

REVIEW OF NATIONAL AND INTERNATIONAL REPORTS ON LITERACY AND NUMERACY



Inspectorate

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1. Introduction

Since 2011, Ireland has participated in a number of international and national assessments in literacy and numeracy. These assessments provide useful information on the achievement of students and adults in literacy and numeracy that can inform the interim review currently taking place of *Literacy and Numeracy for Learning and Life - A National Strategy to Improve Literacy and Numeracy among Children and Young People 2011-2020*.

At primary level, these assessments include:

- The National Assessments of English Reading and Mathematics (NAERM) in 2014
- Progress in International Reading Literacy Study (PIRLS) in 2011 and
- Trends in Mathematics and Science Study (TIMSS) in 2011.

The key assessment at post-primary level was the Programme for International Student Assessment (PISA) in 2012, which generated a number of reports of interest to the interim review of the Literacy and Numeracy Strategy. In the adult context, Ireland participated in the Programme for the International Assessment of Adult Competencies (PIAAC), which was carried out in 2012.

In addition, a number of evaluations on the implementation of Delivering Equality of Opportunity in Schools (DEIS), the Department's Action Plan for Educational Inclusion, were carried out by the Educational Research Centre (ERC). In 2012, the Chief Inspector of the Department published a report on the findings of inspections on teaching and learning in many curricular areas including Mathematics, English reading and Irish.

This report provides an overview of the main findings of the various assessments and reports, and identifies key areas in which progress has been noted, areas for development, and implications for aspects of provision within the educational system. A detailed tabular summary of the key findings from each of the assessments and reports is provided in the Appendices.

2. Main findings of reports regarding literacy

The evidence from national and international assessments of literacy suggests that at primary level and at junior cycle, the standards achieved by Irish pupils/students in literacy have at least been maintained, if not improved.

Reading outcomes at primary level

The National Assessments of English Reading and Mathematics (NAERM), carried out in 2014, showed the first significant improvements in reading at primary level recorded in this assessment in over 30 years. The number of pupils at the lower end of attainment in reading has declined and there has been an increase in the proportion of higher-achieving students in reading.

However, a gender gap in achievement which favours girls continues to persist. Girls in second class at primary level significantly outperform boys; girls in sixth class also do so, but to a lesser extent. It is clear that there is need to improve the performance of boys, and in doing so, to cater for their reading tastes in particular. While this is recommended in the National Literacy and Numeracy Strategy (NLNS), it may need to be emphasised in schools to a greater degree.

Reading outcomes at post-primary level

Overall, the performance of Irish fifteen year-old students in reading, as seen in consecutive cycles of PISA, including that of 2012, compares favourably with the international average. Relative to their peers internationally, low-achieving Irish students are maintaining and improving their performance levels in reading. On the other hand, while higher-achieving students in Ireland perform at above-average levels in reading, there is still room for improvement. It is evident that high-achieving students need to be motivated to stretch themselves further.

Results indicate that, relative to their OECD counterparts, Irish students are doing well in print and digital reading. Ireland's digital reading performance in 2012 was above the OECD average. In particular, Irish students were among those in the high-ranking countries in demonstrating persistence in the completion of complex digital reading tasks.

Reading outcomes among Irish adults

In contrast with the performance of students within the school system, the achievements of Irish adults in literacy as seen in the PIAAC assessment, are relatively low, ranking in the lower half of countries which took part in the assessment. Consistent with international trends, the highest scoring Irish adults were in the 25-34 age bracket and the lowest were in the 55-65 age bracket.

However, the achievement of Irish adults in PIAAC suggests that adult literacy levels have improved since the International Adult Literacy Survey (IALS), in 1994. In 2012, proportionately fewer adults performed at the lower levels of proficiency.

The inconsistency between the performance of Irish students in PISA and Irish adults in PIAAC is also noteworthy. Given the differences between the surveys, it is not feasible to draw any firm conclusions or to offer any clear explanation for this inconsistency. However, the fact that participation levels for PIAAC were higher in Ireland than in other countries, thus covering a broader profile of adults, may have been a factor that contributed to the low performance of Irish adults in this assessment relative to that of adults in other countries.

Teaching of literacy

The positive performance of learners within the school system is reflected in the high quality of teaching and learning generally observed during inspections carried out by the Department's Inspectorate, as reported in the Chief Inspector's Report 2010-2012. In the period 2010-2012, at both primary and post-primary levels, school inspectors noted high levels of satisfactory or better pupil learning outcomes in English. Inspectors also noted that in the majority of English lessons observed, appropriate teaching approaches are used. However, the need for improvements in assessment practices in English, particularly as they relate to the use of formative assessment approaches, was highlighted.

Supports for literacy development

A number of curriculum developments are expected to impact positively on pupils'/students' future achievements. The new language curriculum for infants to second classes is expected to lead to improvements in primary pupils' overall language competencies. Similarly, the new English specification at junior cycle will help to support progression in the development of students' literacy skills, including oral language skills, from the primary level. At junior cycle, an increase in the use of digital texts should further enhance students' digital literacy skills. The inclusion of Being Literate as a key skill to be developed across learning in all subjects at junior cycle will also promote the cross-curricular development of literacy skills.

