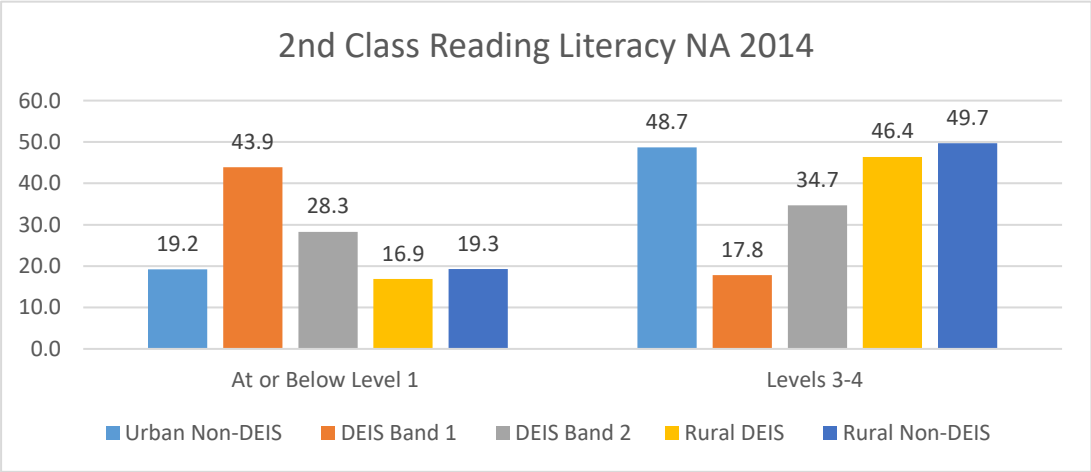
	3rd class		**6th class**	
	2007	**2010**	**2007**	**2010**
	N=2,081	*N= 2,048*	*N=1,975*	*N=2,102*
Raw score mean (SD)	14.2 (6)	14.8 (5.8)	13.9 (6.3)	15.1. (6.3)
Standard score mean (SD)	98.0 (15.8)	99.4 (15.4)	96.8 (14.7)	99.9 (14.9)
At or below 10th percentile	12.5%	10.0%	16.1%	11.5%
At or above 90th percentile	11.8%	12.8%	8.7%	13.0%

Source: Weir & McAvinue, 2013, Table 3

Though rural DEIS schools are not divided into Band One and Two, a measure of disadvantage is the holding of a medical card. Achievement data were also analysed to determine if differences existed between the achievement of children whose families were medical card holders and those who were not. Both medical card holders and non-medical card holders showed statistically significant increases in average standard scores for reading from 2007 to 2010 (94.3 to 96.0 – medical card; 99.05 to 100.5 – non-medical card). Results were less clear cut for mathematics. Non-medical card holders showed a statistically significant increase from a mean of 101.1 to 103.0 while medical card holders showed a non-significant increase (95.8 in 2007 to 97.0 in 2010). This is similar to differences between DEIS Band One and DEIS Band Two in urban findings, again illustrating that level of disadvantage is associatede with achievement gains and that, for the most disadvantaged children, achievement has not increased sufficiently to close the gap.

Further analysis of the differences in reading and mathematics achievement between pupils in DEIS and non-DEIS schools in urban and rural settings was completed as part of the national assessments (Shiel et al., 2015). Analysis of data was possible between Urban DEIS Band One, Urban DEIS Band Two, Urban Non-DEIS, Rural DEIS and Rural Non-DEIS, though caution in the interpretation of outcomes is advised in the case of Rural DEIS, where numbers of pupils and schools were low.

Figure 5: Percentages of pupils at various proficiency levels on the overall reading scale, NA 2014 assessment by DEIS/SSP status and year, Second class

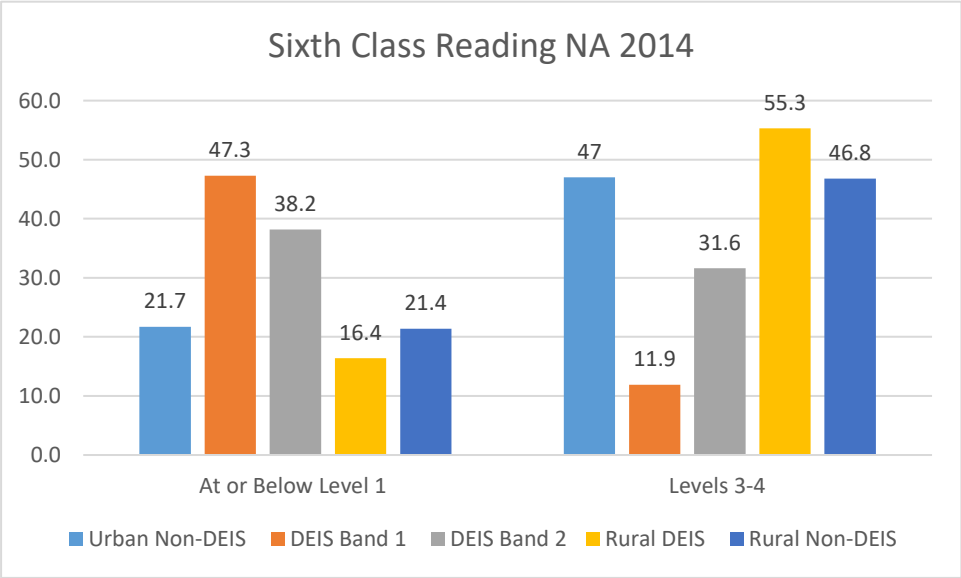


At Second class, the percentage of very low-achievers (below Level One) in rural DEIS increased between 2009 and 2014 (3.9% to 6.1%). Though this is higher than the percentage found in DEIS Band Two in 2014 (5.1%), it is far lower than DEIS Band One (15.5%). As can

be observed in Figure 5, the smallest percentage (16.9) of low-performers (Level One and below) was found in rural DEIS schools and the highest percentage was found in DEIS Band One (43.2). Data for Sixth class are broadly similar (Figure 6).

For children in Second class in Urban Non-DEIS and Rural Non-DEIS, performance at levels three and four combined, is similar (48.7%, 49.7% respectively) with rural DEIS not far behind (46.4%). Performance at these levels in DEIS Band One is far below (17.8%) the other contexts. In examining the percentage at the highest level (Level 4), at DEIS Band One there were only 1.5% of children performing at this level, compared to DEIS Band Two (9.5%) and Rural DEIS (14.7%), rural non-DEIS (14%) and urban non-DEIS (15.2%) (Shiel et al, 2015).

Figure 6: Percentages of pupils at each proficiency level on the overall reading scale, NA 2014 assessment by DEIS/SSP status and year, Sixth class

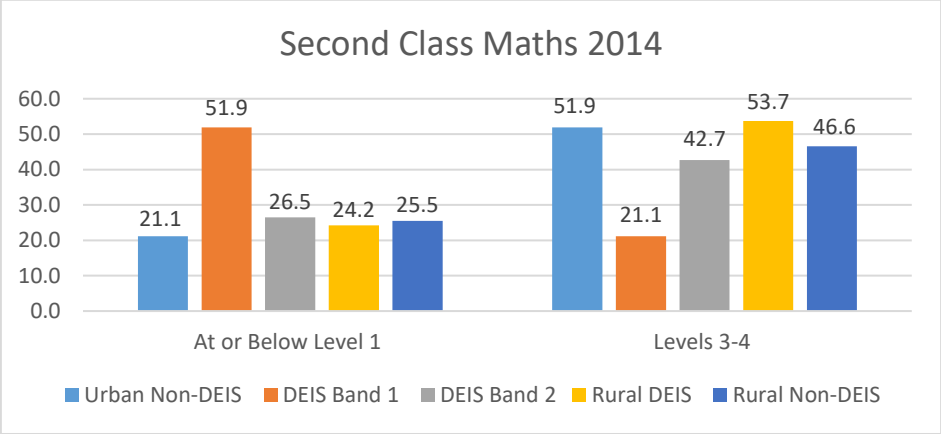


The largest percentage of high-achievers (Level 4 only) in reading (17%) was found amongst rural non-DEIS Sixth class pupils who also had the lowest percentage of children performing at Level One or below (Shiel et al., 2015). This compared to 11.7% in rural DEIS and just 3.4% in Urban DEIS Band One and 15.5% in Urban Non-DEIS. Figures 10 and 11 demonstrate the scale of the gap between DEIS Band One and each of the other school contexts (DEIS Band Two, Urban Non-DEIS, Rural DEIS and Rural Non-DEIS). Rural non-DEIS Sixth class pupils also had the lowest percentage (16.4%) of children performing at Level One or below and DEIS Band One had the highest (47.3%).

In Second class in 2014, in Mathematics, the lowest percentage (4.6%) of very low-achievers (Below Level 1) was found among rural DEIS pupils and the highest percentage was

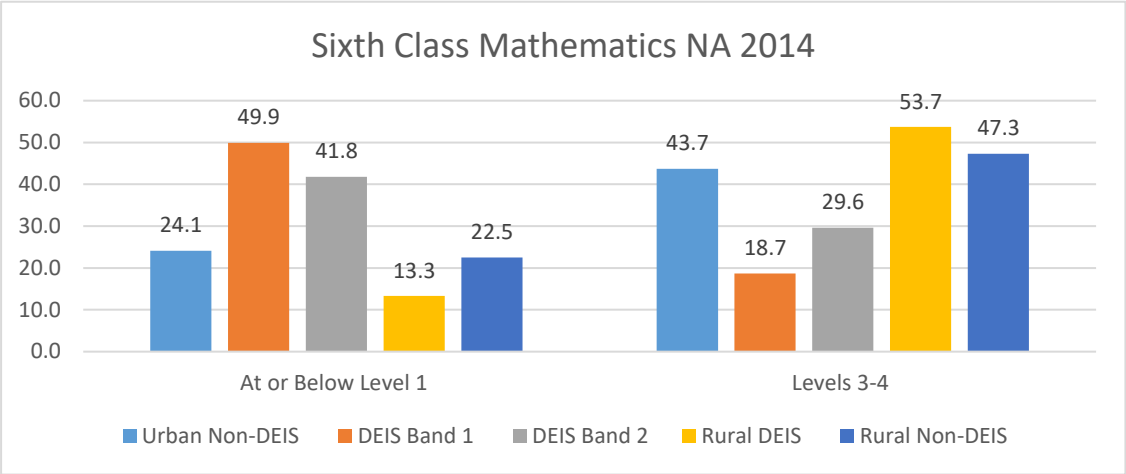
found in Urban DEIS Band One (14.3%) (Figure 7). Furthermore, the percentages of children in Second class performing at the highest level (Level 4) were found in urban non-DEIS and rural DEIS (17.3%, 15.6%, respectively). The lowest percentage of high-performers was in DEIS Band One (2.1%), which showed no increase since 2009 (2%.0) while DEIS Urban Band Two increased from 2% to 9% (Shiel et al., 2015).

Figure 7: Percentages of pupils at various proficiency level on the overall Mathematics scale, NA 2014 assessment by DEIS/SSP status and year, Second class



Children in Sixth class in rural schools (DEIS and Non-DEIS) outperfomed their urban peers at Levels 3 and 4, with 53.7% and 47.3% of children respectively at this level, compared to a low of 18.7% and 29.6% of children in DEIS Band One and Two respectively (Figure 8). Also in 2014, just 2% of children in rural DEIS and rural non-DEIS performed Below Level One while the percentages for DEIS Band One (11.9%) and DEIS Band Two (12.8%) are much higher (Shiel et al., 2015). As noted earlier, particular care should be exercisedin interpreting the percentages in relation to rural DEIS given the very small sample invovled in the study.

