

**A Comparison of Outcomes from Spring and Autumn
Administrations of PISA Tests in Ireland**

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Doctor of Philosophy**

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Abstract

Sylvia Denner

A Comparison of Outcomes from Spring and Autumn Administrations of PISA Tests in Ireland

The Programme for International Student Assessment (PISA) assesses the performance of 15-year-old students in reading, mathematics, and science. In Ireland, information from PISA is highly valued by the Department of Education (DoE) as a guide to inform policy-making. Since Ireland first participated (2000), PISA testing has taken place in the Spring (March/April). This is a particularly busy time in schools for the 60% of PISA-eligible students who are in Third Year of post-primary education. As a consequence, moving PISA testing to the Autumn (October/November) has been on the agenda of Irish policy makers for some time. While research in the United States found no statistically significant difference in performance on PISA tests administered during the Spring and Autumn 2003, research exploring the issue in an Irish context had never been conducted.

The research at the heart of this thesis was designed primarily to compare the performance of 15-year-olds across Spring and Autumn administrations of the PISA tests in Ireland. Data analysed came from administrations of PISA tests and background questionnaires in the Spring and Autumn of 2018, from bespoke questionnaires administered to subject teachers and from interviews conducted with school principals. Results indicated that, overall, there was no statistically significant difference between the performance of 15-year-olds in PISA tests administered across the two time periods. However, multi-level modelling involving the interaction between time of testing and gender indicated that testing in the Autumn was associated with lower mathematics scores for males. Of particular note was the statistically significant higher percentage of low-achieving males in the Autumn administration of the tests (21.4%) compared to the Spring administration (15.7%). Other outcomes with respect to similarities and differences in student engagement, motivation and wellbeing when measured in the Spring and Autumn are also presented in the thesis. The implications of the findings for policy and practice related to PISA testing as well as avenues for further research are discussed.

Chapter 1 Introduction

1.1. The Research Topic/Problem

PISA is a project of the Organisation for Economic Co-Operation and Development (OECD). The primary functions of PISA are to provide international comparative data on students' knowledge and skills at the end of compulsory schooling, a knowledge base for policy analysis and research, and trend indicators showing how results change over time (OECD, 1999). PISA also provides an evaluation of how well school systems prepare students for life beyond school (Ramalingam, 2017). This thesis sets out to examine the performance of 15-year-olds in Ireland on tests of reading, mathematics and science in PISA (the Programme for International Student Assessment) when testing occurs in the Autumn rather than in the Spring (March/April), as is currently the case. Section 1.2 reviews the development of international large-scale assessments and is followed by a section providing an overview of the PISA study and its significance in the making of educational policy. In Section 1.4, issues surrounding PISA testing in the Spring are discussed with the aim of providing a context for the research problem being addressed in this study. The chapter continues with a discussion of the relevance and significance of this investigation (Section 1.5) and concludes with an outline of how the thesis is organised (Section 1.6).

1.2. The Role of International Comparative Studies in Educational Policy Making

PISA, as a standardised test, has its roots in the development of the first practical I.Q. test, by French psychologist Alfred Binet around the year 1905. This was followed by the development of multiple-choice tests in about 1914 by Frederick J. Kelly of the University of Kansas (Mathews, 2006), which meant that tests could be scored objectively. Tests at that time were individually-administered and focused on intelligence. It wasn't until World War 1, when selection and placement for personnel in the United States army became a priority, that group testing began (using the Army Alpha test developed by Arthur Otis) (Shiel et al., 2010). Shiel et al. note that after the war, tests of achievement in the 1920s were developed in a variety of curriculum areas such as spelling and hand-writing. The tests were mainly used to evaluate curricula and, as the years progressed into the 1930s, tests were mainly used to make judgements about individual students. According to Heyneman and Lee (2014), in 1933 Dottrens (pedagogical research) and Piaget (cognitive development) had a difference of

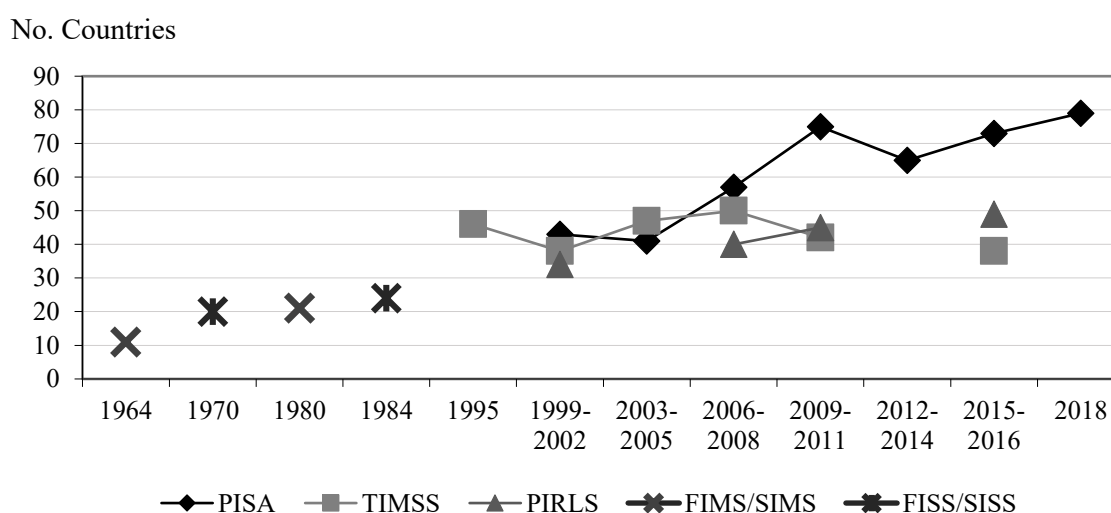
opinion when Dottrens proposed carrying out an international survey to record the state of education in various countries. Piaget apparently opposed it because he felt it would be impossible to generate comparable statistics. By the mid-1950s it was noted by Ben-Simon and Cohen (2004) that discussion about comparing different educational systems was even higher on the agenda. Wolf (2004) claimed that the publication of books such as 'Swiss Schools are better than ours' in 1958 by Admiral Hynam Rickover, which were anecdotal and had no evidence to support their claims, began to raise questions about the state of the education. He even went as far to say that the launch of Sputnik 1 raised questions about the state of American education. In 1955, a group of educators and educational researchers from several countries began to discuss ways in which educational research could contribute to the improvement of education throughout the world. The first formal meeting of these researchers was held in 1958 and was attended by researchers from the United States and several other countries. At this meeting, it was proposed to implement a pilot study to test the feasibility of conducting a multinational study of educational performance (Wolf, 2004) and from there the 'First International Mathematics Study' (FIMS) took place in 1964. The group of researchers called themselves the IEA (International Association for the Evaluation of Educational Achievement).

The outcomes of such studies in the following decades did not receive any great attention. Then, in the 1990s, according to Ben-Simon and Cohen (2004), several factors contributed to increased levels of interest in the results of these international studies such as technological progress, the speed of communication and increased international trade and competition. They also noted the heightened focus on education by such organisations as UNESCO (United Nations Educational, Scientific and Cultural Organisation) and the OECD. UNESCO came into force in 1946, during the aftermath of World War II. It was founded on the belief that peace had to be built on the intellectual and moral solidarity of mankind, and advanced through educational, scientific, and cultural relations. The heart of their mission was to build peace through international cooperation in Education, the Sciences and Culture (UNESCO, 2018). The OECD was officially established on 30 September 1961 with roots in the Organisation for European Economic Cooperation (OEEC), which was founded in 1948 to administer aid after WW2 (OECD, 2018). The OECD¹ was established to stimulate economic progress and to provide a platform to compare policy experiences. According to Marsh et al. (2006), improving the quality of education has been the main concern of the OECD from the

¹ Since 1993 the OECD have published 'Education at a glance: OECD indicators' annually; in the early years it included international studies conducted by the IEA, and eventually included PISA outcomes.

beginning of its existence, and the prosperity of countries now derives to a large extent from their human capital. It was argued that opportunities needed to be available for individuals to obtain knowledge and skills that would enable them to continue learning throughout their lives. Students cannot learn everything they will subsequently need to know during their compulsory schooling years, they need to acquire the prerequisites to learning in future life and develop successful approaches to continuing learning (Marsh et al., 2006). Seller et al. (2017) point out that these ideas led to the development of PISA. PISA was set up to assess and monitor the extent to which young people have acquired the wider knowledge and skills, in the areas of reading literacy, mathematical literacy and scientific literacy, that they would need in adult life (OECD, 1999). PISA was to include many more countries and overcome issues of trend and the differences in curricula across countries (OECD, 1999). The first PISA assessment was conducted in 2000 and PISA has followed a three-yearly cycle since then. However, PISA 2021 was postponed until 2022 due to COVID-19. In that first year PISA was conducted in 28 OECD member countries and four non-OECD countries, and a further 11 took part in 2001 (using the same tests and questionnaires that were administered in 2000). Figure 1.1 shows the increasing number of countries/economies participating in international studies as the years have progressed. The total number of countries/economies participating in PISA in 2000 was 43, and by 2015, had increased to 73 and 79 countries/economies took part in 2018.

Figure 1.1: Number of countries participating in a selection of international comparative studies in education



Note. See Appendix A for descriptions of studies

1.3. PISA

Internationally, PISA is implemented on behalf of the OECD by a consortium of institutions.² The lead institution for the 2018 cycle was the Educational Testing Service (ETS) in the United States, with the PISA Governing Board determining the policy priorities for PISA which are guided by the OECD's education objectives (OECD, 2020a). Each OECD country has a voting representative on this Board and therefore can contribute to decisions about the development and implementation of PISA, with non-OECD participants generally having less input in decision making. Locally, PISA is managed on a day-to-day basis by the PISA National Project Manager and other staff from the National Centre in each country. In Ireland, the Educational Research Centre (ERC) is the National Centre. The ERC is a statutory body under Section 54 of the Education Act (1998). It carries out independent research on all levels of the Irish education system and implements PISA on behalf of the Department of Education (DoE). A National Advisory Committee oversees the implementation of PISA in Ireland, and advises on aspects of the assessment, survey administration, and reporting of results.

PISA is not considered a curriculum-based study, as is TIMSS (Trends in International Mathematics and Science Study). Rather it seeks to assess the extent to which young people (15 year-olds) have acquired the wider knowledge and skills, in the areas of reading, mathematics and science that they would need in adult life. Arising from its key function as a yield study,³ the PISA Governing Board made the decision to assess 15-year-olds, who, in most participating countries, are at the end, or near the end, of their compulsory schooling. After this age, as Ramalingam (2017) notes, students take various paths and so it is appropriate to collect this information before this transition in their lives. The age definition for PISA is 15 years 3 months to 16 years 2 months. Other studies, with a stronger focus on curriculum coverage, such as TIMSS and PIRLS (Progress in International Reading Literacy Study) implement assessments with grade-based samples. The PISA test takes two hours to complete and includes a mix of open-ended and multiple-choice questions. The definition and framework for each domain determines the test questions that are developed. Subject expert committees, appointed by the OECD, oversee the development of tests in each domain. In order for PISA to inform

² The consortium for PISA 2018 was: **Core A Design, development, implementation, and analyses** – carried out by Educational Testing Service (ETS), in co-operation with the Deutsches Institut für Internationale Pädagogische Forschung (DIPF), cApStAn, Statistics Canada, Westat, University of Liège (Service d'Analyse des Systèmes et des Pratiques d'Enseignement; aSPe), University of Luxembourg, and HallStat SPRL; **Core B Framework development** – carried out by Pearson; **Core C Sampling** – carried out by Westat, in co-operation with the Australian Council for Educational Research (ACER); **Core D Linguistic quality assurance and linguistic quality control** - carried out by cApStAn.

³ Provides educational outcomes at a point in time (OECD, 2019a).

policy, information on students' home and school experiences, as well as their personal attitudes, interests and behaviour, are collected in the form of a student questionnaire, while principals provide information on school-level policies and practices on a school questionnaire. These questionnaires are core elements of the PISA study. The resulting data allow for an exploration of factors that are associated with different levels of proficiency in reading, mathematics and science. PISA has also developed parent questionnaires, teacher questionnaires, and student questionnaires on ICT familiarity, career expectations, and wellbeing, which are optional to countries participating in PISA. In more recent cycles of PISA, additional innovative domains have been developed and made available to countries to administer to students. For example, creative problem solving was a minor domain in 2012 (Ireland participated), and collaborative problem solving was an additional domain in 2015 (Ireland did not participate). Global Competence is the innovative domain in the 2018 cycle; however, Ireland and many other countries chose not to participate.

Between 2000 and 2018, PISA has been administered every three years, with one of the core areas (reading, mathematics and science) featuring as a main domain in each cycle. Reading was the main domain in 2000, followed by mathematics in 2003 and science in 2006 (see Table 1.1). In recent cycles, the distinction between major and minor domains has begun to become less distinct, with much larger numbers of items used for minor domains than has been the case in the past.

Table 1.1: Major and Minor domains assessed in PISA

	Assessment Year						
	2000	2003	2006	2009	2012	2015	2018
Subject Assessed	Reading	Reading	Reading	Reading	Reading	Reading	Reading
	Maths	Maths	Maths	Maths	Maths	Maths	Maths
	Science	Science	Science	Science	Science	Science	Science

Note. The subject in bold is the major domain for the given year.

For the first five cycles of PISA tests, completed between 2000 and 2012, the main mode of assessment was paper, with optional tests on computer-based science (2006), reading literacy (2009, 2012), mathematics (2012) and cross-curricular problem solving (2012). In 2015, most participating countries, including all 35 OECD-member countries at the time, administered the main tests (and questionnaires) on computer. The OECD and its contractors investigated whether performance on computer-based tests in 2015 could be linked back to earlier paper-based scales, thereby maintaining trend lines. Their mode-effect study drew on

data from the PISA 2015 Field Trial (administered in 2014). Using pooled data across countries, it was concluded that a link back to earlier paper-based cycles could be maintained (OECD, 2015). The move to computer-based delivery as the main mode of assessment also makes it possible to collect more in-depth information, not just on student responses but also the processes behind those responses, such as the amount of time it takes to complete each task and the number of actions taken by the student. These processes are saved into what are termed *log files*. Log file data allows for more in-depth analysis of the strategies used by students in responding to particular questions (Yamamoto, 2019).

PISA has resulted in an increased interest in and concern for education worldwide and has generated a vast data bank that is open to analysis by independent researchers. Hopfenbeck et al. (2018) note that the number of publications of PISA-related research per year has been growing steadily since 2002. Sjøberg (2015) argues that the availability of data of different education systems has led to new ideas and perspectives in educational research. Others have argued that if the data are used appropriately, analyses can allow for discussions about education and can either challenge or reinforce reasons for investing in education (Rutkowski et al., 2014). In general, International Large-Scale Assessments (ILSAs) are international representative studies at the system level which are prime resources for researchers and policy makers and it is the responsibility of the researcher to make it clear what assumptions/projections are stated and whether they can be validated or not (Rutkowski et al., 2014). PISA has taken several precautions, as noted by Shiel (2017), to ensure the quality of the findings are reliable. These include laying out clear frameworks for each domain (contributing to the validity of the assessment) and requiring countries to meet rigorous technical standards in each cycle (e.g. reliability of translation, representative sampling, school and student level response rates and inter-coder reliability). The content of the PISA tests is established in consultation with national representatives and international panels of subject experts and participating countries/economies also play a key role in the item-selection process to ensure the validity of the PISA test. The robustness of PISA is based on the rigour that is applied to all technical aspects of the survey design, implementation and analysis. The validity of the assessment lies in the rigour of the procedures used in item development, field trials, analysis, review and selection. In developing the PISA assessment, specialists work with advisory groups who are made up of international experts.

As the cycles of PISA have progressed, criticisms of PISA have also increased. Hopfenbeck et al. (2018) found that, between January 1999 and September 2015, of the 654 English publications which focussed on PISA, 16% critiqued the PISA assessment. They

categorised some 40% of these as critique publications dealing with the nature of the construct (i.e. does PISA measure intelligence or academic literacy) and a further 27% critiquing aspects of scaling and Item Response Theory (IRT). PISA has also been criticised for globalising educational policy (Sjøberg, 2019). Dale (2000) has defined “Globalization” as a progression toward cultural homogeneity where the nation state would be replaced by a world society or at a broader level by what Rutkowski and Rutkowski (2008, p2) refer to as a “world of increased interconnectedness and interdependence”. However, they concluded that policy and curriculum may be related to regional forces than global forces. PISA has been criticised by many as presenting a universal assessment that has not taken into account the cultural differences found all over the world (Seller et al., 2017; Eivers, 2010; Meyer & Zahedi, 2014). The OECD strongly encourages all of its members to participate in PISA, which has created a competition between countries based on their performance with the publication of league table/rankings (Dale, 2000). Criticisms have arisen when the analysis has not considered the complexity of the data or when reports are written that over-attribute causality and become detached from their basis in the data, with correlation sometimes taken to imply causation (Seller et al., 2017; Singer et al., 2018). At ground level in an Irish context, it has been claimed that studies such as PISA have increased the number of school inspections being carried out (Brown et al., 2018). Notwithstanding these criticisms, many of the English-language publications examined by Hopfenbeck et al. (2018) contribute to a shared understanding of the potential of PISA to contribute to the analysis of education and the formulation of policy.

1.4. Research Problem: Issues Arising From the Administration of PISA in the Spring

Ireland has participated in PISA since the first cycle in 2000. The assessment has always been conducted in the Spring of the year, during a six-week window in the months of March/April. In presenting the structure of post-primary education in Ireland, this section will highlight some issues that can arise when tests are administered in the Spring.

The Irish education system is made up of primary, post-primary, third-level and further education. Post-primary level consists of a 3-year junior cycle programme followed by a 2-year or 3-year senior cycle programme, depending on whether an optional Transition Year (TY) is taken by students. At the end of the junior cycle programme, students sit their first state examination. This was called the Junior Certificate, and, since June 2017, has been called the Junior Cycle Profile of Achievement (JCPA). Unlike the Junior Certificate, the JCPA now incorporates both results of formal examinations and classroom-based assessments. The first

subject that was introduced under the new framework was English and in the PISA 2018 cycle, all participating students had studied under the new specification (and assessment arrangements) for English, while the majority of PISA-eligible students had studied mathematics and science under the older Junior Certificate programme (McKeown et al., 2019). Students are assessed on a number of core and optional subjects in a final written state exam in the June of the third year of the junior cycle programme. Incorporated into the final Junior Certificate Exam, students undertook oral exams in the modern languages and (optionally) in Irish, and completed various practical tests (in subjects such as Home Economics, Music, and Metalwork) which were typically scheduled during March/April. Other subjects (such as Materials Technology (Wood), Technology and Civic, Social and Political Education (CSPE)) require students to complete project work by April/May. With the introduction of the JCAP, externally-administered and scored oral tests no longer count towards a student's grades, but instead form part of the classroom-based assessments (CBAs). The CBAs are conducted in the second and third year of the JCAP. An Assessment Task (essentially a reflection on the student's CBAs in a subject), which is marked by the State Examination Commission (SEC), is completed after the second CBA. In 2018 when PISA was conducted, the timeline was a once off as teachers were undergoing CPD (Continuing Professional Development); the following year gives an example of the window for completing the second CBA and Assessment Task which ran from November to March 2019 (NCCA, 2019).

The Leaving Certificate programme covers two years (Fifth/Sixth Year), with the majority of students completing the Leaving Certificate written state examination in June of the second year. Similar to the Junior Certificate, there are oral tests in the subjects Irish, French, German, Italian, Spanish, Russian and Japanese conducted in the March/April of the final year of the programme. There are practical examinations and/or coursework in a number of subjects including Engineering and Construction Studies which are also completed during March-May of the final year.

Approximately four months prior to sitting their final exam (i.e. during the month of February), students in Third and Sixth Year sit in-house practice exams similar to the Junior Certificate/JCPA and Leaving Certificate (known as mock examinations, also known colloquially as '*the mocks*'). The purpose of *the mocks* is to give students an opportunity to experience what a state exam is like, the amount of preparation that is involved, and what it is really like to sit exams day after day for two weeks.

Transition Year is a non-academic 'gap' year in Irish post-primary education. It is officially recognised as the first year of a three-year senior cycle (Department of Education,

1993), although considered separate from the two-year Leaving Certificate programme. Transition Year is optional. Some schools offer TY to all students who have finished the Junior Certificate where it is considered compulsory by the school management and other schools make it available as an option, with students either moving from Third Year into TY, or straight into Fifth Year (PDST, 2019). In 2019 the PDST estimate over 30,000 students in approximately 560 schools⁴ participated in the TY programme (PDST, 2019). While classes in core examination subjects are provided during TY, there are no final state examinations at the end of the year. A key feature of the TY programme is the out-of-school activities. Students may participate in school exchanges, community service and multi-week placements in the workplace. The latter can vary in length, from one day a week for a number of weeks to one or more full weeks at certain times of the year, depending on the school.

PISA is an age-based assessment, which means that students are distributed over different class years or grade levels. When administered in Spring, approximately 60% of PISA eligible students in Ireland are in Third Year, a further 27% are in Transition Year, and the remainder are distributed over First/Second (1.8%) and Fifth Years (11.1%) (Shiel et al., 2016). Taking into consideration the assessments/examinations which students in Third Year (the largest group eligible for the PISA test) undertake and the management of orals/practical tests (for Third/Sixth Year) by school staff, PISA (currently conducted in the Spring) presents particular challenges for schools and students selected to participate. The following are issues experienced with testing in the Spring:

- Completion dates for the second CBAs and Assessment Tasks for Third Year students occur in the Spring time.
- Mock exams for Third Year students are conducted during the month of February – immediately before PISA is administered.
- Some Third Year students have practical tests which are typically scheduled during March/April.
- Project work for some subjects must be completed by Third Year students by April/May.
- The management of the oral exams (for Sixth Year students) by school staff occurs in Spring.

If PISA testing were done in the Autumn, it would be from mid-October to mid-November, and would not overlap to the same extent with the other assessments/preparations

⁴ 723 post-primary schools listed in the 2019/2020 academic year (DoE, 2022).

in which students in Third/Fifth Year are involved. Due to the nature of PISA, which is not considered a curriculum-based assessment and uses an age-based sample, it is possible to move the testing period to a different time in the calendar year. However, such a move prompts the research question at the heart of this thesis: **‘Would the performance of 15-year-olds differ if the PISA tests were administered during the Autumn term rather than the Spring term?’**

Research conducted in the United States examining the move from Spring to Autumn on PISA tests found no association with time of testing and performance on PISA (Ferraro et al., 2009). However, in Ireland, there is no empirical evidence comparing the performance on PISA tests conducted in the Spring and the Autumn. One potential concern that is accentuated by the fact that students in Transition Year study a different, less structured curriculum, compared with other year levels. Hence, in the event of a voluntary or enforced change to Autumn testing, it would be important to quantify and explain factors associated with a change to the testing window on performance or on other indicators of educational outcomes. Additional research questions, pertinent to this topic, will be presented in chapter 2 following the literature review of all the relevant issues impinging on it.

1.5. Significance and Scope of the Current Study

This study has the potential to be highly relevant at the level of the school and at a national policy level. Both schools and the Department of Education and Skills are concerned about the numerous demands on students, in particular Third Years, and on staff in the Spring of the year, related to mock exams, the completion of CBAs, project work, and preparation for state examinations. Moving PISA testing to the Autumn would also result in a somewhat different grade distribution, in that more PISA-eligible students would have completed Third Year and be in TY and Fifth Year. Also, those students in Third Year (of which there would be fewer) would have more time to focus on a low stakes exam such as PISA as they would not be in the process of completing CBAs, project work. In addition, the Junior Certificate Examination would be 5/6 months away rather than the 2/3 months when PISA is administered in the Spring.

At a policy level, PISA has provided valuable information on the achievement of students in reading literacy, mathematics and science that has informed policy making in the Department of Education and Skills (DES). Prior to the introduction of PISA in 2000, the DES presented a framework for the development of education in Ireland in their launch of the 1995 White Paper on Education (DES, 1995a) which presented a comprehensive policy agenda for

developing education in Ireland into the 21st century. Since then mathematics and science subjects have been included as core curricular areas at both primary and post-primary levels. The Chief Inspector's Report for the period 2001-2004 presented the results of the second cycle of PISA when mathematics was the major assessment domain. Reference was made to the need to benchmark students in Ireland internationally (DES, 2005).

A major focus on PISA came when there was a significant drop in performance on mathematics and reading literacy in PISA 2009 which helped to spur the implementation of a National Strategy to Improve Literacy and Numeracy 2011-2020 (DES, 2011; 2017a). The strategy makes specific reference to the PISA 2009 results and the DES established nationwide targets in relation to mathematics and reading based on the PISA proficiency levels. These targets were intended to increase the percentage of students performing at Level 5 and above in both PISA reading literacy and mathematics by at least five percentage points by 2020 and to reduce the percentage of students performing below the lowest level (below Level 2) by half the 2009 estimate (DES, 2011). The reliance on the PISA results by the DES can be seen in policy formation when the interim report on the Strategy was published after the 2015 PISA cycle. In this interim report, the DES continues to use indicators from national and international studies with specific reference to PISA 2021⁵ (DES, 2017a). The DES not only revised the targets set in 2011 based on PISA, but set targets for the first time for the highest achieving students, i.e. those at or above Level 5 in both reading literacy and mathematics. Furthermore, further targets were established for DEIS (Delivering Equality of Opportunity in Schools) post-primary schools with an aim to reduce the achievement gap between DEIS (disadvantaged) and non-DEIS post-primary schools based on PISA results (DES, 2017a). Not only are targets set based on PISA results but PISA data from 2015 has also indicated a need to intensify support children whose first language is not English or Irish. This is especially important for this group in the context of DEIS schools as they cater for large numbers of children for whom English or Irish is not their first language (DES, 2017b).

Results of PISA data also informed the development of the Science, Technology, Engineering and Mathematics (STEM) Education Policy Statement in 2017 (DES, 2017c), with a particular focus on high achievement in mathematics and science, and continued benchmarking of student achievement in STEM through participation in PISA (DES, 2017d). PISA data has also had an important influence in the Wellbeing Policy Statement and Framework for Practice 2018–2023, where the role of the teacher is identified as being critical

⁵ PISA 2021 is now being administered in 2022 due to Covid-19.

to children and young people's wellbeing. The implementation of the Wellbeing Promotion Process in Ireland, according to DES, will be monitored by PISA and other OECD data (DES, 2019). The Department of Children and Youth Affairs (DCYA) also use PISA data when reporting the 'State of the Nation's Children' (SONC). They compile data from a variety of sources on child wellbeing. The DCYA not only use PISA achievement data, they also use data on children's relationships, such as the amount of time 15-year-olds spend just talking with their parents and the frequency with which parents discuss school progress with their children (DCYA, 2016). The importance placed on achievement and wellbeing indicators from the PISA data in the development and monitoring of policy by various agencies means that the reliability of the data shouldn't come into question. It is imperative then, that if the PISA test were to be moved to a different time of the year, there would be minimal association with performance and other educational outcomes due to the time of testing.

The study described in this thesis sought to address this lacuna using a combination of quantitative and qualitative data. The first part of the study involved administering PISA in the Spring and Autumn of 2018 to two different but parallel samples of students. This involved collecting cognitive data in the reading, mathematics and science domains and background information on participating schools and students using questionnaires. The second element of the research involved the development of a teacher questionnaire by the researcher which was administered to teachers in schools participating in the Autumn testing. This questionnaire sought teachers' views about implementing PISA testing at different times of the year, summer learning loss, time spent revisiting topics/skills/learning outcomes after the summer and teachers' perception of their students' motivation and engagement. The final element of the study involved the collection of interview data gathered from a convenience⁶ sample of principals in schools participating in Autumn testing. This semi-structured interview enabled additional information to be gathered that would have otherwise been difficult to obtain with just a questionnaire, such as insights into the organisational demands on the school and staff and the possible presence of summer learning loss in schools (testing in the Autumn after the summer holidays).

⁶ This is a type of non-probability sampling that involves the sample being drawn from part of the population that is close to hand.

1.6. Outline of the Remainder of the Thesis

Chapter 2 examines what PISA measures and who it is designed for. The issue of Spring versus Autumn testing is then discussed and the limited research on the topic is highlighted. Literature on summer learning loss, students' opportunities to learn, and other educational outcomes that may be associated with performance if testing occurs in the Autumn is reviewed. Chapter 3 provides details on the conceptual framework and the study design, methods, sampling, implementation, participation rates and indicators (measures/constructs) used. Chapter 4 examines students' performance by comparing the mean achievement scores on the overall reading, mathematics and science scales between Spring and Autumn testing. Included is an examination of the performance of various student subgroups in the two testing periods. The chapter concludes with a multi-level model examining whether time of testing has an association with performance when student- and school-level background variables are controlled for. Chapter 5 considers factors associated with performance on PISA tests including an examination of topics/skills/learning outcomes covered by teachers in the first six weeks of the academic year. The chapter concludes with a multi-level model examining whether time of testing has an association with performance while controlling for student- and school-level background variables and other variables associated with performance on PISA. In Chapter 6 the views of principals and teachers on PISA testing in the Spring and Autumn are examined. In Chapter 7, the study findings and conclusions are presented before consideration is given to the limitations of the study and possible topics for further research.

Chapter 2 Literature Review

2.1. Introduction

This chapter reviews literature pertinent to the key issues that could explain factors associated with PISA performance on reading, mathematics and science literacy and other educational outcomes if the testing period for PISA were moved from the Spring (as is currently done in Ireland) to the Autumn. While acknowledging that student performance depends on assessing school learning in terms of curricular content, the focus of this study is on the attributes of the PISA assessment and its analytical framework (OCED, 2019a). The literature review commences in Section 2.2 with an examination of PISA and what it tests, who it tests and how it tests. In addition, the main components of the PISA assessment are described, including its age-based structure and its non-curricular focus as these make it possible for the tests to be administered at different times of the year.

Section 2.3 provides the main factors relevant to time of testing in PISA. Previous research examining the move of PISA testing from a Spring testing is extremely limited, with the United Kingdom not conducting any research before their move to an Autumn testing in 2006. While the evidence from the United States did reveal no significant difference, their focus appeared to be more on school-level variables than on student-level variables (Ferraro et al., 2009). This section also explores in more detail the challenges post-primary schools in Ireland face during the Spring term.

The potential for six additional factors related to student performance during the Autumn term are also explored. These are: summer learning loss, opportunity to learn (OTL), engagement, motivation, wellbeing and the general learning environment. In general, the prioritisation of these constructs is supported by their relationships with performance and the potential for such constructs to fluctuate throughout the school year. Their selection in this thesis is not intended to represent an exclusive set; however, for the most part, they are PISA related, in that they are often examined in PISA.

An examination of how 15-year-olds in Ireland performed in prior cycles of PISA cycles is presented in Section 2.4 as this is crucial to an understanding of how Irish students are likely to perform in future (Autumn) administrations of the tests. It provides a baseline against which the PISA 2018 Spring and Autumn performance scores can be benchmarked. Factors that are associated with expected future performance are also considered in section 2.4. The final section of the chapter (Section 2.5) provides a brief summary of the evidence that

might likely be associated with performance on PISA and other educational outcomes if testing were to be carried out in the Autumn compared to the Spring and presents the research questions to be explored in this study.

2.2. PISA

PISA was set up to assess the extent to which young people (15 year-olds) have acquired the wider knowledge and skills, in the areas of reading, mathematics and science, that they would need in adult life. When establishing PISA, the OECD defined each domain in terms of important knowledge and skills needed in adult life and not merely in terms of mastery of the school curriculum (OECD, 1999). If PISA were solely curriculum based, it would not be possible to move the time of testing for fear of curriculum topics not covered at specific times of the year. However, students need to have a level of knowledge and skill that they can use when dealing with issues in everyday life. It is important then to establish what PISA assesses. With the introduction of PISA in 2000, the PISA Advisory Committee in Ireland carried out the first TCRP⁷ (Test Curriculum Rating Project) with the aim of capturing the extent and type of similarities and differences between PISA items and the types of questions students in Third Year of the Junior Certificate programme were exposed to, based on an examination of the intended curriculum at each level of the syllabus (Shiel et al., 2001). The Junior Certificate programme was the focus, as students studying in this programme make up approximately 60% of PISA eligible students when testing occurs in Spring. The following sections present what PISA measures, who is tested and how they are tested.