Summary on literacy

Overall, the achievement of pupils in reading within the educational system is very good and substantial progress has been made in reducing the proportion of lower-performing students. Nonetheless, there is a need for an enhanced focus within the educational system on increasing the proportion of higher-performing students in literacy and on addressing the persistent gap between the achievement of students in DEIS and non-DEIS schools.

While improvements have been noted in adult literacy levels and there are some questions about the comparability of the Irish sample in PIAAC with that of other participating countries, the low levels of literacy among the adult population, particularly among those in the 25-34 age bracket, is of concern. It is clear that there is need to generate a greater awareness among adults of the importance of ongoing development of literacy skills and encouraging access to literacy development opportunities through community education schemes or through further education literacy supports.

3. Main findings of reports regarding numeracy

The performance of Irish students in numeracy in international and national assessments is weaker than for literacy, particularly among higher-performing students.

Numeracy outcomes at primary level

In 2011, primary-level Irish pupils (fourth class) performed significantly above the international average in TIMSS although the performance of Irish pupils was well below the performance of pupils in the top performing countries. The performance of lower-achieving pupils in Ireland has also improved as indicated by the results achieved by pupils in TIMSS 2011 and in the NAERM 2014. At primary level, Irish pupils display relative strengths in some aspects of Mathematics including the content area of number and the cognitive domain of knowing which encompasses facts, concepts and procedures.

However, reports show that there is scope for development in the achievement of Irish primary pupils in Mathematics. In particular, there is need to enhance the performance in numeracy of higher-performing pupils. Irish pupils also appear to experience difficulties with topics relating to the content areas of *Shape and Space*, and *Data*, and in the cognitive domain of reasoning, which encompasses unfamiliar situations, complex contexts and multi-step problems.

Numeracy outcomes at post-primary level

With regard to print Mathematics at post-primary level, Irish students' performance in PISA 2012 was above the OECD average, which on the face of it, is an improvement compared with previous cycles of PISA. However, this does not represent an improvement in absolute terms, as the average performance across OECD countries had fallen since previous cycles. Higher-performing students in Ireland also continue to underperform. Furthermore, the performance of Irish students in problem-solving relative to overall performance in Mathematics was lower than expected.

While Irish students' performance in computer-based Mathematics has improved, it falls within the OECD average. In computer-based interactive problems, the performance of Irish pupils was stronger than expected.

Numeracy outcomes for specific cohorts of students

The national and international assessments indicate that there are particular cohorts of students whose numeracy development requires attention. The report *Irish Students' Performance in PISA 2012 Computer-Based Assessment of Problem-Solving* highlights that students with an immigrant background and students whose parents are in semi-skilled or elementary occupations require additional support in Mathematics. There is also need to promote more positive attitudes towards problem-solving tasks among lower-achieving students as well as enhancing their ability to persevere at problem-solving. In some aspects of Mathematics, such as *Measures* and *Applying and Problem-Solving*, the more favourable achievement of boys indicates that girls may benefit from more support.

Numeracy outcomes among Irish adults

The numeracy achievement of Irish adults, as evidenced in PIAAC 2012, is significantly below the international average. The performance of Irish adults was ranked among those in the six lowest performing countries that participated in the assessment. As in the case of primary and post-primary students, gender differences in numeracy favour adult males over adult females.

Teaching of Mathematics

As reported in the Chief Inspector's Report 2010-2012, inspectors at primary level noted satisfactory or better learning outcomes for 85% of mathematics lessons inspected with satisfactory or better teaching approaches in 83% of lessons. However, at post-primary level, significantly lower rates of satisfactory lesson and student learning in Mathematics were noted. At both levels, the potential for improvement in planning and assessment practices was highlighted.

International assessments in particular highlight a relative underuse of information and communications technology (ICT) to support teaching and learning of numeracy. For example, *Students, Computers and Learning - Making the Connection, OECD, (September 2015)*, shows that relative to the OECD averages, Irish students spend less time online in school, and that computers are used less frequently by Irish students in mathematics lessons or for homework. The OECD did not find a positive correlation between high use of ICT and high performance in Mathematics. However, the report also highlights that it is the manner in which computers are used in support of learning which leads to more favorable learning outcomes for students in numeracy. In that context, more focused, judicious use of computers may lead to overall improvements in pupils' achievements in Mathematics.

The report, *Irish Students' Performance in PISA 2012 Computer-Based Assessment of Problem-Solving*, indicates that students in Transition Year (TY) achieved higher mean scores and above the expected level for problem-solving, than students in other years. The report on Project Maths and PISA 2012 indicates that students in schools where Project Maths was initially implemented, achieved higher actual scores in each area than students in non-initial schools, although the difference in the scores was not significantly different statistically. Such preliminary results may be seen to indicate that some approaches to teaching and learning in Mathematics, espoused in TY and in Project Maths, are having a positive impact on student achievement. These approaches include discovery-based learning, class and group discussions, skills development, problem-solving in real-life contexts, and formative assessment.