Figure 8: Percentages of pupils at various proficiency levels on the overall Mathematics scale, NA 2014 assessment by DEIS/SSP status and year, Second class



Data arising from questionnaires and teacher ratings of pupils characteristics shed further light on differences in performance between children attending urban and rural schools and are addressed in the next section.

Influence of Affective Dimensions of Learning on Literacy and Mathematics Achievement

Attitudes and dispositions towards reading and mathematics in rural DEIS schools

In attempting to explain the differences in achievement, Weir and McAvinue (2013) and Weir et al. (2015) drew on three sources of data: (a) pupil questionnaires which explored pupil attitudes, habits, aspirations and behaviour; (b) parental questionnaires which examined home environment factors; and (c) teacher ratings of pupils' behaviour, dispositions and habits. Analysis revealed greater levels of parental engagement in and emphasis on education in rural DEIS than typically found in urban DEIS settings. Additionally, children in rural contexts had greater access to educational materials and engaged more frequently in reading outside of school than their urban peers. Furthermore, children in rural disadvantaged schools were less likely to engage in unstructured leisure time activities such as playing with friends or on computers. Moreover, while only 15% of Sixth class pupils nationally reported watching television for more than two hours daily, 39% of urban DEIS pupils reported doing this (Kavanagh & Weir, 2018). This is linked to the finding that children who report having a television in their bedroom (64-68% urban DEIS across class levels; 43-48% nationally) have lower achievement (Kavanagh et al., 2015; Kavanagh & Weir, 2018). Also linked to lower

reading achievement was smart-phone ownership among children in second class in urban DEIS schools (54%: 33% nationally).

Drawing on the *Growing up in Ireland* study, the ESRI review of DEIS research (Smyth et al., 2015) highlighted other factors which also contribute to the variation in outcomes. It highlighted that though families in rural DEIS contexts have lower income levels than urban DEIS Band Two families, a number of other factors may contribute to better educational outcomes. Compared to their urban counterparts, students in rural DEIS tend to be more advantaged in terms of social class, education and family structure. They are also more likely to be taught by more experienced teachers, which may have implications for achievement.

In controlling for other factors, the *Growing Up in Ireland* study reported higher reading and maths scores among nine year olds taught by more experienced teachers (McCoy et al., 2014). Worryingly, urban DEIS Band One schools tend to have a high concentration of newly qualified teachers and teachers with less than five years' experience (just over 60%) compared to Non-DEIS (just under 40%). Additionally, this cohort of teachers is less likely to stay in the DEIS urban context, contributing to teacher turnover and lack of continuity in some DEIS Band One schools. Other factors such as pupils' engagement and dispositions that may also contribute to varied outcomes are discussed next.

Attitudes and dispositions towards literacy and mathematics in Urban DEIS

As well as achievement, the DEIS evaluations explored pupils' attitudes, beliefs, sense of self-efficacy and aspirations for the future. In each of the evaluations (Weir, et al., 2009; Weir et al., 2011; 2010, Weir & Denner, 2013; Kavanagh et al., 2017) children were asked to what extent they liked school, and liked reading and mathematics. Children who reported they liked school or liked it a lot had higher mean achievement in both domains than those who reported that they disliked school or disliked it a lot. For example, in 2016, there were large differences (eight points in reading; 12 points Mathematics) in mean achievement standard scores between the 15.3% of children in 6th class who reported they liked school a lot (96.4 reading; 99.7 Mathematics) and the 7.3% who disliked it a lot (88.5 reading; 87.9 Mathematics). Children in Second class could answer, yes, no or don't' know. In 2016, 58.3% agreed that they liked school while 20.2% reported that they didn't like school, and a further 21.4 % didn't know. Average achievement scores for those who liked school (97.7 points reading and mathematics) and those who didn't know (99.3 reading; 98.9 mathematics) were

approaching national norms, while for those who didn't like school they were below those norms.

Table 10: Percentage of pupils in Third, Fifth and Sixth class in 2016 who agree they like to solve mathematical problems and mean standard scores

	3rd class (N-4232)		5th class N=4007		6th class N=4127	
	%	Maths	%	Maths	%	Maths
Strongly agree	36.6	101.7	25.5	104.5	21.0	103.0
Agree	31.1	99.2	35.3	98.5	36.5	96.9
Disagree	17.4	96.1	25.2	95.0	27.5	92.7
Strongly disagree	14.9	93.2	13.9	90.6	15.0	88.6
Total	100	98.7	100	98.0	100	96.-

Kavanagh, Weir & Moran (2017), Table 4.17

This difference increased even further in relation to attitudes towards reading and mathematics. In ascertaining attitudes to mathematics, pupils were asked to what extent they agreed that they liked solving mathematical problems. As can be observed from Table 10, across class levels, children who strongly agreed that they liked to solve mathematical problems exceeded national norms and had significantly higher achievement than those who strongly disagreed. This translated into a 15.1 standard score difference at Sixth class, 13.9 at Fifth class, and 8.5 at Third class.

Sixth class pupils who strongly agreed they liked reading a lot (28.7%) had a mean score of 100.5 (reaching national norms), while those who disagreed (18.8%) or strongly disagreed (8.5%) had significantly lower mean scores (90.9, 88.0 respectively). Furthermore, across all class levels, children who reported that they read for fun at home *daily* had higher mean achievement than those who read once or twice a week, once or twice a month or hardly ever or never. For example, children in 5th and 6th classes who read daily for pleasure had mean achievement scores above the national norms (102.2, 102 SS points respectively) compared to those who reported that they hardly ever or never read (93.3, 90.6 SS points respectively). Daily reading is key, as analysis revealed that those who reported they read once or twice a week also had lower achievement (95.6, 95.6 SS respectively) than those who reported reading daily. Data from the national assessments (NA, 2014, Kavanagh et al, 2015) highlight that 43% of Sixth class pupils read stories or novels every day or almost every day at home, while 16% hardly ever did so. In DEIS urban schools, positive dispositions towards reading declined as children progressed through primary with 28.7% of children in Sixth class strongly agreeing they liked to read compared to 47% in Third class.

We do not have data analyses for the variation in reading attitudes and behaviours between children in DEIS Band One and DEIS Band Two but it is likely that reading frequency is an important factor, given the large differences in achievement between these cohorts,. Weir and McAvinue (2013) highlight that student attitudes are the biggest predictor of reading achievement for urban pupils, which suggests *that 'those urban children who did achieve to a higher standard did so largely on the strength of their own scholastic ambitions and interests'* (p.37). Reading frequency is also related to access to books (see Kennedy & Shiel, 2022; Allington & McGill Franzen, 2021). Parental questionnaires administered as part of the DEIS evaluations to parents of 2nd and 3rd class pupils in 2016 (Kavanagh & Weir, 2018) and findings from the national assessments (Shiel et al., 2014; Kavanagh et al., 2015) demonstrate the importance of availability of books in the home with clear associations between the number of books and achievement. For children in second and third class (13%) who had access to between 101-250 books, achievement was above national norms (102.9 in 2nd; 102.0 in 3rd) and for those who had access to 250+ books (7.4%, 5.4%) achievement rose to 105.5 and 105.0 respectively. In the 2014 National Assessments, about 25% of Second-class pupils had access to 250+ books in the home. On the opposite end of the spectrum, where parents of children in Second and Third classes reported no books in the home (3.4%, 3.0% respectively), children's achievement was well below national norms (90.9, 90.2 SS points). Similarly, for the children of parents who reported between 1 and 10 books (20.8% 19.8% respectively), achievement was 94.3 and 93.1 respectively. Access to books is also linked to libraries. For the 70+% of children whose parents reported that at least one person in the family had library membership, average achievement scores were higher than for those who did not. Not surprisingly, the children of parents who reported they read newspapers and books daily also had higher reading achievement than did children of parents who hardly ever or never read such materials (17.7% parents of Second-class pupils; 18.3% of Third class parents). It is interesting that these percentage are in line with the combined percentage of children in 3rd class who dislike reading (9.2%) and dislike it a lot (8.6%). While we don't have data on the reading habits of the parents of children in 6th class urban DEIS schools, where achievement is particularly low, there is likely to be a similar proportion. Positive relationships were also found between children's achievement and access to other educational resources such as educational games (including apps), reference material and computers (not gaming consoles).

Clearly, increasing the frequency and volume of reading within and outside school and ensuring access to books holds promise for addressing underachievement in reading. This has implications for classroom teaching and learning and resources (see Kennedy & Shiel, 2022a).

Internationally, disengagement from academic work has been directly linked to students' experiences of academic tasks and classrooms disconnected from their needs and motivations (Christenson et al., 2013). Nationally, a factor linked to disengagement is the prevalence of ability grouping in disadvantaged schools (Smyth et al., 2015; McGillicuddy & Devine, 2018; Kennedy, 2018). Smyth et al. (2015) note that DEIS schools *'are more likely to use rigid forms of ability grouping which our research has shown contribute to disengagement, underperformance and early school leaving among those allocated to lower stream classes'* (p.viii). Between class ability grouping at primary level is more common in DEIS schools (7%) than non-DEIS (4%). Additionally, special classes can be seen as a form of ability grouping and are common in DEIS Band One Schools (24%) and DEIS Band Two (21%) compared to only just 5% of rural DEIS and 4% of non-DEIS schools. McGillicuddy & Devine (2018, p.97) have conceptualised ability grouping 'as acts of symbolic violence' in which teachers seeking to manage diverse classrooms, 'funnel and filter' children into ability groups. Citing Bernstein, (1990) they argue that such groupings frame and set boundaries for children's learning. They result in lower teacher expectations and qualitatively different instruction (repetition, more structured differentiated activities) for lower-ability groups which in turn affect children's opportunities to learn and as such affects achievement. Kennedy (2017, 2018) reported improved outcomes in achievement, engagement and self-efficacy for children in DEIS Band One schools working in reciprocal partnership with the Write to Read research project. In this work, a consistent dialogic and relational approach was taken within mixed-ability reading groups in senior classes convened on student choice of book, and an integrated balanced approach to overall literacy instruction was adopted. The balanced approach, which included attention to oral language, writing and explicit instruction in key literacy skills, formative assessment and feedback, also impacted positively on children's writing development (Kennedy & Shiel, 2022b).

The DEIS evaluations also investigated children's self-perception of their literacy ability when compared to their peers. Poor sense of self-efficacy is linked with poor achievement (Guthrie et al., 2013). It is noteworthy that children who indicated that they were at the bottom of the class (10.1% in 3rd class; 10.8% in 5th; 11.6% in 6th) had the lowest standard

scores (87.8 87.7, 86.0 SS points respectively). A related concept is children's understanding of what it takes to be successful at school. Similar percentages of children in 5th (14.5%) and 6th (10.2%) classes were likely to attribute success in school to 'being smart' or innate ability and have lower achievement (90.3, 89.9 SS points) than children who disagree (44.7%, 50.8%) and whose achievement is much higher (98.8; 95.7 SS points respectively). Children who have a low self-concept are likely to be those confined to low-ability groups and research in the Irish context (McGillicuddy, 2013, cited in Smyth et al., 2015, p.64) confirms that children in such groups at primary level have a *'poorer self-concept [which] evokes more negative emotional responses such as shame, sadness and upset among children*'.

Parental aspirations for children's futures were high as evidenced by 95% of parents of children in Second and Third class who would like their children to attend college or university (Weir & Kavanagh, 2018) while about 82% were of the opinion that they would attend third level education. In contrast the aspirations of children in Third class were somewhat lower with 64% aspiring to attend college or university and 57% expecting that they would attend. Thus there is a gap between parental and child aspirations and expectations.