2.2.1. What PISA measures

In general, each item in each domain in PISA has three dimensions: the content or structure of knowledge that students should acquire; a range of processes to be performed; and the situation or context in which knowledge and skills are applied or drawn (Ho, 2004). Several of these elements are evident in the definition of reading literacy which was defined in PISA 2018 as:

'understanding, using, evaluating, reflecting on and engaging with texts in order to achieve one's goals, to develop one's knowledge and potential and to participate in society' (OECD, 2019a, p28)

Reading literacy is not about measuring whether 15-year-old students are technically able to read (i.e. whether they can recognise words in written text) but about examining the

⁷ The aim of the TCRP was to develop a set of rating scales which were reliable, valid, and capable of capturing the extent and type of similarities and differences between PISA items and the types of questions students in Third Year of the Junior Cycle are exposed to, based on an examination of the intended curriculum at each level of the syllabus.

ability of students to understand and reflect on a wide range of texts, with 2018 incorporating the use of digital texts. It has been operationalised into three dimensions. The first one is *situation*, which is the range of broad contexts or purposes for which reading takes place and the context in which knowledge and skills are drawn on or applied. In the context of research on teachers' views on the Junior Cycle English specification,⁸ the NCCA (2018) reported that teachers welcomed the goal to give students 'a wide and varied experience of texts' and 'meaningful and stimulating language experiences across a broad range of contexts' but that some teachers felt that this was more aspirational rather than achievable. The second dimension of the reading literacy is *text* (a proxy for content) which is the range (type) of material that is read and the structure of the texts. The content or structure of texts can be either continuous texts (sentences arranged in paragraphs, which, in turn, may be arranged into longer texts such as sections, chapters or books) or non-continuous texts (matrix format, based on combinations of lists, and include charts and timetables which are often presented to students studying subjects other than English (e.g. science, mathematics, geography)). The remaining dimension relates to the cognitive approaches used by readers to read between or around texts, called *aspects*. One of the developments reflected in the 2018 framework is the reframing of reading processes under two broad categories, text processing and task management. Text processing is divided into three broad categories: (i) retrieving information (locating one or more pieces of information in a text); (ii) developing an interpretation (constructing meaning and drawing inferences using information from one or more parts of the text); and (iii) reflecting on and evaluating the content and form of texts (relating a text to one's experience, knowledge and ideas), including a new component of reading fluency. Task management processes (setting goals and plans, monitoring progress and implementing self-regulating strategies) form part of the assessment through student interaction with the test (OECD, 2019a).

The PISA assessment is not designed to be curriculum based, and little information on curriculum or instructional factors within schools is collected, unlike other curriculum-based studies (Mullis et al., 2006). However, students need to have covered a base level of learning by the time they reach 15 years-of-age (the testing age in PISA). Comparing the 'learning outcomes' in the Junior Cycle,⁹ it can be seen that many of the dimensions of the PISA Reading Framework have been incorporated. Some of these include 'to read texts with fluency,

⁸ Junior Cycle English introduced in 2014, so the majority of students tested in PISA 2018 will have participated in this programme.

⁹ The new English specification was introduced in 2014, and thus all participating students in PISA 2018 studied under the new specification.

understanding and competence...to use a wide range of reading comprehension strategies appropriate to texts, including digital texts (i.e. to be able to retrieve information, to follow a process or argument, summarise)...to monitor their own understanding...to be able to analyse, synthesise and evaluate' (JCT, 2019). A TCRP has not been conducted on the PISA 2018 Reading Literacy with the Junior Cycle English. However, as noted by Cosgrove et al. (2005), test-curriculum ratings do not take into account the likelihood that numerous factors, other than curriculum intent and the manner in which it is implemented, associated with student achievements. Reading cuts across many domains; for instance, reading strategies are taught or learned through other courses (e.g. retrieving information in history class). The strategies used for online reading are also used in other subjects; for example, when researching a geography topic online a student will have to make decisions on which page and link to follow and will result in them building a text around a topic. While PISA reading literacy examines students' ability to locate information and understand texts, it also assesses ability to evaluate and reflect on texts in order to develop knowledge over a range of contexts to participate in society.

In relation to mathematics and science, the curriculum most students tested in PISA 2018 will have experienced are: Project Maths and the revised science curriculum introduced in 2006. It is important to consider the content covered in school by Irish students as PISA literacy purports to examine students' ability to use knowledge learnt to deal with the problems they meet in everyday life. Project Maths is a post-primary mathematics syllabus introduced in pilot schools in Ireland in 2008 that has been rolled out in a phased basis in all schools since 2010. It involves a strong focus on developing students' conceptual understanding in mathematics, and on applying mathematical knowledge in solving problems in context using a range of methods (Shiel, 2017). Project Maths identified five key skills that were seen as being central to effective teaching and learning – information processing, being personally effective, communicating, critical and creative thinking and working with others (DES, 2015a). The PISA definition of mathematical literacy used in PISA 2018, as established in 2012 when mathematical literacy was the main domain is:

'An individual's capacity to formulate, employ and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematics concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individuals to recognise the role that mathematics plays in the world and to make the well-founded judgments and decisions needed by constructive, engaged and reflective citizens' (OECD, 2019a, p75)

This definition encompasses students' capacities to analyse, reason, and communicate ideas effectively by posing, formulating, and solving problems in a variety of situations. The PISA framework specifies four content categories which were called 'overarching ideas' in the PISA 2003 cycle. These content areas are: chance & relationships (ability to understand types of change and to recognise when they occur); quantity (quantification of the world and quantitative reasoning); space and shape (such as understanding perspective and constructing representations of shapes); and uncertainty and data (knowledge of variation in processes, uncertainty and error) (OECD, 2004). As Oldham (2006) notes, these overarching ideas may be considered as representing areas of mathematics as encountered in daily life and work, rather than as reflecting the traditional strands of academic mathematics or school curricula. The three mathematical competencies that were developed for the 2003 cycle of PISA, which were called mathematical processes in 2012, were: (1) formulating situations mathematically; (2) employing mathematical concepts, facts, procedures and reasoning and (3) interpreting, applying and evaluating mathematical outcomes. Mathematical contexts or situations in which problems are presented are also included in the PISA mathematical literacy framework. Situations include personal life, school life, work and sports, local community, society as encountered in everyday life, and scientific contexts (Cosgrove et al., 2005; Perkins et al., 2013). A pre-Project Maths Test Curriculum Rating Project reported a substantial mismatch between the material examined in the PISA tests and the material in the Junior Certificate syllabus (Oldham, 2006). A post-Project Maths and PISA comparison found that applied arithmetic and measure and statistics were over-represented in PISA compared to the Project Maths curriculum and there were aspects of the Project maths curriculum not covered by the PISA items such as equations, functions, sets, both formal and co-ordinate geometry, trigonometry and property of number (Merriman et al., 2014). More recently Cunningham et al. (2017) examined the content, cognitive processes and contexts that the Junior Certificate mathematics examination questions are based on for students in Third Year in 2003 and 2015, using the frameworks underpinning the PISA and TIMSS studies. They found that there seemed to have been an increased emphasis on 'Statistics and Probability' in the revised curriculum. They reported that the assessment of JC mathematics had not been overly influenced by the PISA approach, a somewhat similar conclusion to that made by Kirwan, who suggested that while Project Maths, the curriculum covered by the students assessed in PISA 2018, emphasises the PISA-like approach to real-life problem solving, it still retained the abstract and symbolic mathematics (Kirwan, 2015). The analysis by Cunningham et al. (2017) indicated that the 2015 JC examination is more similar to TIMSS (a curriculum based

assessment) than to PISA in terms of content and processes and that the Junior Certificate examination continues to emphasise lower-order processes, at the expense of higher-level thinking as defined by PISA (Cunningham et al., 2017). Thus, PISA mathematical literacy includes processes (formulate, employ and interpret) which draw on the student's knowledge about individual topics; however, to become mathematically literate students need more than mathematical processes. Students are also required to learn and understand the broad concepts of mathematics and then recognise how mathematics can help them deal with situations, solve problems and make sound judgements in everyday life. This is what PISA mathematical literacy is intended to measure.

The third domain that PISA measures is scientific literacy. This was defined in 2015, when it was the main domain, as:

'the ability to engage with science-related issues, and with ideas of science, as a reflective citizen. A scientifically-literate person, therefore, is willing to engage in reasoned discourse about science and technology, which requires the competencies of: explaining phenomena scientifically...evaluating and designing scientific enquiry...interpreting data and evidence scientifically' (OECD, 2019a, pp.100-101)

As noted by Shiel et al. (2016), the interpretation of the literacy part implies putting a focus on the application of scientific knowledge in the context of life situations. PISA is concerned with the capacity of students to draw appropriate conclusions from evidence and information given to them, to criticise the claims made by others on the basis of evidence put forward, and to distinguish opinion from evidence-based statements. To operationalise scientific literacy, the OECD organise the domain by three competencies. The first is *explain phenomena scientifically*, which is to recognise, offer and evaluate explanations for a range of natural and technological phenomena. The second competency, *evaluate and design scientific enquiry*, is to describe and appraise scientific enquiries and propose ways of addressing questions scientifically. The third competency is to *interpret data and evidence scientifically*. This entails the analysis and evaluation of scientific information, claims and arguments in a variety of representations and the ability to draw appropriate conclusions. All these competencies require three broad types of scientific knowledge: content (a knowledge of the facts); procedural (methods and practices used to establish scientific knowledge) and epistemic (an understanding of the rationale for the common practices of scientific enquiry). Scientific literacy also classifies the items in terms of the main knowledge systems, those of Physical Systems, Living Systems and Earth and Space Systems (OECD, 2016a).

In a comparison examination of TIMSS, NAEP¹⁰ and PISA, soon after the introduction of PISA, Nohara and Goldstein (2001) found that PISA contains a large number of items that integrate more than one curriculum topic, focusing on students' ability to reason and think scientifically, and requiring students to read and interpret extended passages of text or charts and figures similar to ones found in newspapers or other common media. The test curriculum rating project carried out in Ireland in 2000 was before the introduction of the revised science curriculum. Based on their analyses, the researchers reported that 43% of PISA science items were considered to deal with topics that were not included in the syllabus (Shiel et al., 2001). The revised science curriculum introduced in 2006 required all students to study each of the three major areas of science (biology, chemistry and physics) and placed an increased emphasis on an investigative approach to science (NCCA, 2013). Eivers et al. (2006) noted that the revised science curriculum seemed to place greater emphasis on student investigation and practical work, designed to help students develop an understanding of science concepts, as well as acquiring the necessary science process skills. It recognised the importance of the capacity to use scientific knowledge, of understanding how science can shape our environment, and of using science to draw evidence-based conclusions and make decisions (Eivers et al., 2006). Perkins et al. (2012) suggest that as the 2009 PISA results for science didn't decline to the same extent as mathematics and reading literacy, changes to the curriculum could have offset what might have been a lower performance on science. However, a review of the implementation of the revised science curriculum by the Department of Education and Science (2008) seems to suggest that students were not learning about science in an investigative way, as required by the syllabus. Eivers et al. (2006) did find that there was an increase in the familiarity with the concepts underlying PISA science items (however, it should be noted that this change applies only to students of the revised science curriculum that had participated in the programme at that stage, none of the senior cycle students had). They found that thirty-seven percent of PISA science items were described as based on competencies that were very familiar to Irish students, 63% were described as somewhat familiar, and none was rated unfamiliar (Eivers et al., 2006). They also noted that of the 15% of items addressing content not covered in the revised science curriculum, most related to the PISA science categories of Earth and space systems, or scientific enquiry and scientific explanations.¹¹ They pointed out that some elements of Earth

¹⁰ NAEP is The National Assessment of Educational Progress and is the largest nationally representative and continuing assessment in America, of what America's students know and can do in various subject areas. (IES 2019).

¹¹ Since 2015 Earth and space systems have been included in the science curriculum (DES, 2015b).

and space systems are covered in the Junior Certificate geography syllabus. This is also in line with what Nohara and Goldstein (2001) found in their examination of PISA (as mentioned above) where PISA items integrate more than one curriculum topic.

In conclusion, while PISA purports to be a non-curricular based study, mathematics and science, more so than reading, require students to have covered broad content areas (such as Shape and Space and Quantity in mathematics and Physical Systems and Living Systems in science). As a consequence, performance on PISA requires students to have covered these broad areas in depth, but the main difference with other curriculum-based studies is that it also measures literacy, and to be literate in reading, mathematics and science, students need to be able to apply what they have learnt in school to everyday problems. PISA assesses students' competences in applying knowledge and skills essential to their future. It does not exclude curriculum-based knowledge and understanding, but it tests for it mainly in terms of the acquisition of broad concepts and skills that allow knowledge to be applied (OECD, 1999). Consequently, items used in PISA involve more diverse contexts and require multi-step reasoning often found in daily life (Nohara & Goldstein, 2001). PISA tests literacy in broad concepts and skills and their applications (Ho, 2004), which potentially allows testing to be conducted at any time during the year of assessment.

2.2.2. Who does PISA test?

Decisions about the methodology used in PISA have been guided by the need to evaluate the success of school systems in preparing their students for life beyond school, and it is from this aim that the decision to assess 15-year-old students derives. The OECD noted in their preparation for the administration of PISA in 1999 that the age of 15 marks the end of the 'basic period of schooling in which students follow a broadly common curriculum' (OECD, 1999, p. 11). At the age of 15, most students in OECD countries are at the end or near the end of compulsory education. Ramalingam (2017) notes that after this age students will decide to enter the world of work or continue with education. This departure point is an important milestone for collecting information on how well students are prepared for life beyond compulsory education, nearer to the age of facing the problems of everyday life on their own or at least with less support (Prais, 2003).

The operational definition of the age population in PISA directly depends on the testing dates; therefore, the age definition for the Spring and Autumn testing will differ. In 2018 in

Ireland, the Spring testing period was from 1st March - 20th April¹² and so the age definition was 1st January 2002 to 31st December 2002. The Autumn testing period was recorded as 15th October 2018 to 23rd November 2018 and the age definition was 1st August 2002 to 31st July 2003. This means that the age of students in PISA will be 15 years and 3 months to 16 years and 2 months (allowing for one month deviation) regardless of when testing occurs. This therefore allows for the possibility of moving PISA testing within a given cycle. However, while the age definition remains the same, the amount of schooling a student will have undergone will change. This section will examine the association between the amount of schooling and the change in grade distribution when PISA occurs at different times of the year.

The advantage of using an age-based sample for PISA is that the students have had similar life experiences and it can guarantee the comparability of average age of the student sample, as well as the one year age span (Rust et al, 2017). However, an obvious disadvantage of an age-based sample is that students will range in school grade and therefore the number of years of education completed (Ramalingham, 2017). In a comparison of age- and grade-based assessments, Wu (2008) notes that, on average, students with more years of schooling do better than students with fewer years of schooling and that the comparative age of the students has less of an association on their achievement than the actual amount of instruction provided. A similar result was found by O’Leary (2001), noting that in Ireland and also England and the United States (both of which now do an Autumn testing), year of birth makes little difference to overall achievement for students in the same grade. However, Leuven et al. (2003) found that increased potential school time only increased second grade test scores for the disadvantaged students. When England moved to Autumn testing, almost all the children who sat the PISA test belonged to the same academic year (for example almost all the 2009 participants were ‘year 11’ students born between September 1993 and August 1994). This compares to the Spring testing in the PISA 2000 and 2003 cycles where all the students were born in the same calendar year (1984 and 1987, respectively) and approximately two-thirds of the participants were in ‘year 11’ and one third in ‘year 10’ (Jerrim, 2011). In Ireland, parents have the option (not a requirement) to send their children to school between the ages of four and six, starting in Junior Infants.¹³ With different starting ages and the possibility of repeating a year, students at the age of 15 in Ireland are distributed primarily between First Year and Fifth Year of post- primary schooling; however, the distribution of grades will change if testing

¹² The technical standards for the age definition will be covered in the methodology chapter.

¹³ Junior and Senior infants are the first two years of primary school in Ireland and are classified as ISCED 0.

moves to the Autumn, which may have an association on performance. At the Spring testing there are approximately 61% of PISA eligible students in Third Year, and this reduces to just 26% when testing occurs in the Autumn, with the percentage in TY increasing to 52.6%, from 27.9%. The effect of moving testing in Ireland on the distribution of all grades can be seen in Table 2.1.

Table 2.1: Percentages of 15-year-old students by grade, Spring and Autumn testing in Ireland 2018

	1st Year	2 nd Year	3rd Year	4th Year (TY)	5th year	6th Year
Spring testing	0.0	2.0	61.6	27.9	8.5	0.0
Autumn testing	0.0	0.6	26.4	52.6	19.8	0.7

Note: With very small numbers in 1st Year, the percentages are rounded to 0.0%.

It should be noted that a Third Year student in the Spring term will have completed six to seven months of Third Year compared to the Third Years in the Autumn who will only have completed a minimum of six weeks. Likewise, TY and Fifth Year students in the Spring and those in the Autumn will have had different educational experiences. While it may appear that the students will have had more schooling in the Autumn testing, some students will have had three months of a summer break, while others (Third Year students will have sat final JCAP exams in June) will have had two months summer break. This will be examined in more detail when reviewing students' opportunity to learn.

In summary then, while the age definition remains the same for students tested in the Spring and the Autumn (15 years and 3 months to 16 years and 2 months) it will be important when analysing the results to take into account the change in grade distribution and also the length of time students in the Autumn testing will have spent in their respective grade to the students in similar grades in the Spring testing.

2.2.3. How is PISA administered?

The main mode of assessment for PISA when it was introduced in 2000 was pencil and paper. The development of computer-based testing in PISA began in 2005 when the OECD field tested a computer-based element of science literacy. It was carried out with the aim of administering questions that included video footage, simulations and animations, none of which would be possible with the traditional paper-and-pencil test (OECD, 2010). The need to develop and adapt PISA came from three challenges: incorporating a wider range of competencies; the efficient delivery of assessments; and the relevance of the assessment tasks (e.g. adaptive testing). For the PISA Main Study in 2006, only three countries participated in

the computer-based element of the science assessment; in the sixth cycle of PISA in 2015, most participating countries, including all 35 OECD-member countries, administered the achievement test in all domains and questionnaires on computer.

An important benefit of the use of computers for testing has been the development of adaptive testing systems which can provide more precise measures of student ability for a greater proportion of test takers (Koomen & Zoanetti, 2018). PISA 2018 used multistage adaptive testing for the reading domain and had a three stage process: Core Stage, Stage 1 and Stage 2 (OECD, 2020b). While there are positives and negatives of computerised testing (Rotou et al., 2007; Sari et al., 2016), the introduction of the multistage adaptive testing for PISA 2018 should provide additional information about students at all levels of ability, and make the assessment process more relevant, as students are more likely to encounter tasks close to their ability level.

One of the outcomes of computer-based testing is the availability of log files. Log files contain all the data that are captured in a digital-based assessment (DBA) such as the clicks and keystrokes which give information on the order and speed of the inputs. From the log-files, the process data provides the empirical data that reflects the processes of working through a test question. One of the uses of log files has been to provide information on student engagement and effort put into the test. Goldhammer and Zehner (2017) have availed of process data in examining disengaged behaviour during a test. Kong et al. (2007) suggest that low examinee effort can cause sizable validity problems for a study. In sum, the use of computer-based testing could allow for a better comparison of proficiency levels and engagement with the test between Autumn and Spring testing.

2.3. Research on Factors Relevant to Time of Testing in PISA

This section presents the issues with PISA testing in Ireland during the Spring term and factors that may be associated with performance if testing occurred in the Autumn. It commences with an exploration of the research conducted in the United States using the 2003 PISA data, which included data from both the Spring and Autumn terms.

2.3.1. Previous research

There is no evidence from the Irish system on whether there is a difference in performance if PISA testing is conducted in the Spring compared to the Autumn. Up to 2018 there were only

two countries in the Northern Hemisphere that administered PISA in the Autumn that had previously tested in the Spring,¹⁴ the United States and the United Kingdom.

The United States participated in PISA in the Spring of 2003 and, due to the low response rate at school level, it conducted PISA in the Autumn of that same year (with approval from the international consortium). The school sample in the Autumn included only the original schools sampled in the Spring that had declined to participate in the Spring but indicated a willingness to participate in a fall (Autumn) assessment. In summary, a total of 420 schools were sampled, out of which 382 were eligible (i.e. had at least one 15-year-old student). In the Spring, 179 schools plus 13 replacement schools participated and in the Autumn an additional 70 schools participated. Hierarchical linear modelling, using school-level factors, was used to examine school average performance, where a session effect (Spring or Autumn) was found not to be statistically significant (Ferraro et al., 2009). The data for Spring and Autumn were then combined for the United States results in PISA 2003. As PISA is age-based, and the eligibility for PISA shifts as students in the Spring and Autumn are both 15 years of age¹⁵ at the time of testing, it could be expected that the time of testing would have no association on performance. However, Ferraro et al.'s (2009) methodology treated session effects as school-level effects because it was the schools rather than the students who had opted to be tested and so their outcomes reflect differences (or lack of them) across schools rather than students. They used a two-level hierarchical linear model where the student-level was fully unconditional with student scores a function of the school mean plus a random component and at the school-level, session (participating in the Spring or Autumn), and a number of school characteristics (e.g. number of age-eligible students enrolled and percentage of minority students) were used to predict variation in school means.

The intra-class correlation coefficient (ICC) should be considered when analysing student performance within schools. The ICC measures the variation in student performance accounted for by clustering (OECD, 2017a), i.e. the ratio of the between-school variance and the sum of the between-school and within-school variance. Table 2.2 shows the intra-class correlations for the United States and Ireland in PISA 2015 indicating that there is slightly more clustering in schools in the United States than in Ireland. As a consequence of the low ICC in Ireland, student level variables as well as adaptations of the model used by Ferraro et al. (2009) will need to be considered for analyses of the Irish data.

¹⁴ Australia, NZ have always administered the PISA test in the Autumn.

¹⁵ The target population for PISA is 'students aged 15 years and 3 completed months to 16 years and 2 completed months at the time of testing, or a one-month variation of this' (OECD, 2017a, p.66).

Table 2.2: Intraclass correlations in United States and Ireland, by domain in 2015

	Reading (Rho)	Mathematics (Rho)	Science (Rho)
Ireland	0.13	0.15	0.13
United States	0.19	0.21	0.19

Note: Source: OECD (2017a).

The Department for Education in the United Kingdom requested a change in the PISA test window in 2006 from the Spring to the Autumn and PISA is now administered in November/December (Wheater et al., 2014). The reason for the shift to late Autumn relates to the proximity of Spring PISA testing to the GCSE preparation and examination period which resulted in schools refusing to participate when asked to do so. No known specific analyses were conducted on the change in test window. Results reported by the OECD (OECD, 2001; 2007) in 2000 and 2006 for the United Kingdom shows differences on the mean scores in all domains. Preliminary work done by Jerrim (2011) on the decline of England's PISA mathematics scores suggests one of the reasons may have been the change in season when PISA was administered. He notes that in PISA 2000 and 2003 children were all born in the same calendar year but belonged to years 10 and 11, with the students in year 10 having their birthday between September and December 1984. In contrast, the PISA 2006 and 2009 studies had children born over parts of two years (1993 and 1994) and the majority were in grade 11. He converted the mathematics achievement scores into international z scores (Table 2.3) and examined the comparable sets of students in all four cycles. From these results it would seem that differences occurred (unknown if the differences are significant) between 2003 and 2006, but, without further analyses of other relevant factors, it is impossible to confirm if these were associated with the changing testing time for PISA in the United Kingdom.

Table 2.3: Mathematics achievement scores for England converted to international z scores, 2000 to 2009

	2000	2003	2006	2009
Full sample	0.43	0.35	0.27	0.23
Restricted sample*	0.47	0.39	0.26	0.22

Note. Source: Jerrim, 2011.

*Restricted sample: year 11 pupils who were born between January and August in all four waves.

2.3.2. Challenges in Irish schools associated with Spring testing

During February, *the mocks* are undertaken by Third Year students who comprise a large proportion of the PISA eligible students in Spring. Although the purpose of *the mocks* is to give students an opportunity to experience what a state exam is like, it has been noted by researchers (Smyth et al., 2011) that they can be very stressful and sometimes traumatic experience for some students and that by the end of *the mocks* students can feel exhausted. Smyth et al., (2011) found in their longitudinal study that some teachers were concerned about students becoming too stressed about *the mocks* and the potential negative stress that this might cause. They also noted that doing badly in *the mocks* sometimes increased students' stress levels. If PISA testing then occurred in the Autumn, the Third Year students selected to participate (about one-quarter of the sample) would not be experiencing so many potentially stressful events at one particular time and some of the students might feel less pressure.

During the busy period of February and March, students in Third Year not only undertake their mock exams, but also complete practical tests and project work required for the JCAP. These are only some of the challenges experienced by students and staff with testing in the Spring. While Sixth Year students are not normally selected to participate in PISA, they are also completing mocks, practical test and project work, along with oral exams in Irish and modern languages which need to be coordinated by staff in the school and therefore, the logistics of this coordination can be demanding on staff time.

The second largest group of students who participate in PISA are Fourth Year or Transition Year (TY) students. As noted, a key feature of TY is the out-of-school activities that students participate in, which in part, are intended to promote socioemotional development and to prepare students for adult life (Clerkin, 2016), and to enable them to become "autonomous, participative and responsible members of society" (Department of Education, 1993 p.3). These out-of-school activities can create logistical problems when plans are being prepared for the PISA testing. While the work experiences are more often than not planned by a co-ordinator in the school, it may not be the co-ordinator assigned to overseeing the administration of PISA in the school, which can cause issues when there is overlap. One or more full weeks of work placement during the PISA testing window also means that there are fewer dates available when a school can schedule testing. However, in the Spring term approximately 28% of PISA eligible students are in TY, compared with about 50% in the Autumn. This could mean that the co-ordination of TY students may be more of an issue in the Autumn than the Spring.

There are other pressures that occur in the Spring which have been anecdotally noted by PISA school coordinators and Test Administrators in previous cycles. These include the scheduling of sporting events in Spring, often at short notice, including finals of league and cup matches. The date for PISA testing is, more often than not, planned at least three months in advance by the PISA school coordinator, while sporting events are planned potentially by another staff member, with each stage of league or cup matches having to be played by an agreed date. The timing of the Easter holidays and extra holidays around St. Patrick's Day (especially if it falls close to a weekend) take more school days out of the PISA testing window compared to a single mid-term break in the Autumn. These then are the usual pressures that schools have to deal with in the Spring term. The selection of a school to participate in PISA can only place more logistical pressures on staff and students.

Spring can also be a heavy testing period in post-primary schools if there are a number of international studies taking place, such as in 2015, when both PISA and TIMSS were administered. While overlap control was employed to remove the possibility of a school being asked to participate in both studies, the pool of post-primary schools in Ireland is not very large (in 2018 there were 694 post-primary schools with PISA eligible students (ERC, 2017)) and even though schools would not have been selected to participate in both these studies, they could have been selected to take part in the Field Trials which occur in the Spring.¹⁶ Furthermore, overlap control does not take replacement schools into account, and a school selected for one study may not be available as a replacement in the other, if required.

While the main concern is with the demands and pressures schools and students experience during the Spring term, other problems that arise from testing in the Spring are concerned with the administration of PISA by the National Centre. With a Spring testing, Ireland is one of the first countries to receive the assessment software (Student Delivery System (SDS)), the sampling software (Keyquest), coding software (OECS) and data management software (DME) and, hence experiences more 'bugs' in the system than countries testing later, for whom bugs will have been eliminated as soon as they have been discovered. For example, when a variable has been incorrectly adapted in the DME that will not allow the import of student data a *patch* needs to be developed to resolve the issue, and valuable time can be lost in preparing to administer PISA. PISA testing in the Autumn would alleviate some of these issues within the National Centre. However, as the main concern is with students selected to participate in PISA during the Spring and their teachers, given that PISA can only add to the

¹⁶ In Spring 2014, the Field Trial of both PISA and TIMSS G8 were administered.

numerous other challenges they face at that time of the year and hence a move to the Autumn would seem a better option.

2.3.3. ‘Opportunity to Learn’ issue

For a student to do well in PISA, they must ‘be able to extrapolate from what they know, think across the boundaries of subject-matter disciplines, apply their knowledge creatively in novel situations and demonstrate effective learning strategies’ (Schleicher, 2019, p3). In an examination of the PISA 2012 results, Schmidt et al. (2013) raised the question that, if there is such an emphasis on measuring the application of, for example, mathematics, is there a need at all to have been taught the formal mathematics content in school in order to successfully complete tasks/problems in the real world (as presented in the PISA achievement test)? This section will examine the relationship between students’ opportunities to learn (OTL) in school and performance on PISA.

Opportunity to learn, as a measure of schooling, goes back to the 1960s when John Carroll developed a model of school learning which included the element of time, defined as the amount of time available for learning both in class and within homework (Bokhove et al., 2019). Bokhove et al. (2019) note that Carroll’s model of school learning depended on student factors and elements controlled by the teacher. The student factors included aptitude (the amount of time a student needs to learn a specific task), ability (the ability of the student to comprehend the task), and perseverance (the willingness of the student to engage in active learning). The factors controlled by the teacher are quality of instruction (how the learning task was organized, how the instruction was designed) and opportunity to learn (the time allocated for learning). The OECD (2016b) define OTL as the content taught in the classroom and the time a student spends learning that content. The outcome of this school learning model, and therefore an outcome of OTL, is academic achievement (Bokhove et al., 2019; Rintaningrum, 2018).

The main domain in PISA 2012 was mathematics and in order to derive a set of OTL indices conceptually related to mathematics literacy, a small number of items were included on the student questionnaire. Schmidt et al. (2013) showed that, of the constructed OTL indices developed from the items on the questionnaire (exposure to word problems, formal mathematics topics, and applied mathematics problems), there was a significant relationship with the overall PISA measure of mathematics literacy at the student level in Ireland. The relationship was linear for the indices of exposure to word problems and formal mathematics. However, it was quadratic for exposure to applied mathematics, indicating that at a certain

point the relationship levelled out and became negative. While there was indication that those students who have more exposure to formal mathematics perform better on PISA, it should be noted that the nature of this is cyclical, the best students (perhaps those taking higher level) are likely to spend more time on maths and do more maths homework. However, there is a definite relationship between students' learning opportunities in school and performance on PISA and one that needs to be considered when examining PISA testing at different times of the year.

Familiarity with and exposure to mathematics concepts increase as grade level increases (OECD, 2016b). The increase in the number of PISA eligible students in TY and Fifth Year for Autumn testing may mean that performance may be higher for these students than at Spring testing (see Table 2.1 above). However, using the minimum number of teaching days per school year in post-primary schools of 167 (DES, 1995b) as a guide in calculating the number of instruction days a student tested in the Spring will have, compared to a student in the Autumn, and building on Table 2.1, Table 2.4 shows the approximate number of teaching days for students at each grade level, in Spring and Autumn. A student in Third Year in the Autumn will have had approximately 364 days of instruction in the JCAP programme compared to a Third Year student in the Spring who will have had approximately 449 days of instruction in Junior Cycle and will have completed most of the Junior Cycle curriculum. On the other hand, when examining the combined total of teaching days across the PISA assessed students in the Spring (509.2) compared to the Autumn (504.4), the difference is small. It is also important to note that, the familiarity with and exposure may be less-relevant for reading literacy, and possibly science compared to mathematics, given that most students are unlikely to acquire complex mathematical concepts without some instructional support.