Summary of numeracy

Overall, the achievement of pupils within the educational system in Mathematics has improved and there are indicators that certain teaching approaches are successful in raising pupils' achievements. However, the performance of Irish students still falls considerably short of the performance of students in the highest-performing countries internationally. In particular, the assessments indicate that there is need to focus on enhancing students' ability to reason, to apply their learning and engage in problem-solving processes, particularly as they relate to the content area of *Measures*. The content area, *Shape and Space*, has persisted to present challenges for Irish students. The low achievement in numeracy among Irish adults also gives rise for concern.

Supports for numeracy developments

A number of initiatives including curriculum reform measures, such as Project Maths, are in train to address the shortcomings in student learning and achievement in numeracy. Transition Year also affords flexibility to schools and teachers to use innovative teaching approaches and deliver enriched learning experiences to students.

The findings of research suggest that the teaching approaches associated with TY and Project Maths may merit extension. These approaches, which include discovery-based learning, class and group discussions, skills development, problem-solving in real-life contexts and formative assessment, are noted to be effective in addressing the needs of more able students and improving students' attitudes towards Mathematics. In the long term, these may lead to improvements in *Shape and Space*, areas in which Irish pupils have performed poorly in the past. It is expected that the new specification for Mathematics to be introduced in 2018, as part of junior cycle reform, will extend the promotion of these teaching approaches. Other curriculum innovations, such as the development of an optional short course in coding, and exploration of how learning related to Computer Science can be accommodated at senior cycle, will also help to extend and support the development of key skills that are closely related to numeracy learning.

At both primary and post-primary level, steps are being taken to support greater engagement with computers during teaching and learning, including that associated with numeracy. Such steps, include the implementation of the *Digital Strategy for Schools 2015-2020*, and the provision of enhanced broadband capabilities.

While the Literacy and Numeracy Strategy (2011) sets out the need to emphasise Mathematics across the curriculum at both primary and post-primary levels, this requirement may need to be reiterated and emphasised in schools to a greater degree.

4. DEIS schools

At both primary and post-primary levels, it is evident that the DEIS interventions are having a modest impact overall on the achievement of students attending schools that are participating in the initiative.

The most recent ERC evaluation of DEIS indicates that, relative to the baseline data collected in 2007, significant increases in pupil outcomes were noted in the follow-up testing in 2010 and again in 2013. In urban primary schools, the number of pupils scoring in the lowest range in both English reading and Mathematics has been reduced, while the percentage of high achievers in reading and Mathematics has been maintained, and in some cases, increased. It is positive to note that gains are most evident among the lowest-scoring pupils, in schools with high levels of disadvantage and in junior grades.

In rural DEIS schools, consistent progress is being made in English reading and Mathematics and currently, pupils' scores are closer to the national norm than is the case in urban DEIS schools. This is most evident in Mathematics, where significantly higher mean scores were achieved in the national assessments in 2014.

Notwithstanding these improvements, the gap between the performance of students in DEIS schools and those in non-DEIS schools, is not being reduced to any significant degree. In the national assessment of English reading in 2014, the number of pupils in the very low range of achievement in reading in DEIS urban Band 1 schools, was a particular concern. While scores in English reading are closer to the national norm in rural DEIS schools, these scores are still significantly below the national norm.

A number of reports point towards the need for teachers, parents and children in DEIS Band 1 schools to continue to receive even more intensive support for the remainder of the National Literacy and Numeracy Strategy.

5. Conclusion and future actions

The review of national and international reports published since the launch of the National Literacy and Numeracy suggest that a number of areas of provision in these areas should be prioritised in the next phase of implementation, namely:

- a focus on improving pupils'/students' competence in numeracy, particularly their ability to reason, to apply their learning and engage in problem-solving processes
- the need to increase the proportion of higher-performing students in both literacy and numeracy and to increase expectations relating to the performance of this cohort of pupils

- the need to strengthen the achievement of boys in reading and of girls in Mathematics
- the need to improve or extend some aspects of provision in schools including teachers' planning, assessment strategies, the use of computers, and in the case of Mathematics, certain teaching approaches
- the need for continued investment in and additional measures to strengthen literacy and numeracy provision in DEIS schools
- a focus on ensuring that there is awareness among adults of the importance of literacy and numeracy in their working and their personal lives, and that a range of opportunities are provided to enable them develop their proficiency in literacy and numeracy.