Clearly, the affective dimensions of literacy and mathematics are as critical as the cognitive dimensions and leveraging student engagement, agency and voice has potential for addressing the achievement gap and in supporting pupils in discovering and achieving their potential. The DEIS evaluations considered patterns and trends in achievement at school level as well as pupil level (Kavanagh & Weir, 2018; Kavanagh et al., 2017) and the findings synthesised in the next section draw on these two reports.

School level outcomes in reading and mathematics

Analysis of achievement data in reading and mathematics

As noted earlier, though overall mean achievement in reading rose on each testing occasion at each class level, there was variation across individual schools. School structural factors such as gender composition and size, and attendance rates were examined to establish if such factors accounted for school level variations in achievement.

Nationally, 78% of pupils attend mixed schools. The majority of urban DEIS pupils attended mixed schools (59-64% depending on class level) while the remainder were split between boys' schools (16-19%) and girls' schools (19-22%). Though some gender differences were observed, no clear pattern of change across class levels emerged, e.g., 3rd and 5th class

pupils in girls' school had higher mean reading achievement than pupils in boys' or mixed schools but had no difference in mathematics at these class levels. Additionally, 6th class pupils in girls' schools outperformed pupils in mixed schools in both reading and mathematics, though not pupils in boys' schools. School gender was not a factor in relation to 2nd class reading or mathematics achievement. Data from the national assessments (administered to 2nd and 6th classes) indicate no significant correlation with school gender composition for either reading or mathematics.

Schools were categorised as small (<190 pupils), medium (190-304 pupils) or large (>305 pupils). Though nationally school size was not a factor in achievement levels, among DEIS schools, pupils in the largest one third of schools had higher mean achievement in both reading and mathematics than those in the smallest third of schools. It should be noted that most of the larger DEIS schools were Band Two rather than Band One. Overall attendance rates were about 92% with a one-point difference in favour of DEIS Band Two which was just slightly lower than national figures (94%). Attendance at 3rd, 5th and 6th class levels was associated with significantly higher mean achievement in both reading and mathematics (reading: $r = .33$, $r = .37$ and $r = .24$; mathematics: $r = .33$, $r = .34$ and $r = .28$).

Schools were classified according to changes in average achievement scores at second, third and sixth classes (e.g., scores increased, decreased, a mixed pattern of change). As can be seen from Table 11, only one school had consistent decreases in reading and mathematics at 6th class level at each time of testing and two schools had consistent decreases in mathematics only at 2nd and 3rd class level. About a quarter of schools experienced consistent increases in reading at 2nd and 3rd class levels, but only 16% at 6th class levels. For mathematics, the number of schools experiencing consistent increases was much lower (13 in 2nd; 11 in 3rd; 16 in 6th). The more typical pattern in the majority of schools was a mixed pattern from one testing time to the other (2007, 2010, 2013, 2016). Fifth classes were not included in the analysis as they were not involved in each round of testing.

Table 11: Numbers and percentages of schools with consistent increases, decreases or mixed performance at 2nd 3rd and 6th class levels

	Reading			Mathematics		
	2nd (n=98)	3rd (n=111)	6th (n=111)	2nd (n=98)	3rd (n=111)	6th (n=111)
All decreases	0 (0%)	0 (0%)	1 (0.9%)	2 (2%)	2 (1.8%)	1 (0.9%)
Mixture	74 (75.5%)	73 (74.8%)	92 (82.9%)	83 (84.7%)	98 (88.3%)	94 (84.7%)
All increases	24 (24.5%)	28 (25.2%)	18 (16.2%)	13 (13.3%)	11 (9.9%)	16 (14.4%)

Source: Kavanagh & Weir, 2018. Table 3.2 and Table 3.3

Chi-square and t-tests revealed that the structural composition of schools (gender, size) was not associated with these patterns of achievement. Other factors such as attendance, DEIS status, number of parents holding medical cards, or organisation of learning support within schools were also not significantly associated with patterns of achievement over the time period (2007-2016).

The magnitude of the changes that occurred is also of interest. According to Archer and Weir (2011), an increase or decrease of six raw score points in reading (Drumcondra Sentence Reading Test: 40 item multiple choice reading vocabulary test used in all DEIS evaluations) is considered large equating to two thirds of a standard deviation (10/15 SS points) at 2nd and 3rd classes and to three quarters of a standard deviation at 6th class (12/15 SS points). Only a small percentage of schools (<4%) had a net decrease of three or more raw score points between 2007 and 2016. As can be observed in Table 12, large increases (greater than 6 points) were found for 21.4% of schools with second classes, 17% for third classes and almost 11% for 6th classes.

Table 12: Percentages of schools with varying increases and decreases in reading raw score at 2nd, 3rd, 6th class levels between 2007 and 2016

Reading	2nd (n=98)	3rd (n=112)	6th (n=111)
Increase >6	21.4%	17.0%	10.8%
Increase 3-6	40.8%	42.0%	30.6%
Increase 0-3	27.6%	29.5%	37.8%
Decrease 0-3	8.2%	8.9%	17.1%
Decrease 3-6	2.0%	2.7%	2.7%
Decrease >6	0.0%	0.0%	0.9%

Source: Kavanagh & Weir, 2018, Table 3.4

Across class levels, the most common increase was in the region of 3-6 points in reading which can be considered to be a medium increase while a small increase was found for 2nd classes in 28% of schools, and almost 30% and 38% of schools in relation to 3rd and 6th classes. On the other hand, just over 20% of schools experienced decreases of varying degrees at 6th class level and smaller percentages at 2nd and 3rd class levels.

As noted earlier, in relation to Mathematics, a modified version of the Drumcondra Primary Mathematics Test was used in the DEIS evaluations. According to Archer and Weir (2011), an increase or decrease of four raw score points is considered large equating to two thirds of a standard deviation (standard deviation smaller) at 2nd and 3rd classes and to three quarters of a standard deviation at 6th class. Across class levels, compared to reading patterns,

greater percentages of schools experienced decreases of varying sizes. At 6th class level, just over 36% of schools experienced consistent decreases at each time of testing (small: 14.5%; medium: 7%; large:14.5%) but on the other hand just over 27% of schools had large increases.

Kavanagh and Weir (2018) concluded that there were no school-level characteristics that could consistently explain the large school level variations in reading and mathematics achievement. Other data (questionnaires and interviews) collected as part of the DEIS evaluations can shed further light on these findings. These are explored next.

Findings from questionnaires and focus group interviews with principals

Though collected in 2014, two years prior to the 2016 achievement data collection, analysis of questionnaires completed by urban principals (n=221: 131 DEIS Band One), focus group interviews conducted with principals (n=163) and visits to schools with consistent improvements between 2007, 2010, and 2013 (n=20), provide further insights to shape our understanding of factors influencing the variations in school level achievement. The sample for these data was wider than the 120 schools that contributed test data on each of the three testing periods. It provided opportunities for principals of schools not evaluated in the testing to provide their views on the DEIS strategy to date.

A majority of principals agreed that in their school achievement in both reading and mathematics was similar to (61%) or higher (21.5%) than achievement in the sample schools. Principals reported that gains were most evident in junior classes (89% in relation to reading; 82% in relation to mathematics). Additionally, 51.4% indicated that lowest-achieving pupils had benefitted the most in reading while for mathematic it was more evenly spread between low-achievers (39.8%) and middle-achievers (32.4%). High achievers in both domains were least likely to have benefited (2.8% of principals in relation to reading; 11.1% in relation to mathematics). Principals whose schools experienced gains were also asked to rank in order of significance (first, second, third) from a list of factors, the ones they considered most influential in bringing about the improved outcomes. The top three factors highlighted were specialised literacy and numeracy programmes introduced under DEIS, target setting in both domains and reduced class size. Other factors which principals also highlighted as important included children's enhanced motivation and engagement, better attendance rates, improved learning support services and professional development for teachers. Factors which were least likely to have accounted for gains included a general increase in achievement nationally, the presence in classrooms of children for whom English is an Additional Language or increased exposure

to standardised testing. Furthermore, almost 80% of principals agreed that further gains were possible under the DEIS programme. Just over three quarters of principals (77.8%) considered that behaviour had improved while almost a fifth (18.6%) indicated no change and 3.6% felt it had declined.

Just under 50% of principals invited to participate (n=163) attended focus group interviews across seven locations countrywide in 2014. Interviews provided an opportunity for principals to contextualise responses given in the questionnaires and to convey other views not explored in questionnaires. Principals of DEIS Band Two schools drew attention to the lower pupil-teacher ratios in DEIS Band One schools and expressed the view that these more favourable ratios should be extended to all DEIS schools. Some principals also cited serious behaviour issues and high levels of 'severe emotional difficulties' (Kavanagh et al., 2017, p. 53) as factors affecting progress. Principals also suggested that improving outcomes for higher-achievers was a challenge and that pupils in the 10th to 30th percentile range who had potential to improve had been adversely affected by the General Allocation Model (DES, 2005) which had reduced access to learning support for pupils in this bracket. Others drew attention to the negative impact the cessation of the Resource Teachers for Travellers (RTTs) and Visiting Teachers Service for Travellers (VTS) had had on the progress of Traveller children. A large number of principals also highlighted the large class sizes and lower availability of learning support at senior end of primary as factors impeding the maintenance of any gains made at the junior end of the school.

A few principals noted that parental involvement often waned as children progressed into senior classes due in part to parental literacy levels which were often inadequate to support children. Others noted that the increasing complexity of reading and higher-order comprehension skills were challenging to develop in upper primary without greater levels of engagement in reading outside school. A small number of principals were of the opinion that the literacy achievement of children in 6th class was perhaps somewhat better than results indicated, as pupils' lack of engagement with testing at the end of their final term in primary school may have impacted results. A similar number suggested that in some cases newcomer children had in fact bolstered achievement. Unlike the questionnaire data where 80% of principals felt further gains were possible, there was a more mixed reaction in focus groups. Overall, principals expressed the view that it was the combination of the range of supports available to DEIS schools that had contributed to improved outcomes rather than any one single

factor and they argued that continued professional development for teachers was critical to success and should be maintained going forward.

In addition to the main principal focus groups, on site interviews were conducted with principals of 20 schools identified as having larger than average achievement gains. Principals acknowledged the same key contributing factors as those identified by principals in questionnaires (highlighted earlier) but also drew attention to the following:

- increased levels of home support and parental involvement;
- engaging parents in students' learning;
- improvement in Learning Support services for low-achieving children;
- improved attendance;
- increased professional support for teachers;
- raised teaching standards in the school;
- teaching literacy and mathematics across the curriculum;
- grouping students for reading and mathematics;
- use of both formative and summative assessment;
- the National Strategy to Improve Literacy and Numeracy.

Conclusion (Primary)

Clearly, a range of factors are at work in bringing about an improvement of outcomes across DEIS schools at primary level. While the DEIS evaluations provide valuable insights and a picture of trends and patterns in reading achievement over time, they do not measure other key dimensions of literacy such as oral language or writing. The latter is assessed in England, US and Australia as part of their national assessments. In addition, the reading measures utilised are vocabulary based and as such are a proxy for reading comprehension. More nuanced reading assessments and a broadening of assessment to include other dimensions of literacy would give a more complete picture of achievement. Similarly, in relation to mathematics, as a shortened version of the DPMT-R test was given, there were too few items for each content area or process to draw firm conclusions on particular aspects of mathematics. The inclusion of full samples of DEIS schools in future National Assessments of English Reading and Mathematics may serve to address some of these issues.