Table 2.4: The number of teaching days at post-primary level that students in each grade will have received if tested in the Autumn compared to the Spring

	Spring			Autumn		
	%	N teaching days*	Total Teaching days per grade (approx.)	%	N teaching days*	Total Teaching days per grade (approx.)
Third Year	61.2	449	274.8	26.4	364	96.1
TY/Fourth Year	27.9	616	171.9	52.6	531	279.3
<i>Fifth Year split out between...</i>						
Fifth Year and no TY	2.4	616	14.8	5.5	531	29.2
Fifth Year having completed TY	6.1	783	47.8	14.3	698	99.8
Total combined teaching days across all grades			509.2			504.4

Note. *These are approximate days based on: 30 days to the first day of PISA testing in the Autumn and approximately 115 days to the first day of PISA testing in the Spring, plus the minimum number of teaching days for each year (167). Fifth Year students include students who have moved from Third Year and also some from Transition Year with approximately 72% of students reported to have undertaken TY in 2019 (McGuire, 2019).

While achievement is the main outcome of OTL, the OECD (2016b) also note that another outcome of OTL is attitude to the learning task. Using the PISA 2012 data they note that exposure to more complex mathematics is associated with lower self-concept and greater anxiety among low-performing students and is associated with higher self-concept and lower anxiety among high-performing students. In sum, there is not only a definite relationship between students' learning opportunities in schools (OTL) and performance on PISA but also their attitudes to the task.

2.3.4. Summer Learning Loss

The loss of academic skills and knowledge over the course of summer holidays has been referred to variously as a 'summer effect'; 'summer slide' or 'summer learning loss'. Acknowledging that an element of the performance on PISA is based on what students have learnt in school, there is a concern that students' summer learning or lack of summer learning could lower or bias results of tests carried out in the Autumn time. Much of the research on 'summer learning loss' has been undertaken in the United States. Cooper et al. (1996) conducted a meta-analysis of 39 research reports that contained descriptions of empirical studies meant to test the effect of summer vacation on school achievement. They documented research dating back to 1906 and made three conclusions: on average, students' achievement scores declined over summer vacation by one month's worth of school-year learning; declines were sharper for mathematics than for reading; and the extent of loss was larger at higher grade levels. Noting the speed of summer learning loss through the grades, Atteberry and McEachin

(2021) also find that students lose a greater percentage of their school-year gains as they progress through the grades and that maths sees a greater loss than reading. Cooper et al. (1996) suggest that, as mathematical computation shows significant losses overall, it may be important to examine factual and procedural knowledge compared to conceptual knowledge such as mathematics concepts and problem solving. The former requiring extensive practice while the latter requires a lot of experience but not necessarily practice. So, for example, students may forget science facts but retain knowledge of scientific concepts. They also found that income-based reading gaps grew over the summer, with middle-class students tending to show improvement in reading skills and lower-income (lower socio-economic status (SES)) students tending to experience loss.

More recent literature has been mixed in its findings. An analysis using the nationally-representative Early Childhood Longitudinal Study in the United States, the Kindergarten Class of 2010 – 11 showed little evidence of overall loss over the summers after grades K and 1, and over the summer socioeconomic status gaps widened in some subjects and grades but not others (Quinn et al., 2016). Von Hippel and Hamrock (2019) compared three longitudinal data sets and concluded that while gaps are already large when children start school, they grow very little in the following years. They say that evidence is inconsistent regarding whether gaps grow faster during the school years or during summer holidays. Research carried out on school and teacher effectiveness suggests that, if a high-stakes test is to be carried out, doing so in the Spring may give a better indication of what students have accomplished (Hayes & Gershenson, 2018).

Very little research on summer learning loss has been carried out in Ireland and the research that was conducted in the US mainly involved children in the early years of schooling (primary schools). In 2007/2008 the ERC took advantage of the existence of data¹⁷ already collected as part of the development of a test for diagnosing reading difficulties among young school children (Weir & Archer, 2011). The study found that, contrary to expectations, significant gains rather than losses were observed overall. Furthermore, students in SSP¹⁸ schools showed larger average gains between Spring and Autumn than those in non-SSP schools. The authors noted that there are other issues at play in their methodology that may

¹⁷ Pupils in 39 schools took a standardised group test of reading ability on two occasions, initially at the end of First class (typically aged six to seven) as part of the development of a diagnostic test, and again at the beginning of Second class to investigate summer learning.

¹⁸ Delivering Equality of Opportunity in Schools (DEIS) is the Action Plan for Educational Inclusion and provides for a standardised system for identifying levels of disadvantage and an integrated School Support Programme (SSP).

have a relationship on the outcomes (e.g. half of the students took an alternate form of the test, practice effects).

A unique feature of the Irish education system is the Transition Year programme that some schools opt to participate in. Academic loss over the Transition Year programme has not been researched and whether this has an association on the PISA test when conducted in the Autumn is not known.

As PISA testing cannot start until six weeks after the first day of term (OECD, 2020b), the main concern may not be with summer learning loss but with the time teachers may spend catching up on material taught in the previous term and thereby not covering new material. The National Summer Learning Association (NSLA) in the United States examined the amount of time teachers spent re-teaching old material in the new term. They surveyed 500 teachers¹⁹ from 16 school districts around the country. The research found that teachers regarded summer learning (courses carried out over the summer) to be important in preparing students for school at the start of a new academic year, and it helped them to work with students more effectively. The report also noted the wasted time and money caused when teachers must use a large portion of the beginning of the school year to re-teach material forgotten over the summer. They reported that 66% of teachers said it took them at least 3-4 weeks to re-teach the previous year's skills at the beginning of a new school year. Of those, more than a third said it takes them 5 weeks or more (NSLA, 2013).

While there is mixed findings on the extent of summer learning loss and very little research has been conducted on the area in Ireland, analysis examining the comparison of performance on PISA tests in Spring and the Autumn needs to consider the potential of summer learning loss and the time spent by teachers revisiting topics/skills/learning outcomes at the beginning of the academic year, especially for lower SES groups, and this may also apply to students participating in the Transition Year programme.

2.3.5. Student engagement

There is evidence from a variety of studies that student engagement influences achievement and components of students' engagement have fluctuated over the course of the year. On a general level, student engagement refers to the extent to which students identify with, and participate in school life, both academically and socially. The study of student engagement has given rise to much debate about its definition and the appropriate terminology. Various

¹⁹ It is unclear what grade these teachers taught.

researchers have considered the concept of student engagement with reference to school engagement, academic engagement, engagement in schoolwork, participation in and identification with school, school bonding, school attachment, orientation to school and student engagement with school (Appleton et al., 2008; Jimerson et al., 2003). Early models of engagement (e.g., Finn, 1989) used a two component model, behavioural (such as effort or participation) and emotional (such as affect or sense of belonging). In the early part of the 21st century, three-component models of engagement were presented by researchers such as Fredricks et al. (2004) and Jimerson et al. (2003), where a cognitive component (self-regulation/learning goals) was added to the previous two. An academic component was later added by some researchers (e.g., Appleton et al., 2006; Reschly et al., 2008), which included such constructs as credits earned toward graduation and time on task.

In a review of research on student engagement, Fredricks et al. (2004) confirm that engagement positively influences achievement. Examining the relationship of student engagement and performance among Irish students in the first cycle of PISA, Willms (2003) found that nearly 39% were categorised into two groups, that of *top students* (they had high reading and mathematical literacy and above average sense of belonging) and *engaged students* (they had a high sense of belonging and their literacy scores were close to average). A further one-fifth of students reported low feelings of belonging in school and also performed poorly academically. It was concluded that student engagement has a strong association with academic achievement. In examining the performance in Ireland in the 2009 cycle, Perkins et al. (2012) suggest that one of the reasons for the drop in PISA reading and maths literacy was the drop in student engagement, suggesting a relationship between performance and engagement. Having established that engagement is associated with performance, an examination of the various components of students' engagement and the extent to which they can fluctuate throughout the year will now be conducted.

2.3.5.1. Behavioural engagement

Measurements of behavioural engagement include participation in class, involvement in extra-curricular activities, completing homework, and skipping class. Shiel et al. (2001) found in the first cycle of PISA that students in Ireland who did more homework and study in a subject generally achieved higher mean scores in the corresponding assessment domain than did their counterparts who did less homework, although there was a trend of diminishing returns for students who reported doing very large amounts of homework. They also found that the difference in mean reading and science scores of students who were not absent from school

and those who were absent for 1-2 days (in the two weeks prior to the PISA tests) is statistically significant. A study carried out by Everston and Veldman (1981) examined the extent to which classroom behaviour data are stable over time (i.e., whether they are reliable). The study was conducted over a six month period in 68 junior high school classes. They examined up to 30 variables related to high-inference measures (such as pupil orientation toward the teacher, the task at hand or the extent to which students engage in passive, as opposed to active modes of behaviour) and low-inference measures (such as frequency counts of objective, specific teaching acts like student-initiated call-outs or student behaviours judged to be disruptive to the class). They found that higher cognitive-level student behaviour (activities that require the student to think through or analyse and infer) is higher in the first three months of the school year compared to the last three months. On the whole, their results showed a gradual *increase* in student misbehaviour (measured as student inattention, daydreaming, chatting) and a gradual *decrease* in work-related activities (measured as questioning, student initiated comments) over the course of a school year. While the changes they found were not dramatic, they did report that there was a deterioration in behaviour in late Spring and that data gathered early or late in the school year were more distorted than data collected midyear (around March).

Behavioural engagement is also measured by effort and perseverance in learning and by effort put forward in assessment contexts. PISA is considered a low-stakes test for the students involved. This effort put into a test can be measured by student self-reports or, more objectively, it can be based on item response times in computer-based tests (Attali, 2016). Analysing response times on a computer-based test, Wise and Kong (2005) suggest that a prevalence of very short response times can be indicative of low effort since, under these conditions, the student does not even have time to fully consider the item. They defined a *response time effort* person index as the proportion of short rapid-guessing responses in a test and found that this index had high internal consistency and showed positive correlations with self-report measures of effort. A study conducted by Wise et al. (2014) investigating the relationship between time of testing and test-taking effort, found that effort did not appear to vary across time of year. The testing occurred at three general time periods during the year (Autumn, Winter and Spring testing terms) and on five days of the week (Monday through Friday) of the 2008- 2009 academic year across students in grades 3-9. The data (from NWEA's Growth Research Database) had a total number of 355,116 participants in the maths test and 356,715 in reading. While the database was substantial, Wise et al. note that the study was considered exploratory and the analysis consisted of descriptive statistics. Depending then on

the type of methodology used, there is evidence to suggest that behavioural engagement varies throughout the year.

2.3.5.2. Emotional engagement

Emotional engagement can be examined through the sense of belonging construct. According to Baumeister and Leary (1995), the belongingness hypothesis is that human beings have a determination to develop and maintain positive and significant interpersonal relationships. This is accomplished through frequent and affectively-pleasant interactions with other people, which are temporally stable, and may include a concern for each other's welfare. Appleton et al. (2006) note that emotional engagement has emerged as the primary theoretical construct for understanding school drop-out. Clerkin and Creaven (2013), in an examination of the PIRLS and TIMSS 2011 data, show that as early as Fourth class, about one-quarter of 10-year-olds say they do not like going to school and 18% of them say that they do not feel they belong at their school. For those students with the least sense of belonging, the relationship between belonging at school and performance is strong. In a 19-year longitudinal study, Jimerson et al. (2000) found that the process of disengaging from school can potentially begin even before the child starts school. Goodenow (1993) notes in a study conducted with 353 students from grades 6, 7 and 8, that sense of belonging might be especially problematic during adolescence where there are changes in self-consciousness and in relationships with peers and with teachers. She cites Good et al.'s (1987) work as evidence of increasing student passivity and a decrease in students-initiated questions over the grade levels. The emotional risk of participating in class can increase over the years, which in turn creates changes in the student-teacher relationship (Goodneow, 1993). In a study conducted in Ireland using data from a post-primary longitudinal study, Smyth (2013) notes that changes in relations between student and teacher were seen between September and May of the first year of post-primary schooling, where negative relations had increased within the same academic year. The longitudinal study involved 900 students in 12 case study schools, including a survey of First to Sixth Year students. She quotes a student in a working class all-boys' school as saying:

'School drives you mad, it actually would, the teachers, if you'd better teachers there would be no one getting in trouble...When you come back at the start of the year you're alright for a while...You calm down but then it starts building up through the year because you're so bored of school and you want to get out of it' (Smyth, 2013, slide No. 17).

Research then has shown a decrease in emotional engagement over the grade levels but the extent to which this occurs within the same academic year for all grades and subjects is unclear. It is also unclear if this decrease occurs across all schools, or in certain school types, such as disadvantaged schools.

2.3.5.3. Cognitive engagement

Another element of engagement is that of cognitive engagement. Fredricks et al. (2004) note that cognitive engagement can be on a continuum from simply summarising or memorising material to the level of implementing self-regulated learning strategies. They also note that there can be deep strategy usage such as actively monitoring comprehension ('I went back over things I did not understand') and surface strategy usage such as demonstrating help seeking or use of effort avoidant strategies ('I skipped the hard parts'). Perkins (2015) examined the strategies students usually used in the PISA 2012 survey when they did not know the answer to a multiple-choice question or a question to which they had to write an answer. Those who reported that they kept on working until they thought they had the right answer achieved the highest scores in mathematics, reading and science in PISA 2012, significantly outperforming all other students. Using item response times from computer based tests, Wise et al. (2014) examined results from students in grades 3-9 from the Autumn, Winter, and Spring terms and found that rapid guessing behaviour was a little more likely to occur in the Autumn. While this study was considered an exploratory study, it does suggest that the use of different learning strategies, in particular how students approach a test by implementing learnt strategies, can fluctuate at different times of the year. These learning strategies are linked to self-regulated learning, which will be further explored in the following section on motivation.

2.3.6. Motivation

Motivation is interrelated with engagement and also has a strong association with performance. The manifestation of some of its components has also been shown to vary throughout the school year. For students to be engaged they must be motivated. This is evident when they are involved in their learning; they know what they can achieve, they understand why they want to achieve, and they know how they go about succeeding in a task. Motivation is seen as a pre-requisite for and a necessary element of student engagement (Saeed & Zyngier, 2012) and research has shown that it is considered one of the most important factors in student achievement and in ensuring continuous improvement (Pintrich, 2003).

Motivation theories have their origins in the work of Jack Atkinson and David McClelland (who based his work on that of Henry Murray's theory of personality). According to Atkinson's (1964) classical achievement motivation theory, when a person's motive to achieve success is stronger than the motive to avoid failure, they will approach the task without procrastination. Researchers have observed that contemporary motivation research tends to be organized around three broad categories (Broussard & Garrison, 2004; Eccles & Wigfield, 2002). The first concerns beliefs about competency and expectations for success, asking the question: can I do this task? Theories that fall into this category include self-efficacy theory (Bandura, 1994), the extent of which has been found to fluctuate throughout the academic year, and self-worth theory (Covington, 1984). The next group of theories seek to look at the reasons for the actions and ask the questions do I want to do this task and why? Modern expectancy-values theories fall into this group such as Self-Determination Theory (SDT) and Intrinsic Motivation Theory (Deci & Ryan, 1985a), and again research has shown that these motivational constructs have been found to change throughout the school year. The third group relates to questions about what one does to be able to succeed with the task in hand and includes theories of self-regulation (Zimmerman, 1989) focusing on how motivation gets translated into regulated behaviour. The cyclical nature of the self-regulation process implies that students can be at various stages of the process throughout the school year. The following sections examine these main groups of theories in more detail.

2.3.6.1. Self-related cognitions and beliefs - Can I do the task?

The motivational construct that examines individuals' beliefs in their ability to carry out a task is that of self-efficacy which has a strong association with students' performance. It has been shown to waiver during different times of the year, especially around examination time. Self-efficacy was identified by Albert Bandura and derives from social cognitive theory. According to Bandura (1982), self-efficacy is related to both learning and performance. Firstly, it effects the goals a person chooses (individuals with low levels of self-efficacy are more likely to set lower goals for themselves than individuals with higher self-efficacy). Secondly, self-efficacy is related to learning as well as the effort that individuals exert on the task. Finally, self-efficacy can influence the persistence a person shows as they attempt to learn a new and difficult task. Self-efficacy then can be considered one's "belief in the power to produce results" (Bandura, 2001) and so if individuals do not believe that they can produce desired outcomes by their actions, they have little motivation to act, or to continue on if they face difficulties (Bandura, 2006). A powerful influence on self-efficacy is past performance, where repeated success on

the manageable small parts will boost self-efficacy (Urdan & Schoenfelder, 2006). For some students in Third Year, short class tests might be more manageable throughout the school year compared with the longer and more pressurised mock exams in Spring, and performance on *the mocks* may have a positive or negative association on their self-efficacy. Bong (2005) found that girls' self-efficacy fluctuated significantly around examinations and that evaluation is the most noticeable factor related to student motivation. Her research was in Korean schools (n=375) and self-efficacy was assessed the 7th week after the beginning of academic term and both before and after the first semester final exams. Bong did note that in these schools there was a strong emphasis on grading and competition. In Ireland, Spring testing for PISA occurs just after mocks, with approximately 60% of the PISA-eligible students in Third Year. It is not known how their results on *the mocks* are associated with their self-efficacy, and their performance on PISA, if at all. Developmental changes in self-efficacy measured at two points in time across one school year among Grade 7 secondary school students in Germany was examined by Schöber et al. (2018). They found that at the mean level, mathematics self-efficacy and reading self-efficacy increased across the school year. A study of 335 university students by Ouweneel et al. (2013) observed that changes in self-efficacy were significantly associated with students' performance and engagement. The testing occurred at the end of semester one and also at the end of semester two. They found in their two studies (a natural environment study and an experimental one) that changes in self-efficacy corresponded to changes in engagement but only in the experimental setting did changes in self-efficacy relate to task performance (where external factors were excluded). While they did note that their measure of self-efficacy in the experimental study was a more specific measure, changes in self-efficacy did appear to change over the course of the school year.

Self-concept is also an important motivational attribute and is a strong correlate of reading achievement (OECD, 2017b), and, while the construct can be seen to change over the years, there is no evidence of it varying throughout the year. Self-efficacy beliefs have been noted to change more easily than more general motivational beliefs such as self-concept (Bong & Skaalvik, 2003). The OECD (2017b, p34) have described it as the 'individual's own perceived abilities related to a domain'. According to Pajares and Miller (1994), the difference between self-concept and self-efficacy is that self-efficacy is a context-specific assessment of competence to perform a specific task and a judgment of one's capabilities to execute specific behaviours in specific situations e.g. self-efficacy for reading. Self-concept is not measured at that level of specificity and includes beliefs of self-worth associated with one's perceived competence. Though they are distinct constructs, they are related in their conception and in

their association with student achievement (Williams & Williams, 2010). The association of self-concept and achievement has been observed by Dapp and Roebbers (2018), where they explored the development of self-concept in kindergarten children entering school and up to first grade. They found that kindergarten children's self-concept was already organized in a multidimensional structure composed of domain-specific facets, containing literacy, mathematics, peer-related and teacher-related self-concept aspects, with gender differences already developing at a young age. This research demonstrates that self-concept develops and changes over the years, in particular for the younger age, but not throughout the year.

2.3.6.2. Student motivation - reasons for doing the task/action

The literature on theories that seek to look at the reasons for doing a task, in particular Self-Determination Theory and Achievement Goal Theory, show the manifestation of the constructs to vary over the academic year. SDT is a theory of motivation that aims to explain individuals' goal-directed behaviour (Deci & Ryan, 1985b; Ryan & Deci, 2000). The theory proposes three universal and essential psychological needs: those of competence (the subjective belief in one's ability to perform well in a task); autonomy or freedom of choice (when individuals engage in an activity of their own free will); and psychological relatedness (the sense of shared experience and meaningful relationships) (Ryan & Deci, 2000). Clerkin (2019) notes that SDT highlights the importance of attending to students' needs for autonomy, competence, and relatedness in order to support motivation and engagement in school and that the TY programme enables students to take a more active and participative role in classroom activities, which are guided and directed by the teacher taking on a role that is more supportive and less didactic than at other grade levels (Clerkin, 2018). While there is no research in the area, one would then expect to record a difference between grades when comparing students' motivation and engagement through SDT as well as a difference between students' mean SDT scores at the beginning of the TY programme (PISA Autumn testing) and nearly six months into the programme (PISA Spring testing). Measurement of SDT is more easily done by examining the elements of SDT.

SDT has been presented on a continuum with amotivation (not valuing an activity) on the far left and intrinsic motivation, where individual tasks are carried out mainly for the satisfaction of completing them, on the far right. Students who are intrinsically motivated are more likely to persist and try novel ideas in order to achieve the goals they have set for themselves (Ryan & Deci, 2000; Vansteenkiste et al., 2006). It can be said then that intrinsic motivation corresponds to the highest level of self-determination. At this level, there have been

several studies over the years which have shown positive correlations between intrinsic motivation and academic achievement (e.g., Gottfried, 1985; Adamma et al., 2018). One indication of intrinsic motivation is 'interest in reading' with Perkins et al. (2012) reporting that, in 2009 41.9% of students in Ireland reported that they do not read at all for enjoyment. They go on to note that the students who did not read at all for enjoyment had an average print reading score in the PISA assessment of 457.6 which was significantly lower than that of students who read for up to 30 minutes a day (505.4). The change in intrinsic and extrinsic motivation over time has been observed by Lepper et al. (2005) while conducting a study with 797 students from third to eight grade in the United States. They note that many studies have found that intrinsic motivation declines across the grade levels whereas extrinsic motivation changes very little, if at all. They do remark that schools appear to tighten controls and reduce choices just as students' needs around autonomy begin to increase. Opdenakker et al. (2012) found that students' autonomous motivation (i.e. intrinsic motivation) declined over the course of a school year as their teachers "focused too much on keeping students on task and (unconsciously) neglected the interpersonal relationships" (p113). Their data were collected from 566 first-grade students from three secondary schools in the Netherlands, five times within the academic year. They also found that girls report higher autonomous motivation than boys, over time. Another measurement of SDT that has also been seen to change over the academic year is interpersonal relationships.

According to Self-Determination Theory, individuals become willing to perform desired actions when they internalize the values and expectations of socializing agents (Ryan & Deci, 2000). An individual's interpersonal relationship with socializing agents, including teachers and other students in school settings, is believed to be critical to the process of internalization. Thus, it is understandable that students who have positive relationships with teachers make more effort and persevere in learning because they have internalized the academic values and expectations appreciated by teachers. Opdenakker et al. (2012) found that the quality of interpersonal relationships between the teacher and student within the same academic year (first year students in secondary school) decreased. They observed that about 9% of the total variance in autonomous motivation could be explained by differences in teacher-student interpersonal relationships over time.

Achievement Goal Theory, which focuses on how students choose to define success, has shown students with a focus on mastering the task at the beginning of the school year to having a focus on performance and how well they do compared to others later on in the year. Nicholls (1975) had two ideas of success, ego involvement and task involvement. Ego

involvement happens when an individual compares his or her current performance to that of others and task involvement is when one compares his or her current performance to past performance. These are also known as performance-goal orientation (proving high ability relative to others) and learning or mastery-goal orientation (a desire to develop one's competencies) (Meece et al., 2006). Meece et al. (2006) report that performance goals have been further differentiated into performance-approach goals, which focus on the attainment of favourable judgments of competence, and performance-avoidance goals, which focus on avoiding unfavourable judgments of ability. Urdan and Midgley (2003) found that a perceived decrease in mastery goal structure had the most negative relationship with changes in cognition and performance. Their study was conducted in the Spring semester²⁰ of three consecutive years when the students (n=555) were in 5th, 6th and 7th grade. Examining changes in the school environment, in particular the goals of the classroom, they found that students who perceived a decrease in the emphasis on mastery goals in their classrooms from 6th to 7th grade also experienced decreases in their scores on a variety of adaptive motivational and achievement variables. Those students who perceived an increase in the classroom mastery goal structure appeared to avoid the general decline in motivation, affect, and achievement. They also note that increasing mastery goal orientation may help decrease the decline in motivation (Urdan & Midgley, 2003). However, the focus on state exams in Third Year, as well as mocks in the Spring prior to the state exams, may result in students focusing strongly on performance (grades) at the Spring testing compared to the Autumn testing. Researchers Chouinard and Roy (2008) have found that mastery goals tend to be lower at the end of the school year than at the beginning. Collecting data twice yearly (October and May) from Canadian students in grades 7-11, Chouinard and Roy (2008) found a gradual drop in mastery-approach goals through high school for both males and females, with mastery-approach goals lower at the end of the grade level than at the beginning in grades 7, 8 and 10 for both genders and for males in grade 11. Bong (2005) observes that testing and grading in Korean secondary classrooms is highly competitive and students gradually perceive a reduced mastery focus and an increased performance emphasis in that type of learning environment. In a girls' public high school, she found that girls who felt more successful after their semester finals tended to start the next semester with stronger mastery goals, and weaker performance-avoidance goals. Changes in self-efficacy occur before changes in achievement goal orientations. Self-efficacy beliefs of

²⁰ Urdan and Midgley (2003) noted that there was ample opportunity to develop perceptions of classroom goal structures by Spring (March/April).

the high school girls after they received feedback on their first-semester final exam performance predicted their subsequent self-efficacy and mastery goal orientations at the start of the second semester (Bong, 2005). When PISA testing occurs in the Spring, students in Third Year (comprising just over 60% of the assessed students in PISA) will have probably completed their mocks and their beliefs around how well they did could have relate to their persistence and effort with the PISA test.

2.3.6.3. Self-regulation - What do I have to do to succeed in performing this task?

Self-regulated learning (SRL) is the processes that students use to initiate and direct their efforts to acquire knowledge and skill (Zimmerman, 1989), with its cyclical nature implying that it may fluctuate during the academic year. It is considered a proactive activity where the student takes the lead in helping themselves, as well as in developing learning strategies (de la Fuente et al., 2015). In a review of the literature on SRL, Panadero (2017) notes that it includes the cognitive, metacognitive, behavioural, motivational, and emotional/affective aspects of learning and that SRL is cyclical, composed of different phases and sub-processes. In general, the phases consist of: the *forethought and planning phase*, which involves students analysing the learning task and setting specific goals toward completing that task; the *performance monitoring phase*, where students employ strategies to make progress on the task and monitor the effectiveness of the strategies employed; and the *self-reflection phase* students, where students respond to the efforts they have made and so initiate the cycle to begin again (de la Fuente et al., 2015; Zumbrunn et al., 2011). To promote SRL in classrooms, teachers must teach students the processes that facilitate learning and these include goal setting, flexible use of learning strategies, motivation, planning, self-monitoring, self-evaluation and appropriate help-seeking (Zumbrunn et al., (2011). The use of different learning strategies by students has been noted to fluctuate at different times of the year and in particular it has been noted by Wise et al. (2014) who found that rapid guessing behaviour was slightly more likely to occur in the Autumn. This study may have only been exploratory in nature; however, when one considers the overall cyclical nature of the SRL process, it does imply that students can show varying degrees of SRL during the academic year.

Models of self-regulation have been used in the study of anxiety. It suggests that evaluative pressure makes everyone anxious and that the difference between high- and low-anxious people lies in how individuals respond to the arousal and the situation as a whole. The immediate distress is seen primarily as the result of negative self-beliefs, with the more long-term distress seen as the result of negative feedback from others (Putwain, 2008). Results from

the 2015 cycle of PISA showed that, on average across the OECD, more than one in two students felt anxious about exams. Girls reported feeling more anxious than boys. When looking at the relationship between achievement on PISA and anxiety, the OECD reported that the PISA 2015 data showed a negative relationship between anxiety about schoolwork (students' cognitive and emotional reactions to schoolwork) and performance on science, mathematics and reading (OECD, 2017b). In Ireland, when anxiety is measured PISA in Spring, it may reflect students' heightened anxiety arising from *the mocks*, or it may provide a more general measure of anxiety that is relatively stable throughout the course of the school year. If students are experiencing a period of high test anxiety, it could relate to how they approach or perform on the PISA tests.

How students evaluate the information provided by the teachers can also lead to increase test anxiety. The way information about an exam or test is communicated can contribute to increased test anxiety and reduce test performance (Putwain, 2008). According to Putwain and Best (2012), one classroom strategy employed by teachers prior to important and high stakes tests and examinations is to frequently, and sometimes forcefully, remind students about the importance of test results for future educational aspirations and the negative consequences of failure. Fear appeals have been defined as persuasive messages which are designed to change behaviour by arousing fear (Putwain & Best, 2012). Do teachers in the Spring encourage the students to work harder for their Junior Cycle exams because they may fail, and does this have a connection with PISA scores? Another issue to consider is how the PISA test itself has been presented to the students by the staff co-ordinating PISA at school level. Is there a sense that as this test is low stakes and therefore it does not really matter how they perform? Are teachers' attitudes different in the Spring, when there is a lot of pressure to get the curriculum covered than in the Autumn when there is less pressure? There is no research available on teachers' attitudes to the PISA test, how they present the PISA test to the students or how the PISA tests may link with their approaches to teaching and learning (if at all).

2.3.7. Life satisfaction

Performance on PISA has been shown to have a strong association with Life Satisfaction (OECD, 2017b). It therefore needs to be included when investigating performance at two periods of the academic year, although there is no apparent evidence of their measurement fluctuating over the course of the school year.

Life satisfaction has most commonly been referred to as one's overall appraisal of his or her quality of life (Diener & Diener 1995), an overall assessment of feelings and attitudes

about one's life at a particular point in time, ranging from negative to positive, and is considered to be a key construct of subjective wellbeing (SWB) along with the presence of positive emotions and the absence of negative ones (Shek et al., 2017). Low levels of Life Satisfaction have been associated with poor academic performance and, according to Heffner and Antaramian (2015), Life Satisfaction is the only component of SWB to significantly predict academic achievement. While the importance of wellbeing in different aspects of youth's life has been recognised, and its relationship to academic achievement acknowledged, how youth wellbeing progresses over time continues to be a concern (The Children's Society, 2018; DES, 2019).

PISA 2015, drawing on a measure of global life satisfaction,²¹ reported that, on average across OECD countries, students had an average life-satisfaction score of 7.3, with 15-year-olds in Ireland achieving a similar average score (OECD, 2017b). In an Irish study in 2012 with more than 19,000 young people, Dooley and Fitzgerald (2012) found lower life satisfaction among senior-cycle students than among First and Second Year students. In the follow-up study seven years later they observed levels of anxiety and depression in young people in Ireland had increased (Dooley et al., 2019). In their cross-sectional study of 1,274 German students aged 11-16 years, Goldbeck et al., (2007) examined the effects of age and gender on adolescents' life satisfaction and noted a significant declining trend in German adolescents' life satisfaction in both general (e.g., family life, school life, and social relationships) and health-related domains (e.g., physical condition, freedom from anxiety, and ability to relax). In Asian schools, Shek and Liu (2014) also found that perceived life satisfaction reports have tended to decline over the adolescent years. This was also a longitudinal study of students over three years (grade 7 to grade 9). In a relatively small study of university students (n=82) Steger and Kashdan (2007) found that life satisfaction measured twice, 13 months apart, was moderately stable. In conclusion, most studies present evidence on the changes in life satisfaction over the years with no apparent evidence in the research as to changes occurring within a year.