Appendix 1: National and International Assessments: Primary Level

1.1: The 2014 National Assessment of English Reading and Mathematics

<ul style="list-style-type: none">• 2014 was the 8th in the series of National Assessments in English Reading and Mathematics (NAERM) administered approximately every five years.• As in 2009, secure tests were administered in second and sixth class across a range of skills and competencies. Accordingly, comparative analyses of results in 2009 and 2014 are possible for the first time since the publication of the National Literacy and Numeracy Strategy in 2011.• Continuing professional development (CPD) and target setting in schools may have contributed to the success of the improvements noted, although the pupils in sixth class would only have benefited from these factors for a lesser proportion of their schooling than pupils in second class.
<p>Positive findings:</p> <ul style="list-style-type: none">• These assessments showed the first significant improvements in reading and Mathematics recorded by the NAERM in over 30 years.• All of the targets in the National Strategy to Improve Literacy and Numeracy among Children and Young People 2011-2020 for primary level have been reached in advance of the scheduled target date of 2020.• The results show a reduction in the number of students at the lower end of attainment in both English reading and Mathematics and an increase in the proportion of higher-achieving students in reading and to a lesser extent in Mathematics.• In DEIS schools, results in 2014 were better than results in 2009 in both English reading and Mathematics, particularly in DEIS Band 2 schools where some significant increases were noted.• In rural DEIS schools, outcomes for pupils remained largely unchanged with the exception of Mathematics in sixth class, where significantly higher mean scores were achieved in the National Assessments in 2014.
<p>Areas for development:</p> <ul style="list-style-type: none">• Notwithstanding the improvements in reading in DEIS schools, there is still a gap between pupils in DEIS urban schools and pupils in other school types.• The number of very low achievers in reading in DEIS urban Band 1 schools is a particular concern.• Gender differences in reading favoured girls at second class level significantly and to a lesser extent at sixth class level.• Mathematics in DEIS schools is well below the national standard, indicating that Mathematics in DEIS schools requires development.• Higher level mathematical processes need to be improved at second and sixth classes.• Boys' overall score was higher than girls' overall score in Mathematics although not statistically significant. However, in some aspects of Mathematics i.e. in <i>Measures</i> and in <i>Applying and Problem Solving</i>, boys' scores were significantly higher than girls' scores.

Implications / Actions:

- Overall targets need to be reconsidered as part of an interim review of the Literacy and Numeracy Strategy.
- There is a need to consider the setting of separate national targets for sub-groups of pupils in both literacy and numeracy, for example pupils in DEIS Band 1 schools.
- In DEIS Band 1 schools, teachers, parents and pupils will require even more intensive support for the remainder of the Strategy.

1.2: PIRLS and TIMSS 2011 Reading, Mathematics and Science Outcomes for Ireland

<ul style="list-style-type: none">• In 2011, PIRLS (Progress in International Reading Literacy Study) and TIMSS (Trends in International Mathematics and Science Study) comparative studies of achievement were carried out. Pupils' skills in English reading, Mathematics and Science were assessed.• 151 randomly selected schools in Ireland participated in both studies at 4th class level.• The performance of Irish pupils can be measured against the performance of students in other countries.
<p>Positive findings:</p> <p><u>Overall:</u></p> <ul style="list-style-type: none">• Irish pupils performed significantly above the international average in the three areas of English reading, Mathematics and Science.• Lower-achieving pupils' achievement was better than in 1995, in both reading and Mathematics. <p><u>Reading:</u></p> <ul style="list-style-type: none">• Irish pupils were among the top performers in the reading test, ranking 10th out of 45 countries.• Irish performance was largely consistent with the performance in three successive PISA tests.• More than half of Irish pupils reached the High International Benchmark and only 3% of Irish pupils failed to reach the Low Benchmark, indicating strong performance by both high-achieving and low-achieving pupils. <p><u>Mathematics:</u></p> <ul style="list-style-type: none">• Irish pupils displayed relative strengths in <i>Number and Knowing</i>.• There was no significant gender gap among Irish pupils.• More than twice the percentage of pupils in Ireland reached the Advanced Benchmark than is the norm internationally.
<p>Areas for development</p> <ul style="list-style-type: none">• In both reading and Mathematics, Irish pupils were outperformed by pupils in our two closest neighbours, Northern Ireland and England.• In reading, a gender gap is clearly in evidence where girls significantly outperformed boys.• Irish pupils displayed relative weaknesses in <i>Geometric Shapes and Measures</i> and <i>Data Display</i> and in the cognitive domain of <i>Reasoning</i>.
<p>Implications / Actions</p> <ul style="list-style-type: none">• The performance of Irish pupils relative to the performance of pupils in Northern Ireland and England in reading and Mathematics merits further monitoring and examination.• Gender gaps in performance in reading need to be addressed.• The relative weaknesses displayed by pupils in <i>Geometric Shapes and Measures</i> and <i>Data Display</i> and in the cognitive domain of <i>Reasoning</i> need to be addressed.