DEIS evaluations also cannot provide insights into the day-to-day workings of classrooms, the shape of literacy instruction in individual classrooms and how it changes and

is adapted across class levels. Given the variation in outcomes for DEIS schools, the ESRI (Smyth et al., 2015, p.ix) has called for case-study research that *'could provide insights into which school and teacher factors influence such variation'.* Such case studies are currently under construction in the Irish context (Ng & Kennedy, in press; Kennedy & Shiel, in press). Case study research can provide rich and thick descriptions of practice useful for the system. Such information would enable policy makers to identify critical enabling and constraining school and classroom factors impacting on progress and, as such, should be a priority for further research going forward.

Additionally, given the extent of the achievement gaps between DEIS Band One urban schools and non-DEIS urban schools, a more intensive and concentrated approach should be considered. Such an approach would include more sustained customised school-based professional development on literacy and numeracy pedagogies, greater use of formative assessment and feedback to target teaching specific to children's identified needs, whole school approaches to literacy and numeracy to ensure overall progression and growth from year to year, and a more concerted effort to foster engagement in and enjoyment of reading and writing and confidence with numeracy.

Evidence of the Impact of DEIS on Literacy and Numeracy among Students in Post-Primary Schools

A number of sources have provided evidence about the performance, wellbeing and dispositions of students in DEIS post-primary schools, compared with students in non-DEIS post-primary schools, as they relate to literacy and numeracy. These include reviews of performance on international assessments, outcomes of state examinations and retention rates, and analyses of questionnaire responses. Outcomes are discussed with reference to national targets for literacy and numeracy for DEIS schools, where such targets have been set.

The Programme for International Student Assessment (PISA)

PISA, an international assessment of reading literacy, mathematics and science, is overseen by the Organisation for Economic Cooperation and Development. In 2018, the most recent cycle for which PISA results are available, reading literacy was the main assessment domain, with mathematics (and science) included as minor domains. Since 2015, PISA has been administered on computer in most participating countries. PISA uses an age-based sample. First, it draws a representative sample of schools, and then selects students at random from among those aged 15 in participating schools.

PISA is especially relevant in considering the outcomes of the National Literacy and Numeracy Strategy. This is because the Interim Review of the Strategy (DES, 2017a) includes specific targets to be achieved by students in DEIS schools, by 2020.[3] PISA reports on performance by average score and with reference to the percentages of students performing at each of 6 proficiency levels.

A report by Gilleece et al. (2020) examined the outcomes of PISA 2018 in DEIS and non-DEIS school, including whether the adjusted targets set out in the Interim Review had been achieved. Here, data on reading literacy and mathematics from Gilleece et al. (2020) are reviewed.

Performance on PISA Reading Literacy

As noted earlier, PISA reports on performance with reference to mean (average) scores. When reading literacy was assessed for the first time as a major assessment domain in PISA 2000, the OECD average was set at 500, and the standard deviation at 100. Figure 9 shows the mean scores for students in DEIS schools, for students in non-DEIS schools, and for all students in Ireland, as well as the OECD average, across PISA cycles, or the period 2009 to 2018 (i.e., following implementation of the DEIS Strategy from 2007 onwards).

First, it might be noted that performance in Ireland on PISA 2009 (when, as in 2018, reading literacy was a major assessment domain) was atypical. In PISA 2009, the mean reading literacy score for students in Ireland was 495.6, which was not significantly different from the OECD average in that year. This represented a large decline, compared with previous cycles. In PISA 2000, the overall average score for students in Ireland was 526.7. Hence, the drop between 2000 and 2009 was 31.1 score points (or almost one third of an OECD standard deviation). This represented the largest decline among countries that participated in both PISA 2000 and 2009. The next largest declines were in Sweden (-18.9 score points), and in Austria and the Czech Republic (both -13.4).

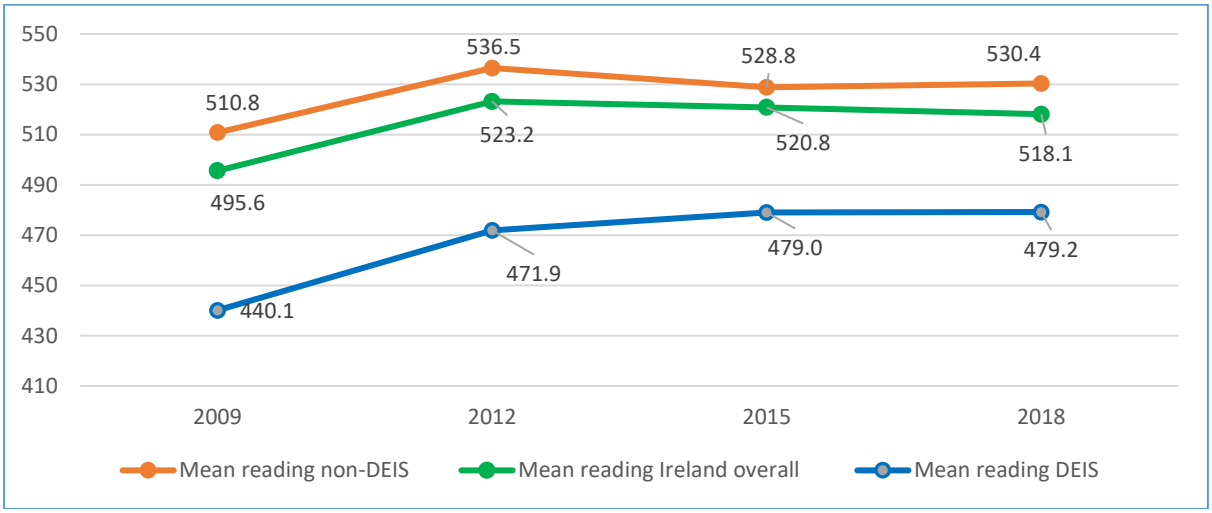
Subsequent to PISA 2009, a number of studies examined the decline in performance in Ireland. LaRoche and Cartwright (2010) ruled out the possibility that an atypical or unrepresentative sample of schools and students might have been chosen in either 2009 or 2018. However, they did note the relatively small number of link items in PISA 2009 reading

[3] Due to an error in the PISA 2015 baseline data for DEIS schools, which overestimated the baseline level of achievement, incorrect baseline information and associated targets were published in the Interim Review. Corrected targets, which were generated by Gilleece et al. (2020, p. 13), are included in the current report.

literacy (28 in all, though individual students took only a portion of these), giving rise to the possibility of statistically unstable links across PISA cycles. They also noted increasing proportions of skipped responses and not reached items for Irish students on the link items in the second, third and fourth blocks in test booklets compared with previous cycles, suggesting a greater level of disengagement with the test among students in Ireland, relative to earlier PISA cycles. Sachse, Mahler and Pohl (2019) also examined skipped and not reached items in the PISA 2009 reading literacy data for Ireland and showed that the assumptions underlying the treatment of such items in scaling PISA 2009 reading literacy data may have contributed to the large reported decline in performance. Hence, while the decline in the performance of students in Ireland in PISA 2009 is not in dispute (this can be observed in lower percent correct scores), the size of the decline, as reported by the OECD, is.

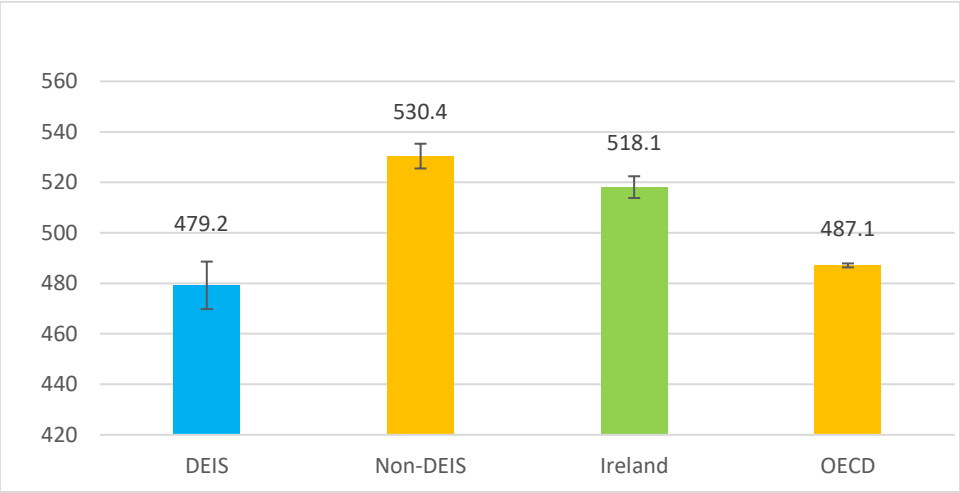
Mean scores for DEIS schools range from 440.1 in 2009 to 479.2 in 2018. On the face of it, this might be interpreted as indicating good progress. However, it must be interpreted in the context of the overall decline in performance in Ireland in 2009. The difference in performance between students in Ireland in DEIS and non-DEIS schools in PISA 2018 was 51.2 score points (just over half an international standard deviation) in favour of students in non-DEIS schools – a difference that is statistically significant. As noted by Gilleece et al. (2020), the mean score of students in DEIS schools in Ireland in 2018 (479.2) is not significantly different from the average score across OECD countries in PISA 2018 (487.1) (Figure 10). This can be confirmed by examining the 95% confidence intervals in each bar in Figure 10. Where these intervals do not overlap, it can be concluded that a difference is significant (e.g., between the mean score for students in DEIS and non-DEIS schools in Ireland). Where they overlap (e.g., between students in DEIS schools in Ireland and the average for OECD countries), it can be concluded that a difference is not significant.

Figure 9: Mean scores of students on PISA reading literacy, overall and by school DEIS status, 2009 to 2018



Source: Gilleece et al. (2020), Table 3.2.

Figure 10: Mean scores on PISA 2018 reading literacy in Ireland (DEIS, non-DEIS, Ireland and OECD average)



As noted above, performance on reading literacy in PISA is also reported with reference to proficiency levels. Here, we look at the proportions performing below Level 2 (low achievers) and at or above Level 5 (high achievers).

Table 13 summarises the skills that students at these levels are expected to demonstrate, on suitably=challenging computer-based texts. These are based on the skills elicited by reading comprehension questions of varying difficulty. For example, the highest performing students in PISA – those performing at Level 6 – are expected to be able to reflect deeply on a text's source in relation to its content, using criteria external to the text. They are also expected to be able to compare and contrast information across texts, identifying and resolving inter-textual discrepancies and conflicts. On the other hand, less-able readers performing at Level 1c are expected to be able to understand and affirm the meaning of short, syntactically-simple sentences on a literal level, and read for a clear and simple purpose within a limited amount of time.