2.3.8. Learning environment

The term 'learning environment' as used in this thesis includes the coming together of a number of previously discussed constructs such as the nature of relationships between teachers and students, and students' wellbeing. Also included is the students' perception of the school

²¹ Global Life Satisfaction is assessed using context free-free items, where a student is asked to rate their life on a scale from 0 -10, where 0 means the worst possible life and 10 means the best possible life.

climate and the “essential supports” of a whole school approach such as leadership and school management and parental involvement. Performance on PISA has been shown to have a strong association with school climate (OECD, 2017b), although there is no apparent evidence of its extent fluctuating throughout the school year. School climate has been defined by Haynes et al. (1997, p. 322) as ‘the quality and consistency of interpersonal interactions within the school community that influence children’s cognitive, social, and psychological development’. Where there are shared values and norms, learning is facilitated, whereas lack of fairness is associated with lower engagement levels among students (Fredericks et al., 2004). Byrne and Smyth (2010) note that the effect of the perceptions of students about school climate works by shaping student motivation and engagement, and that students who experience negative relations with their teachers appear to disengage with school. In their review of other theorists, Way et al. (2008) note four aspects of school climate relating to Self-Determination Theory which stress the importance of students’ wellbeing, particularly among adolescents: the nature of relationships between teachers and students; the nature of relationships between students themselves; the extent to which student autonomy is allowed in the decision-making process; and the extent to which the school provides clear, consistent, and fair rules and regulations. They observe that subtle factors, such as shifts in student-teacher relationships or peer relationships, can easily influence adolescents’ perceptions of their schools, which Opdenakker et al., (2012) have seen changing during the school year. Students’ perceptions of school climate as measured by PISA have not previously been investigated in the context of Spring and Autumn testing.

The whole-school approach, involving all the members of the school community, does not appear to have been examined as something that might change throughout the school year. A whole school approach is that which involves all members of the school community (staff, students and parents) engaging in a collaborative process (DES, 2019). It is where the entire system of individuals and their inter-relationships in and around the school are considered in supporting the students’ educational journeys and nurturing their learning experience throughout the whole academic year. The whole-school approach involves the shared values of the school community; however, students are more likely to internalize and adopt values and rules when their relationships with the socialization agents (e.g. teachers/principals) are nurturing and supportive (Ryan & Deci, 2000). According to Lee (2012), the primary reason that people (students) are willing to do uninteresting activities is that these activities are valued by significant others whom they feel connected to or to whom they have a sense of relatedness. He suggests that the best student outcomes arise where there is an orderly disciplinary climate,

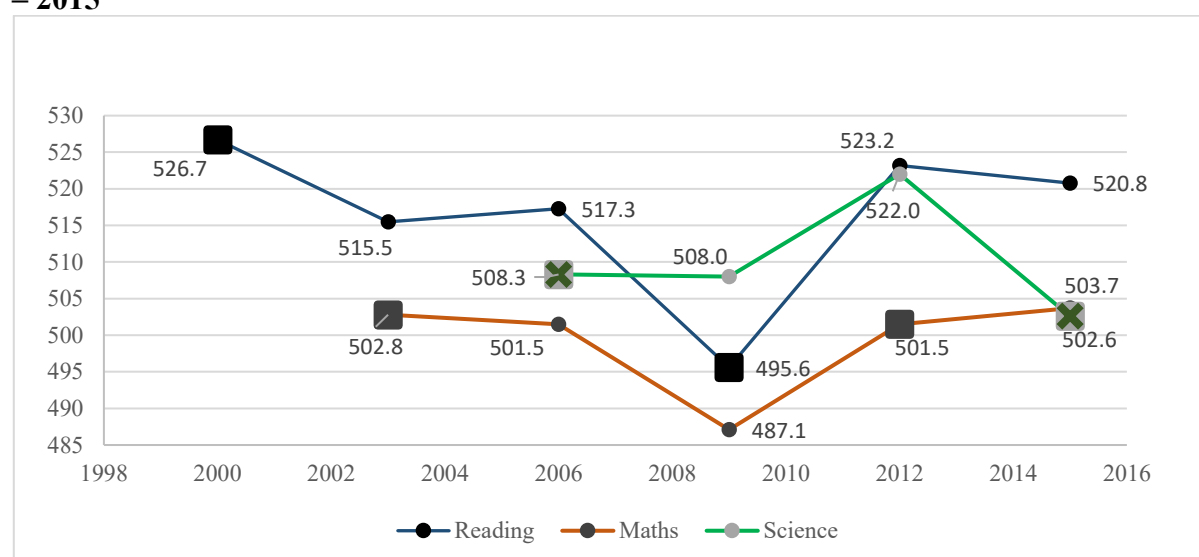
supportive teacher-student relationships and shared values. With the pressures schools have in the Spring, principals might be more willing to conduct the PISA test in the Autumn, and with a more positive approach to PISA from school staff, students may take on these values and engage more with the assessment.

2.4. Patterns of Performance on PISA

Examining how Irish students performed in past cycles of PISA can provide a basis for predicting future performance on PISA and more specifically as a basis of comparison for expectations about performance in the Autumn of 2018. In 2000, the PISA achievement scales in mathematics, reading and science were each set to have an OECD mean score of 500.0 and a standard deviation of 100.0, using random samples of 500 students drawn from each participating OECD country. To be able to compare achievement over the years, the reading achievement scales were anchored to the 2000 cycle when reading literacy was the main domain, the mathematics scales to 2003 and science to the 2006 cycle (Eivers et al., 2007). As Shiel et al. (2016) note, care needs to be exercised when examining performance on PISA over the years, especially when a domain has major status in one cycle and comparisons are made to the previous cycle when it was a minor domain. An example of this is when Science was a major in 2015 and then compared to 2012 when it was a minor domain. PISA advises that the safest comparisons can be drawn when a major domain is compared with major domain such as reading in 2018 with reading in 2009 and reading in 2000. However, comparison can also be drawn from minor domain back to major (such as mathematics in 2015 (minor) to mathematics in 2012 (major)).

Over the years, since the introduction of PISA in 2000, there have been substantive changes made and in particular the 2015 cycle saw the introduction of new scaling methodologies along with the move from a paper-based to a computer based assessment. The current cycle of PISA (2018) has seen the introduction of multi-stage adaptive testing for reading literacy. Taking all things into consideration, Figure 2.1 presents an overall look at how Ireland has performed on average since the introduction of PISA in 2000, the results of which have been comprehensively reported in several national publications (e.g. Shiel et al., 2001; Cosgrove et al., 2005; Eivers et al., 2007; Perkins et al., 2012; Perkins et al., 2013; Shiel et al., 2016).

Figure 2.1: Ireland's mean score performance on reading, mathematics and science 2000 – 2015



In the first cycle of PISA, when reading was a major domain, students in Ireland achieved a mean reading score of 526.7. There was a significant decline in reading literacy in Ireland in 2009 compared with 2006 (21.7 score points) followed by an improvement between 2009 and 2012, of 27.6 score points. Performance was relatively stable between 2012 and 2015, with a non-significant drop of 2.4 score points (Shiel et al., 2016). Excluding the 2009 cycle, Ireland's mean score ranges between 515.5 and 526.7. Students in Ireland achieved a mean mathematics score of 502.8 in 2003 and 501.5 in 2006. As with reading literacy, performance dropped significantly in 2009, when the mean score was 487.1. There was an improvement again in 2012 (501.5), and the mean score in 2015 was 503.7. Hence, in all cycles except 2009, Ireland's mean score in mathematics ranged between 501.5 and 503.7. In 2006 when science was a major domain, Ireland's mean score in science was 508.3. This dropped marginally to 508.0 in 2009, but increased significantly to 522.0 by 2012, before falling back to 502.6 in 2015. Looking at the comparison between 2006 and 2015 when science was a major domain in both cycles, there is a difference of 5.7 score points.

Another important way in which PISA describes results is through the use of proficiency levels, which are specific to each domain. The DES (2011; 2017) have focused on proficiency levels in PISA when setting targets for post-primary schooling, in particular the low- (at or below Level 1) and high-achievers (at or above Level 4 and at or above Level 5). In 2000, 11.0% of students performed below Level 2 on reading literacy and this was broadly the same for all cycles except 2009 (17.2%). The percentage of students at or above Level 5 was at its highest in 2000 (14.2%) and dropped to 11.0% in 2003 with a further drop in 2009

to 7.0%, rising in 2012 to 11.4%, and with a similar percent for the 2015 cycle (10.7%). Excluding the 2009 PISA cycle, the percentages of students at and above Level 5 on mathematical literacy ranged from 9.8% to 11.4%, with percentages below level 2 ranging from 15.0% to 16.9% (again excluding the 2009 cycle). Finally, proficiency levels for science began in 2006 with approximately 15.5% of the students scoring below proficiency Level 2, dropped slightly in 2012 to 11.1% but in 2015 rose back up in line with 2006 and 2009. There was a similar trend for the high performers, with 9.4% in 2006, 8.7% in 2009, 10.7% in 2012 and 7.1% in 2015. This examination of the overall performance for all three domains and the high and low proficiency levels has provided a point of reference against which performance in the Spring and Autumn testing in 2018 may be compared. It also indicates that, with the exception of 2009, average performance, and the proportions of students at different proficiency levels have been remarkably stable.

2.4.1. Factors associated with expected performance

The 2009 cycle of PISA saw results for Ireland drop substantially for reading and mathematics performance, which raises the question, could this happen again? In their analysis of the 2009 results, Perkins et al. (2012) suggest that some of the reasons for the decline could be due to: demographic changes (increase in the percentage of students with an immigrant background); changes in the distribution of 15-year-old students in post-primary schools (e.g. the proportion of Transition Year students went from 16% in 2000 to 24% in 2009, and these students had the largest decline in mathematics); random sampling fluctuation (eight schools in 2009 had considerably lower mean scores than the lowest school mean scores in 2000); and survey fatigue and student engagement. Sachse et al. (2019) note that response patterns (i.e. students omitting an item) are seen as a measure of student engagement and they found a larger increase in missing data for Ireland between 2003 and 2009 than for the rest of the OECD countries. The treatment of missing data on the results of the analysis need to be considered carefully when drawing conclusions from the data.

An independent review of the 2009 results by LaRoche and Cartwright (2010) confirmed the declined in student achievement but also suggested that it could be a case of regression to the mean (the phenomenon of a variable that is extreme on its first measurement but moves closer to the *mean* or *average* on subsequent measurements). Another source of error they suggested at the time was linking error (the linking of common or trend items over the cycles). However, in the sixth cycle of PISA in 2015 (and again in 2018) there has been greater construct coverage to help combat the linking error. The 2015 cycle increased the

number of link items which allowed for greater construct coverage and reduced uncertainty in linking scales from cycle to cycle (OECD, 2016a; 2017a). For example, the number of link reading items between 2009, 2012 and 2015 was only 43 compared to 85 link items between 2009 and 2015²² (Shiel et al., 2016). The OECD also try to account for fluctuations in performance from cycle to cycle by using linear regression to produce average 3-year trends. Covering the period 2006 to 2015, Ireland's average three-year trend in science was -0.4 score points, indicating a non-significant decline of less than one score point across PISA cycles. The average 3-year difference in reading literacy between 2009 and 2015 (+12.8) was statistically significant and the average three-year trend in mathematics (since 2003) is just 0.1 points (Shiel et al., 2016). The changes to the design of PISA should ensure that if fluctuations occur between cycles, they are more likely to be due to changes in performance rather than the design of PISA. This is especially relevant in comparing performance on the Spring and Autumn 2018 PISA assessments in Ireland.

The introduction of computer-based testing in PISA caused concern regarding students' performance. Examination of test administration mode and students' performance in cognitive tests has been the focus of many studies. Kingston (2008) conducted a meta-analysis on 81 studies performed between 1997 and 2007 on the administration mode (computer or paper) and test scores of students in grades 1–12. He found that the grade the students were in appeared to have no relationship between the computer and paper test performance while the subject they were tested in did appear to relate to comparability. Other factors such as study design, sample size and computer practice have also been the focus of mode effect studies, with no effects observed; however, there was found to be more of a difference in test scores between computer and paper tests for linear tests than for adaptive tests (Wang et al., 2007). Examining the results from three countries participating in the first computer based testing as part of PISA 2006, the OECD (2010) reported that the paper-and-pencil science test appeared to disadvantage males due to the length of the items and the reading load. The computer presentation seemed to disadvantage females, but the OECD could not find an explanation for this. The OECD (2015) conducted a further mode effect study in 2014 on the PISA Field Trial data prior to the full introduction of computer based testing in 2015 and found no significant mode effect. The challenge for the PISA assessment in 2015 was the comparability with performance in PISA cycles conducted prior to the introduction of the computer based test. Jerrim et al. (2018) note

²² The number of reading link item between 2000 and 2009=26 and the number between 2006 and 2009=26 (OECD, 2012).

the importance of each piece of research should conduct its own empirical verification of mode effects and they acknowledged that the strategy used by ETS²³ more than likely minimised mode effect in the PISA assessment. Several empirical findings suggest that CBT mode effects may depend on school characteristics such as schools having limited access to fully-updated computers or the high-speed Internet access required for the online testing platform (Backes & Cowan, 2019). To counteract this problem, the administration of PISA in Ireland was conducted on laptops hired by the Educational Research Centre (with encrypted tests copied to the hard drive) and therefore all students, in both the Spring and Autumn testing, did the assessment on the same make and model of laptop. Familiarity with conducting assessments on computers may also be associated with student performance. The OECD (2010) suggested taking into account the nature of students' computer use which is changing all the time, as are types of ICT activities, access to the internet and time spent on the internet. Taking account of and controlling for these factors is necessary when examining performance on PISA and time of testing.

In order to understand how students perform on PISA, student background variables such as gender and grade level also need to be taken into consideration along with family background variables, such as socio-economic status (SES). For example, regarding gender differences in Ireland, females in general perform better than males on the PISA reading literacy scale, males significantly outperform females in mathematics and there is usually no significant difference between males and females on the science literacy scale. Examining differences in Ireland by grade level in the most recent cycle, where science was the major domain, students in Third Year scored significantly higher on average than students in Second Year and students in Fifth Year on science (by 73 points and 14.8 points, respectively), and significantly lower than students in Transition Year (by 19 points) (Shiel et al., 2016). With the differences in the percentage of students at each grade changing with Autumn testing (as noted in section 2.4.2), along with time of testing, the performance at each grade level may also differ. Students' economic, social and cultural status (ESCS) is a known predictor of student achievement and is associated with significant differences in student performance. Shiel et al. (2016) found in the 2015 PISA cycle that students in Ireland in the top third of the OECD's index of socioeconomic status had a mean science score (548.1) which was significantly higher than students in the middle third (507.8) and in the lowest third (472.8). In sum, it will be

²³ ETS described the analyses undertaken using field trial data in Annex A5 and A6 of the PISA 2015 Technical Report (OECD, 2017a): The assumption is that there is no person- (or country-) specific mode effect and that the statistical adjustment be made to the PISA questions is taken to be the same across all demographic groups.

important to consider these and potential other background characteristics that may be associated with changing PISA testing to the Autumn period. They should be considered individually and in the context of multi-level modelling, where the effect of a single variable or interaction can be examined, while other school and student level variables are held constant.

2.5. Conclusion and Research Questions

Challenges experienced by schools in the Spring term prompted a review of the PISA testing period which has always been conducted in the Spring. Research has shown the significant contributions PISA data have made in the development of educational policy in Ireland. The data have been used by the DES to set targets in order to improve literacy and numeracy and reduce the achievement gap between students in DEIS (disadvantaged) post-primary and non-DEIS post-primary schools. Internationally, PISA has provided a vast data bank that is open for analysis to independent researchers, and PISA outcomes can be used by policy makers, indicating the importance of the data. A review of the literature examining the key defining elements of the PISA assessment (PISA is not curriculum-based or grade-based) has shown that, in theory, it should be possible to move the time of testing from Spring to Autumn. However, the lack of research examining performance on PISA when conducted at different times of the year in an Irish context, has led to this research study and the primary research question:

- **RQ1: Does the performance of 15-year-olds in Ireland differ across Spring and Autumn administrations of the PISA tests?**

In examining how students in Ireland might perform in Spring compared to the Autumn, it was necessary to examine how 15-year olds in Ireland performed across previous cycles of PISA and in doing so provide a point of reference. While Ireland's results were shown to be relatively stable over the years, the drop in PISA results in 2009 and the introduction of computer based testing were causes for concern. However, in more recent cycles, the OECD has adjusted the design of the PISA assessment to address earlier criticisms of its approaches to scaling and linking, and has implemented strategies to minimise mode effect in the PISA assessment. In examining what PISA measures, it was established that while PISA purports to be a non-curriculum-based assessment, the subject domains of mathematics and science in particular, require students to have covered broad content areas in school. Having established that an element of the performance on PISA is based on what students have learnt in school, an important factor to consider when analysing performance on PISA when administered at two different periods in the school year is students' opportunity to learn. Research has shown

familiarity and exposure to mathematics content to be related to performance on PISA. Another important factor that needs to be considered if testing were to occur in the Autumn is students' summer learning or lack of summer learning which could be linked in a negative way on results of tests carried out in the Autumn time. Much of the research on 'summer learning loss' has been undertaken in the United States with limited research carried out in Ireland and with no research conducted on the possible academic loss that students in the Transition Year programme may experience. Research has also shown that as part of examining summer learning loss it will be important to look at the time teachers spend at the beginning of the academic year in catching up on material taught in the previous term and topics/skills/learning outcomes revisited. This has led to a number of additional research questions that need to be examined as part of this study:

- **RQ2: To what extent might summer learning loss be mitigated as a factor associated with the performance of 15-year olds in Ireland taking PISA tests in the Autumn?**
- **RQ3: To what extent might Opportunity to Learn be a factor associated with the performance of 15-year olds in Ireland taking PISA tests in the Autumn?**

A review of the literature on other educational outcomes that are related to student achievement and that research has shown may vary at different points during the school year, concern components of student engagement and motivation. The review of this literature found a gradual increase in student misbehaviour (e.g. student inattention, daydreaming, chatting) and a gradual decrease in work-related activities (e.g. questioning, student initiated comments) across grade levels. Various elements of motivation were examined and were found to change over the course of the school year. For example, self-efficacy (one's belief in their ability to carry out a task) was found to fluctuate over the academic year. Reviewing the research on the theory of self-determination, it was noted that the quality of the interpersonal relationships between the teacher and student within the same academic year of First Year in secondary school decreased over time. Some researchers found that mastery goals tend to be emphasised less often at the end of the school year than at the beginning. Other factors that are related to performance but research has not shown whether time of testing is associated on their estimation are those of students' Life Satisfaction and the learning environment. In considering these factors the following research questions will be explored in this study when examining the performance on PISA if testing were moved from the Spring to the Autumn:

- **RQ4: Do 15-year-olds' level of engagement with school differ between the Spring and Autumn terms?**

- **RQ5: Do 15-year-olds' level of motivation differ between the Spring and Autumn terms?**
- **RQ6: Do 15-year-olds' sense of well-being differ between the Spring and Autumn terms?**
- **RQ7: Is there a difference in the school learning environment (school climate) between the Spring and Autumn terms?**

The chapter to follow outlines the design and implementation of the empirical study that was designed to address these questions.

Chapter 3 Methodology

3.1. Introduction

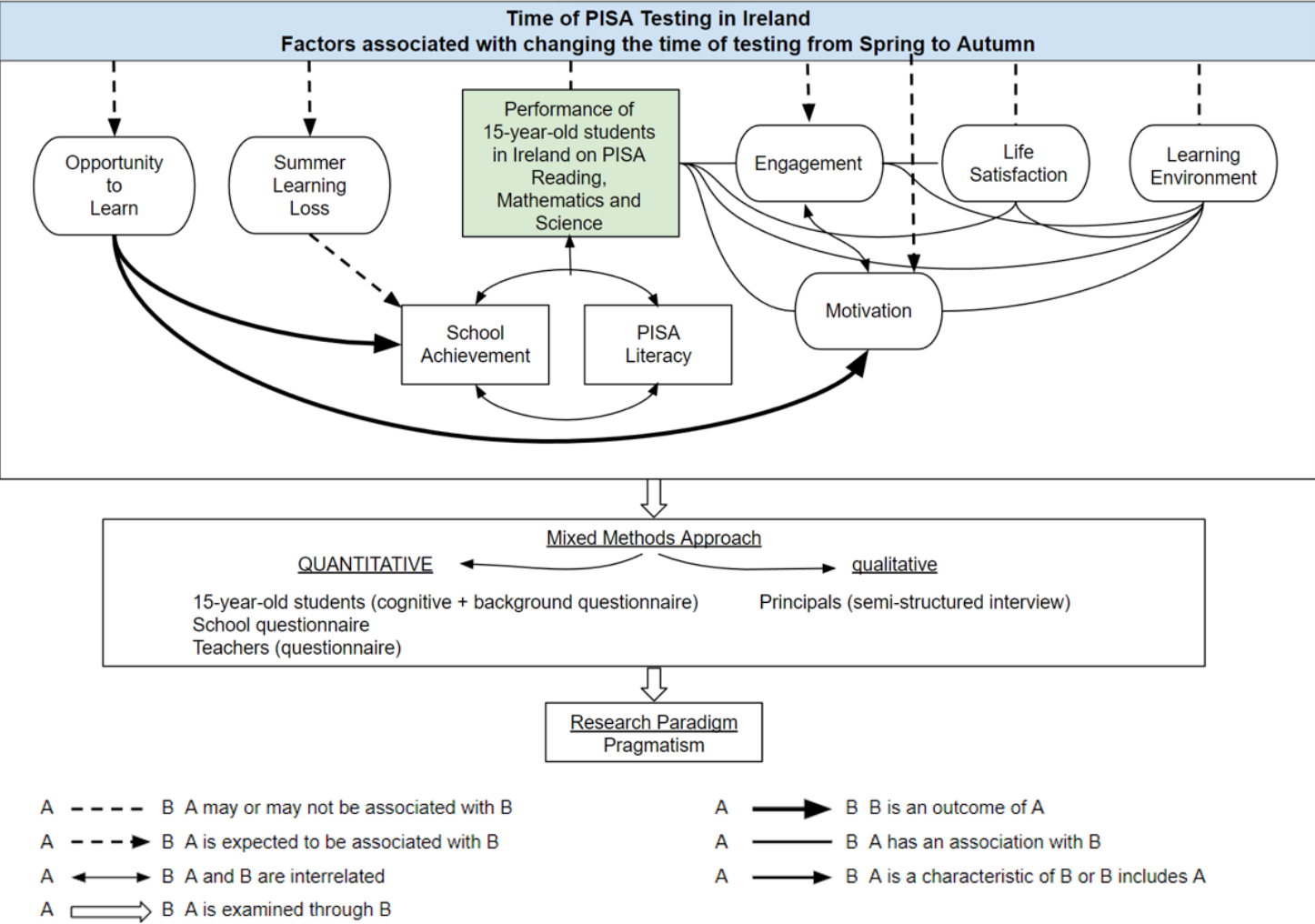
This empirical study seeks to examine student performance on PISA reading, mathematics and science when students in an age-based sample are tested at different times of the year (Spring versus Autumn testing). The research uses data gathered from three sources: the main National PISA study in Ireland conducted in the Spring of 2018, a study conducted with a smaller sample of Irish students in the Autumn of 2018 (a feasibility study on behalf of DES) and data gathered by the researcher from a sample of teachers and principals from the participating schools in the Autumn study. The research questions, which were presented at the end of the previous chapter, are addressed using a Mixed Methods approach. Student performance on PISA and related school- and student variables are measured quantitatively at two points in time and the views of teachers and principals on issues relevant to the study are gathered through questionnaire and semi-structured interviews respectively.

Section 3.2 outlines the conceptual framework of the study within the theoretical framework of pragmatism. The details of the instruments used, the sampling procedures, the administration of the PISA tests, the researcher-designed questionnaires, and the implementation of the interviews will be described in sections 3.3 and 3.4. In section 3.5 the means by which data were analysed is explained. Section 3.6 examines the ethical issues considered in the study. The validity and trustworthiness of the study are discussed in Section 3.7.

3.2. Conceptual Framework.

The issues discussed in chapters one and two underpin the conceptual framework for this study, which is presented in Figure 3.1.

Figure 3.1: The conceptual framework for this study



The conceptual framework is a ‘bringing together’ of the issues in an attempt to present the aim of the study. As expressed by McGaghie et al. (2001), it “sets the stage” for the presentation of the research question. At the top of the figure is the context and research question of the study, which involves examining the factors associated with changing the time of PISA testing in Ireland from Spring to Autumn. The centre of the diagram presents the key research question - whether testing in the Spring or the Autumn is associated with performance of students in PISA, of which there are two elements: the broad concepts of what the students have learnt in school (labelled school achievement) and how students apply what they have learnt in school to deal with real life problems (literacy). Testing in the Autumn may be associated with students’ opportunity to learn and by summer learning loss, which research has shown to be associated with school achievement. Another variable associated with opportunity to learn is students’ self-beliefs (self-efficacy, a component of motivation). Performance on PISA has also been shown to be related to engagement and motivation, on which time of testing is also expected to be associated with. Life Satisfaction and elements of the learning environment are also associated with performance on PISA but it is not clear from the research whether time of testing is associated with them.

In order to examine all of these factors on the performance of 15-year-olds in the timing of the administration of the PISA tests, this research methodology uses a mixed methods approach (see bottom of the diagram) whereby, the main data collected are the quantitative data gathered in the form of the students’ cognitive assessment and background questionnaire (core PISA test) in the Spring and Autumn 2018. Additionally, the views and opinions of teachers were collected through a researcher-designed questionnaire, while those of principals (a selected few) were obtained by interview. The details of the methodology will now be presented.

This study is set within the worldview/paradigm²⁴ of pragmatism, which is seen as moving away from concepts such as *truth* and *reality* and giving more attention to *what works* as the truth when investigating the research question. The philosophical theory of pragmatism is seen as a means of bringing an empirical singular scientific approach to research (such as post-positivism) and a more universal subjective approach (such as constructivism) together. Pragmatism originates in the work of Peirce, James and Dewey (Cherryholmes, 1992). Unlike other worldviews (such as positivism, social constructionism, critical paradigm or post-

²⁴ Worldview/paradigm is a distinct set of concepts or thought patterns, including theories, research methods, and standards that are recognised within a field. Paradigms are big assumptions about the world compared to theories which describe more specific phenomena.

modernism), pragmatism focuses on the consequences of the research and the importance of the research question over the methods used. It also recognises that multiple data collection methods can be used to inform the study (Creswell, 2003).

The basic set of beliefs that guide action include epistemological, ontological and axiological beliefs (Johnson & Onwuegbuzie, 2004). Epistemologically, the key to pragmatism is practicality; the researcher collects data by ‘what works’ when investigating the research question. Post-positivism does complement this study strongly in the first phase where distance and impartiality permitted the data to be collected objectively from the primary participants of the study i.e. 15 year-old students. However, the interviews with the principals allowed for a more personal view of the factors influencing time of testing. Ontologically, social reality can be viewed as singular or universal and through a pragmatist lens it is seen as constantly shifting, depending on the individual. Axiology considers the role of values in research and in pragmatism, a multi-stance approach enabling the researcher to bring both biased and unbiased perspectives to the research. Both the objective and the subjective knowledge are valuable in answering the main research questions of this study.

Critics of pragmatism say it is not possible to combine ontological and epistemological traditions and that there is too much concentration on practicality but David Morgan (2014), drawing on Dewey’s concept of experience, notes the importance of joining beliefs and actions in the quest for knowledge. He advocates ‘treating research as a human experience that is based on the beliefs and action of the actual researcher’ (Morgan, 2014, p7).

For this study, which aims to measure and explore the performance of students on PISA when tested at different times of the year, a pragmatic theoretical framework is an appropriate means of inquiry. The pragmatic approach, as noted by Morgan (2007), highlights how the philosophical concerns about the nature of knowledge and the technical concerns about the methods used to generate that knowledge are well connected. The most suitable means of exploring this, within a pragmatic framework, is through the use of a mixed methods sequential explanatory design. Such a design involves collecting qualitative data after a quantitative phase in order to explain the quantitative data in more depth (Creswell, 2003). In Spring 2018, a sample of students undertook the PISA assessment and a further sample participated in the Autumn administration of PISA. Students also answered a detailed background questionnaire after taking the PISA tests. As part of the Autumn administration, a sample of teachers also completed a questionnaire about their views and opinions on testing at different times of the year. The second phase of the study (qualitative phase) was conducted to gain a more thorough understanding of the factors principals felt could have an association with students’

performance and motivation, based on when PISA is administered in schools. The following section lays out the research design of this study.

3.2.1. A Mixed Methods Sequential Explanatory Study

The fundamental principle of mixed methods research is that the combination of quantitative and qualitative approaches provides a better understanding of the problem than either approach can achieve alone. The term mixed methods, as used in this study and defined by Tashakkori and Creswell (2007, p. 4) is ‘research in which the investigator collects and analyses data, integrates the findings and draws inferences using both qualitative and quantitative approaches in a single study or a program of inquiry’. Drawing on a wide range of tools for data collection (student and teacher questionnaires and semi-structured interview with principals) allows for a comprehensive study of the research problem. The goal of mixed methods research, according to Johnson and Onwuegbzie (2004, p. 15), is ‘not to replace either of the approaches but rather to draw from their strengths and minimise the weaknesses of both’. Ivankova et al. (2006) provided detailed ‘how-to’ guidelines on developing a visual model for mixed methods procedures. Drawing on their work, Figure 3.2 presents the visual model for this study. The quantitative phase is the dominant phase of this study and this is represented in the capitalising of the word (QUANTITATIVE or QUANT) with the qualitative phase (qual) assisting with the interpretation of the results from the quantitative phase.

Figure 3.2: Visual Model for Mixed Methods QUANT - qual Sequential Explanatory Design

Phase	Procedure	Product
QUANTITATIVE Data Collection ↓	- Spring 2018: 5,577 students' cognitive assessment + Student Background Questionnaires, 157 School Questionnaires - Autumn 2018: 1,988 students' cognitive assessment + Student Background Questionnaires 57 School Questionnaires 415 Teacher Questionnaires	- Numeric data - Some text data from Teacher Questionnaire
Initial QUANTITATIVE Data Analysis ↓	- Descriptive statistics on Teacher Questionnaires (weighted) - SPSS quantitative software	- Descriptive statistics
Connecting Quantitative and Qualitative Phases ↓	- Purposefully selecting principals from schools that participated in the Autumn testing. Schools in the administration regions 1, 2 and 3 and within a one-hour drive of Dublin were randomly selected with numbers proportional to their distribution in school sector type. - Developing interview question for Principal interview	- Interviews (n=6) - Interview protocol
Qualitative Data Collection ↓	- Semi structured interviews with Principals - NVivo software	- Text data (interview transcripts)
Qualitative Data Analysis ↓	- Coding and thematic analysis - NVivo qualitative software	- Codes and themes
Quantitative Data Analysis ↓	- PISA achievement and questionnaire data with IDB Analyzer - Multi-level modelling with MPlus	
Integration of the QUANTTATIVE and qualitative results	- Interpretation and explanation of the quantitative and qualitative results	- Discussion - Implications

3.3. Phase 1 - Quantitative Phase, PISA Testing

The first phase of this mixed methods study was the gathering of the quantitative data from the National PISA 2018 Study (conducted in the Spring) and the PISA Study conducted in the Autumn of 2018. The core elements of the PISA assessment were gathered in both these studies, namely the cognitive assessment of 15 year-old students in mathematics, reading and science literacy in PISA, the completion of student background questionnaires and school questionnaires. Additionally, in this first phase, data were gathered in the form of a questionnaire from a sample of teachers in the Autumn study. This section describes the procedures that were followed in this quantitative phase.