Appendix 2: International Assessments: Post-Primary level

2.1: Irish Students' Performance in the Programme for International Student Assessment (PISA), 2012

<p>Positive findings:</p> <ul style="list-style-type: none">• In print and digital reading, results are very good. Irish students' scores at either end of the performance scales exceeded the corresponding OECD averages.• Lower achieving students are maintaining and improving their performance levels.• Between-school differences were small. This points towards a relatively equitable school system.• Scores in Mathematics were significantly above the OECD average, but there was no improvement on Ireland's 2003 results.• Classroom climate in Ireland in Mathematics is more positive than on average across the OECD.• Ireland is maintaining standards in Mathematics and in reading, which is reassuring in a context where there has been an increase in immigrant students and in students with special educational needs (SEN) participating in PISA and a decrease in students leaving school early.
<p>Areas for development:</p> <ul style="list-style-type: none">• Ireland is doing well, but we are not among the top performing countries.• While DEIS is having a positive impact, the performance of pupils in these schools still needs to be addressed.• More computer-based modes of assessment will be used in PISA 2015. This will be challenging for Irish pupils and for girls in particular.• Higher-achieving pupils in Ireland are underperforming, especially in Mathematics.• Results in <i>Shape and Space</i> are a cause for concern at primary and post-primary levels as is the drop in performance in <i>Uncertainty and Data</i>.
<p>Actions and implications:</p> <ul style="list-style-type: none">• Schools need to set higher expectations for all learners. In TY, schools could more effectively address the needs of more able students as well as students' skills and their attitudes towards Mathematics.• Gender differences in Mathematics favouring boys, and in reading favouring girls, need to be examined. Boys' reading tastes need to be catered for to a greater degree (the NLNS and the revised JC have allowed for this).• At junior cycle, the use of digital texts should further enhance digital literacy skills and Ireland's performance in digital reading.• Gaps in performance between school types need to be addressed.• The challenges posed by computer-based assessment need to be addressed.• Project Maths and the junior cycle will lead to more emphasis on skills development, problem-solving in real-life contexts, and formative assessment. It is hoped that this will improve results in <i>Uncertainty and Data</i> and <i>Shape and Space</i>.• The introduction of the new language curriculum at primary level should lead to raised standards.• Emphasising Mathematics across the curriculum, as outlined in the National Literacy and Numeracy Strategy, should be beneficial.• Pupils need to engage in more mathematics-related extra-curricular activities.

2.2: Irish Students' Performance in PISA 2012 Computer-Based Assessment of Problem-Solving

<ul style="list-style-type: none">• PISA is an international survey of the achievement of 15-year old students in mathematics, reading and scientific literacy. In 2012, Mathematics was the main domain.• The 2012 survey included print-based assessments of English reading, Mathematics and Science, and in 2012, optional computer-based assessments of English reading, Mathematics and problem-solving were included.
<p>Positive findings:</p> <ul style="list-style-type: none">• In print Mathematics, English reading and Science, Irish pupils' scores were significantly above the OECD averages.• In digital reading, Irish pupils' performance was above the OECD average.• Irish students' performance on the computer-based interactive problems was stronger than expected.• Irish students with an immigrant background performed well in comparison with the corresponding OECD average. Their mean score was significantly higher. In Ireland, there is less of a gap between immigrant and native students.• Students in TY achieved higher mean scores and above the expected level for problem-solving, than students in other year groups.
<p>Areas for development:</p> <ul style="list-style-type: none">• Relative to their overall performance in Mathematics, more Irish pupils performed below the expected level in problem-solving in comparison with pupils from other OECD countries.• Students, whose parents work in semi-skilled or elementary occupations, are less likely to be successful on some problem-solving tasks than pupils who are considered advantaged.• Students with an immigrant background perform significantly less well in problem-solving than native speakers.• Lower-achieving students are less open to problem-solving and they persevere to a lesser degree with problem-solving.• Gender differences in problem-solving need to be examined. In problem-solving, the difference between boys and girls is very small. In print Mathematics and computer-based Mathematics, the difference is more significant in favour of boys.• Lower performance on the computer-based assessment in Ireland is linked to lack of familiarity with using computers.• In the computer-based assessment of problem-solving, Irish students performed at the OECD average. Lower and higher-performing students' results in problem-solving are similar to the OECD average for such students.
<p>Actions and implications</p> <ul style="list-style-type: none">• There is scope for improvement by both lower and higher-achieving students relative to their counterparts in other countries.• In light of plans to move to a computer-based assessment across all domains in PISA 2015, pupils' familiarity with using computers needs to be improved. Work is being carried out by the ERC and the Inspectorate to identify and address logistical and ICT difficulties.

- Certain pupils require additional support. For example, immigrant pupils, and pupils whose parents are in semi-skilled or elementary occupations need support in problem-solving; and lower achieving pupils need support to develop more positive attitudes towards problem-solving tasks and to encourage them to persevere more at problem-solving.
- Given the relative success of TY students, certain methodologies, which they experience to a greater extent, may be worth extending to all year groups, for example, student-directed learning, a focus on practical activities, and the use of ICT.