Table 13: Descriptions of the skills high-achieving and low-achieving students are expected to demonstrate on the PISA reading assessment

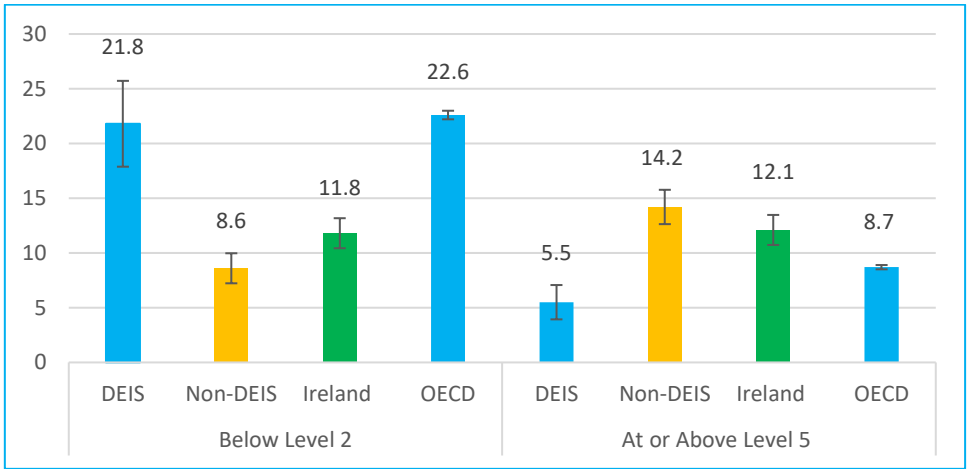
Level	Skills . . . Students at this level are capable of. . .
6 (cut point = 698 and above)	Reflecting deeply on the text's source in relation to its content, using criteria external to the text. They can compare and contrast information across texts, identifying and resolving inter-textual discrepancies and conflicts through inferences about the sources of information, their explicit or vested interests, and other cues as to the validity of the information.
5 (626 to less than 698)	Comprehending lengthy texts and inferring which information in the text is relevant even though the information of interest may be easily overlooked. They can perform causal or other forms of reasoning based on a deep understanding of extended pieces of text. They can also answer indirect questions by inferring the relationship between the question and one or several pieces of information distributed within or across multiple texts and sources.
4, 3, 2	See McKeown et al. (2019) for descriptions
1a (335 to less than 407)	Understanding the literal meaning of sentences or short passages. Readers at this level can also recognise the main theme or the author's purpose in a piece of text about a familiar topic, and make a simple connection between several adjacent pieces of information, or between the given information and their own prior knowledge. They can select a relevant page from a small set based on simple prompts, and locate one or more independent pieces of information within short texts. Level 1a readers can reflect on the overall purpose and on the relative importance of information (e.g., the main idea vs. non-essential detail) in simple texts containing explicit cues.
1b (262 to less than 335)	Readers at Level 1b can evaluate the literal meaning of simple sentences. They can also interpret the literal meaning of texts by making simple connections between adjacent pieces of information in the question and/or the text. They can scan for and locate a single piece of prominently placed, explicitly stated information in a single sentence, a short text or a simple list. Level 1b readers can access a relevant page from a small set based on simple prompts when explicit cues are present.
1c (189 to less than 262)	Readers at Level 1c can understand and affirm the meaning of short, syntactically simple sentences on a literal level, and read for a clear and simple purpose within a limited amount of time.
Below 1c (less than 189)	There is insufficient information on which to base a description of the reading skills of these students.

Source: McKeown et al. (2019), Table 3.7, p. 50; Originally adapted from OECD (2019a), Table 1.B1.1

Figure 11 shows that percentages of low- and high-achievers in Ireland on PISA 2018 reading literacy IN DEIS and non-DEIS schools, in Ireland (across all schools) and on average across OECD countries. Also shown are 95% confidence intervals around the percentages. For example, while the proportion of students below Level 2 in DEIS schools is estimated at 21.8%, we can say with 95% certainly that the true percentage is between 17.8% and 25.8%. Since there is no overlap in the 95% confidence intervals between students below Level 2 in DEIS and non-DEIS schools (first two columns on left side of Figure 11), we can say that the proportion of students performing below Level 2 in DEIS schools (21.8%) is significantly

higher than the proportion in non-DEIS schools (8.6%). It might be noted that there is no significant difference between the proportion of students below Level 2 in DEIS schools (21.8%) and the proportion on average across OECD countries (22.6%). Hence, while there may well be concern about the high proportion of students in DEIS schools performing below Level 2, and hence lacking the reading skills for effective participation in society and in further education according to UNESCO (see OECD, 2019b), that proportion is no different from the average proportion for all students across OECD countries. On the other hand, students performing below Level 2 in Ireland might well be at a disadvantage relative to other students in Ireland, where reading literacy skills are particularly high.

Figure 11: Percentages of high- and low-achieving students in PISA 2018 reading literacy (DEIS, non-DEIS, Ireland and OECD average)



Source: Gilleece et al. (2020), Figure 3.4.

Figure 11 also shows that significantly fewer students in DEIS schools (5.5%) than in non-DEIS schools (14.2%) perform at or above Level 5, the highest proficiency levels in PISA. On average across OECD countries, 8.7% performed at or above Level 5, an estimate significantly above that for DEIS schools.

Although no targets for DEIS schools were established in the original National Literacy and Numeracy Strategy (DES, 2011), targets were established for three groups of students in DEIS schools in the 2017 Interim Review of the Strategy (DES, 2017a). The data in the second and third columns were updated by Gilleece et al. (2020, Appendix 3) after an error was found in the computation of the figures that were drawn on in compiling the targets for the Interim Review.

Table 14 shows that a reduction in the order of 4% was sought in the Interim Review for students in DEIS schools performing below Level 2 (the difference between the second and third columns). There was no change the proportions achieving below Level 2 in DEIS schools in 2015 and 2018 (second and fourth columns). However, Gilleece et al. concluded that the target would probably be met, on the basis that the target (18%) falls into the 95% confidence interval around the 2018 estimate (column 4).

The targets for higher achievers, those performing at or above Level 4, and those performing at or above Level 5 are also set out in Table 14. These are 26% and 8% respectively. There was a small decline in the proportion achieving at or above Level 4 between 2015 and 2018, in the order of 0.2%. However, because the target (26%) is outside the 95% confidence interval for the 2018 estimate, Gilleece et al. concluded that it would be unlikely the be achieved. Similarly, while there was an increase of 0.8% in the proportion performing at or above Level 5 in 2018, compared with 2015, Gilleece et al. concluded that the target of 26% was unlikely to be met, given that the target fell outside the 95% confidence interval around the 2018 estimate.

Gilleece et al.'s use of confidence intervals in evaluating whether or not targets were likely to have been achieved by 2020 is important. Without the use of confidence intervals, it might be concluded that a target had been achieved, when in fact a difference between two percentages may not in fact be significant. Similarly, if raw percentages are used, it might be concluded that a target had been achieved, when in fact it had not. The issue of target setting is addressed again in the conclusion to this paper.

Table 14: Targets for 2020 for percentages of students in DEIS Schools with PISA reading achievement below Level 2, at or above level 4, and at or above level 5

PISA Proficiency Level	Baseline PISA 2015 – DEIS Schools	Target for 2020	PISA 2018 – DEIS Schools (95% CI)	Target Likely to be Met?
Below Level 2	21.8%	18%	21.8% [17.8, 25.8]	Probably
At or above Level 4	21.4%	26%	21.2% [17.6, 24.9]	Unlikely
At or above Level 5	4.7%	8%	5.5% [3.9, 7.0]	Unlikely

Source: Gilleece et al. (2020), Table 3.2.

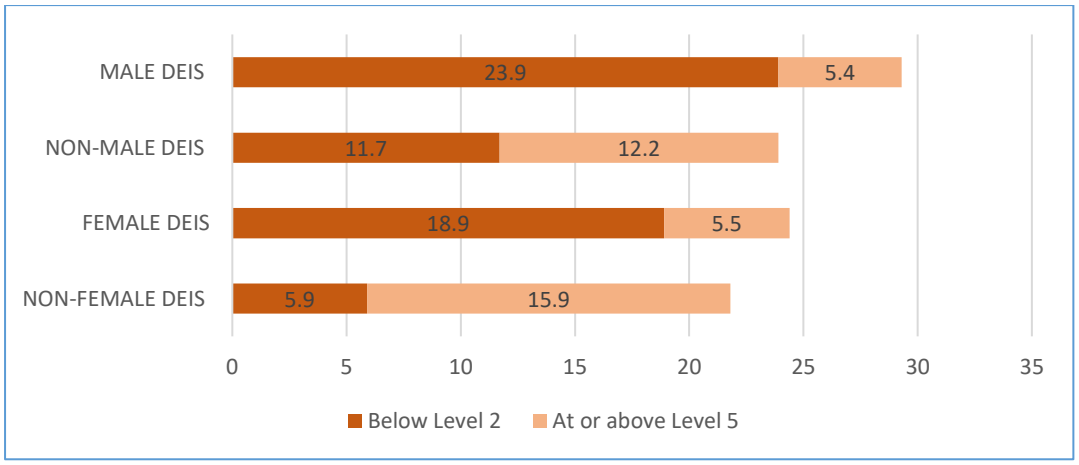
Gender Differences at Reading Proficiency Levels

Although targets were not set for the proportion of male and female students performing at various proficiency levels in DEIS schools, it is worth looking examining the outcomes of PISA 2018 with reference to gender. Figure 12 shows that 23.9% of male students in DEIS

schools performed below Level 2, compared to 18.9% of females. The corresponding estimates for male and female students in non-DEIS schools are 11.7% and 5.9% respectively. Hence, underachievement in literacy is a particularly pressing issue among male students in DEIS schools.

Figure 12 also shows that 5.4% of male students and 5.5% of females in DEIS schools performed at the highest proficiency levels – Level 5 and above – in PISA 2018. Hence, the gender gap observed between lower-achieving male and female students in DEIS schools does not manifest itself among higher-achieving students. However, over twice as many male students in non-DEIS schools (12.2%) as in DEIS schools (5.4%) perform at or above Level 5, while nearly three times as many females in non-DEIS schools (15.9%) as in DEIS schools (5.5%) perform at these levels.

Figure 12: Percentages of male and female students performing below level 2 and at or above level 5 in DEIS and non-DEIS schools in PISA 2018 Reading Literacy



Source: Gilleece et al. (2020), Figure 3.7.

Enjoyment of Reading

As part of a questionnaire administered in PISA 2018, students answered a number of questions about their enjoyment of reading. These included questions such as 'I only read if I have to' and 'I like talking about books with other people'. The OECD placed students' responses on a scale with an OECD average of -0.06, with high scores indicating a greater enjoyment of reading. The mean score of students in Ireland was almost the same as the OECD average (-0.07). According to Gilleece et al. (2020), the mean score of students in non-DEIS schools in Ireland was 0.00, while for students in DEIS schools, it was significantly lower, at -0.31. Furthermore, both male and female students in DEIS schools (-0.50 and -0.05) had mean scores that were lower than their counterparts in non-DEIS schools (-0.27 and 0.25,

respectively). Hence, male students in DEIS schools had the lowest level of reading for enjoyment among the four groups that were compared.

Evidence of low engagement in reading is found in the proportion of students in DEIS schools in PISA 2018 who reported that they did not read at all for enjoyment (58.5%), which is significantly lower than the proportion in non-DEIS schools (44.3%) (McKeown et al., 2019). In DEIS schools, 66.0% of males and 48.4% of females reported that they did not read at all for enjoyment, compared with 52.1% and 37.4% (respectively) in non-DEIS schools.