3.3.1. Instruments used in phase one of the research

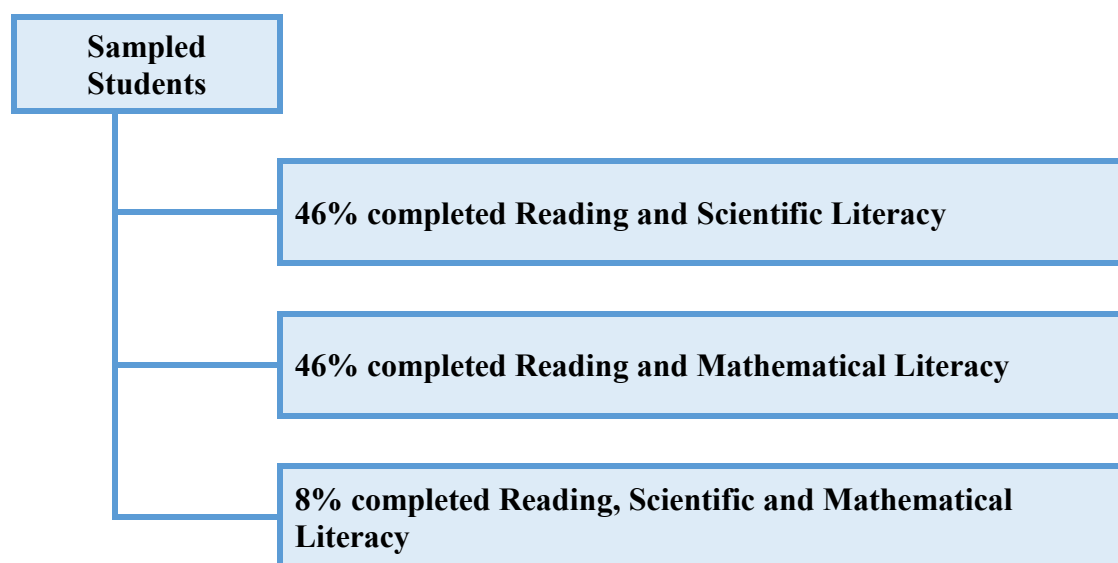
Cognitive instruments – reading, mathematics and science

The cognitive instruments used in PISA and that are used for the Spring and Autumn testing comprise tests of reading literacy, mathematical literacy and science literacy. Reading literacy was the main domain for 2018 and included items that were used in previous cycles (i.e., trend items originally developed for paper-based testing, but now on computer) and a new set of items developed for this cycle under the Reading Literacy Framework for 2018 (i.e., a set of items specifically developed for computer-based testing). Mathematics and science in 2018 just used items from previous cycles as they were minor domains. While science included some older paper-based items, it also included new items developed specifically for computer-based assessment when science was a major domain in 2015, such as virtual items, where students would run and interpret the outcomes of experiments. Mathematics included only items drawn from earlier paper-based tests as it was a major domain back in 2012, when most countries took PISA on paper only. The distribution of items by dimensions of each of the frameworks for reading, mathematics and science can be found in Appendix B, Table B1, B2, and B3.

The content of the PISA tests was established in consultation with national representatives and international panels of subject experts. Every student was assessed on reading literacy in both Spring and Autumn studies, with 46% of the students assessed on reading and scientific literacy and another 46% assessed on reading and mathematical literacy. Figure 3.3 presents the full assessment design used in Ireland.²⁵

²⁵ Ireland participated in computer based assessment without the global competence option in PISA 2018.

Figure 3.3: Computer based assessment design, proportions of students sampled in each domain



Note. Source: ETS (2016).

This combination provided the necessary covariance²⁶ information between reading literacy and each of the two minor domains. In addition to this, 8% of students completed items from all three domains which provided tri-variate information. Each student assessed in Spring and Autumn was presented with a test form based on these prescribed probabilities and Table 3.1 shows a detailed view of how the 36 forms were assembled for the computer-based assessment. As discussed in chapter 2, a multi-stage adaptive testing design was used for reading literacy (there were no clusters of items like that of mathematics and science), and this is presented in the table covering two clusters of approximately an hour of testing. These forms were assigned to students during the second stage of sampling (see section on ‘Sampling Students’ below).

²⁶ Covariance is the degree to which tests (in this case) are linearly associated.

Table 3.1: Domain coverage and distribution of forms for PISA testing

Forms	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Forms	Cluster 1	Cluster 2	Cluster 3	Cluster 4
1		R	M1	M2	19	S1	S3		R
2		R	M2	M3	20	S2	S4		R
3		R	M3	M4	21	S3	S5		R
4		R	M4	M5	22	S4	S6		R
5		R	M5	M6a	23	S5	S1		R
6		R	M6a	M1	24	S6	S2		R
7	M1	M3		R	25		R	S1	M1
8	M2	M4		R	26		R	M2	S2
9	M3	M5		R	27		R	S3	M3
10	M4	M6a		R	28		R	M4	S4
11	M5	M1		R	29		R	S5	M5
12	M6a	M2		R	30		R	M6a	S6
13		R	S1	S2	31	M1	S1		R
14		R	S2	S3	32	S2	M2		R
15		R	S3	S4	33	M3	S3		R
16		R	S4	S5	34	S4	M4		R
17		R	S5	S6	35	M5	S5		R
18		R	S6	S1	36	S6	M6a		R

Note. r=reading literacy, M1-M6a=mathematic literacy, S1-S6=scientific literacy

Source: OECD (2020b).

Context questionnaires

PISA collects background information using questionnaires. The PISA 2018 Questionnaire Framework is shown in Figure 3.4. This includes the following key components: Non-cognitive/metacognitive constructs, student background constructs, and schooling constructs – teaching and learning, school policies and governance. The framework is represented in the Student Questionnaire and Core School Questionnaire that were developed by the international PISA consortium. Also included in this study are the optional Educational Career Questionnaire and the Wellbeing Questionnaire, and a national questionnaire developed by the Educational Research Centre, the Test-Taking Behaviour Questionnaire. Summary details on all these questionnaires can be found in the national report on PISA 2018 prepared by the Educational Research Centre (McKeown et al., 2019).

Figure 3.4: Outline of content covered in PISA 2018 questionnaire modules

	Student background constructs:	Schooling Constructs:	Non-Cognitive / Metacognitive Constructs
Reading Literacy for PISA 2018:	Out-of-school reading experiences	-Teaching and Learning: Learning time and curriculum -Teaching and Learning: Teaching practices for reading -Teaching and Learning: Teacher qualifications and professional development -School Policies: School-level learning environment for reading	-Reading related outcomes: attitudes, motivation and strategies
General categories for PISA:	- Student SES, family and home background, - Migration and culture, - Educational pathways in early childhood	-School Policies: School climate: interpersonal relation, trust and expectations -School Policies: Parental involvement -School Policies: School context and resources -Governance: Allocation, selection and choice -Governance: Assessment, evaluation and accountability	-Dispositional & school-focused variables -Dispositions for global competence

Note. Source: OECD, 2019a.

In addition to these questionnaires, a teacher questionnaire was developed specifically for this research study to provide additional insights from teachers' perspectives on PISA testing at different times of the year. The purpose of the first section of the questionnaire was to gathered information on the characteristics of the teachers in relation to the length of time they have been teaching, whether they were part-time/full-time, the subjects they taught and the year group. The year groups that were focused on were Third Year, Transition Year and Fifth Year as these represent the majority of PISA eligible students. Questions on their familiarity of the PISA survey and their understanding of the purpose of PISA testing were also presented to teachers. The remaining questions in this section of the questionnaire sought to gather information on teachers' views on their students' overall performance on PISA if testing was conducted in the Autumn compared to the Spring. The purpose of the next section of the questionnaire was to examine the potential presence of summer learning loss and opportunity to learn (OTL). The development of this section began with ideas from the report by the

National Summer Learning Association (NSLA) in the United States where they examined time teachers spent re-teaching old material in the new term (NSLA, 2013). Questions on the number and length of class periods were first presented to the teachers. This was followed by questions specifically about the number of class periods in the first six weeks of the academic year devoted to revisiting concepts and skills covered in the previous academic year. The next part presented questions about the topics/skills/learning outcomes that are covered at the beginning of the academic year for students in Third, TY and Fifth Year. The final part of this section presented questions on the Junior Cycle curriculum specification for English in relation to the PISA assessment framework. The next two sections presented questions about student motivation and engagement at different times of the year, which teachers were asked to answer in relation to the students they teach. The aim of the final question, which was open-ended, was to see if the teachers felt there were other factors (not mentioned in previous questions) that might explain any potential difference in PISA performance between testing in the Spring and the Autumn.

To improve the internal validity of the questionnaire it went through various stages of checking. The first main stage of checks involved asking ERC colleagues to review it. These colleagues had experience in questionnaire design and one member had extensively reviewed literature on summer learning loss. The main revision at the end of this stage of checking involved revision to the Likert scales used for questions four and five. The next step in the development of the questionnaire involved presenting it to the PISA National Advisory Committee (NAC). There were two areas noted for revision by members of the NAC; the first involved the re-wording of ‘revising topics/skills/learning outcomes’ (which was initially used) to revisiting topics/skills/learning outcomes. The second area was around the wording of the familiarity with PISA. The original wording had implied that teachers should be using a PISA-style approach. Finally, the questionnaire was piloted by five teachers in a school that had not been selected for either Spring or Autumn testing. This enabled the questionnaire to be administered in exactly the same way as it would be in the Autumn study. Pilot teachers were asked for feedback, including any ambiguities and difficult questions they identified. As part of this check, the time taken to complete the questionnaire was recorded. The answers were assessed on whether each question gave an adequate range of responses and all questions were checked for completeness. Very few changes were made to the questions after this phase of piloting, and these related to minor spelling and punctuation issues. The final version of the questionnaire can be found in Appendix C.

3.3.2. Sampling schools, students and teachers

This section provides a brief outline of the sample design used for the first phase of the study i.e. PISA testing in the Spring and the Autumn. The layout of this section will follow the steps used in the sampling procedure carried out by Westat /Core C.²⁷ Data standards implemented in this study have been endorsed by the PISA Technical Advisory Group²⁸ and wherever proportions or quantities are specified (for example, response rates), these have been determined through an examination of research undertaken or have been reviewed by members of the Group so as to minimise the effect of any potential bias in the data (OECD, 2020b). While the sampling procedure was the same for both samples of schools, there are some differences relating to numbers of schools, age definition, overlap control and the use of replacement schools and these will be noted in the relevant sections. The first section examines the sampling of the schools. This is followed by the sampling of the students, as sampling in PISA takes a clustered two-stage stratified approach.

Sampling schools

This section presents the process of sampling schools with particular reference to the differences that arise between the Autumn and Spring study. As noted in chapter 2, the operational definition of the age population directly depends on the testing dates; therefore, the age definition for the Spring and Autumn testing will differ. The Spring testing period was from 1st March 2018 - 20th April 2018²⁹ and so the age definition was 1st January 2002 to 31st December 2002. There were additional restrictions on the dates for Autumn testing. Testing in PISA is not permitted during the first six weeks of the school year³⁰ because of a concern that student performance levels may be lower at the beginning of the academic year than at the end of the previous academic year. The earliest possible date that Autumn testing could take place was 15th October 2018 given that the first day of term had been recorded as 1st September

²⁷ PISA 2018 Technical Standard 1.13 states that, as in the previous cycles, the International Contractor (for 2018 it was Westat (United States) –Core C) should select the school samples unless otherwise agreed upon. As part of my role as data manager in Ireland for PISA 2018 Spring and Autumn testing, I liaised closely with Westat on the sampling tasks for both the Spring and Autumn testing (finalizing the school sample size and allocation to explicit strata; reviewing, checking and approving the selection of the school sample; and checking and approving the creation of the file used to drive the within-school sampling in KeyQuest (KQ) (OECD, 2020b).

²⁸ The OECD Secretariat put together a large team of people with collective expertise in a variety of areas including: the Technical Advisory Group, Mathematics Expert Group, Reading Expert Group, Science Expert Group, Questionnaire Expert Group, Others as needed.

²⁹ PISA 2018 Technical Standard 1.3 notes that unless otherwise agreed upon, the testing period: is no longer than eight consecutive weeks in duration for computer-based testing participants (OECD, 2020b).

³⁰ PISA 2018 Technical Standard 1.3 notes that unless otherwise agreed upon, the testing period: does not coincide with the first six weeks of the academic year (OECD, 2020b).

2018. The Autumn testing period was then recorded as 15th October 2018 to 23rd November 2018 and the age definition was 1st August 2002 to 31st July 2003.

Stratification (both explicit and implicit) is used in the sampling process in PISA and the same stratification variables were used in both the Autumn and Spring samples, details of which can be found in Appendix D, Table D.1 The desired base PISA target population internationally consists of 15-year-old students (students aged 15 years and 3 completed months to 16 years and 2 completed months at the time of testing, or a one-month variation of this) attending educational institutions in grades 7 and higher (Westat, 2016). This means that, in Ireland, 15-year-old students, enrolled full-time/part-time, between First year and Sixth year in post-primary school would be included in the National Desired Target Population. Details of the data used for both samples can be found in Appendix D, D.2.

The total number of schools to be sampled had to be at least 150 schools in Spring testing and 50 schools (as per the guidelines for an adjudicated region) in the Autumn. For Autumn testing, Ireland was treated as an additional adjudicated region.³¹ An adjudicated region is a country, geographic region, or similarly-defined population, for which the international contractors fully implement quality assurance and quality control mechanisms (OECD, 2020b). The total number of students to be sampled had to be at least 6,600 in the Spring testing and 2,244³² students in the Autumn (as per the guidelines). The percentage of students in the sample for each explicit stratum had to be approximate to the percentage in the population for each stratum so that the expected proportion of students in the sample was approximately the same as the population proportions of PISA eligible students in each of the explicit strata. This gave an initial allocation of 150 schools for the Spring testing and 51³³ for the Autumn testing, Appendix D, Table D.3 presents the details for each explicit stratum.

Before the final sampling of schools, there were two other procedures undertaken – small school³⁴ analysis and overlap control. Small School Analysis (SSA) was conducted so as to ensure that such schools would be adequately represented in terms of student numbers, thereby controlling the desired target sample size. The same procedure was carried out for both the Spring and the Autumn, and results of the SSA can be found in Appendix D, Table D.4.

³¹PISA 2018 Technical Standard 1.9 notes that the school sample size needs to result in a minimum of 150 participating schools, and 50 participating schools for additional adjudicated entities (OECD, 2020b).

³²PISA 2018 Technical Standard 1.8 notes that the student sample size for the computer-based mode is a minimum of 6600 assessed students, and 2244 for additional adjudicated entities (OECD, 2020b).

³³ It would have just been 50, as only one stratum yielded 0 schools and this was adjusted so that a school was sampled in every stratum.

³⁴ A small school as defined by PISA has 44 or fewer PISA eligible students in contrast to the ERC stratification of school size (up to 45, 46-85 and 86 or more, see Appendix D, Table D1).

The other procedure, overlap control, is usually undertaken when another international education study (e.g. TIMSS) occurs in a country at the same time as the PISA assessment (Westat, 2017) such that a minimum (or a maximum) of the same schools are sampled for each study. For Spring testing, there was no requirement for overlap control. However, for the Autumn testing, overlap control was required with PISA Spring testing, specifically because students in Spring testing who were born between 1st August 2002 and 31st December 2002 could potentially be sampled in both studies if their school was selected for both samples.

The final part of the stage 1 in the sampling of schools involves carrying out the sampling using a procedure called sampling with Probability Proportional to Size (PPS). This same procedure was used for both the Spring and Autumn testing and Appendix D, D.5 show the details of the procedure. Table 3.2 presents the details of the final sample allocations for both samples; 157 were to be sampled for the Spring study and 57 for the Autumn study.

Table 3.2: Distribution of PISA eligible student population and final sample allocation for the Spring and the Autumn testing

	Final sample allocation Spring testing			Final sample allocation Autumn testing			
Explicit Strata labels	No. schools to sample	Est. No. students	% eligible students expected in sample	No. schools to sample	After Overlap Control, No. schools to sample	After Overlap Control Est. No. students	% eligible students expected in sample
	(n)	(n)	%	(n)	(n)	(n)	%
Community-comp/up to 45	3	95	1.4	2	3	129	5.4
Community-comp/46 - 85	4	176	2.6	1	2	88	3.7
Community-comp/86 or more	21	924	13.9	7	7	308	12.8
Secondary/up to 45	6	193	2.9	1	2	77	3.2
Secondary /46 - 85	17	748	11.2	6	6	264	11.0
Secondary /86 or more	61	2684	40.2	20	20	880	36.6
Vocational/up to 45	8	222	3.3	4	4	84	3.5
Vocational/46 - 85	11	484	7.3	4	4	176	7.3
Vocational/86 or more	26	1144	17.2	9	9	396	16.5
Grand Total	157	6,670	100.0	54	57	2,402	100.0

Each sampled school in the Spring and Autumn studies was assigned two replacement schools from the school sampling frame. A replacement school is listed one above and one below the sampled school in the sampling frame. These schools are selected at the same stage as the sampled schools. Their characteristics are very similar to the sampled schools. There were no replacement schools required for the Spring testing as all selected schools agreed to take part. However, for the Autumn testing, five schools required replacement schools because at the time of inviting schools to participate in the Autumn testing, those schools had been selected to take part in the TIMSS Field Trial. Four of these schools were replaced with either the first or second replacement school, but not the fifth school. The first and second replacement schools for this fifth school had been in the Spring PISA testing³⁵ and therefore could not take part. It was decided to contact this fifth school when they had finished TIMSS FT testing and invite them to take part in the Autumn testing as well, which they did.

Sampling students

Student sampling was done using KeyQuest,³⁶ the International Contractor's sampling software. This software uses systematic sampling (Westat, 2016) where every student has an equal probability of being sampled. There were 44 students sampled from the selected schools and for any school with 44 or less, all PISA eligible students were selected. The same procedures were used for both the Spring and Autumn testing and can be found in Appendix D, D.6.

Sampling teachers

For the Autumn testing only, all the schools were first asked to supply a list of all the mathematics, English and science teachers³⁷ in the school. From these lists, three teachers were randomly selected from each group, giving a potential of nine in total from each school. Once the teacher questionnaires had been administered and returned these lists were shredded and only the ID of the school remained on the questionnaire. The teachers were supplied with return-envelopes for returning completed questionnaires.

³⁵ There was minimal overlap control with the Spring testing which meant only overlap control with the sample school and not the replacement schools.

³⁶ PISA 2018 Technical Standard 1.4 notes that unless otherwise agreed upon, the National Centre will use KeyQuest to draw the student sample, using the list of eligible students provided for each school (OECD, 2020b).

³⁷ Science teachers included the senior cycle science-related subjects such as Biology, Physics, Chemistry, Physics & Chemistry and Agricultural Science.

3.3.3. Administration of PISA

The following personnel were involved in implementing PISA in schools: the School Contact; the Lead Test Administrators; and the Support Test Administrators and Technical Support personnel.³⁸ Support materials (manuals, video clips) outlining the procedures for testing, the completion of paper work (especially student tracking forms), and the uploading of data to the secure server were supplied to all personnel. All these procedures and guidelines are set out by the PISA contractors in their Technical Standards (OECD, 2020b) to ensure that all PISA operational objectives are met in a timely and coordinated manner and to ensure consistency, accuracy and comparability of results across schools. Identical procedures and standards were applied in both the Spring and Autumn administrations.

3.3.4. Scoring and scaling of student responses

Scoring of test items

International training for the scoring of each constructed-response item on the PISA test occurred prior to the Spring testing. National Project Managers (NPMs) and lead coders (staff in the ERC) were provided with full item-by-item coder training.³⁹ During the training, the coding guides were presented and explained. Detailed guides were developed for all the new reading items that included examples of correct and incorrect responses. For trend items, coding information from previous cycles was included in the coding guides. During the coding process, a coder query service was available which allowed national teams to submit coding queries and receive responses from the relevant domain experts (PISA contractors). The ERC developed a training package for their own coders whom they recruited independently of the OECD and its contractors. The training package consisted of an overview of the survey and nationally-developed training manuals based on the manuals and materials provided by the international PISA contractors. While the same ERC staff were responsible for both the Spring and Autumn testing, the teams of coders recruited for both studies were different. However, throughout the scoring for both testing periods, reliability reports were produced by the OECS (open-ended coding system) software. In 2015, the OECS was developed by the PISA contractors to support coders in their work to code the human-coded constructed-response items. The OECS software enabled the monitoring of the reliability of the scoring and thereby

³⁸ Lead Test Administrators (LTA) are inspectors from the Department of Education; Support Test Administrators (STA) are retired inspectors/teachers/principals; Technical Support personnel are hired by the ERC, full details of their roles in the implementation of PISA 2018 can be found in McKeown et al., (2019).

³⁹ The researcher for this study received an overview of the mathematics and science scoring process.

ensured the consistency of the coding of human-coded constructed-response items. The careful monitoring of coding reliability is important to ensure consistency within (multiple coding) and across (anchor coding) countries and to identify coding inconsistencies or problems early in the coding process so they can be resolved as soon as possible. The level of agreement between two coders is represented by an index called inter-rater reliability. In PISA, inter-rater reliability represents the extent to which any two coders agree on how a particular response should be coded, and thus the comparability in how the coding rubric is being interpreted and applied. Inter-rater reliability will vary from 0 (no reliability or 0% agreement) to 1 (maximum degree of reliability or 100% agreement). The goal in PISA coding is to reach a within-country inter-rater reliability of 0.92 (92% agreement) on average across all items, with at least 85% agreement for each item. The inter-rater reliability criteria were achieved for both the Spring and Autumn studies.

Scaling of PISA

Scaling in PISA is conducted by the PISA contractors (ETS).⁴⁰ The test design for PISA uses different sets of items and different assessment modes (based on a variant of matrix sampling). Each student gets a subset of items from the total item pool. PISA uses an approach called item response theory⁴¹ (IRT) to estimate achievement/proficiency scores, which gets over the problems associated with using number or percent correct scoring methods when there are multiple test forms (OECD, 2020b). This modelling approach estimates both the difficulty of the items and proficiency of the students. The scaling process implemented for PISA 2018 brought forward some of the changes implemented in 2015, including, for example, the use of a two-parameter logistic (2PL) item response theory (IRT) model for dichotomous data and a generalized partial-credit model for polytomous data (Shiel et al., 2016). To improve the robustness of the achievement estimates some unique item parameters were applied within countries, to account for test items that behave differently⁴² across countries. For the PISA Spring data in Ireland, 52 unique item parameters were used: 33 for reading literacy, 16 for science and 3 for mathematics (McKeown et. al., 2019). Item parameters used in scaling PISA 2018 Autumn data for Ireland was based on those obtained during the scaling of 2018 PISA

⁴⁰ The PISA contractors scaled both the Autumn and Spring data and recorded the procedures for PISA Spring scaling in the PISA 2018 Technical report (OECD, 2020b).

⁴¹ In 2018, the PISA tests were scaled using two-parameter logistic (2PL) item-response theory model for dichotomous data and a generalised partial credit model (GPCM) for polytomous data.

⁴² Differences were established by implementing differential item functioning (DIF) analysis.

Spring data for Ireland (these item parameters are based on all the 2018 International data as well as historical data from past cycles from Ireland and from other countries). These item parameters were evaluated to ensure they also fit the Ireland Autumnal data. The item parameters were reported to fit quite well (all within the flagging thresholds for Mean Deviation and Root Mean Square Deviation). ETS reported that they had no concerns about the Autumn sample. After the evaluation of the item parameters, ETS ran the population model as if the Ireland Autumn data were a separate country participating in PISA 2018 (personal communication by email 07/02/2022, Kandathil, Mathew M.).

3.3.5. Weighting of school, student and teacher data

Weighting school and student data

Weighting the school and student data were conducted by the PISA contractors. In PISA the probability of a school being selected is the PISA Measure of Size (MOS) multiplied by the number of schools to be selected within a stratum divided by the total PISA MOS within a stratum. This established the school-base weight. The student base weight was given as the reciprocal of the probability of selection for each within a school. Full details of the weighting procedures can be found in the PISA 2018 Technical Report (OECD, 2020b).

Weighting teacher data.

Weighting the teacher questionnaire involved using the school-base weight which was then adjusted for school non-response (where there was no teacher questionnaires returned from a school⁴³). The probability of an English, Mathematics or science teacher within a selected school being selected was three divided by the number of teachers from each subject group⁴⁴. The teacher weight was then adjusted for non-response. Hence, the teacher weight is:

$$\text{school-base weight} * \text{school non-response adjustment} * \text{probability of the} \\ \text{teacher being sampled} * \text{teacher non-response adjustment}$$

For analyses, the normalised teacher weight was used; that is, the population weight adjusted in order to return the same N as the number of respondents. The normalised rather

⁴³ Adds more weight to the schools in that stratum to make up for the schools that did not have any teacher questionnaires returned. One school failed to return any mathematics teacher questionnaire, seven schools failed to return any science teacher questionnaires, four schools failed to return any English teacher questionnaires.

⁴⁴ In some schools there were not three teachers within a subject, the probability was capped at 1.

than the population weight was used in order to avoid artificially inflating the power of analyses.

3.3.6. Response rates

School and student response rates

The school-level participation rates in both Spring and Autumn (once replacement schools were taken into account) were 100%. In total, 5,577 students (82.5% unweighted) participated in the assessment in Spring 2018, with a similar unweighted percentage in Autumn 2018 (82.0% or 1,988 students) (Table 3.3).

Table 3.3: Unweighted numbers of participating, non-participating/absent, ineligible and excluded students by gender and testing period

	Students - Sampled	Students - Participated		Didn't Participate/ Absent		Ineligible		Excluded	
		N	% *	N	%	n	%	n	%
PISA Spring 2018									
All	6,761	5,577	82.5	868	12.8	59	0.9	257	3.8
Gender									
Male	3,413	2,800	41.4	434	6.4	36	0.5	143	2.1
Female	3,348	2,777	41.1	434	6.4	23	0.4	114	1.7
PISA Autumn 2018									
All	2,424	1,988	82.0	314	13.2	33	1.4	89	3.7
Gender									
Male	1,228	987	40.7	173	7.1	14	0.6	49	2.0
Female	1,196	1,001	41.3	141	5.8	19	0.8	40	1.7

Note. The data in the table are unweighted. Percentages are relative to totals (e.g., based on 6,761 sampled students in Spring; 2,424 in Autumn).

Broadly similar percentages of students were deemed ineligible to participate (i.e. outside the eligible age definition or had left school; 0.9% for the Spring sample and 1.4% for the Autumn sample) and exclusion rates due to specified special educational needs were the same across the Spring and Autumn (3.8% and 3.7% for the Spring and Autumn samples, respectively). In the Spring sample, 12.8% did not participate or were absent on the day on which the test was administered compared to 13.2% in the Autumn sample. Of students who did not participate or were absent on the day, 8.6% were withdrawn from the assessment by their parents in the Spring sample compared to 7.0% in the Autumn sample. There were no marked gender differences on participation and non-participation rates of students across assessment windows.

PISA is an age-based sample and the PISA eligible students are distributed over a number of the grades in post-primary schools. The PISA-eligible students in the Spring sample are spread over five year levels with 2.0% in First/Second Year, 61.6% in Third Year, 27.9% in Transition Year and 8.5% in Fifth Year (Table 3.4). This compares to 0.6% in First/Second Year, 26.4% in Third Year, 52.6% in Transition Year, 19.8% in Fifth Year and a further 0.7% in Sixth Year in the sample tested in the Autumn. Therefore, in the Autumn, a majority of students were in Senior Cycle (TY, Fifth and Sixth Years), while in the Spring, a majority were in Junior Cycle (First to Third Years). However, most of those in Senior Cycle in the Autumn study only had about six weeks experience at Senior Cycle (i.e., the TY group).

Table 3.4: Unweighted numbers and percentages of students by grade and testing period.

Grade	PISA Spring 2018		PISA Autumn 2018	
	Unweighted number of students	Weighted percent	Unweighted number of students	Weighted percent
First/Second Year	116	2.0	13	0.6
Third Year	3,533	61.6	526	26.4
Transition Year	1,479	27.9	1,063	52.6
Fifth Year	449	8.5	374	19.8
Sixth Year	0	0.0	12	0.7

Table 3.5 presents the response rate of students within grade for the Spring and Autumn testing. Slightly higher percentages of sampled Fifth Years completed the assessment in the Autumn compared to the Spring (80.3% and 78.5%, respectively). Similarly, of the sampled TY students, 83.2% completed the assessment in the Autumn compared to 78.9% in the Spring testing. However, examining the response rate for Third Year students, 85.7% of the sampled Third Year in the Spring testing completed the assessment compared to 82.4% in the Autumn testing.

Table 3.5: Unweighted numbers of participating, non-participating/absent, ineligible and excluded students by grade and testing period

	Assessed		Absent		Excluded		Ineligible		Total Sampled	
	N	%	N	%	N	%	N	%	N	%
PISA Spring 2018										
All	5,577	82.5	868	12.8	59	0.9	257	3.8	6,761	100.0
Grade										
1st/2nd Year	116	59.8	33	17.0	37	19.1	8	4.1	194	100.0
Third Year	3,533	85.7	414	10.0	151	3.7	23	0.6	4,121	100.0
TY	1,479	78.9	321	17.1	56	3.0	18	1.0	1,874	100.0
Fifth Year	449	78.5	100	17.5	13	2.3	10	1.7	572	100.0
Sixth Year	0		0		0		0		0	
PISA Autumn 2018										
All	1,988	82.0	314	13.2	33	1.4	89	3.7	2,424	100.0
Grade										
1st/2nd Year	13	52.0	2	8.0	7	28.0	3	12.0	25	100.0
Third Year	526	82.4	67	10.5	38	6.0	7	1.1	638	100.0
TY	1,063	83.2	180	14.1	27	2.1	7	0.5	1,277	100.0
Fifth Year	374	80.3	61	13.1	17	3.6	14	3.0	466	100.0
Sixth Year	12	66.7	4	22.2	0	0.0	2	11.1	18	100.0

Teacher Response Rates

For Autumn testing only, all the schools were first asked to supply a list of all the mathematics, English and science teachers in the school. From these lists, three teachers were randomly selected from each group, giving a potential of nine teachers in total from each school. In total, 508 teachers were sampled and 415 participated, giving a response rate of 81.7% (Table 3.6).

Table 3.6: Total unweighted numbers of teachers in selected schools (Autumn testing), total sampled and response rates by each subject teacher

	Total		Total sampled		Total Returned		Response rate
	N	%	N	%	N	%	%
Maths	440	35.2	171	33.7	146	35.2	85.4
Science	360	28.8	167	32.9	134	32.3	80.2
English	449	35.9	170	33.5	135	32.5	79.4
Total	1,249	100.0	508	100.0	415	100.0	81.7

3.4. Phase 2 – Qualitative Phase

This phase began with some preliminary analysis of the teacher questionnaire, in particular questions related to the teachers' views on the expected performance of their students on PISA tests administered in the Spring compared to the Autumn and also teachers' time spent

revisiting topics/skills/learning outcomes at the beginning of the academic year. The principals sampled for this phase of the study were from the sample of schools that participated in the Autumn testing. The next three sections will present the instruments used, the sampling and the administration of the qualitative phase of this study.⁴⁵

3.4.1. Instruments - Semi-structured interview

There are key factors in this study such as the presence (or not) of summer learning loss which are difficult to explore solely using quantitative data. It was therefore decided that to better understand factors that might be associated with performance of students in PISA when tested at different times of the year, it would be appropriate to ascertain the views of school principals, given their experience in the classroom and their in-depth knowledge of post primary schools/education. The approach taken to data gathering was a semi-structured interview, which allowed the researcher ask the same core questions of each interviewee while at the same time pursuing other relevant topics as the need arose (Blandford, 2013).