2.3: Report on Project Maths and PISA 2012

(Performance in Initial Project Maths Schools and Non-initial Schools on PISA 2012 Mathematics and Problem-solving and on Junior Certificate Mathematics)

<ul style="list-style-type: none">• Project Maths (PM) is a curriculum reform intervention.• This report, which was prepared by the Educational Research Centre (ERC) compares the performance of students in 23 Initial Project Maths schools with those in non-initial schools using data from PISA. Both achievement and attitude are analysed.• PISA questionnaires, national questionnaires, PISA achievement scores and Junior Certificate Mathematics outcomes in 2011 and 2012 were used in the comparative analysis.
<p>Positive findings:</p> <ul style="list-style-type: none">• In the 23 schools where PM was implemented, the actual scores achieved by students (in comparison to schools where PM was not implemented) were (a) higher in PISA, (b) higher in all four content areas particularly in <i>Shape and Space</i>, and unlike peers in non-initial schools, these students' scores were in line with the OECD average (c) higher in print Mathematics and (d) higher in the Junior Certificate. It should be noted however, that the students' scores were not significantly different statistically.• A wider range of teaching approaches was being used in the initial schools.• Principals in initial schools were more positive about PM than their peers.
<p>Areas for development:</p> <ul style="list-style-type: none">• PM has adversely effected student attitude. This is not surprising given the unrest in initial schools regarding resources, support, and parental concerns.• PM leads to additional literacy demands.
<p>Actions / implications:</p> <ul style="list-style-type: none">• Ongoing CPD in Mathematics is essential. The ERC recommends that teaching and learning approaches used in PM will be extended and embedded as part of the reform of the junior and senior cycles. This should lead to more discovery-based learning, and class and group discussions across all subjects.• All students, particularly, more able students will need to engage in more extra-curricular activities relating to Mathematics.

2.4: Students, Computers and Learning - Making the Connection, OECD, September 2015

<ul style="list-style-type: none">• This report provides a first-of-its-kind internationally comparative analysis of the digital skills that students have acquired, and of the learning environments designed to develop these skills. It uses the data generated from PISA 2012.
<p>Positive findings:</p> <ul style="list-style-type: none">• In Ireland, the number of computer-equipped households has increased to 97.9% in 2012 – this is above the OECD average. The majority of Irish pupils have internet access at home.• At school, 96% of pupils have access to computers – this exceeds the OECD average of 92%.• Ireland’s digital reading performance in 2012 was above the OECD average. Irish students were among the high-ranking countries in demonstrating persistence in completing complex digital reading tasks.• Internet access at school has increased in Ireland to 95%. This is well ahead of the 70% figure in other OECD countries.• The performance of Irish students improved in computer-based mathematics assessment from 2009.• In web browsing, Irish students ranked in the highest groups, demonstrating good skills in selection. This strength may be linked to their performance in digital reading. Only 10% of Irish students have weak navigation skills.
<p>Areas for development:</p> <ul style="list-style-type: none">• Overall, Irish students performed at the OECD average in computer-based Mathematics.• Irish students performed worse than expected on tasks that required the use of computers to solve problems• Computers are used less frequently in Ireland in mathematics lessons and for homework. Irish students spend less time online in school per day (15 minutes) compared to the OECD average (25 minutes). However, the PISA 2012 study also showed that more frequent use of ICT does not of itself lead to better learning outcomes for students.
<p>Implications / Actions:</p> <ul style="list-style-type: none">• Investment in school ICT in itself, does not automatically translate into greater use of computers in instruction. Greater use of computers does not in itself, automatically lead to better scores in Mathematics and reading. In each of the strongest performing countries, Finland, Korea, Chinese Taipei, and Japan, use of computers in mathematics classes / tasks ranks relatively low. The focus should therefore be on the use of ICT for particular purposes /activities that contribute to learning. For example, the PISA study highlights that computers are effective when used to extend study time, to allow students to control the learning situation, and to support collaborative learning.• Curriculum content and the use of computers are linked; curriculums which include the application of mathematical skills in real-world contexts and applied mathematical tasks, lead to greater computer use. The new curriculum at post-primary allows more potential for pedagogical use of ICT in Mathematics. The new curriculum for Mathematics at primary level, the development of which has just commenced, is also likely to promote pedagogical use of ICT.

- There are specific evaluation skills required to read online texts, which need to be developed among learners. Online texts are often more challenging to readers than printed texts.

Current / Future actions to support the use of ICT in the classroom:

- Broadband capabilities in post-primary schools have been improved significantly. The Department published its Digital Strategy for Schools in 2015.
- A short course in coding is available and is optional for schools /students at junior cycle.
- The NCCA is considering options for the incorporation of Computer Science at senior cycle.
- All work undertaken on new curriculums will feature a consideration of the potential of ICT. The use of electronic portfolios as learning and assessment aids is being considered.
- The findings of this report will be brought to bear on the review of the National Literacy and Numeracy Strategy and on the review of Project Maths (in 2016/2017).