Performance on PISA Mathematics

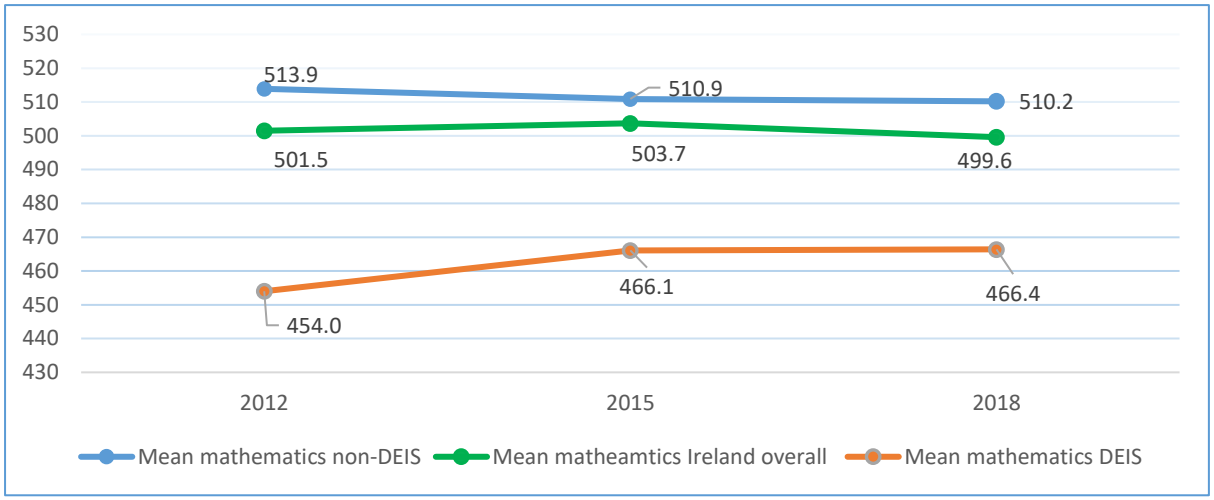
Mathematics (or mathematical literacy, as it sometimes referred to in PISA), was a minor domain in PISA 2018, having enjoyed major domain status in 2003 (before the implementation of DEIS), and 2012. It might be noted that most PISA mathematics items are embedded in real-life problems, which students must read and understand, before applying the relevant mathematics to solve them. In addition to this, students may be asked to communicate their solution, and the rationale behind it. Unlike reading literacy, PISA mathematics in 2018 had not been updated to incorporate the affordances of technology. The items that were carried over from earlier paper-based assessments and applied to a computer-based platform. An update will occur in 2022, when PISA mathematics becomes a major assessment domain, and new items are added.

Like reading literacy, the OECD average score on mathematics in PISA was set at 500, and the standard deviation at 100, when mathematics was a major assessment domain in PISA for the first time (in 2003). It might be noted that performance on mathematics in PISA in Ireland is weaker than on reading literacy. Whereas Ireland has typically performed well above the OECD average on reading literacy (with the exception of 2009), Ireland's mean score has been closer to the OECD average on mathematics.

Figure 13 tracks average performance of students in DEIS and non-DEIS schools, as well overall performance in Ireland from 2012 to 2021. As the Figure shows, performance on PISA mathematics has been stable in the years 2012 to 2018 for all students, and for students in non-DEIS schools, with a small drop between these years for both categories. The performance of students in DEIS schools increased by 12.4 score points between 2012 and 2018. However, as noted by Gilleece et al. (2020), the change is not statistically significant. Moreover, there was no change between 2015 and 2018. Gilleece et al. do note that, while the

achievement gap between students in DEIS and non-DEIS schools decreased between 2012 (60 points) and 2018 (44 points), the reduction was not statistically significant at the .05 level. They note that 2023 will provide another opportunity to look at mathematics in greater detail when it becomes a major domain again.

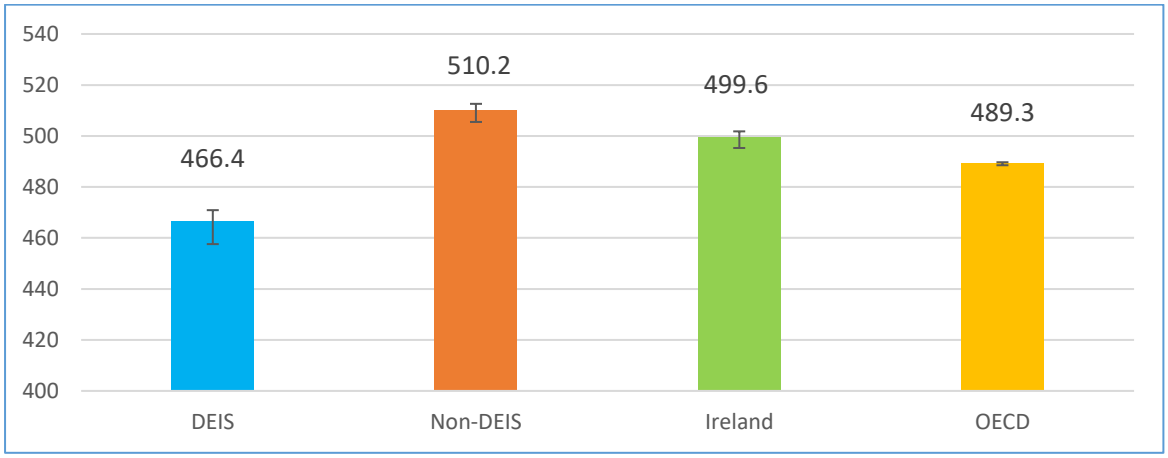
Figure 13: Mean scores of students on PISA mathematics, overall and by school DEIS status, 2012 to 2018



Source: Gilleece et al. (2020), Table 3.2.

Figure 14 confirms that that students in DEIS schools achieved a lower mean score in PISA 2018 mathematics (466.4) than students in non-DEIS schools (501.2). Whereas in the case of reading literacy, the mean score of students in DEIS schools did not differ from the OECD average (Figure 11), here performance among students in DEIS schools is significantly lower than the corresponding OECD average (489.3). This indicates greater underachievement in mathematics among students in DEIS schools, relative to underachievement in English.

Figure 14: Mean scores on PISA 2018 Mathematics in Ireland (DEIS, non-DEIS, Ireland and OECD average)



As in reading literacy, performance in PISA can be described with reference to proficiency levels. PISA defines Level 2 as a baseline that students should achieve to deal with the mathematical demands of life after school and in further education. Hence, students below Level 2 can be described as low achievers. Conversely, students at Levels 5-6 can be described as high achievers.

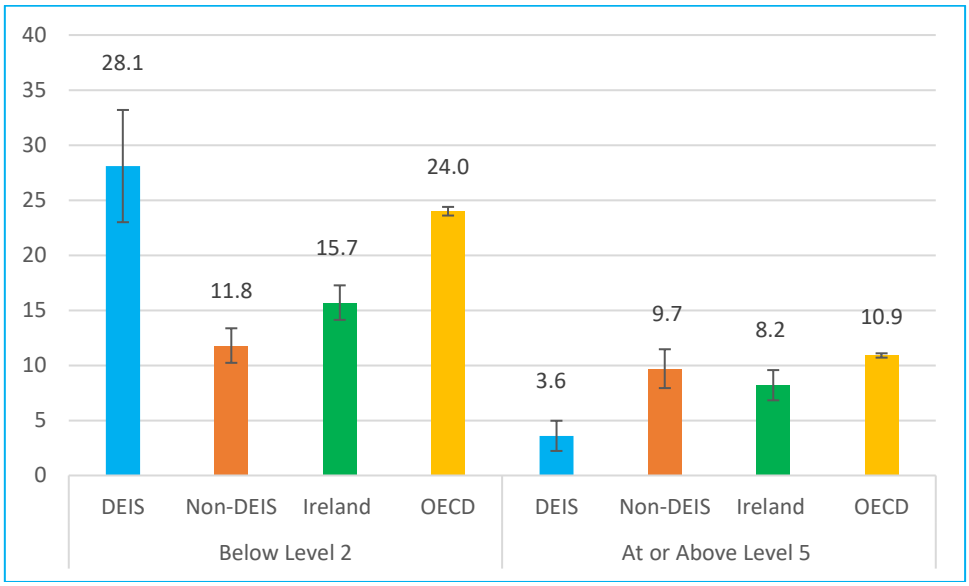
Table 15: Descriptions of the skills high-achieving and low-achieving students are expected to demonstrate on the PISA Mathematics

Level	Skills . . . Students at this level are capable of. . .
6 (cut point = 669 and above)	Conceptualising, generalising and using information based on their investigations and modelling of complex problem situations; using knowledge in relatively non-standard contexts; linking different information sources and representations and moving flexibly among them; applying their insight and understanding, along with mastery of symbolic and formal mathematical operations and relationships, to develop new approaches and strategies for addressing novel situations; and reflecting on their actions and formulating and precisely communicating their actions and reflections regarding their findings, interpretations and arguments.
5 (607 to less than 669)	Developing and working with models of complex situations; selecting, comparing and evaluating appropriate problem-solving strategies for dealing with complex problems related to these models; working strategically using broad, well-developed thinking and reasoning skills, appropriate linked representations, symbolic and formal characterisations and insights pertaining to these situations; and beginning to reflect on their work and formulating
Levels 2-4	See McKeown et al., 2019, Tables 5-6
1 (358 to less than 420)	Answering questions involving familiar contexts where all relevant information is present and questions are clearly defined; identifying information and carrying out routine procedures according to direct instructions in explicit situations; and performing actions that are almost always obvious and follow immediately from the given stimuli.
Below Level 1 (less than 358)	Performing very direct and straightforward mathematical tasks, such as reading a single value from a well-labelled chart or table where the labels on the chart match the words in the stimulus and question, so that the selection criteria are clear and the relationship between the chart and the aspects of the contexts depicted are evident; and performing arithmetic calculations with whole numbers by following clear and well-defined instructions.

Source: McKeown et al. (2019), Table 5.6, p. 103; Originally adapted from OECD (2019a), Table 1.B1.2

It might be noted that, whereas in reading literacy, Level 1 is subdivided into Levels 1a, 1b and 1c, in the case of mathematics this does not occur. Whereas, in reading literacy, there is no description of the skills that students are expected to demonstrated below the lowest level (1c), in the case of mathematics, some skills that students performing below Level 1 are expected to demonstrate are described.

Figure 15: Percentages of High- and Low-Achieving Students in PISA 2018 Mathematics (DEIS, non-DEIS, Ireland and OECD average)



Source: Gilleece et al. (2020), Figure 4.2

As with reading literacy, the Interim Strategy Review provided targets to be reached by 2020 for the proportions of students in DEIS schools performing below Level 2, at or above Level 4, and at or above Level 5. In line with reading literacy, Gilleece et al. modified the targets to take into account that led to incorrect data for 2015 appearing in the Interim Review. According to Gilleece et al., it is unlikely that the revised targets for at or above Level 4 and at or above Level 5 would be achieved by (the end of) 2020, given that the target value in each case was outside the 95% confidence interval for the 2018 estimate (Table 16). In the case of above Level 5, for example, the target is 9%, but this is outside the 95% confidence interval of [2.1, 5.8] around the 2018 value of 3.6%. According to Gilleece et al., it was unlikely that the target for below Level 2 would be achieved because the target value was not contained in the 95% confidence level around the 2018 value of 28.1% (i.e., between 23.1 and 33.0). However, they note that the target of 23% is close to the lower bound of the interval (23.1%). Hence, the rating of 'possible'.

Table 16: Targets for 2020 for Percentages of Students in DEIS Schools with PISA Mathematics Achievement Below Level 2, At or Above Level 3, and At or Above Level 5

PISA Proficiency Level	Baseline PISA 2015 – DEIS Schools	Target for 2020	PISA 2018 – DEIS Schools (95% CI)	Target Likely to be Met?
Below Level 2	29.0%	23%	28.1% [23.1, 33.0]	Possible
At or above Level 4	16.1%	22%	15.8% [12.8, 18.8]	Unlikely
At or above Level 5	4.7%	9%	3.6 % [2.1, 5.0]	Unlikely

Source: Gilleece et al. (2020), Table 4.2

Gilleece et al. (2020) noted some evidence of progress among students in DEIS schools on PISA mathematics between 2012 and 2015. Whereas 37.4% of students in DEIS schools performed at or below Level 1 on PISA 2012, significantly fewer did so in 2015 (29.0%) and in 2018 (28.1%). In contrast, there was no significant difference between 2012 and 2018 in the proportions of non-DEIS students performing at those levels (11.5%, 12.3% and 11.8% respectively).