Topics for the interview were developed from a review of the literature and preliminary results from the teacher questionnaire. The introduction to the interview began with gathering some general information on the characteristics of the principal and their school such as the length of time they have been principal and if their school(s) had participated in a PISA survey previously. This then was followed by general questions on the organisational demands on them as a principal and the staff at different times of the year, focusing on the Autumn and Spring time. They were shown prompt cards at this stage to help them focus on possible demands such as sporting events, classroom-based assessments, orals and Transition Year work placements. Some specific questions on the planning of Transition Year work activities were also presented to the principal. The next part of the interview focused on preliminary results from the teacher questionnaire, in particular how the teachers across schools had rated their students' performance if tested in the Autumn compared to the Spring. This was followed by results showing the percent of time the teachers had reported spending on revisiting topics/skills/learning outcomes and when this time occurred at the beginning of the academic year. These questions were to lead the interviewees onto the topic of summer learning loss. Principals were asked if there was any evidence of summer learning loss in their school and if so, how it was related to different subjects and different subject groups and how the school

⁴⁵ As noted earlier, this aspect of the study was added as part of Ph.D. study, and was conducted independently of the OECD and its contractors.

addressed it. From the review of the literature, aspects of student engagement and motivation appear to change throughout the school year, so those aspects were presented to the principals through a series of questions. The core PISA questionnaire collects information on students' Life Satisfaction, which is an overall assessment of their feelings about their lives at a particular point in time, and is considered to be a key construct of subjective wellbeing. The principals were asked general questions about student wellbeing in their school, the wellbeing programme and the extent to which various elements of it are carried out at different times of the year. One final area of the student learning environment that hadn't been addressed previously was parental involvement and this was addressed through questions on parent teacher meetings, when they were held in the academic year and if there was any link with performance following them. The final part of the interview comprised questions around their familiarity of PISA, comparisons to other international tests that are more curriculum based, the usefulness of the feedback schools receive on how their school performed compared to the national estimate and the timing of these results (with Spring testing feedback to schools arriving 24 months later compared to feedback from Autumn testing which would be 15 months after testing) and the use of computer-based testing (see Appendix E1, E2 for full details of topics/questions covered in the interview and prompt cards used).

To improve the internal validity of the instrument, the interview protocol went through a number of checks to ensure a high level of content validity. The first main stage of checks involved asking colleagues to review the topics covered and from this feedback the ordering of topics was changed to help with the flow of the interview. The interview instrument was then piloted on a work colleague who had undertaken numerous interviews of this type. The feedback received at this stage was to include the questions at the beginning of the interview on the characteristics of the principals and their schools which enables the responses to be put in context. The interview instrument was then piloted on a second colleague, and a recording was made. The audio taping allowed the interviewer to practice using the tape recorder. This recording was transcribed, allowing the interviewer to note where the interviewer had interrupted the interviewee during the interview. The piloting of the instrument helped the interviewer become more familiar with the instrument which enabled them to listen to the responses rather than just ask the questions. Finally, the pilot also provided an estimate of the length of time for the interview so that principals could be informed before the interview and could schedule the appropriate amount of time. As it was thought that the response rate among the principals might be low, it was decided that the initial interview would be considered a

‘pilot’ and if there was any issues arising from the first interview these would be looked at before conducting any more interviews with principals. There were no issues of concern with the first interview, so the remaining interviews were conducted with the same list of topics.

3.4.2. Sampling of Principals

It was initially decided to sample approximately 10 principals from the 57 participating schools in the Autumn testing. Sample size in qualitative research is often debated, but it has been noted by researchers that as few as 10 participants can yield fruitful and applicable results (InterQ, 2020) and that the concept of saturation is the most important factor to think about when deciding sample size decisions in qualitative research (Mason, 2010). Mason (2010) defines saturation as the point at which the data collection process no longer offers any new or relevant data. Ten principals were then sampled as an initial sample, which was reviewed as the interviewing progressed. The interviewing took place in the Spring of 2019. This allowed the principals to compare the current time of Spring with the time when they took part in the Autumn testing.

While it was hoped to have a similar representation of principals from the various school sectors, the sample was convenient with respect to distance travelled by the interviewer (a convenience sample). It was felt that conducting the interviews in the school would provide context to principals’ responses rather than conducting the interview over the phone or internet. From the 57 participating schools in Autumn testing, 34 of the schools were removed, as they were considered too far to travel to. The initial sample of principals consisted of two from the community/comprehensive sector, five from the secondary school sector and three from the vocational sector (see Appendix F, Table F1).

Principals were first contacted on March 5th 2019 with a follow-up email approximately two weeks later (20th March, 2019) to those who hadn’t responded. From this initial sample four principals indicated that they were willing to participate. From the remaining six principals, three declined and three never responded (see Appendix F, Table F.2).

At the time of the initial selection, replacement schools were identified (four from the community/comprehensive sector, two from the vocational sector and two from the secondary school sector). It was decided to contact the community/comprehensive and vocational school principals only at this time, with letters of invitation to participate sent mid-April 2019. The final response from the two mail-outs is presented in Table 3.7. In total 16 principals were invited to participate; three declined and there was no response from seven. While six principals

agreed to participate, in two of the schools the Deputy Principal⁴⁶ also sat in the interview as they were responsible for the co-ordination of the administration of the PISA test in their school.

Table 3.7: Numbers of responding and non-responding principals in final sample.

	Total principals contacted	Willing to participate	Declined*	No response after letter and follow-up email
Community/Comp	6	3	0	3
Secondary	5	2	2	1
Vocational	5	1	1	3
Total	16	6	3	7

Note. *Declined: too busy/did not want to be involved/principal no longer in school.

Table 3.8 presents the characteristics of the principals and their schools. Two of the interviewees were principals of secondary schools, a further two were from community schools, one was from a vocational school and the sixth interviewee was a principal from a comprehensive school. Experience of the principal role ranged from ‘no previous experience at all’ to one of the principals having 17 years’ experience. Finally, school size ranged from an enrolment of 367 students in the smallest school to 1,230 students in the largest. After the sixth interview, it was felt that no further interviews should be arranged at that time as saturation or sufficiency of data appeared to have been reached in terms of identifying additional relevant themes or topics (Saunders et al., 2018).

⁴⁶ While Deputy Principals sat in on two of the interviews with the principals, all the participants of the interviews will be referred to as principals throughout the thesis.

Table 3.8: Characteristics of participating principals

School Type	Gender	School Size	Number present for interview	Length of time principal in this school	Principal's previous experience	Second Person attending interview	Participation in PISA before
Comprehensive	mixed	727	1	5 years,	No previous role as principal		No
Vocational	mixed	669	2	10 years,	No previous role as principal	Deputy Principal*	No
Secondary	mixed	952	1	Less than 1 year	Principal in a school in England		No
Secondary	girls	367	1	1 year	Principal for 17 yrs girls school, 4 yrs DEIS school		Yes
Community	mixed	1230	1	2 years	No previous role as principal		Yes, but not when principal
Community	mixed	914	2	8 years	Previously Deputy Principal in this school	Deputy Principal*	Yes, when they were DP

Note. *co-ordinated PISA at the Autumn testing.

3.4.3. Administration of semi-structured interview

Principals were first contacted by letter, which included information about the project. This information was provided in a 'Plain Language Statement for Principals' (see Appendix G) which included details about the project; who is undertaking the project; the involvement required by the principal; assurance of confidentiality/ data protection; and details of contacts if there were questions. Also included in the first postal contact was a participation form for them to indicate their preferred date of interview plus a reply envelope. A week later, a follow-up email was sent to them to confirm receipt of the invitation to participate. After confirmation from the principal indicating their participation, the list of topics and a consent form was sent to them. Interviews took place in the schools and took about 40-60 minutes to administer. The interview was audiotaped and afterwards, was transcribed verbatim.

3.5. Data Analysis

3.5.1. Analysis of quantitative data

This section will first present the student- and school-level background variables used in the study. The constructs/indices used from the PISA student data and the teacher data are also presented, along with an overview of the analysis conducted on the quantitative data.

Student background variables

Student performance on reading, mathematics and science literacy in Spring and Autumn is examined in this section with reference to selected students' background variables: gender, grade, socio-economic status and immigrant language status (Table 3.9). Selection of these variables was based on interest in them in the Irish context.

PISA-eligible students are distributed over a number of the grades in post-primary schools. Third Year students accounted for 61.6% of students in the PISA 2018 Spring testing compared to only 26.4% of students in Autumn testing. In contrast, TY students accounted for 27.9% in the PISA 2018 Spring testing and this increased to 52.6% in the Autumn. While PISA is not designed to assess performance associated with a particular grade level, performance of students at the different grades is of interest in the Irish context and it will be important to record the results so comparisons can be made with PISA 2022 when testing occurs in the Autumn in Ireland.

Students' economic, social and cultural status (ESCS) as measured by PISA is a known predictor of student achievement and is associated with significant differences in student performance across many PISA countries and economies (OECD, 2016a). In PISA 2018, the ESCS index⁴⁷ was derived using IRT from three variables: home possessions (a composite of cultural, educational and material possessions, and books in the home), parental occupation, and parental education.⁴⁸ Higher scores on the ESCS index indicate higher student economic, social and cultural status. The average ESCS score for students in the PISA 2018 Spring testing was 0.13 (SD=.87) compared to 0.14 (SD=.86) for the Autumn testing period. For reporting purposes, the ESCS score at the student level has been split into four roughly equal groups:

⁴⁷ In 2018, a small number of changes were made to improve the measure of ESCS, including equal weighting of all components, assignment of scores to parents in education, in receipt of welfare, or at home (previously treated as missing), and country-specific parameters assigned for several international home possession items. In the present analysis, the ESCS scores of the Spring and Autumn 2018 cohorts are fully equivalent.

⁴⁸ Full details of the components of the ESCS may be found in the PISA 2018 Technical Report (OECD, 2020b).

lowest ESCS quartile, low-medium ESCS quartile, medium-high ESCS quartile, and highest ESCS quartile.

With reading was the main domain in 2018, an examination of students' country of birth and the language they usually spoke at home was merited. Students are considered 'native' if they, and at least one parent, were born in the country. This question is combined with an indicator of the language spoken at home to yield three categories: native students, immigrant students who normally spoke English/Irish at home and immigrant students who normally spoke another language at home.

Table 3.9: Student background variables included in the study, valid percentages and missingness, Spring and Autumn testing

		Spring	Autumn
		Valid %	Valid %
Gender	Male	50.3	49.6
	Female	49.7	50.4
	<i>Missingness (%)</i>	0.0	0.0
Grade	First/Second Year	2.0	0.6
	Third Year	61.6	26.4
	Transition Year/Fourth Year	27.9	52.6
	Fifth/Sixth Year	8.5	20.5
	<i>Missingness (%)</i>	0.0	0.0
ESCS quartiles	Lowest ESCS	25.0	25.0
	Low-Medium ESCS	25.0	25.0
	Medium-High ESCS	25.0	25.0
	High ESCS	25.0	25.0
	<i>Missingness (%)</i>	1.1	2.2
Immigrant language status	Native	82.1	81.4
	Immigrant & Eng/Irish	9.0	8.5
	Immigrant & other lang	8.8	10.1
	<i>Missingness (%)</i>	2.9	4.5

School-level background variables

Student performance on reading, mathematics and science literacy in Spring and Autumn was examined with reference to selected school background variables: school sector, gender composition and DEIS status. In Ireland, schools are categorised into five types based on sector and gender composition: girls' secondary, boys' secondary, mixed secondary, community/comprehensive, and ETB vocational. The DEIS status of a school is identified by the Department of Education (DES, 2021) using data from the Small Area Population Statistics and published on the Post-Primary Online Database (P-POD). Each school at post-primary level is identified as having DEIS status or non-DEIS status (Table 3.10).

Table 3.10: School-level background variables included in the study, valid percentages and missingness, Spring and Autumn testing

		Spring Valid %	Autumn Valid %
Sector-gender school composition	Girls' secondary	21.2	19.2
	Boys' secondary	15.0	15.9
	Community/comprehensive	16.9	17.5
	Mixed secondary	17.4	19.0
	ETB vocational	29.5	28.3
	<i>Missingnes (%)</i>	0.0	0.0
DEIS status	Non-DEIS	75.9	74.4
	DEIS	24.1	25.6
	<i>Missingnes (%)</i>	0.0	0.0

Note. Sector-gender school composition categories may be abbreviated in some tables throughout the thesis (for easier presentation of tables) to: girls' sec., boys' sec., comm./comp., mixed sec. and ETB vocational,

Measures examined

This section presents the measures examined in this study. The concept of 'Opportunity to Learn' was examined from the teacher and student perspective. From the teachers' perspective, data were gathered on the teacher questionnaire asking teachers what topics/skills/learning outcomes they taught Third Year, Transition Year and Fifth Year students in the first six weeks of the academic year. They were also asked what topics/skills/learning outcomes were revisited and time spent revisiting. Opportunity to Learn from the student perspective was represented by examining the variables associated with exposure to domain specific content (*types of reading materials, length of text read, reading activities in class, and strategies for online reading*) and the English Learning environment (indices: *teachers' stimulation of reading engagement, teacher feedback, teacher-directed instruction, adaptive instruction and disciplinary climate in English class*).

Student engagement was broken into three aspects: behavioural; emotional; and cognitive engagement. The questions used to measure behavioural engagement were students' reports on how often they *skip a whole school day, skip some classes* and *arrive late* for school in the two weeks leading up to the day on which they took the PISA test. Emotional engagement was measured by examining the indices *sense of belonging at school* and *teacher-student relationships*. Cognitive engagement was measured by examining students awareness and ability to use appropriate strategies when engagement with texts that of *understanding and remembering, summarising, and assessing credibility of sources*.

A number of aspects of student motivation were examined in this study, that of students' perception of their ability, intrinsic motivation, motivation to master tasks and general fear of

failure. Students' perception of their ability was measured by the indices *general self-efficacy*, *perceived competence in reading* and *perceived difficulty in reading*. The index of *enjoyment of reading* was used to measure intrinsic motivation. Students' *motivation to master tasks* and *attitudes towards competition* were used to examine students' reason for doing the task/action. The final measure used to measure motivation was the index *general fear of failure*.

Other school outcomes measured in this study were wellbeing, general learning environment and general learning environment. The scale *life satisfaction* and indices *eudemonia: meaning in life* and *subjective wellbeing: positive affect* were used to examine wellbeing. Finally the indices included in the examination of general learning environment were: *attitude towards school/learning activities*; *perception of competitiveness at school*; *perception of cooperation at school*; and *student's experience of being bullied*.

Descriptive statistics of these measures such as means and percentages will be presented in Chapter 5 as each measure is examined. A summary of the indices can be found in Appendix H, Table H1, which includes the items incorporated in the indices, scale reliabilities and their interpretation.

Indices from teacher data

Teachers were presented with six questions relating to the engagement of their students. The questions were factor analysed using principal component analysis. The analysis yielded two factors (for each year group) explaining a total of 64.27%, 63.83% and 64.3% of the variance for the entire set of variables for Third Year, Fourth Year and Fifth Year, respectively (Table 3.11).

Table 3.11: Exploratory Factor Analysis (EFA) of the items presented to teachers on the engagement of their students in each year group

	Third Year		Fourth Year		Fifth Year	
	Factor 1.	Factor 2.	Factor 1.	Factor 2.	Factor 1.	Factor 2.
My students tend to skip classes more in the Autumn than the Spring	0.08	0.78	0.10	0.68	0.06	0.73
My students are more engaged with learning in the Autumn than the Spring	0.78	-0.14	0.75	-0.19	0.82	-0.12
My students seem to be less enthusiastic about learning in the Autumn than the Spring	-0.20	0.77	-0.16	0.80	-0.16	0.77
My students tend to arrive late to class more in the Autumn than the Spring	0.05	0.82	0.03	0.82	0.09	0.81
My students are more likely to complete their homework in the Autumn than the Spring	0.79	0.05	0.80	0.11	0.79	0.05
My students seem to engage better with study in the Autumn, compared with the Spring	0.82	0.05	0.86	0.06	0.85	0.07
% of Total Variance	33.69	30.59	33.26	30.57	34.22	30.09
Total Variance		64.27		63.83		64.31

Note. Extraction method; maximum likelihood; Rotation method. Loading larger than .60 are in bold.

Factor 1 was labelled ‘engagement is better in the Autumn’ due to high loadings on the following items ‘my students are more engaged with learning in the Autumn than the Spring’, ‘my students are more likely to complete their homework in the Autumn than the Spring’, and ‘my students seem to engage better with study in the Autumn, compared with the Spring’. This first factor explained approximately 33%-34% of the variance (for each year group). The second factor derived was labelled ‘engagement is better in the Spring’ and included the items ‘my students tend to skip classes more in the Autumn than the Spring’, ‘my students seem to be less enthusiastic about learning in the Autumn than the Spring’, ‘my students tend to arrive late to class more in the Autumn than the Spring’. This factor explained approximately 33%-34% of the variance. Based on these factors two subscales were created for teachers’ perception of student engagement: ‘engagement is better in the Spring’ and ‘engagement is better in the Autumn’ for each year group,⁴⁹ with a low score on the scale indicating a greater perception of engagement. In setting up the subscales, *don’t know* was recoded from the end position on the

⁴⁹ The formula used was: $((\text{mean}(\text{item1}, \text{item2}) - 1) / N \text{ response options} - 1) * 100$ (Perry et al., 2004).

scale to the middle, more neutral position. Using the midpoint category of scales suggests a “neutral” or “uncertain” opinion (Nadler et al., 2015). Internal consistency, given by Cronbach’s alpha, is a measure of the extent to which a set of individual items making up a scale are assessing the same underlying construct (Henson, 2001). Alpha is expressed as a number between 0 and 1, with higher values denoting greater internal consistency. The subscale ‘engagement is better in the Autumn’ has values greater than 0.7 for all three groups of teachers (Table 3.12). However, while the subscale ‘engagement is better in the Spring’ has slightly lower values for each teacher group (below 0.7), the subscale has been used.

Table 3.12: Cronbach’s Alpha for the subscales ‘Engagement is better in the Spring’ and ‘Engagement is better in the Autumn’, for teachers teaching Third Year, Fourth Year and Fifth Year students.

	Third Year	Fourth Year	Fifth Year
Engagement is better in the Spring	0.687	0.642	0.653
Engagement is better in the Autumn	0.722	0.729	0.756

Process used for the analysis of quantitative data

The initial analysis to determine ‘if there is a difference in performance arising from the time of the year in which PISA is administered’ used the IEA International Database Analyzer (IDB Analyzer),⁵⁰ which is capable of combining and analysing data from large-scale assessments. It generates SPSS syntax that takes into account information from the sampling design in the computation of sampling variance, and also is capable of processing plausible values (IEA, 2016). A main concern with the data are the differences in the samples sizes (the Autumn sample had 57 schools and the Spring sample had 157 schools) which could give rise to larger standard errors in the Autumn, and could result in an incorrect interpretation of the results. This was addressed in the computation of standard errors⁵¹ and, where relevant, the adjustment of the alpha level (risk level/confidence levels⁵²).

The 95% confidence level (corresponding to an alpha level of .05) is the most commonly used level when evaluating the difference between two means. Under this scenario, one can be 95% confident that a difference observed has not occurred by chance. However,

⁵⁰ This software application is developed by the IEA Data Processing and Research Center (IEA-DPC) in Germany.

⁵¹ Standard Errors measure the precision of estimates of population parameters by taking into account sampling error.

⁵² Confidence level refers to the percentage of probability, or certainty, that the confidence interval would contain the true population parameter when a random sample is drawn many times. Confidence Intervals (CI) indicate the range that is likely to contain the true population parameter, so the CI focus on the *population*.

given the smaller sample size and slightly lower precision of the Autumn study, the interval in this analysis was expanded to 99% (or alpha of .01), allowing a greater degree of certainty in reporting identified differences. When a difference was not significant at the .01 level, it was also evaluated at the .05 level. To test for significant differences between the Autumn and Spring testing, the normal independent samples t-test was used. To test for significant differences within a testing window the samples were treated as dependent and the alpha levels were adjusted when making more than one comparison (Armstrong, 2014).⁵³

The incorporation of sampling weights allows the analysis to more appropriately reflect the population characteristics and ensures that the estimates are unbiased (Stapleton, 2014). A sampled student needs to represent the correct number of students in the full population. To ensure that the results are representative of the population of students, sampling weights for students were applied to school and student data in all analyses. The data from the teacher questionnaire were first weighted and then analyses are conducted in SPSS to examine descriptive characteristics.

As part of the examination of student performance in PISA at Spring and Autumn testing, item analysis was conducted. Item-level analysis can provide some insight on student proficiency levels before scaling takes place at both testing periods.

The two stage sampling in PISA means that schools are the primary sampling unit, with students within the sampled schools as the secondary sampling units. Students within schools will have similar characteristics. Each observation then, provides less unique information than would be expected of a simple random sample of students across schools (because some information is shared among students nested in schools) so that the *effective sample size* is smaller than the actual sample size. Eivers et al. (2010) note, in their analysis of the 2009 National Assessments in Ireland, that the effective sample size is directly associated with the accuracy of the survey estimates. This will be taken into consideration when undertaking the analysis as will the interclass correlation (ICC). The latter is a measure of how similar to each other students within a school are on a particular measure - in other words, it describes how strong the clustering is. The higher the ICC, the stronger the clustering effect. Table 3.13 shows that there was slightly higher clustering effect in the Spring data compared to the Autumn data,

⁵³ The .01 and .05 statistical significance levels were used for 2 groups (1 comparison). Adjustments/corrections for multiple comparisons were applied as follows: 3 groups (2 comparisons), statistical significance levels: .005 and .025; 4 groups (3 comparisons), statistical significance levels: .0033 and .0167; 5 groups (4 comparisons), statistical significance levels: .0025 and .0125.

particularly for reading and mathematics. The intra-class correlation of 0.172 for reading achievement in the Spring indicates that 17.2% of the variance in student performance can be attributed to differences between the schools, while the remainder (82.8%) can be attributed to within-school differences (i.e. differences between students and/or classes).

Table 3.13: Estimated intraclass correlations, Spring, Autumn and the combined Spring and Autumn data

	Reading	Mathematics	Science
Spring data	0.172	0.179	0.149
Autumn data	0.145	0.136	0.149
Combined Spring and Autumn data	0.159	0.157	0.149

Note: Interclass correlations estimated using Mplus.

Finally, in answering the overarching research question, **RQ1: Does the performance of 15-year-olds in Ireland differ across Spring and Autumn administrations of the PISA tests?** the data were drawn together in a multilevel model. The multilevel modelling was conducted using Mplus, drawing on Raudenbush and Bryk's (2002) examples and uses of multilevel modelling. Mplus is a statistical modelling programme with the capabilities of using various types of data (e.g. cross-sectional, longitudinal data, single-level and multilevel data). The purpose of modelling data is to describe the structure of data in a simple way so that it is easier to understand and interpret (Muthén & Muthén, 1998-2017). This specialised software takes appropriate account of the clustered nature of the data. Without correction for clustering, standard errors would be under-estimated, increasing the risk of reporting a false positive result. Therefore, correcting for clustering by inflating the standard errors is a more conservative approach and a more appropriate way to analyse data of this type.

PISA administers large numbers of items in limited time to representative samples of students. IRT estimates an ability distribution for each student using auxiliary variables ("conditioning"). Ten plausible values are generated in PISA based on student responses to the subset of items they receive, as well as on other relevant and available background information. Plausible values are seen as a set of special quantities generated using a technique called multiple imputations (von Davier et al., 2009). Mplus allows the use of multiple imputation data. To account for the complex unit sampling design, weights are used. In multilevel models, the design weights need to be disentangled and weight adjustment factors at the multiple sampling stages. In this study the final student weight was divided by the final school weight to generate a within school weight. For the multi-level models in this study, the default in

Mplus provides maximum likelihood estimation. Grand mean centering was considered the most appropriate for the variables used in the models.

The following steps were employed when conducting the multi-level modelling:

1. **Model 1: Means-as-outcomes model on reading, mathematics and science performance (school-level background variables).** Examination of a similar model to that constructed by Ferraro et al. (2009) on the PISA 2003 data where they presented a ‘means-as-outcome’ model (based on Spring and Autumn PISA 2003 testing in the United States) and reproducing a similar model with Ireland’s data for 2018.
2. **Model 2: Random intercept model on reading, mathematics and science performance (student and school-level background variables).** Student background variables, as examined in this study (gender, ESCS and immigrant and language status), were then added to the model for Ireland (excluding the Grade of the student, since as noted previously, it is not comparable between Spring and Autumn). At this stage, interactions between ‘Session’ and the student background variables were examined.
3. **Analysis of other learning outcome variables.** Other learning outcome variables (as presented in Chapter 5) were examined one-by-one for their associations with achievement in reading, mathematics and science. The significance of a variable was determined by adding that variable to Model 2 (i.e., where student and school background variables were controlled) and if $p < .05$, the variable was retained.
4. **Model 3: An examination of ‘session’ using a random intercept model on reading, mathematics and science performance on PISA.** The model was finalised by retaining only those variables that were statistically significant when all variables were added to the model together. Interactions between ‘Session’ and each other learning outcome variable in the model were also examined.

3.5.2. Analysis of qualitative data

The interview with the principals was designed to get a more in-depth understanding of possible factors influencing time of testing and interpretation and use of outcomes. There are many methods of qualitative data analysis such as grounded theory, ethnographic research or narrative research (Kawulich, 2004, citing Merriam, 1998 and Bernard, 2000); however, Creswell (2003) suggests starting with generic steps. This involves organising and preparing the data, reading through all the data, and then beginning a detailed analysis using a coding process, which involves assigning text, and segmenting sentences or paragraphs into

categories. Similar to Creswell's generic steps, Braun and Clarke's (2006, 2020) six-step approach was used as a guide to implementing thematic analysis. As they note, it is not taken as procedural but as a means of analysing the data. Phase 1 involved gaining a thorough overview of all the data collected which was done by conducting the interviews in person, reading through the transcribed text, taking initial notes, and looking through the data to become familiar with it. NVivo was used as a tool in Phase 2 to manage the coding of the transcripts. NVivo is a qualitative data analysis computer software package produced by QSR International enabling the classification, sorting, arranging of information and examination of relationships in the data (QSR International, 2019). Within NVivo sections of text were highlighted and labels/codes were assigned to describe the content, which the researcher considered pertinent to the research questions. This created 110 codes (Appendix I, Table I1). Phase 3 began the process of sorting and mapping the codes and noting the degree of the occurrences (references) of codes to generate initial themes. Braun and Clarke (2006) maintain that a theme should capture something important about the data in relation to the research questions, and that it represents some level of patterned meaning within the dataset. At this stage, some of the codes did not appear relevant enough to answer the research question so they were discarded. Phase 4 and 5 were interchangeable where themes were reviewed, defined and named (Appendix I, Table I2 has the full listing of the final listing of themes, categories and codes). Phase 6 of thematic analysis involved writing up of the results/finding section, with a detailed presentation on each theme. In presenting each theme, examples from the data were presented as evidence.

3.5.3. Analysis using a Mixed Method Approach

As noted at the beginning of this chapter the fundamental principle of mixed method research is that the combination of quantitative and qualitative approaches can help to provide a better understanding of the problem than either approach might achieve alone. Initial analysis of the Teacher Questionnaire was conducted prior to the interviews with the principals. The results of this analysis were then presented to the principals. The interviews with the principals were conducted prior to the release of the scaled data from the Autumn testing by the PISA contractors. The two major phases of analysis were conducted separately and the concluding chapter draws the results from both phases together.

3.6. Ethical Issues

The administration of PISA is carried out in Ireland by the Educational Research Centre (ERC) on behalf of the Department of Education. For PISA 2018, the ERC operated under the Lawful Processing Condition of Public Interest for personal data and Substantial Public Interest for special category data. For these reasons, the ERC does not gather consent from students or from the holder of parental responsibility over the student. In order to capture a true representation of educational ability of students in the Irish Educational System, all students within the sampled group for testing are encouraged to participate. However, parents of students under the age of 18, and students aged 13 and over, are given the option to withdraw from participation in advance. A student's teacher may also exclude a student based on specific criteria relating to special educational needs or language proficiency, where English is not the primary language of the student.⁵⁴

Ethical approval for the teacher questionnaire and the semi-structured interview with principals was obtained from the Dublin City University Research Ethics Committee in September 2018 (see Appendix J). The approval process did not include core PISA achievement and questionnaire data, which, it was argued, were covered under a different set of protocols. The elements of the study involving teacher questionnaires and interviews with principals were considered low risk as they involved asking questions to teachers and principals to obtain information and opinions about their normal everyday work as professional educators and administrators. Results are reported at an aggregate (and not individual) level and thus, the identity of all participants is protected. As part of obtaining ethical clearance it was made clear in the application that, consistent with GDPR (General Data Protection Regulation) legislation, the data would not be used for any purpose other than those outlined in the submission.

3.7. Validity, Reliability and Trustworthiness

The validity and reliability of the core PISA data used in this study have been referred to in previous sections including areas such as subject expert groups, validity of the PISA test, standards for sampling, administering of the PISA tests, coding reliability and the clustering

⁵⁴ This information can be got from the following document on the ERC website: <http://www.erc.ie/wp-content/uploads/2018/09/Data-Protection-Policy-Procedures.pdf>.

with the PISA sample. Validity and trustworthiness of the qualitative data are covered in this section.

One method of checking the validity of the teacher questionnaire was by piloting the teacher questionnaire with a number of teachers in a school after it was reviewed by colleagues and the NAC. A second was to share aggregated results from some of the questions with principals during the semi-structured interview to obtain their opinion on the results.

Unlike quantitative data, qualitative data aims to design and incorporate methodological strategies to ensure the ‘trustworthiness’ or the credibility of the findings. In relation to the qualitative dimension of the study, the first concern is that the responses of principals who agreed to take part in interviews could be biased in favour of those who are interested in PISA and see the benefits of participating in such assessments and being interviewed. A record was kept of the reasons given by principals for declining to be interviewed and also the participation of the principals from the different school types. Secondly, the thematic analysis may be a concern because of the wide variety of interpretations that can be attributed to themes, as well as the consistent application of themes to large quantities of text. To provide credibility to the results, the identification of themes and coding process were monitored by generating an audit trail (Hoepfl, 1997) which was reviewed by supervisors and colleagues. The use of Creswell’s steps (2003) and Braun and Clarke’s (2006) six-step approach enabled the analysis of the qualitative data be conducted in a precise, consistent, and exhaustive manner through recording, systematising, and disclosing the methods of analysis with enough detail, allowing the processes and results to be accepted as trustworthy or credible (known as reliability in quantitative research).

Validity in qualitative research can be checked by a technique known as respondent validation. This technique involves testing initial results with participants to see if they still ring true. Although the research has been interpreted and condensed, participants should still recognize the results as authentic. This was done indirectly by sharing aggregated outcomes provided by teachers with principal teachers, as noted above.

3.8. Positionality of the Researcher

According to Coghlan and Brydon-Miller (2014), positionality refers to the standpoint of the researcher in relation to the community, the organization or the participant group within the research study. The researcher in this study works in the Educational Research Centre, a

statutory body under the Department of Education, in Dublin, and has been involved with PISA since 2015. The core elements of the PISA study were funded by the Department of Education with the additional elements for this study funded by the Educational Research Centre. To conduct PISA testing in schools, it was necessary to follow the technical procedures that are set out according to the PISA contractors and thereby the objectivity of the research was maintained. As with the core elements of the PISA study, the additional components of this study, the teacher questionnaire and interviews with principals, also followed strict confidential and data protection procedures. The researcher had overall responsibility for implementation of the PISA Autumn 2018 study, including liaising with and overseeing PISA in schools.

The researcher was also a parent of a 15-year-old who was a participant in the study and has therefore benefited from the insights of her child's opinions and attitudes to the PISA test. Work in relation to the Teacher Questionnaire and Interviews with Principal Teachers was carried out independently of the core elements of PISA, and the researcher, along with her supervisors, had full discretion in designing these elements of the study (with some input from the National PISA Advisory Committee), and in deciding how the resulting data would be analysed.

3.9. Conclusion

This chapter provided an overview of the study from the conceptual framework, the design of the study, and the details of the quantitative and qualitative phases. The following chapters, Chapter 4 to Chapter 6, discuss the outcomes of the analyses described here.