2.5: Literacy and Numeracy in Northern Ireland and the Republic of Ireland in International Studies (Shiel and Gilleece, 2015)

<ul style="list-style-type: none"> • In PIRLS 2011, 4th grade students in Northern Ireland ranked 5th in literacy, while students in the Republic of Ireland ranked 10th. • In TIMSS, students in Northern Ireland performed well, ranking 6th while students in the Republic ranked 17th. • In 2009, there was a decline in performance in both English reading and Mathematics in PISA. The following factors may be considered as possible reasons for this decline - lower levels of engagement among 15-year olds, shifts in the distribution of students across grades with more students in TY (where there is less academic emphasis), and changes to test design. A bias in sampling is considered unlikely. • Poor performance in PIAAC literacy and numeracy was seen in both the North and the Republic. There has been a slow response to PIAAC. • Targets in the National Literacy and Numeracy Strategy have been achieved well ahead of 2020. The targets established for PISA Reading literacy and Mathematics have also been achieved. This suggests that new targets should be established, perhaps with specific targets for disadvantaged schools. • In <i>Count, Read: Succeed</i>, there is more of an emphasis on assessment and on achievement of targets at critical stages. Rather than targets relating to national assessment, the Northern strategy includes targets in relation to gaps in achievement e.g. in disadvantaged schools and less disadvantaged schools, as well as targets for overall performance. • The Northern strategy focuses on capitalising on existing infrastructure in schools, rather than introducing new initiatives.
<p>Positive findings:</p> <ul style="list-style-type: none"> • In both the North and the Republic, the percentage of ‘advanced’ readers was on a par with other high-performing countries. • In PISA, the Republic has performed satisfactorily in reading literacy, and scores are above the OECD average.
<p>Areas for development :</p> <ul style="list-style-type: none"> • In both the North and the Republic, there were more students above, at, or below, the PIRLS low benchmark than in other high-performing countries. • In the Republic, a low percentage of students performed at the Advanced TIMSS mathematics proficiency in comparison with the North and other higher-scoring countries.
<p>Implications / Actions:</p> <ul style="list-style-type: none"> • Low performance at higher level is associated with an over-emphasis on <i>Number</i> compared to <i>Geometric shapes, Measures</i> and <i>Data display</i>, and a stronger instructional focus on lower-order mathematical processes than on higher-order processes. This needs to be addressed. • A realignment or more accurate alignment between the content of text books and the Primary School Curriculum for Mathematics is required. • More time needs to be allocated to the teaching of Mathematics. • Project Maths, focuses to a greater degree on problem-solving in real-life contexts. While the scores of students in initial and non-initial schools did not differ in a manner that was significantly different statistically, the actual scores of students in the initial Project Maths schools was higher than the scores of students in non-initial schools.

Appendix 3: International Assessments: Adult Literacy and Numeracy

3.1: PIAAC 2012

<ul style="list-style-type: none">• This is a major new international survey of adult skills across 24 countries to provide data on adult skills in literacy, numeracy, problem-solving in technology-rich environments.
Positive findings: <ul style="list-style-type: none">• In Ireland, a gender gap was not evident in literacy scores.
Areas for development <ul style="list-style-type: none">• In literacy, Ireland scored 17th out of the 24 countries. Scores were similar to some other EU countries, but behind those of England and Denmark. Ireland was ahead of the US, France, Spain and Italy.• In numeracy, Ireland was significantly below the PIAAC average, and 19th out of the 24 countries.• In numeracy, and in <i>problem-solving in technology-rich environments</i>, there is a gap between males and females, favouring males. More males are proficient at the higher levels than females.• In literacy and numeracy, scores are highest at the 25-34 age bracket and lowest at the 55-65 age bracket. This is consistent with international trends. Numeracy and literacy levels decline for older age groups.• In <i>problem-solving in technology rich environments</i>, the highest scores are seen at the 20-24 age group, and the lowest are at the 60-65 age group.

Appendix 4: DEIS Evaluations

4.1: The Evaluation of the School Support Programme (SSP) under DEIS: Changes in Pupil Achievement in Urban Primary Schools between 2007 and 2013

<ul style="list-style-type: none">• The ERC has carried out evaluations of the impact of DEIS since it was introduced by the DES in 2007.
<p>Positive findings:</p> <ul style="list-style-type: none">• There was evidence of improved pupil outcomes in the DEIS evaluations. Test scores at all grade levels increased significantly in the period between the collection of baseline data in 2007 and follow-up testing in 2010.• Initial gains were maintained and they were built upon between 2010 and 2013.• Gains were particularly evident in the junior grades and in schools that have high levels of disadvantage. Improvements were most noticeable among lowest-scoring pupils.• There has been a reduction in low-scorers i.e. those at or below the 10th percentile in both English reading and Mathematics.• The percentage of high achievers in reading and Mathematics has been maintained, and in some cases, increased.• High levels of engagement with the programme were evident among staff.• There was an improved focus on planning and target setting.
<p>Areas for development:</p> <ul style="list-style-type: none">• Some participating schools have made large gains, while others have not.
<p>Implications / Actions:</p> <ul style="list-style-type: none">• The fact that some schools improved their outcomes and others did not merits further investigation