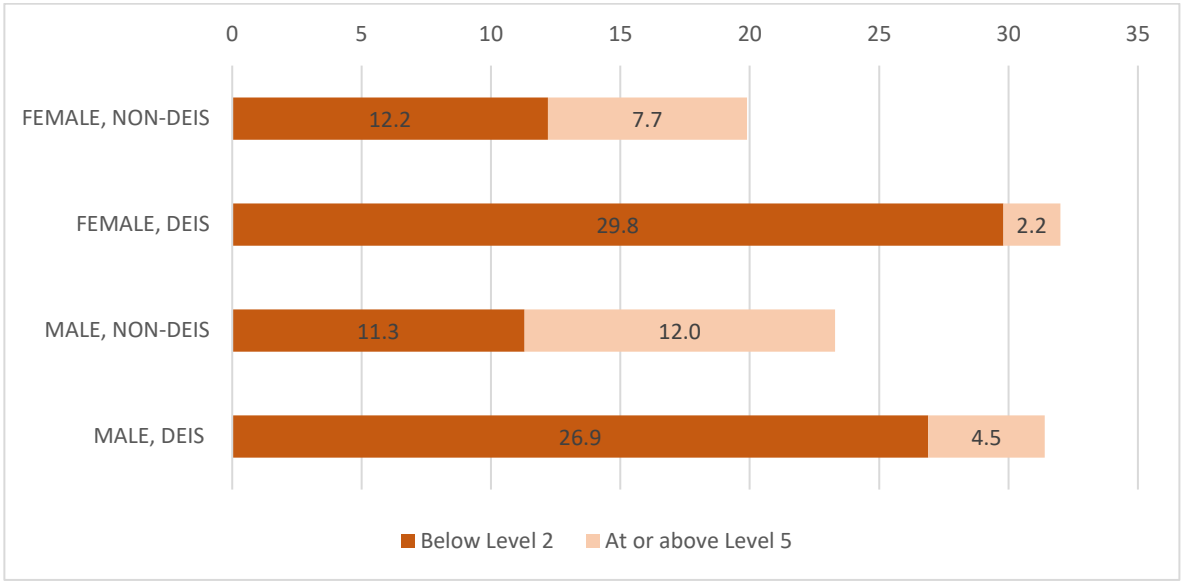
The proportions of students in DEIS schools performing at Level 5 or higher dropped from 5.7% in 2012 to 4.7% in 2015, and to 3.6% in 2018. However, differences between 2012 and 2015, and between 2012 and 2018 were not statistically significant. There were also non-significant declines in non-DEIS schools between 2012 and 2018 (12.1% in 2012, 10.8% in 2015, and 9.7% in 2018).

Gender Differences at Mathematics Proficiency Levels

In contrast to reading literacy, where female students in Ireland had significantly higher average performance than males, there was no overall difference between female and male students in Ireland on PISA 2018 mathematics, with respective mean scores of 497.7 and 502.6. The difference between female and male students in DEIS schools was not statistically significant either, with respective scores of 460.9 and 470.4. On the other hand, females had a significantly lower mean score than males in non-DEIS schools, with respective scores of 505.7 and 515.2.

Among students in DEIS schools, 26.9% of males and 29.8% of females performed below Level 2 in PISA 2018 mathematics (Figure 16). These estimates are 2.5 times higher than for non-DEIS schools (11.3% and 12.1% respectively), indicating higher levels of underachievement in DEIS schools. The percentages of high-achieving males (4.5%) and females (2.2%) in DEIS schools (those at Level 5 or higher) are also significantly lower than in non-DEIS schools (Gilleece et al., 2020).

Figure 16: Percentages of male and female students performing below level 2 and at or above level 5 in DEIS and non-DEIS schools in PISA 2018 Mathematics



Source: Gilleece et al. (2020), Figure 4.3

Comparison of Students in DEIS and non-DEIS Schools on Aspects of Wellbeing

Nelis et al. (2021) drew on PISA questionnaire data to examine differences between students in DEIS and non-DEIS schools on a range of well-being variables. Among the key strengths they identified in DEIS schools were:

- Parents of students in DEIS schools had a significantly higher mean score on an index of school policies for parental involvement, indicating that parents in DEIS schools held more positive perceptions of home-school communication, parental involvement opportunities, and the provision of parent education and supports.
- There was no significant difference between students in DEIS and non-DEIS schools on an index of parents' emotional support (based on parent responses), indicating that, despite differences in access to material resources, parents of students in DEIS and non-DEIS schools provided equivalent levels of emotional support.
- Over half of students in DEIS schools were reported by their principals to have opportunities to engage in volunteering or service activities, and half of DEIS students attended schools where the principal teacher reported collaboration with local libraries.

Nelis et al. also identified a number of challenges in the DEIS context, including:

- Fewer than one in three students in DEIS schools had a parent with a university-level qualification, and therefore such students may lack role models for university

attendance. Fewer than one-half of students in DEIS schools expected to complete a university-level qualification. Nelis et al. concluded that addressing the perception that university is not a viable or realistic option was a key challenge for DEIS schools. Moreover, they noted a need to gain a better understanding of the weight given to financial factors and perceptual ones as drivers of the disparity. They referred to the continued importance of university access programmes, opportunities for school-based career guidance and opportunities for student work placements with exposure of graduate roles, in order to raise student expectations.

- Despite very high levels of technology ownership in students' homes, 13% of students in DEIS schools indicated that they did not have a quiet place to study. A similar percentage (17%) did not have a desk for study at home while nearly one-fifth (19%) reported that they did not have a computer to use for schoolwork at home. Nelis et al. noted that it is likely to be very challenging for these students to complete homework and study at home, though they did refer to the fact that principals in 90% of DEIS schools indicated that the school provides a room where students can do their homework.
- The percentage of students reported by principals to have SEN in DEIS schools (23%) was significantly higher than in non-DEIS schools (14%), likely presenting a substantial challenge to teachers in DEIS schools to cater for the diverse needs of the student population. Greater proportions with a first language other than English or Irish (15% in DEIS schools vs. 11% in non-DEIS schools), and greater proportions from disadvantage homes (59% and 22% respectively) were also reported.
- Fifty-five percent of students in DEIS schools had principals who indicated that a lack of teaching staff impacted on the schools' capacity to provide teaching while principals of 24% of students identified as a hindrance the issue of inadequate or poorly-qualified teaching staff. Principals of students in 30% of schools indicated that teacher absenteeism represented a problem. The corresponding values in non-DEIS schools were 41%, 7% and 16% respectively. For Nelis et al., these data indicated that teacher retention and well-being may represent particular challenges for DEIS schools.
- Three-quarters of students in DEIS schools had principals who identified unauthorised student absence as a hindrance to learning. Two-thirds of principals indicated that students in DEIS schools being inattentive was a hindrance to learning, while principals of one-fifth of students identified student use of alcohol or illegal drugs as a hindrance.

Nelis et al. interpreted these data as underlining the importance of the DES (2018) student wellbeing framework.

- A large minority of students in DEIS schools reported frequent disruption in English classes associated with student inattention. Nelis et al. interpreted this as a need for support for teachers in developing classroom management skills, in the context of professional development.

Performance on State Examinations and Retention Rates

In addition to data on PISA as an outcome measure for students in DEIS and non-DEIS school, the Educational Research Centre has issued a series of reports that have looked at performance on the Junior Certificate examination, retention rates to Junior and Leaving Certificate levels, and the effects of disadvantage on student performance over time (see Weir et al., 2014; McAvinue & Weir, 2015; Weir & Kavanagh, 2018). Here, the outcomes of the most recent of these (Weir & Kavanagh, 2018) are examined, which covers the period between the introduction of DEIS in 2007 and 2016.

Weir and Kavanagh (2018) note that there were 203 post-primary schools in DEIS when the programme was established in 2006-7. By 2016/7, this number had reduced to 185, as a result of closures and amalgamations. In 2017, the Department of Education announced that 14 additional post-primary schools were being admitted to the scheme, bringing the number up to 199. The Department of Education added a further 37 post-primary schools to the DEIS scheme in 2022 (DE, 2022).

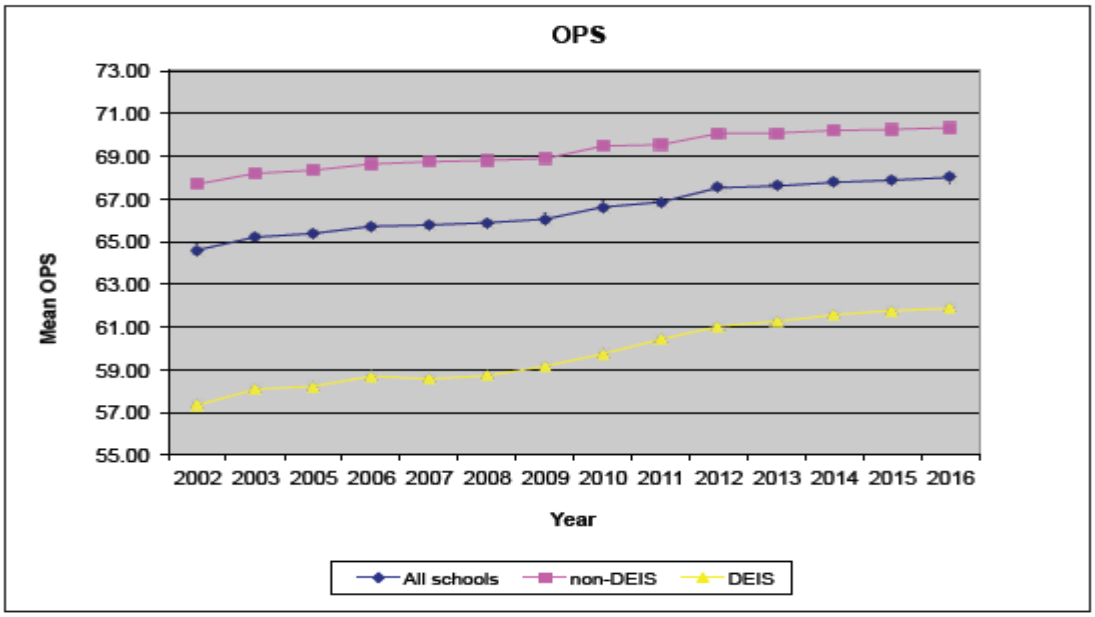
Performance on Examinations

Weir and Kavanagh (2018) mapped the performance of students in DEIS and non-DEIS schools on the Junior Certificate Examination onto an overall scale (the Overall Performance Scale (OPS)) and compared average OPS scores for all schools, DEIS schools and non-DEIS schools, over the years 2002 to 2017. Performance on English Reading and Mathematics was also compared for the three groupings across the same timeframe (see Figure 17).

OPS scores all three groupings increased over time, reflecting a degree of grade inflation across all school types. However, the increase was noticeably greater for DEIS schools. Whereas the average OPS annual increase for schools in general was 0.24 OPS points, it was 0.19 points for non-DEIS schools, and a significantly higher 0.33 points for DEIS

schools. The overall increase in DEIS schools was described by Weir and Kavanagh as being equivalent to an increase of one letter grade. Nevertheless, there continued to be a gap in OPS average scores in favour of non-DEIS over DEIS schools, albeit a narrower one in 2016, compared with 2002. In 2016, the respective mean OPS scores for non-DEIS and DEIS schools were 70.3 and 61.9 points respectively, up from 67.7 and 57.3 in 2002. Weir and Kavanagh noted that, although these and other gains reported below cannot be attributed directly to the implementation of DEIS, it is likely that DEIS played a role.