Chapter 4 Comparing Performance Outcomes Across Spring and Autumn Administrations of the PISA Tests

This chapter examines the main research question of the thesis: **RQ1: Does the performance of 15-year-olds in Ireland differ across Spring and Autumn administrations of the PISA tests.** Students' performance on PISA is examined by comparing mean scores on the overall reading, mathematics and science scales between the Spring and Autumn PISA testing periods. Performance is also compared in terms of the percentages of students achieving various proficiency levels (i.e., high- and low-achievers). Thirdly, students' reading achievement (main domain in PISA 2018) is compared across reading subscales reflecting key competencies. Student performance is also examined by comparing percent correct scores on item types between the Spring and Autumn testing. The chapter concludes with an examination of 'session' (Spring/Autumn), controlling for school- and student-level background variables.

4.1. Overall Performance on PISA

When reading tables in this chapter, the final two columns contain the differences in mean achievement scores or percentage differences between Spring and Autumn. Table 4.1 presents the overall mean scores, standard deviations and standard errors for PISA 2018 Spring testing and PISA 2018 Autumn testing in Ireland in reading, mathematics and science. The mean score for PISA 2018 Spring testing on the reading scale was 518.1, compared to 515.8 for the PISA 2018 Autumn testing; the difference (2.3 score points) is not statistically significant. Similarly, the mean mathematics score for PISA 2018 Spring testing was 499.6, compared to 496.7 in the Autumn, yielding a small 2.9-point difference, which is not statistically significant. The mean score difference for science between the PISA 2018 Spring and Autumn testing is just 1.0, and, as with the other two domains, the difference is not statistically significant. Overall then across the three domains, the mean scores between Spring and Autumn testing were not statistically significant different at either the .01 level or the .05 level. The distributions of scores, indicated by the standard deviations, were also broadly similar in all three domains in Spring and Autumn.

Table 4.1: Overall mean scores, standard errors and standard deviations for reading, mathematics and science, Spring and Autumn testing

	Spring Testing			Autumn Testing			Spring - Autumn	
	Mean	(SE)	SD	Mean	(SE)	SD	Mean Diff	SE Diff
Reading	518.1	(2.2)	90.7	515.8	(4.1)	92.0	2.3	(4.7)
Mathematics	499.6	(2.2)	77.8	496.7	(3.6)	81.9	2.9	(4.2)
Science	496.1	(2.2)	88.3	495.1	(4.0)	88.3	1.0	(4.5)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

4.1.1. Comparison of performance on PISA by student-level variables

Reading

The mean score for males in the PISA 2018 Spring testing on the reading scale was 506.4 compared to 503.1 for males in the PISA 2018 Autumn testing. This small 3.3-point difference is not statistically significant (Table 4.2). For females, there is less than 1-point in the difference between Spring and Autumn.

While the mean score difference for Third Year students between Spring and Autumn was 16.1 points and statistically significant, favouring Third Year students being tested in Spring, the effect size is small⁵⁵ ($d=0.18$). This comparison should be interpreted with caution, as it involves Third Year students who have nearly completed the Junior Certificate programme being tested in Spring and Third Year students who still have approximately six months to complete the programme being tested in Autumn. Although Third Year students in the Spring are more similar to Transition Year/Fourth Year in the Autumn in the sense that both groups having either nearly or fully completed the Junior Certificate programme, these two subgroups have a score difference of 19.0 points in reading, with Transition Year/Fourth Year students in the Autumn performing better. While there is a large difference of 11.7 score points in favour of ‘immigrant students with English or Irish’ spoken at home in Spring, the difference is not statistically significant.

⁵⁵ Effect sizes were computed using Cohen’s d when interpreting the extent of the differences between means and Cohen’s h for the extent of the differences between percentages. Generally the criteria for size of effects is small .2, medium .5 and large .8 (Cohen, 1988). According to the What Works Clearinghouse (2014), an effect size of 0.25 or higher on school-based research can be considered ‘substantively important’ (that is, the association with achievement is strong), whether or not the underlying difference is statistically significant. Effect sizes greater than 0.50 are considered large.

Table 4.2: Mean scores and standard errors for reading by student background variables (percentages included), Spring and Autumn testing

<i>Reading</i>	Spring Testing			Autumn Testing			Spring - Autumn	
	%	Mean	(SE)	%	Mean	(SE)	Mean Diff	SE Diff
Male (ref.)	49.7	506.4	(3.0)	50.4	503.1	(5.7)	3.3	(6.5)
Female	50.3	529.6	(2.5)	49.6	528.7	(4.0)	0.9	(4.7)
First / Second Year	2.0	436.1	(10.9)	0.6	416.5	(25.9)	19.6	(28.1)
Third Year	61.6	517.0	(2.4)	26.4	500.9	(5.2)	16.1	(5.7)
Transition Year (ref.)	27.9	534.6	(3.2)	52.6	536.0	(4.7)	-1.5	(5.6)
Fifth/Sixth Year	8.5	491.1	(5.5)	20.5	485.9	(8.2)	5.2	(9.9)
Lowest ESCS (ref.)	25.0	482.3	(3.0)	25.0	479.3	(6.1)	3.0	(6.8)
Low-Medium ESCS	25.0	510.0	(3.0)	25.0	500.6	(5.1)	9.4	(5.9)
Medium-High ESCS	25.0	527.4	(2.9)	25.0	531.4	(5.2)	-4.1	(5.9)
Highest ESCS	25.0	556.7	(3.0)	25.0	554.1	(5.1)	2.6	(5.9)
Native (ref.)	82.1	522.1	(2.3)	81.4	521.0	(4.2)	1.1	(4.8)
Immigrant & Eng./Irish	9.0	518.2	(5.2)	8.5	506.6*	(6.6)	11.7	(8.4)
Immigrant & other lang.	8.8	498.5	(5.3)	10.1	495.9	(7.2)	2.6	(9.0)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.⁵⁶

Examining score patterns within the testing periods, the gender gap in reading has widened from 23.2 in Spring to 25.6 points in Autumn, favouring females in both testing periods. Transition Year students scored significantly (statistically) higher than students at other grade levels in both test windows. Students in the lowest quartile of ESCS on the reading scale scored significantly (statistically) lower than students in all other ESCS quartiles in both the Spring and Autumn testing. The mean reading achievement score of immigrant students who spoke English or Irish at home (518.2) did not differ from that of native students (522.1) in the Spring; however, the mean reading score difference of 14.4 score points between the two groups in the Autumn was statistically significant at the .05 level. While this might suggest that the Autumn testing may have disadvantaged the immigrant students who spoke English or Irish at home, the corresponding effect size is small ($d=0.16$).

Mathematics

There is a 9.3-point difference for males on the mathematics scale between PISA 2018 Spring and Autumn testing (502.6 and 493.4, respectively); although larger compared to the respective

⁵⁶ The .01 and .05 statistical significance levels were used for 2 groups (1 comparison). Adjustments/corrections for multiple comparisons were applied as follows: 3 groups (2 comparisons), statistical significance levels: .005 and .025; 4 groups (3 comparisons), statistical significance levels: .0033 and .0167; 5 groups (4 comparisons), statistical significance levels: .0025 and .0125.

difference in reading, it is not (statistically) significant. The score difference for females (3.4 score points higher in Autumn), is also not statistically significant.

Similar to reading, Third Year students scored (statistically) significantly higher in mathematics in the Spring compared to the Autumn (497.7 and 478.4, respectively) with an effect size of $d=0.25$. There is less than 1.0 score point difference between Transition Year students in the Spring to those tested in the Autumn. While there was a large difference for immigrant students with another language between the Autumn and Spring testing periods (12.4 points higher in Spring), the difference is not statistically significant. Similarly, across the other student subgroups, there are no statistically significant differences in mathematics performance between Spring and Autumn.

Table 4.3: Mean scores and standard errors for mathematics by student background variables (percentages included), Spring and Autumn testing

<i>Mathematics</i>	Spring Testing			Autumn Testing			Spring - Autumn	
	%	Mean	(SE)	%	Mean	(SE)	Mean Diff	SE Diff
Male (ref.)	49.7	502.6	(2.9)	50.4	493.4	(4.9)	9.3	(5.7)
Female	50.3	496.7	(2.7)	49.6	500.1	(3.8)	-3.4	(4.6)
First / Second Year	2.0	434.2	(9.4)	0.6	399.7	(26.5)	34.6	(28.1)
Third Year	61.6	497.7	(2.2)	26.4	478.4	(5.1)	19.3	(5.5)
Transition Year (ref.)	27.9	514.4	(3.4)	52.6	515.2	(3.6)	-0.8	(5.0)
Fifth/Sixth Year	8.5	480.9	(5.0)	20.5	475.5	(7.4)	5.4	(9.0)
Lowest ESCS (ref.)	25.0	466.9	(3.1)	25.0	463.4	(5.3)	3.5	(6.1)
Low-Medium ESCS	25.0	491.4	(2.5)	25.0	483.5	(4.7)	7.8	(5.3)
Medium-High ESCS	25.0	509.0	(2.8)	25.0	509.1	(5.0)	-0.2	(5.7)
Highest ESCS	25.0	533.9	(3.2)	25.1	532.2	(4.3)	1.7	(5.4)
Native (ref.)	82.1	501.9	(2.3)	81.4	500.2	(3.6)	1.6	(4.2)
Immigrant & Eng./Irish	9.0	494.3	(4.8)	8.5	493.6	(6.5)	0.7	(8.1)
Immigrant & other lang.	8.8	498.5	(5.6)	10.1	486.1	(7.1)	12.4	(9.1)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

Examining the patterns within the testing periods, the gender gap in mathematics has changed from males achieving (statistically) a non-statistically-significantly higher score in the Spring to females performing better, though not statistically significantly so, in the Autumn (Table 4.3). Students in the lowest ESCS quartile score (statistically) significantly less than students in all other quartiles in both Spring and Autumn.

Science

Table 4.4 presents the mean scores and standard errors for science by key student background variables for PISA 2018 Spring and Autumn testing. The mean score for males in PISA 2018 Spring testing on the science scale was just 2.7 points higher (495.4) compared to Autumn

(492.7), while the score difference on the science scale for females between the two testing periods was 0.8 points, with neither of the differences being statistically significant.

Table 4.4: Mean scores and standard errors for science by student background variables (percentages included), Spring and Autumn testing

<i>Science</i>	Spring Testing			Autumn Testing			Spring - Autumn	
	%	Mean	(SE)	%	Mean	(SE)	Mean Diff	SE Diff
Male (ref.)	49.7	495.4	(3.0)	50.4	492.7	(5.6)	2.7	(6.3)
Female	50.3	496.9	(2.6)	49.6	497.6	(4.0)	-0.8	(4.7)
First / Second Year	2.0	431.1	(11.1)	0.6	400.1	(24.3)	31.0	(26.8)
Third Year	61.6	494.7	(2.5)	26.4	482.1	(5.1)	12.6	(5.6)
Transition Year (ref.)	27.9	510.2	(3.2)	52.6	512.3	(4.8)	-2.2	(5.8)
Fifth/Sixth Year	8.5	476.0	(4.7)	20.5	470.5	(8.1)	5.5	(9.4)
Lowest ESCS (ref.)	25.0	460.0	(3.3)	25.0	458.3	(6.3)	1.7	(7.1)
Low-Medium ESCS	25.0	487.4	(2.9)	25.0	480.1	(5.1)	7.3	(5.9)
Medium-High ESCS	25.0	506.8	(2.8)	25.0	509.2	(5.3)	-2.4	(6.0)
Highest ESCS	25.0	533.6	(3.4)	25.1	534.4	(4.8)	-0.8	(5.9)
Native (ref.)	82.1	498.1	(2.3)	81.4	497.7	(4.0)	0.4	(4.6)
Immigrant & Eng./Irish	9.0	499.7	(5.2)	8.5	496.4	(7.1)	3.3	(8.8)
Immigrant & other lang.	8.8	496.0	(5.4)	10.1	487.2	(6.8)	8.8	(8.7)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

Similar to performance on reading and mathematics, Third Year students scored statistically significantly higher in science in the Spring compared to the Autumn (494.7 and 482.1, respectively) with a corresponding small effect size ($d=0.14$). Transition Year students scored slightly higher in Autumn testing compared to Transition Year students tested in the Spring (although the difference is not statistically significant).

Examining the pattern within the testing periods, Transition Year students had the highest science score compared to students at the other grade levels and students in the lowest ESCS quartile had the lowest science score compared to students at the other (ESCS) quartiles in each testing window. The gender gap in science has widened slightly from 1.5 points in Spring to 4.9 points in the Autumn but the gender difference is not statistically significant in either testing period.

4.1.2. Comparison of performance on PISA by school-level variables

Table 4.5 shows the mean scores for students in each school category for the PISA 2018 Spring and Autumn testing on the reading, mathematics and science literacy scales. Examining the school type by their sector-gender composition, four of the five school types had very similar mean scores in Spring and Autumn. However, in the case of mixed secondary schools, mean

scores were higher in Spring than in Autumn by some 23-25 score points in each domain (though these differences did not reach statistical significance, the corresponding effect sizes range from $d=0.25$ to $d=0.28$).

Students in DEIS schools did not score (statistically) significantly different between Spring testing and Autumn testing on any of the three domains (with score differences of 0.3 in reading, 0.9 in mathematics and 4.8 in science - all higher in Spring), which is consistent with the analyses of student ESCS shown in Tables 4.2-4.4. Similarly, students in non-DEIS schools did not score (statistically) significantly different between the two testing periods on any of the domains, with the score differences very alike (1.9 in reading and 2.7 in mathematics favouring Spring administration, 1.2 in science favouring Autumn).

Table 4.5: Mean scores and standard errors for reading, mathematics and science by school background variables (percentages included), Spring and Autumn testing

	Spring Testing			Autumn Testing			Spring - Autumn	
	%	Mean	(SE)	%	Mean	(SE)	Mean Diff	SE Diff
Reading								
Girls' secondary	21.2	541.7	(3.5)	19.2	538.4	(7.5)	3.3	(8.3)
Boys' secondary	15.0	511.1	(6.0)	15.9	515.3	(11.3)	-4.2	(12.8)
Community/comprehensive	16.9	507.6	(3.8)	17.5	516.6	(6.5)	-9.0	(7.6)
Mixed secondary	17.4	536.0	(7.7)	19.0	511.5	(13.4)	24.5	(15.5)
ETB vocational (ref.)	29.5	500.0	(4.2)	28.3	503.1	(7.0)	-3.1	(8.1)
Non-DEIS (ref.)	75.9	530.4	(2.5)	74.4	528.5	(3.7)	1.9	(4.5)
DEIS	24.1	479.2	(4.8)	25.6	478.9	(6.5)	0.3	(8.0)
Mathematics								
Girls' secondary	21.2	506.6	(3.9)	19.2	507.7	(7.9)	-1.1	(8.8)
Boys' secondary	15.0	510.0	(5.6)	15.9	508.2	(10.0)	1.7	(11.5)
Community/comprehensive	16.9	492.2	(4.2)	17.5	494.4	(4.8)	-2.3	(6.4)
Mixed secondary	17.4	517.4	(6.5)	19.0	494.4	(11.4)	23.0	(13.2)
ETB vocational (ref.)	29.5	483.2	(3.9)	28.3	485.8	(5.5)	-2.6	(6.7)
Non-DEIS (ref.)	75.9	510.2	(2.4)	74.4	507.5	(3.4)	2.7	(4.2)
DEIS	24.1	466.4	(4.5)	25.6	465.4	(5.0)	0.9	(6.8)
Science								
Girls' secondary	21.2	506.6	(3.8)	19.2	504.4	(8.4)	2.2	(9.2)
Boys' secondary	15.0	498.8*	(5.5)	15.9	503.6	(10.6)	-4.8	(11.9)
Community/comprehensive	16.9	488.3	(4.0)	17.5	497.6	(5.1)	-9.3	(6.5)
Mixed secondary	17.4	515.0	(7.7)	19.0	492.2	(13.5)	22.9	(15.5)
ETB vocational (ref.)	29.5	480.5	(4.0)	28.3	484.6	(6.8)	-4.1	(7.9)
Non-DEIS (ref.)	75.9	506.0	(2.6)	74.4	507.1	(3.5)	-1.2	(4.3)
DEIS	24.1	465.0	(4.7)	25.6	460.3	(6.3)	4.8	(7.9)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

4.2. High- and Low-Achievers on the PISA Assessment

Students performing below Level 2 are often referred to as lower-achieving students or low performers in the PISA literature and are considered to be below a baseline level of proficiency in literacy required to enable successful participation in education and work (OECD, 2019b). In contrast, the term ‘high-achievers’ is often used to describe the combined percentages of students at Levels 5 and 6. Table 4.6 presents the percentages of students performing below Level 2 (low-achievers), and performing at Level 5 and above (high-achievers) on the reading, mathematics and science scales for PISA 2018 Spring and Autumn testing. The differences in proportions for each of the levels considered between Spring and Autumn testing on PISA reading and science are less than 1%. However, while there is a larger percentage point difference between Spring and Autumn on PISA mathematics for low-achievers (2.4% more in Autumn), the difference is not statistically significant. The percentage point difference on the PISA mathematics scale between Spring and Autumn testing is just 0.4% for high-achievers. Therefore, performance on the PISA proficiency levels is comparable across Spring and Autumn, with some evidence of slightly, though not (statistically) significantly, more students at or below Level 2 on PISA mathematics in Autumn compared with Spring testing.

Table 4.6: Percentages and standard errors of low- and high-achievers for reading, mathematics and science, Spring and Autumn testing

	Spring Testing		Autumn Testing		Spring - Autumn	
	%	(SE)	%	(SE)	% Diff	(SE Diff)
Reading						
Low-achievers - Below Level 2	11.8	(0.7)	12.4	(1.4)	-0.6	(1.5)
High-achievers - Level 5 and above	12.1	(0.7)	11.3	(1.1)	0.8	(1.3)
Mathematics						
Low-achievers - Below Level 2	15.7	(0.8)	18.1	(1.7)	-2.4	(1.9)
High-achievers - Level 5 and above	8.2	(0.7)	8.6	(0.9)	-0.4	(1.2)
Science						
Low-achievers - Below Level 2	17.0	(0.8)	17.3	(1.5)	-0.3	(1.7)
High-achievers - Level 5 and above	5.8	(0.6)	5.4	(0.8)	0.4	(0.9)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable’s categories with alpha levels adjusted appropriately.

4.2.1. Comparison of low- and high-achievers in the PISA assessment by student-level variables

Reading

Table 4.7 presents percentages of low- and high-achievers for reading by student-level variables. There are no statistically significant differences between the proportions of low-

achieving students on the reading literacy scale for any of the student groupings examined (final two columns). At Third Year there was a higher percentage of high-achievers in the Spring (11.8%) compared to the Autumn (7.2%), with the difference statistically significant at .05 level (small effect size $h=0.16$). If students in Third Year in Spring are compared to Transition Year/Fourth Year students in Autumn (more similar in terms of school work covered), there was a higher percentage of low-achievers among Third Year students in Spring compared to Transition Year students in Autumn. This may be because fewer low-SES students do Transition Year; instead they progress to Fifth year. There was also a higher percentage of high-achievers among Transition Year students compared to Third Year students in the Spring.

Table 4.7: Percentages and standard errors of low- and high-achievers for reading by student-level variables, Spring and Autumn testing

	Spring Testing		Autumn Testing		Spring - Autumn	
	%	(SE)	%	(SE)	% Diff	(SE Diff)
Reading – Low-achievers (below Level 2)						
Male (ref.)	15.1	(1.0)	17.6	(2.2)	-2.5	(2.4)
Female	8.5	(0.7)	7.2	(1.1)	1.4	(1.3)
First / Second Year	40.9	(6.1)	46.7	(16.2)	-5.8	(17.3)
Third Year	11.7	(0.7)	14.3	(1.8)	-2.6	(1.9)
Transition Year (ref.)	7.9	(1.0)	8.2	(1.4)	-0.2	(1.7)
Fifth/Sixth Year	18.4	(2.3)	20.1	(3.4)	-1.7	(4.1)
Lowest ESCS (ref)	20.5	(1.3)	20.2	(2.5)	0.3	(2.8)
Low-Medium ESCS	11.5	(1.1)	14.9	(2.2)	-3.4	(2.5)
Medium-High ESCS	8.8	(0.8)	9.0	(1.4)	-0.3	(1.7)
Highest ESCS	5.3	(0.8)	5.4	(1.4)	-0.1	(1.7)
Native (ref.)	10.9	(0.7)	11.3	(1.3)	-0.5	(1.5)
Immigrant & Eng./Irish	12.7	(1.7)	13.4	(3.2)	-0.6	(3.7)
Immigrant & other lang.	14.9	(2.1)	16.6	(3.0)	-1.8	(3.7)
Reading – High-achievers (Level 5 and above)						
Male (ref.)	10.3	(0.9)	9.8	(1.3)	0.5	(1.6)
Female	13.8	(0.8)	12.8	(1.5)	1.0	(1.7)
First / Second Year	1.9	(1.4)	4.3	(8.3)	-2.4	(8.5)
Third Year	11.8*	(0.8)	7.2	(1.6)	4.6*	(1.8)
Transition Year (ref.)	15.1	(1.2)	15.1	(1.6)	0.0	(2.0)
Fifth/Sixth Year	6.9	(1.6)	7.0	(1.9)	-0.1	(2.5)
Lowest ESCS (ref)	5.4	(0.8)	3.9	(1.3)	1.5	(1.5)
Low-Medium ESCS	8.2	(1.0)	6.7	(1.4)	1.5	(1.8)
Medium-High ESCS	13.0	(1.2)	13.4	(1.9)	-0.4	(2.2)
Highest ESCS	22.2	(1.6)	21.7	(2.6)	0.5	(3.1)
Native (ref.)	12.8	(0.7)	12.3	(1.2)	0.5	(1.4)
Immigrant & Eng./Irish	13.3	(2.1)	9.6	(2.7)	3.7	(3.4)
Immigrant & other lang.	7.6	(1.7)	6.7	(2.5)	0.9	(3.0)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

Looking at patterns within the testing period, the percentage of low-achieving students in the low-medium ESCS quartile is statistically significantly different (at the .01 level) from the lowest ESCS quartile in Spring (effect size $h=0.25$) but not in the Autumn, where there is no statistically significant difference between the two subgroups (effect size $h=0.14$). There is a similar pattern for the high-achievers between these two ESCS quartiles. The proportion of high-achieving immigrant students who speak another language is statistically significantly lower compared with high-achieving native students at Spring testing (effect size $h=0.17$). While the difference between proportions favours native students by the same amount at Autumn testing (just over 5%), it is not statistically significant (effect size $h=0.19$), arising from a larger standard error of the percentage associated with immigrant students at Autumn testing.

Mathematics

Examining mathematics there is a statistically significant difference, at the .05 level, between the Spring and Autumn testing for low-achieving males (15.7% achieved below Level 2 in the Spring compared to 21.4% in the Autumn, effect size $h=0.15$) (Table 4.8). There is also statistically significant differences for low- and high-achieving Third Year students between Spring and Autumn testing, with corresponding small effect sizes ($h=0.18$ and $h=0.13$, respectively); again, a like-for-like comparison cannot be made with Third Years.

Within testing periods, while there is no statistically significant difference in the percentage of males and females achieving below Level 2 in mathematics in Spring testing (15.7% for both), the difference between the genders is statistically significant (at .05 level) in the Autumn (6.7% fewer females) with a corresponding small effect size ($h=0.17$). In contrast, there is no statistically significant difference in the percentage of males and females achieving Level 5 and above in mathematics at Autumn testing (9.7% and 7.5%, respectively), while at Spring testing, 9.9% of males achieved level 5 and above compared to 6.6% of females (statistically significant at the .01 level, effect size $h=0.12$).

Similar patterns for mathematics as for reading are present for the low-achieving students in the low-medium ESCS quartile. The percentage of students in the lowest ESCS quartile achieving below Level 2 is (statistically) significantly higher than in the low-medium ESCS quartile in the Spring (10.8% fewer in the low-medium quartile students, effect size $h=0.26$) compared to the Autumn (statistically a non-significant 5.7% fewer in the low-medium quartile students).

Table 4.8: Percentages and standard errors of low- and high-achievers for mathematics by student-level variables, Spring and Autumn testing

	Spring Testing		Autumn Testing		Spring - Autumn	
	%	(SE)	%	(SE)	% Diff	(SE Diff)
<i>Mathematics – Low-achievers (below Level 2)</i>						
Male (ref.)	15.7	(1.1)	21.4	(2.5)	-5.7*	(2.8)
Female	15.7	(1.1)	14.7*	(1.6)	1.0	(1.9)
First / Second Year	44.1	(5.9)	62.5	(15.5)	-18.4	(16.6)
Third Year	16.2	(0.9)	23.4	(3.0)	-7.2*	(3.1)
Transition Year (ref.)	10.8	(1.3)	11.7	(1.5)	-0.9	(2.0)
Fifth/Sixth Year	21.3	(2.6)	26.3	(3.8)	-5.1	(4.6)
Lowest ESCS (ref)	27.3	(1.7)	27.8	(3.2)	-0.5	(3.7)
Low-Medium ESCS	16.5	(1.3)	22.1	(2.7)	-5.6	(3.0)
Medium-High ESCS	11.5	(1.2)	13.9	(2.1)	-2.4	(2.4)
Highest ESCS	6.4	(1.0)	8.2	(1.7)	-1.8	(1.9)
Native (ref)	14.9	(0.8)	16.7	(1.8)	-1.8	(1.9)
Immigrant & Eng./Irish	19.2	(2.4)	19.4	(3.8)	-0.2	(4.5)
Immigrant & other lang.	14.6	(2.7)	20.8	(3.5)	-6.2	(4.4)
<i>Mathematics – High-achievers (Level 5 and above)</i>						
Male (ref.)	9.9	(0.9)	9.7	(1.2)	0.2	(1.5)
Female	6.6	(0.8)	7.5	(1.1)	-1.0	(1.4)
First / Second Year	2.4	(1.8)	0.0	(0.0)	2.4	(1.8)
Third Year	7.5*	(0.8)	4.4	(1.1)	3.1*	(1.4)
Transition Year (ref.)	11.2	(1.3)	11.9	(1.4)	-0.7	(1.8)
Fifth/Sixth Year	5.0	(1.4)	5.9	(1.6)	-0.9	(2.2)
Lowest ESCS (ref)	3.2	(0.7)	2.3	(1.2)	0.9	(1.4)
Low-Medium ESCS	5.2	(0.8)	5.2	(1.4)	0.0	(1.6)
Medium-High ESCS	8.9	(1.1)	10.2	(1.8)	-1.2	(2.1)
Highest ESCS	15.9	(1.5)	17.1	(2.2)	-1.2	(2.6)
Native (ref)	8.4	(0.7)	9.2	(1.2)	-0.8	(1.4)
Immigrant & Eng./Irish	8.6	(1.5)	8.0	(2.7)	0.7	(3.1)
Immigrant & other lang.	8.7	(1.7)	6.9	(2.1)	1.8	(2.7)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

Science

There is no statistically significant difference in the percentages of low- and high-achieving students between the Spring and Autumn testing for any of the selected student groups (Appendix K, Table K1). Similar to mathematics, there is no statistically significant difference in the percentage of male and female students achieving below Level 2 in science in Spring (18.1% and 16.0%, respectively), though the difference between the genders in Autumn (19.9% and 14.7%, respectively) is statistically significant at the .05 level (effect size $h=0.14$). In contrast, there is a statistically significant difference in the percentages of male and female students achieving Level 5 and above in science at the .05 level for Spring testing (6.8% and 4.9%, respectively, effect size $h=0.04$) compared to no statistically significant difference in the percentages between the genders in the Autumn testing (6.0% and 4.8%, respectively).

4.2.2. Comparison of low- and high-achievers on the PISA assessment by school-level variables

This section examines the proportions of high- and low-achievers across the school-level variables. Comparing the Spring and the Autumn testing periods on the reading literacy scale, there is no statistically significant difference in the percentage of low- and high-achieving students in the different sector-gender school types and DEIS and non-DEIS schools (Table 4.9). This is similar for mathematics and science (Appendix K, Tables K2, K3).

Within the testing periods, Table 4.9 shows (statistically) significantly fewer DEIS students among higher achievers, and (statistically) significantly more DEIS students among low-achievers in both Spring and Autumn on the reading literacy scale. This is similar for mathematics and science (Appendix K, Tables K2, K3). The percentage point difference between low-achieving students in mixed secondary schools and ETB vocational schools for reading is statistically significantly higher at the .01 level at Spring testing (effect size $h=0.22$) compared to Autumn testing (7.1 and 4.0, respectively). There is no statistically significant difference for high-achieving students in the four school types compared with those in ETB vocational schools at Autumn testing. However, in the Spring testing period, a statistically significantly higher percentage of students in girls' secondary schools (15.9%) and in mixed secondary schools (17.3%) perform at Level 5 and above compared to students in ETB vocational schools (8.3%) (effect size $h=0.24$ and $h=0.27$, respectively). There is a similar pattern for mathematics (Appendix K, Table K2). In the case of science, there is no statistically significant difference for high-achieving students in the five school types in either the Spring or Autumn testing periods (Appendix K, Table K3).

Table 4.9: Percentages and standard errors of low- and high-achievers for reading by school-level variables, Spring and Autumn testing

	Spring Testing		Autumn Testing		Spring - Autumn	
	%	(SE)	%	(SE)	% Diff	(SE Diff)
Reading – Low-achievers (below Level 2)						
Girls’ secondary	5.9	(1.0)	4.4	(1.7)	1.6	(2.0)
Boys’ secondary	14.1	(2.1)	14.8	(4.6)	-0.7	(5.1)
Community/comprehensive	13.9	(1.3)	12.1	(2.4)	1.8	(2.7)
Mixed secondary	8.5	(1.6)	12.7	(4.1)	-4.2	(4.4)
ETB vocational (ref)	15.6	(1.5)	16.7	(2.3)	-1.1	(2.8)
Non-DEIS (ref.)	8.6	(0.7)	8.5	(1.4)	0.1	(1.5)
DEIS	21.8	(2.0)	23.9	(2.6)	-2.1	(3.3)
Reading – High-achievers (Level 5 and above)						
Girls’ secondary	15.9	(1.2)	14.4	(2.3)	1.6	(2.6)
Boys’ secondary	9.9	(1.4)	11.8	(2.3)	-1.9	(2.7)
Community/comprehensive	10.4	(1.2)	10.6	(2.1)	-0.1	(2.4)
Mixed secondary	17.3*	(2.8)	10.1	(3.3)	7.3	(4.3)
ETB vocational (ref)	8.3	(1.0)	10.3	(1.8)	-2.0	(2.1)
Non-DEIS (ref.)	14.2	(0.8)	13.1	(1.1)	1.1	(1.4)
DEIS	5.4	(0.8)	6.1	(1.6)	-0.6	(1.7)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable’s categories with alpha levels adjusted appropriately.

4.2.3. What do teachers say about their low- and high-achieving students’ performance on the PISA assessment?

Teachers were asked how they think their students (high, low and average achievers) would perform on the PISA tests in general, if testing took place in the Autumn rather than in the Spring. Just over half of English and science teachers (53.4% and 53.8%, respectively) reported that they would expect no difference with their high-achieving students in how they performed in PISA, with 33.1% and 39.7% (respectively) reporting that they would expect them to do better in the Spring (Table 4.10). A slightly larger percentage of maths teachers reported that they would expect their high-achieving students to perform better in the Spring (48.6%) compared to those who would expect no difference in performance (43.9%).

English and science teachers in girls’ secondary schools reported that there would be no difference with their high-achievers between Spring and Autumn testing, while mathematics teachers in girls’ secondary schools reported that they expected their high-achievers to perform better in the Spring. Similarly, mathematics and science teachers in boys’ secondary schools reported that their high-achievers would perform better in the Spring, while English teachers in boys’ secondary school reported that there would be no difference based on the testing period (Appendix K, Table K4). Across all subject teachers, over 50% of teachers in the survey

reported that they would expect their average achieving students to perform better in the Spring. Similarly, a larger proportion of all subject teachers would expect their low-achieving students to perform better in the Spring and this is similar across most of the school types (Appendix K, Table K5). These mixed views from teachers may be in part due to the unfamiliarity with the PISA tests. Separately, only 6.7% of teachers indicated that they were extremely familiar with the PISA study, a further 75.1% were somewhat familiar and 18.2% were not at all familiar with the study.