4.2: The Achievements and Characteristics of Pupils attending Rural Schools participating in DEIS, 2013

<ul style="list-style-type: none">• This report describes the English reading and mathematics achievements of pupils in rural school participating in the SSP under DEIS.
<p>Positive findings:</p> <ul style="list-style-type: none">• Statistically significant increases are noted in English reading and Mathematics between 2007 and 2010 at 3rd and 6th class levels.• Rural DEIS pupils' scores are closer to the national norm. The average mathematics score is not significantly different from the norm. However, the average reading score is significantly below the national norm.• When rural and urban DEIS schools are compared, the performance of rural pupils is significantly better than that of their urban counterparts in both English reading and Mathematics.• Pupils in rural schools have greater access to educational materials and they engage in educational activities more frequently. These activities appear to impact more positively on the children in rural schools.
<p>Areas for development:</p> <ul style="list-style-type: none">• Urban DEIS pupils are more negatively affected by distractions e.g. unstructured free-time activities with friends or on computers.

4.3: Report on the Evaluation of DEIS at Second Level (ERC, 2014)

<ul style="list-style-type: none">• This report was produced by the ERC and published in 2014.• The report describes a range of evaluation activities and outcomes between 2007 and 2013.
<p>Positive findings:</p> <ul style="list-style-type: none">• High levels of implementation have been achieved in participating schools and the majority of school staff are engaging well with the programme.• Most schools have set targets in specified areas and are monitoring progress in relation to those targets.• There is increased level of engagement in SSP schools with programmes targeting at-risk students.• Almost all schools offer JCSP to their students and almost 50% offer Leaving Cert Applied (LCA).• There have been increases in retention levels, in performance in the Junior and Leaving Certificate Examination and in the transfer to post-primary, since the programme was introduced. These increases may possibly be linked with the introduction of DEIS.• Principals described teacher characteristics in DEIS schools as largely positive.• Principals were generally positive about the DEIS programme and the impact of measures under DEIS, including opportunities for professional development and planning support.• The increase in interactions with students outside of classrooms e.g. through homework and breakfast clubs were viewed as important.
<p>Areas for development:</p> <ul style="list-style-type: none">• There is a high degree of turnover with SSP post-primary school principals.• SSP schools continue to deal with 'major problems' e.g. unemployment, lack of parental involvement, emotional and behaviour problems, dysfunctional families.• Unrealistic teacher expectations and difficult learning environments are cited as challenges.• Loss of staff / staffing levels was cited as a major concern – such loss can impact on the most disadvantaged e.g. members of the Travelling community.• Cuts to guidance counsellors and to the psychological services were viewed as detrimental.• Notwithstanding improvements, the achievements and retention levels of schools in the SSP remain well below national norms. It is expected that impacts are more likely to be visible in the long term.• The time constraints for planning was cited as a difficulty by almost 2/3 of principals.
<p>Implications / Actions:</p> <ul style="list-style-type: none">• Continued monitoring of the programme is required.

Appendix 5: Inspectorate Reports

5.1: Chief Inspector's Report 2010-2012

This report focusses on quality and standards in primary and post-primary schools and centres for education inspected by the Department's Inspectorate between 2010 and 2012. This report tells us a lot about the educational landscape during that period:

- There was an increase in class size at primary and post-primary levels.
- Schools faced some challenges relating to finances and staffing.
- Expenditure on DEIS was maintained and expenditure on support for pupils with special educational needs was increased.
- A number of support services continued to be funded, though spending was curtailed.
- Capital investment in schools continued.
- The National Literacy and Numeracy Strategy was launched in July 2011, mandatory standardised testing, and school self-evaluation (SSE) were introduced, and in post-primary schools, Project Maths was rolled out.
- New and revised inspection models, were introduced, including follow-through inspections. Pupil and parent questionnaires were introduced in inspections.
- The Inspectorate commenced its provision of advice to schools in relation to SSE.

Positive findings:

- In both primary and post-primary schools, inspectors noted high levels of satisfactory or better learning outcomes and use of appropriate teaching approaches in English.
- In Mathematics, at primary level, satisfactory or better learning outcomes were noted for 85% of mathematics lessons inspected, with satisfactory or better teaching approaches in 83% of lessons.

Areas for development:

- There was less than satisfactory planning in over 25% of primary schools. Significantly lower rates of satisfactory lesson and student learning were noted in Mathematics at post-primary level.
- There were significant shortcomings in assessment practices at primary level in English and Mathematics (25%, 29% respectively) and at post-primary level, assessment practices were less than satisfactory in 23% of schools.

Implications / Actions

- Overall, there was scope for improvements in planning at primary and post-primary levels and in the use of teaching approaches and resources for English and Mathematics, and in overall assessment practices.