Figure 17: Average overall performance scale scores on the Junior Certificate Examination from 2002 to 2016 – all schools, DEIS schools and Non-DEIS Schools



Performance on Junior Certificate English was also mapped onto the OPS scale by Weir and Kavanagh. There was a significantly higher average annual improvement (0.4 score points) among students in DEIS schools, compared with those in non-DEIS schools between 2002 and 2016 (0.2 points). This was interpreted as indicating a narrowing of the gap between students in non-DEIS and DEIS schools, which declined from 0.8 to 0.4 points between the two years.

A similar exercise was run on Junior Certificate Mathematics data for the period 2002 to 2017. The rate of growth in DEIS schools (0.055 points per year) was significantly higher than in non-DEIS schools (0.041. Between these years, the gap between students in DEIS and non-DEIS schools decreased from 1.9 to 1.2 score points, indicating improved performance in DEIS schools relative to non-DEIS schools.

Weir and Kavanagh (2018) also noted fewer students in DEIS schools took Foundation level papers in English and Mathematics in the Junior Certificate exam between 2002 and 2016. For example, in 2007, the first year of DEIS, 10% of students in DEIS schools took the Foundation paper in English, while in 2016, 4% did so. It might be noted that Foundation level English is no longer available at Junior Cycle level, with students expected to take the subject at either Ordinary or Higher level, from 2017 onwards. In 2007, in DEIS schools, 39% took Higher level English, and 51% took Ordinary level. The corresponding percentages for 2016 were 51% and 47% respectively. While the proportions taking Higher level in non-DEIS schools also increased between 2007 and 2016 (from 73.7% to 82.5%), the increase was marginally greater in DEIS schools (39% to 51%).

In 2007, 24.3% in DEIS school took mathematics at Foundation level in the Junior Certificate exam, and this dropped to 13% in 2018. In the future, however, Junior Cycle mathematics will be assessed at Higher and Ordinary levels only. The proportions taking Higher level in DEIS schools increased from 19% in 2007 to 33% in 2016, while the proportions taking Ordinary level were about the same in both years (57% and 54% respectively). In the same time period, the proportion taking Higher level in non-DEIS increased from 47% to 61%, while the proportion taking Ordinary level dropped from 46% to 36.4%. Just 6% took Foundation level in 2007, and this proportion dropped to 2% by 2018. Between 2007 and 2016, the proportion taking Higher level increased by about the same amount in DEIS schools (13.4%) than in non-DEIS schools (13.3%).

In 2007, the gender gap in favour of females in non-DEIS schools on the Junior Certificate OPS scale was 2.3 score points, while it was 2.6 points in DEIS schools. In 2016, the gender gap was 2.5 OPS points in both school types, indicating a slight narrowing in DEIS schools, and a small increase in non-DEIS schools. Female students in DEIS schools outperformed male students in DEIS schools by 0.7 score points on the OPS scale for English in 2007, and, notwithstanding higher average performance among females and males in such schools, the gap widened slightly to 0.8 score points by 2016. In mathematics, there was a small gap (0.1 points) in favour of females in DEIS schools in both 2007 and 2016.

Retention Rates

Weir and Kavanagh (2018) also examined the impact of DEIS on retention at Junior and Senior Cycles in post-primary schools. In this instance, a student is deemed to have been

retained if they sat the Junior Certificate (now Junior Cycle) examination, and/or the Leaving Certificate examination.

At Junior Certificate level, DEIS schools showed a significantly higher rate of change in retention rates between 1995 and 2011 (0.43 percentage points per year) compared with non-DEIS schools (0.17). However, this needs to be interpreted in the context of a very high baseline in non-DEIS schools in 1995 (96%), compared with DEIS schools (88%). At Leaving Certificate level, retention grew at an annual rate of 0.75 percentage points per year in non-DEIS schools, compared to 1.56 points per year in DEIS schools. In 1995, the gap in retention rates between the two school types was 23% (85% in non-DEIS schools, compared to just 62% in DEIS schools), while it was about 12% in 2011. A report by the Department of Education and Skills (2015) documented a Leaving Certificate retention rate of 93% for student in non-DEIS schools who had started their post-primary schooling in 2008, compared with 82% in DEIS schools. In the same report, Junior Certificate retention rates of 98% (non-DEIS) and 94% (DEIS) were reported for the same cohort.

Figure 18: Leaving Certificate Retention Rates, 2007-2017: All Schools, Non-DEIS schools, and DEIS schools

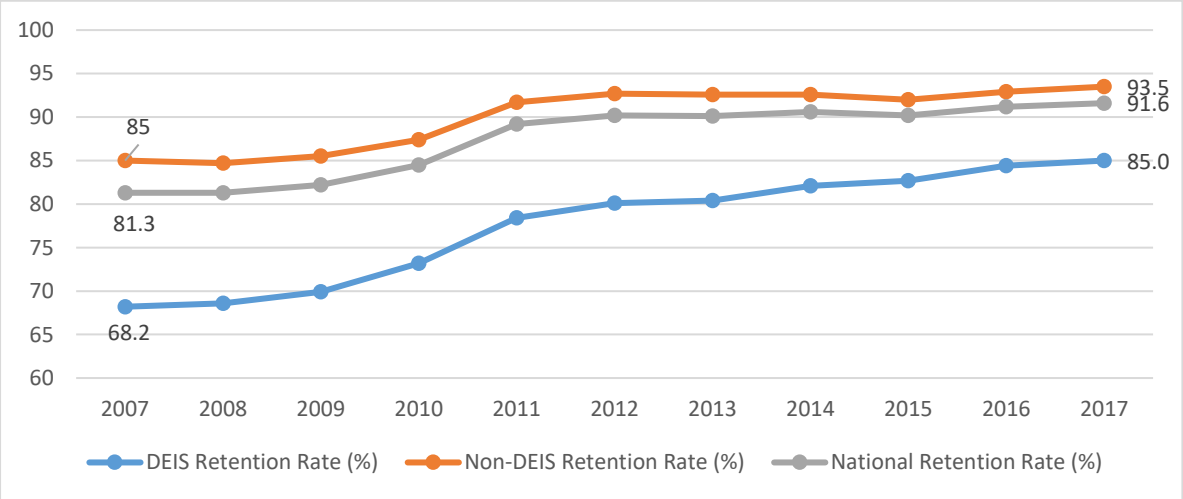


Figure 18 is based on a written response by Minister Joe McHugh to a Dáil question on retention rates at Leaving Certificate Level (Dáil Éireann Debate, 12 November, 2019). It shows continuing improvement of retention rates across all schools, and, by 2017, a reduction in the gap between Non-DEIS and DEIS schools to 8.5%.

Overall, the available data suggest that considerable progress has been made on raising retention rates in schools in both non-DEIS and DEIS schools, with greater progress having been made in the latter. However, it is difficult to attribute improvements for DEIS schools

directly to the DEIS programme and associated initiatives, such as the School Completion Programme.

The DEIS Plan (DES, 2017) has set a target of 90.2% for retention of students in second-level DEIS schools by 2025. It suggests that, in the interim, DEIS schools should set their own achievable targets in relation to retention, when reviewing their school plans.

Conclusion (Post-primary)

The outcomes for students in DEIS schools on reading literacy, as measured by the PISA assessment, are generally positive, notwithstanding a temporary decline in standards across all schools, including DEIS schools, in PISA 2009. The mean score for students in DEIS schools in PISA 2018 (479.2) was well behind the mean score for students in non-DEIS schools (530.4), but was not significantly different from the OECD average in 2018 (487.1). It is encouraging that there were small (though not significant) increases in the mean scores of students in DEIS schools in Ireland in 2015 and 2018, indicating a successful transition to computer-based texts, especially in 2018, when reading literacy was a major assessment domain in PISA and new items designed for computer-based assessment were administered for the first time. While overall performance on PISA reading literacy among students in non-DEIS schools improved between 2009 and 2012, it has remained stable since then.

The targets for reading literacy in DEIS schools, established in the Interim Review of the Literacy and Numeracy Strategy in 2018, to be achieved by 2020, have been partially achieved. When the 95% confidence interval around the proportion achieving below Level 2 in 2018 is taken into account, the target of 18% at or below Level 2 by 2020 have been achieved. However, the targets for two other overlapping groups, those at or above Level 4, and those at or above Level 5, have not yet been achieved.

While it is encouraging that the target for students below Level 2 has been achieved, it is a matter of concern that almost one-quarter of male students (23.9%) as well as almost one-fifth of female students (18.9%) performed below Level 2 in PISA 2018 reading literacy, and that relatively few male students (5.4%) and female students (5.5%) performed at or above Level 5. It may be worth specifying separate targets for male and female high and low achievers if future targets are set.

One factor that may be associated with the (still) relatively large proportion of students performing below Level 2 is the low level of engagement by students in reading for enjoyment.

In 2018, 66.0% of male students and 48.4% of females in DEIS schools reported that they did not read for enjoyment at all.

The situation with regard to mathematics, as assessed by PISA, is less promising. The mean score of students in DEIS schools in PISA 2018 was 466.4, which was significantly lower than the corresponding OECD average (489.3), though the gap between students in DEIS and non-DEIS schools for mathematics in 2018 (34.8) is lower than for reading literacy (51.2 score points). This partly reflects lower performance in Ireland more generally on mathematics compared with reading literacy.

The situation with regard to the targets for mathematics in the 2018 Interim Review is similar to that of reading, with the target for Below Level 2 (23%) likely to have been achieved, and the targets for Level 4 and above, and for Level 5 and above, not yet achieved. Furthermore, there is a negative trend in the proportion achieving Level 5 and above, from 5.7% in 2012 to 4.7% in 2015 and 3.6% in 2018, though differences between 2012 and 2015, and between 2015 and 2018 are not significant. Among male students in 2018, 26.9% performed below Level 2, while 29.8% of females did so in the same year.

While some improvement in mathematics performance may be achieved by focusing more strongly on lower achieving students, it is also clear that recent initiatives designed to improve performance in all schools have not had a very strong effect. For example, mean scores following the implementation of Project Maths in all schools in 2010 have remained more-or-less stable through 2018. What seems to be needed is a stronger focus on developing mathematical proficiency across all schools, though this may now be even more challenging if performance levels have dropped further, arising from school closures during COVID-19.

Other indicators of progress in literacy and numeracy among students in DEIS schools are positive, though it is not always possible to attribute these directly to implementation of DEIS and its component programmes. There has been a greater increase in overall performance of students in DEIS schools on the Junior Certificate (now the Junior Cycle) examination over the years 2002-2017, compared with students in non-DEIS schools. Performance on English and mathematics has also improved at a faster rate, with more students in DEIS schools taking Higher-level English and mathematics, and fewer taking the now defunct Foundation level in these subjects. There has also been greater retention of students in DEIS schools, with, for

example, 94% of the relevant First year cohort in DEIS schools taking the Junior Certificate examination in 2017, and 82% taking the Leaving Certificate examination in the same year.

Of necessity, this short commentary has only looked at a selection of variables associated with the development of literacy and numeracy among students in DEIS post-primary schools. Readers are referred to the paper by Kennedy and Shiel (2022) on international research on reducing achievement gaps between disadvantaged and non-disadvantaged students primary and post-primary levels, and to reports by Nelis et al. (2021) and Smyth et al. (2015).

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