Table 4.10: Teachers' expectations of their students' performance on PISA depending on testing period (percentages)

<i>Subject teachers teaching...</i>		Better in the Autumn	Better in the Spring	No difference
	N	%	%	%
<i>High-achieving students</i>				
English	133	13.5	33.1	53.4
Maths	107	7.5	48.6	43.9
Science	78	6.4	39.7	53.8
Maths and Science	89	3.4	50.6	46.1
<i>Low-achieving students</i>				
English	131	21.4	53.4	25.2
Maths	107	15.9	44.9	39.3
Science	77	15.6	42.9	41.6
Maths and Science	90	6.7	54.4	38.9
<i>Average-achieving students</i>				
English	134	15.7	54.5	29.9
Maths	107	17.8	59.8	22.4
Science	79	13.9	53.2	32.9
Maths and Science	90	4.4	74.4	21.1

An open-ended question also asked teachers to provide a brief explanation of their responses on how they think their students (high, low and average achievers) would perform on PISA tests in general, if testing took place in the Autumn rather than in the Spring. The responses of teachers on how their high-, average- and low-achieving students would perform were combined and are presented in Table 4.11, along with teachers' explanations. Just over a quarter of teachers who responded reported that their high-, average- and low-achieving students would perform better in the Spring, a further 19.5% of teachers were recorded as expecting no difference in performance for their high, average and low students. A slightly lower percentage (17.4%) noted that there would be no difference in performance for their high-achievers but their average- and low-achieving students would perform better in the Spring.

Looking at the explanations given in general, 26.1% of the teachers noted students would accumulate more knowledge up to Spring term, as they were repeatedly exposed to concepts. Similar to this is a perception of the value of more academic time for students where they are more mature and better prepared in Spring (21.3%). Approximately 14% of teachers mentioned that students are engaged, motivated, confident, focused throughout the academic year (no difference between Spring and Autumn) and that their performance would be based on skills rather than content or knowledge. About one-in-ten teachers cited the long summer break (SLL), which would not only be linked to data/content but also methodologies lost and that it takes time to build up concentration again after the summer holidays.

Examining the combination of teachers' responses on how their students would perform and their explanations, over half of the teachers who expected their high-, average- and low-achieving students to perform better in the Spring, cited the 'accumulation of knowledge' as a reason, 21.1% noted that students need more academic time and 17.8% referred to the long summer holidays. Inspecting the explanations of teachers who reported that there would be no difference in the performance of their high, average and low students, 32.7% did not provide any comment, while 29.9% just gave a general comment that there just would be no difference and 24.8% noted that the PISA questions are not curriculum-based and, thus, are (mostly) unseen or new to students, not allowing them to prepare for the test. Nearly one in six teachers who reported that their high-, average- and low-achieving students would all perform better in the Autumn mentioned that their students would have more energy at that time of the year, with just over a quarter of them mentioning that the students would be more engaged, motivated or focused in the Autumn. These teachers may have assumed that the same students would be tested on both occasions.

Table 4.11: Teachers' expectations of their students' performance on PISA depending on testing period and reasons why (percentages)

		Teachers' expectations of their students' performance									
		H-A-L ↑ (Spring)	H-A-L ↔	H ↔ A-L ↑ (Spring)	H-A ↑ (Spring) L ↔	H-A-L ↑ (Autumn)	H ↔ A-L ↑ (Autumn)	H-L ↔ A ↑ (Spring)	H ↑ (Spring) A-L ↔	H-A ↔ L ↑ (Spring)	Various other combinations (16 in total*)
		(100)	(75)	(67)	(34)	(18)	(13)	(12)	(9)	(7)	(49)
(N)	(388)	26.0	19.5	17.4	8.9	4.7	3.4	3.1	2.3	1.8	12.8
1. Greater accumulation of knowledge	26.1	53.5	0.0	32.2	36.5	5.3	0.0	15.0	52.4	12.6	11.3
2. Need more academic time-maturity	21.3	21.1	1.9	38.7	32.9	0.0	0.0	54.5	0.0	14.2	32.3
3. Engaged-motivated-confident-focused throughout the year	14.1	0.0	12.1	24.8	2.2	0.0	36.1	31.6	0.0	44.4	28.8
4. More engaged-motivated-confident-focused in Spring	11.5	11.8	0.0	9.2	30.6	0.0	0.0	0.0	47.6	19.7	19.5
5. Long summer break (SLL)	10.7	17.8	0.0	23.6	14.8	8.9	0.0	0.0	0.0	9.1	1.3
6. More engaged-motivated-focused in Autumn	10.0	0.0	0.0	0.0	0.0	26.2	61.9	0.0	0.0	0.0	55.0
7. In exam mode in Spring	7.7	12.1	0.0	13.4	9.5	9.9	0.0	18.6	0.0	0.0	3.2
8. More settled in Spring time	7.3	17.6	0.0	13.9	1.8	0.0	0.0	0.0	0.0	9.1	0.0
9. No comment given – no difference ticked for all	6.4	0.0	32.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10. General comment – no difference	6.1	0.0	29.9	1.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11. Fresher/more energy in Autumn	6.0	0.8	0.0	0.0	0.0	57.4	59.2	0.0	0.0	0.0	8.9
12. PISA type questions	4.8	0.0	24.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13. Less stressed in Autumn	4.0	0.0	0.0	0.0	0.0	57.4	0.0	0.0	0.0	0.0	10.7
14. Other comment	1.4	0.0	0.8	3.8	1.2	0.0	0.0	6.4	0.0	0.0	2.1

Note. As a combination of responses could be given by a respondent, totals will therefore not sum to 100. *On average, each of these combinations is less than 2% of the total.
H: high-achievers, A: average-achievers, L: low-achievers; ↑: better performance, ↔ no difference in performance.

4.3. Reading Subscales in PISA

Five reading subscales, established in the PISA 2018 Reading Literacy assessment based on item and passage-type, also report student performance on reading literacy. Three of these subscales entail assessment of cognitive processes (Locating Information; Understanding; Evaluating and Reflecting). A further two subscales assess reading performance according to whether items related to reading single or multiple texts. While students taking PISA in the Spring scored three points higher on the single-texts subscale, compared with students taking the test in the Autumn, and students in Autumn did marginally better on the multiple-texts scale (by 0.3 score points), neither difference is statistically significant. Similarly, there are no statistically significant differences across cognitive process subscales (Table 4.12).

Table 4.12: Mean scores on reading subscales, Spring and Autumn testing

	Spring Testing		Autumn Testing		Spring-Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
Overall Mean Score	518.1	(2.2)	515.8	(4.1)	2.3	(4.7)
Process subscales						
Cognitive Locate	520.7	(2.3)	518.5	(4.3)	2.2	(4.9)
Cognitive Understand	510.2	(2.4)	508.0	(4.4)	2.2	(5.1)
Cognitive Evaluate	519.3	(2.5)	518.6	(4.6)	0.6	(5.3)
Source subscales						
Text - Single	512.6	(2.5)	509.6	(4.5)	3.0	(5.2)
Text - Multiple	516.6	(2.4)	516.9	(4.3)	-0.3	(4.9)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

There are no statistically significant differences for males or females across the five subscales between the Spring and Autumn testing (Appendix K, Table K6). Third Year students scored (statistically) significantly higher (at the .01 level) on the process locate subscales at Spring testing compared to Autumn testing (518.6 and 496.1, respectively with a corresponding effect size $d=0.25$). For all other subscales, there are no statistically significant differences between Autumn and Spring testing across the grade levels (Appendix K, Table K7). There are no statistically significant differences on the five subscales across the four ESCS quartiles at the .01 level. Students in the low-medium ESCS quartile scored (statistically) significantly higher at the .05 level on the single text subscale in the Spring compared to the Autumn (504.0 and 492.0, respectively), effect size $d=0.13$ (Appendix K, Table K8).

While there are no statistically significant differences between Spring and Autumn on the five subscales for native students, immigrant students with English/Irish and immigrant students with another language, there are some differences within the testing periods between

native students and other students (Appendix K, Table K9). The most notable is on the locate process subscale, native students scored statistically significantly higher than immigrant students with another language at Autumn testing compared to the Spring testing (score differences of 28.1 (effect size $d=0.30$) and 17.1 (effect size $d=0.18$), respectively – statistically significant at the .01 level). Similarly, on the understand subscale, at Autumn testing, native students scored statistically significantly higher than immigrant students with English/Irish at the .05 level (513.2 and 497.3, respectively) and immigrant students with another language at the .01 level (490.0). At Spring testing, native students scored statistically significantly higher than immigrant students with another language at the .05 level (514.3 and 491.2, respectively) and there are no statistically significant differences between native students and immigrant students with English/Irish. The effect sizes for these differences on the understand subscale were small, ranging from $d=0.13$ to $d=0.17$.

Examining students' mean scores across the types of school sector gender composition and DEIS status shows no statistically significant differences between the Spring and Autumn testing on the five reading subscales (Appendix K, Tables K10, K11).

4.4. Item Analysis - Student Performance on Clusters of Items in the PISA Assessment

Item-level data analysis can provide a better understanding of student proficiency levels before scaling takes place. This section provides an overview of the percent correct of various item clusters, in terms of the percentages of students answering items correctly. The percent correct can be considered as an indicator of item difficulty. As a result of the new adaptive feature in PISA 2018 (multistage adaptive testing (MSAT) design), statistics based on the number or percentages of items answered correctly (P^+) needed to be adjusted. An Equated P^+ ⁵⁷ statistic was developed which is equivalent to the P^+ ⁵⁸ obtained from the non-adaptive designs used in previous PISA cycles, allowing comparisons across cycles. Therefore, the equated P^+ obtained in Spring can be compared with the equated P^+ achieved in the Autumn. Standard errors are not reported.⁵⁹ Therefore, in examining reading literacy/achievement, all results are indicative of broad response patterns only and have not been subjected to statistical significance tests.

⁵⁷ According to the OECD (2020b), “[t]he equated P^+ is equivalent to the P^+ that would have been obtained from the non-adaptive designs used in previous PISA cycles. It accounts for the differences in proficiencies between the sample that responded to the item and the total sample. Therefore, the 2018 reading MSAT equated P^+ can be compared with the classical observed P^+ from 2015 (or earlier cycles) as well as with other equated P^+ statistics from different countries/economies that participated in PISA 2018.” (p. 6).

⁵⁸ P^+ is an ETS-developed index that indicates the usual percent correct for a given item (OECD, 2017a, p. 133).

⁵⁹ That is, the ‘bootstrapping’ method that uses the PISA replicate weights (OECD, 2009) has not been applied.

The mathematics and science items, which were not presented using MSAT, were examined in more detail by looking at the standard errors⁶⁰ to test differences of significances.

Reading items

In PISA 2018, there were 244 items used in the final data file for assessing reading achievement. The average equated percent correct score in the Spring was 63.8 compared to 63.7 in the Autumn, a mean percentage difference of 0.1 (Table 4.13). None of the cognitive processes, except for ‘assess quality and credibility’ have an average percentage difference greater than 1%. Autumn had a higher average equated percent correct on the cognitive process ‘assess quality and credibility’ than Spring (48.1% and 46.4%, respectively, across 8 items). For this cognitive process, students must identify and consider the source of the information and consider the content and form of the text.

⁶⁰ In obtaining the percent correct for each mathematics and science item and their SE, items were recoded to exclude ‘not reached’ and the output from the IDB Analyser provided an SE for each percent correct for each item. The SEs were averaged using the formula: $=\text{SQRT}(\text{SUMSQ}(\text{Item1 SE}:\text{Item17 SE}))/17$ (i.e. 17 items).

Table 4.13: Comparison of mean equated percent correct (P+) scores on reading items, Spring and Autumn

			Spring	Autumn	Spring - Autumn
		N Items	Mean %	Mean %	Mean Diff
Situation	Educational	54	61.9	61.5	0.3
	Multiple	7	40.0	40.3	-0.3
	Occupational	26	70.1	69.4	0.7
	Personal	60	69.2	68.4	0.8
	Public	97	61.5	62.1	-0.6
Cognitive Process*	1. Scan and locate	30	69.6	68.8	0.8
	1. Search and select relevant text	19	67.3	68.3	-0.9
	2. Integrate and generate inferences	78	63.2	62.8	0.4
	2. Represent literal meaning	53	68.7	68.8	-0.1
	3. Corroborate and handle conflict	18	44.8	45.1	-0.3
	3. Reflect on content and form	38	64.4	63.9	0.5
	3. Assess quality and credibility	8	46.4	48.1	-1.8
Text Structure	Multiple	140	63.6	63.8	-0.2
	Single	104	64.0	63.5	0.5
Text Type	Argumentative	39	58.3	58.1	0.2
	Description	30	68.6	68.3	0.3
	Exposition	72	63.3	63.3	-0.1
	Instruction	12	67.4	66.6	0.9
	Interaction	5	82.8	81.2	1.6
	Multiple	21	45.8	45.0	0.8
	Narrative	45	65.6	65.3	0.3
	Transactional	20	76.9	78.4	-1.5
Text Format	Continuous	158	63.6	63.8	-0.2
	Mixed	56	63.8	62.8	0.9
	Non-continuous	30	64.9	64.5	0.4
Unit Type	New	172	65.0	65.2	-0.2
	Trend	72	60.9	60.0	0.8
All Items		244	63.8	63.7	0.1

Note. *Cognitive process covers three broad areas: 1. Locating information 2. Understanding. 3. Evaluating and reflecting.

Similarly, there is very little difference between Autumn and Spring across the multiple text and single text items on the average equated percent correct achieved. The average percentage difference that is observed between trend and new items in the Spring (4.1%) is similar to the difference recorded in the Autumn testing (5.2%). No analysis was conducted examining student subgroups as the Equated P+ was generated by the ETS taking into account the multi-stage adaptive testing procedure.

Mathematics items

Overall, the average percent correct on mathematics items is relatively stable. At Spring testing, the average percent correct for all mathematics items was 46.5% compared to 46.7% in the Autumn (Table 4.14). The differences between the mean percent correct scores for all students between Spring and Autumn on the four content categories ('change and relationships', 'quantity', 'space and shape' and 'uncertainty and data') ranged between -0.6% and 0.7%, with no (statistically) significant differences between Spring and Autumn. This is also the case for the process categories ('employing mathematical concepts, facts and procedures', 'formulating situations mathematically', and 'interpreting, applying and evaluating mathematical outcomes') and item format categories ('complex multiple choice - computer-scored', 'open response - computer-scored', 'open response - human-coded' and 'simple multiple choice - computer-scored').

An analysis of the average percent correct on mathematics items by gender⁶¹ is also presented in Table 4.14. Females had a lower average percent correct score across all items in the Spring (45.5%) compared to the Autumn (46.8%), statistically significantly different at .05 level (effect size $h=0.03$). In contrast, males had a higher average percent correct score in the Spring (47.4%) compared to the Autumn (45.8%), statistically significant with a corresponding effect size of this difference is small ($h=0.03$). Males did statistically significantly better at Spring than at Autumn testing in the area of 'change and relationships' (average percentage score difference of 2.7), 'employing mathematical concepts, facts and procedures' (average percentage score difference of 1.7) and 'open response – human-coded' (average percentage score difference of 1.6). Females on the other hand, did statistically significantly better in the Autumn compared to the Spring on 'quantity' (average percentage score difference of 2.5) and 'employing mathematical concepts, facts and procedures' (average percentage score difference of 2.2). The corresponding effect sizes for all these differences were small ($h<.07$).

⁶¹ No analysis has been completed on the other background variables due to more groupings and therefore smaller numbers.

Table 4.14: Comparison of average percent correct scores (weighted) on mathematics items by gender, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean %	Mean (SE)	Mean %	Mean SE	Mean % Diff	Mean (SE) Diff
All items (<i>n items</i>=70)						
All students	46.5	(0.29)	46.7	(0.17)	-0.2	(0.34)
Male	47.4	(0.25)	45.8	(0.41)	1.6	(0.48)
Females	45.5	(0.24)	46.8	(0.40)	-1.2*	(0.47)
Content						
Change and Relationships (<i>n items</i>=17)						
All Students	47.2	(0.36)	46.5	(0.60)	0.7	(0.70)
Male	48.3	(0.49)	45.5	(0.82)	2.7	(0.96)
Females	46.0	(0.49)	47.6	(0.79)	-1.5	(0.93)
Quantity (<i>n items</i>=18)						
All Students	57.0	(0.34)	57.6	(0.57)	-0.6	(0.66)
Male	57.6	(0.53)	56.3	(0.89)	1.3	(1.03)
Females	56.4	(0.50)	58.9	(0.82)	-2.5*	(0.96)
Space and Shape (<i>n items</i>= 17)						
All Students	31.1	(0.33)	30.9	(0.55)	0.2	(0.64)
Male	32.3	(0.47)	31.6	(0.79)	0.7	(0.91)
Females	29.8	(0.44)	30.2	(0.77)	-0.4	(0.89)
Uncertainty and Data (<i>n items</i>=18)						
All Students	50.7	(0.37)	50.0	(0.58)	0.6	(0.69)
Male	51.4	(0.51)	49.7	(0.82)	1.7	(0.97)
Females	49.9	(0.51)	50.4	(0.83)	-0.5	(0.98)
Process						
Employing Mathematical Concepts, Facts and Procedures (<i>n items</i>=29)						
All Students	50.2	(0.28)	50.4	(0.46)	-0.2	(0.54)
Male	50.6	(0.40)	49.0	(0.66)	1.7*	(0.78)
Females	49.6	(0.39)	51.8	(0.64)	-2.2	(0.75)
Formulating Situations Mathematically (<i>n items</i>=22)						
All Students	31.8	(0.30)	31.1	(0.50)	0.7	(0.59)
Male	33.0	(0.42)	31.4	(0.73)	1.6	(0.84)
Females	30.5	(0.40)	30.8	(0.64)	-0.3	(0.75)
Interpreting, Applying and Evaluating Mathematical Outcomes (<i>n items</i>=19)						
All Students	58.7	(0.35)	58.4	(0.57)	0.3	(0.67)
Male	59.8	(0.49)	58.4	(0.78)	1.5	(0.92)
Females	57.6	(0.49)	58.4	(0.85)	-0.8	(0.98)

Note. Table continues on next page. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Condt. Table 4.14: Comparison of average percent correct scores (weighted) on mathematics items by gender, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean %	Mean (SE)	Mean %	Mean SE	Mean % Diff	Mean (SE) Diff
Item Format						
<i>Complex Multiple Choice - Computer Scored (n items=14)</i>						
All Students	50.7	(0.46)	50.6	(0.74)	0.1	(0.87)
Male	52.8	(0.66)	50.5	(1.03)	2.3	(1.23)
Females	48.6	(0.62)	50.7	(1.00)	-2.1	(1.17)
<i>Open Response - Computer Scored (n items=22)</i>						
All Students	47.3	(0.31)	46.9	(0.52)	0.4	(0.60)
Male	47.1	(0.43)	45.6	(0.75)	1.5	(0.86)
Females	47.4	(0.43)	48.3	(0.71)	-0.9	(0.84)
<i>Open Response - Human Coded (n items=18)</i>						
All Students	34.0	(0.26)	33.7	(0.46)	0.4	(0.53)
Male	34.7	(0.37)	33.1	(0.66)	1.6*	(0.76)
Females	33.2	(0.38)	34.3	(0.67)	-1.1	(0.77)
<i>Simple Multiple Choice - Computer Scored (n items=16)</i>						
All Students	56.6	(0.41)	56.7	(0.65)	0.0	(0.77)
Male	58.2	(0.59)	57.2	(0.93)	1.0	(1.10)
Females	55.1	(0.56)	56.2	(0.91)	-1.1	(1.07)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Science items

As seen with the mathematics items, overall, the average percent correct on science items is relatively stable. At Spring testing, the average percent correct for all science items was 51.1% compared to 50.9% in the Autumn (Table 4.15), and the difference is not (statistically) significant. Examining the average percent correct across the science systems, a slightly higher average percent correct was achieved on the ‘earth and space’ items for all students in the Spring (53.2%) compared to the Autumn (51.8%), statistically significant at the .05 level. This statistically significant difference was observed for the females (53.2% and 50.8%, respectively) but not for the males (53.2% and 52.8%, respectively). The other science systems examined, ‘living’ and ‘physical’, had a similar average percent correct in the Spring and Autumn for all students and male/females. Across the science competencies, the average percent correct is comparable between Spring and Autumn (no statistically significant differences) across all students and for males/females. A slightly higher average percent correct was achieved on ‘complex multiple choice – computer-scored’ items for all students in the Spring (52.0%) compared to the Autumn (50.9%), statistically significant at the .05 level. This statistically significant difference was observed for the females (52.2% and 50.7%, respectively) but not for the males (51.7% and 51.1%, respectively). The corresponding effect size for these differences are small ($h < 0.06$). There were no other statistically significant differences observed for the other item types.

Table 4.15: Comparison of average percent correct scores (weighted) on science items by gender, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean %	Mean (SE)	Mean %	Mean SE	Mean % Diff	Mean (SE) Diff
All items						
All students	51.1	(0.1)	50.9	(0.2)	-0.2	(0.2)
Male	51.2	(0.2)	51.3	(0.4)	0.1	(0.4)
Females	51.0	(0.2)	50.5	(0.3)	-0.6	(0.4)
Systems						
<i>Earth and Space (n items=30)</i>						
All Students	53.2	(0.3)	51.8	(0.5)	-1.4*	(0.6)
Male	53.2	(0.4)	52.8	(0.7)	-0.4	(0.8)
Females	53.2	(0.4)	50.8	(0.7)	-2.4*	(0.8)
<i>Living (n items=47)</i>						
All Students	49.1	(0.2)	49.4	(0.4)	0.3	(0.4)
Male	48.9	(0.3)	49.5	(0.6)	0.6	(0.6)
Females	49.3	(0.3)	49.3	(0.5)	0.0	(0.6)
<i>Physical (n items=38)</i>						
All Students	52.0	(0.3)	52.0	(0.5)	0.0	(0.5)
Male	52.6	(0.4)	52.4	(0.6)	-0.1	(0.7)
Females	51.5	(0.4)	51.7	(0.6)	0.2	(0.7)
Competencies						
Evaluate and design scientific enquiry (n items=30)						
All Students	49.0	(0.3)	48.3	(0.5)	-0.7	(0.6)
Male	48.4	(0.4)	47.5	(0.7)	-0.9	(0.8)
Females	49.6	(0.4)	49.1	(0.7)	-0.5	(0.8)
Explain phenomena scientifically (n items=49)						
All Students	49.7	(0.2)	49.8	(0.4)	0.1	(0.4)
Male	50.0	(0.3)	50.3	(0.5)	0.3	(0.6)
Females	49.4	(0.3)	49.3	(0.5)	0.0	(0.6)
Interpret data and evidence scientifically (n items=36)						
All Students	54.8	(0.3)	54.6	(0.4)	-0.3	(0.5)
Male	55.2	(0.4)	56.0	(0.6)	0.8	(0.7)
Females	54.5	(0.4)	53.2	(0.6)	-1.3	(0.7)

Note. Table continues on next page. Bold indicates statistical significant difference at .01 level; * indicates statistical significant difference at .05 level.

Condt. Table 4.15: Comparison of average percent correct scores (weighted) on science items by gender, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean %	Mean (SE)	Mean %	Mean SE	Mean % Diff	Mean (SE) Diff
Item Format						
<i>Complex Multiple Choice - Computer Scored (n items=47)</i>						
All Students	52.0	(0.2)	50.9	(0.4)	-1.1*	(0.5)
Male	51.7	(0.3)	51.1	(0.6)	-0.7	(0.7)
Females	52.2	(0.3)	50.7	(0.5)	-1.4*	(0.6)
<i>Open Response - Computer Scored (n items=3)</i>						
All Students	44.5	(0.9)	43.1	(1.5)	-1.5	(1.8)
Male	45.2	(1.3)	41.5	(2.1)	-3.7	(2.4)
Females	43.9	(1.3)	44.9	(2.2)	1.0	(2.6)
<i>Open Response - Human Coded (n items=32)</i>						
All Students	40.2	(0.3)	41.2	(0.5)	1.0	(0.5)
Male	39.9	(0.4)	41.5	(0.6)	1.6	(0.7)
Females	40.5	(0.4)	40.9	(0.6)	0.4	(0.7)
<i>Simple Multiple Choice - Computer Scored (n items=33)</i>						
All Students	61.2	(0.3)	61.0	(0.5)	-0.1	(0.6)
Male	62.0	(0.4)	62.2	(0.7)	0.2	(0.8)
Females	60.3	(0.4)	60.0	(0.7)	-0.4	(0.8)

Note. Bold indicates statistical significant difference at .01 level; * indicates statistical significant difference at .05 level.

4.5. An examination of ‘Session’ while Controlling for School- and Student-Level Background Variables

In examining the difference between Spring and Autumn on the United States PISA 2003 data, Ferraro et al. (2009) took the approach that since schools rather than students had chosen to be assessed in either the Spring or the Autumn, session effects were seen as school-level effects. They conducted a ‘means-as-outcomes’ model with the student level fully unconditional with student scores (a function of the school mean) plus a random component and the school level with session (Spring/Autumn), along with a number of school-level predictors. The schools in the United States Autumn study were different from those in the Spring study in the sense that schools that refused in the Spring said they would be willing to take part in the Autumn, with student ages adjusted accordingly. This is broadly similar to the current study, although different schools were sampled in the Autumn compared to the Spring. A similar model to the United States model is presented in Table 4.16 showing ‘session’ and the two school-level background variables (DEIS status and sector-gender composition) that have been used in the analysis. Comparable to the conclusions reached by Ferraro et al. (2009) the coefficient for session does not reach statistical significance, i.e., controlling for all other school background variables in the model, the time of year was not associated with the achievement of students in

PISA reading, mathematics or science. For example, in the case of reading, performance was 1.23 points higher in Spring, compared with Autumn, and this parameter was not statistically significant, when school disadvantaged status (DEIS) and sector-gender composition are taken into account.

Table 4.16: Means-as-outcomes model on reading, mathematics and science performance (school-level background variables)

	Reading			Mathematics			Science		
	Coefficient	SE	p-value	Coefficient	SE	p-value	Coefficient	SE	p-value
Intercept									
	519.36	8.15	<.001	499.84	7.05	<.001	499.01	7.32	<.001
Level 2 (Between School)									
DEIS school status (ref.=Non-DEIS)	-51.30	6.34	<.001	-43.48	5.48	<.001	-46.95	6.16	<.001
School Sector Gender (ref.=ETB Vocational)									
Girls' secondary	19.23	8.05	0.017	5.46	7.05	0.439	4.75	7.79	0.542
Boys' secondary	1.42	8.70	0.871	14.94	7.54	0.048	8.73	8.37	0.297
Community/Comprehensive	4.11	7.18	0.567	3.24	6.31	0.607	3.59	6.63	0.589
Mixed secondary	13.01	8.46	0.124	12.34	7.34	0.093	10.34	8.73	0.237
Session (ref.=Autumn)	1.23	5.06	0.808	1.16	4.48	0.795	0.95	5.11	0.852

Note. Each model based on 7,565 students, no missingness. (ref.) = reference group.

Building on the *means-as-outcomes* model based on Ferraro et al. (2009), the model in Table 4.17 adds in level 1 background variables, in a two-level linear regression or random intercept model. The student-level model was fully unconditional with student scores plus a random component along with the student-level background variables: gender, ESCS and student immigrant and language status. Grade was excluded due to the incomparability, since Third Year students in the Spring have completed most of the Junior Cycle programme, while Third Year students in the Autumn have only completed the first two years of the Junior Cycle programme. The school-level variables in the model along with session, are again school sector composition and DEIS status.

Table 4.17: Random intercept model on reading, mathematics and science performance (student- and school-level background variables)

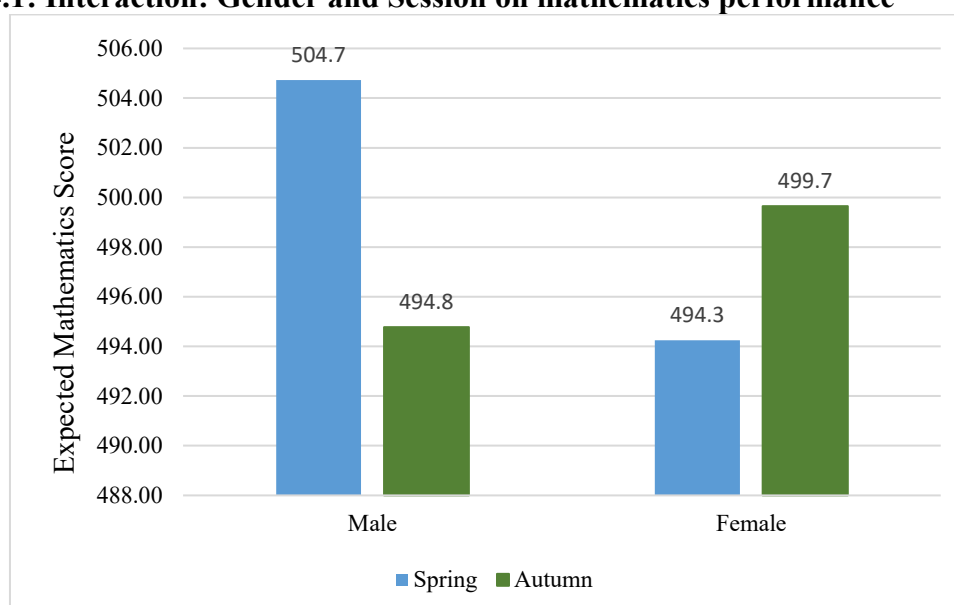
	Reading			Mathematics			Science		
	Coefficient	SE	p-value	Coefficient	SE	p-value	Coefficient	SE	p-value
Intercept									
	509.14	7.09	<.001	494.77	6.63	<.001	496.45	6.43	<.001
Level 1 (Within School)									
Gender (ref.= Male)	18.64	3.52	<.001	4.88	5.07	0.335	-1.85	3.79	0.626
Immigrant Language Status (ref.=Native)									
Immigrant English/Irish	-7.71	4.13	0.062	-6.20	3.68	0.092	0.32	3.93	0.934
Immigrant other language	-11.34	5.44	0.037	4.22	5.07	0.405	5.80	5.43	0.285
ESCS	27.63	1.65	<.001	25.35	1.44	<.001	28.17	1.59	<.001
Session ^a by Gender	a	a	a	-15.35	5.88	0.009	a	a	a
Level 2 (Between School)									
DEIS status (ref.=Non-DEIS)	-33.267	5.691	<.001	-28.22	5.03	<.001	-29.73	5.48	<.001
School Sector Gender (ref.=Vocational)									
Girls secondary	9.767	6.893	0.156	7.23	6.18	0.242	5.54	6.93	0.424
Boys secondary	8.206	7.667	0.284	12.23	7.02	0.081	6.64	7.31	0.364
Community/Comprehensive	2.241	6.18	0.717	2.52	5.38	0.639	2.42	5.72	0.673
Mixed secondary	9.48	7.655	0.216	9.53	6.56	0.146	6.80	7.88	0.388
Session (ref.=Autumn)	3.344	4.261	0.433	9.95	5.06	0.049	2.69	4.32	0.534
R-Squared									
Within-schools	0.092			0.090			0.085		
Between-schools	0.460			0.473			0.374		

Note. Each model based on 7,271 students, overall missingness=3.9%. No missingness on Gender, DEIS status, School Sector Gender, missingness on Immigrant Language Status (3.3%) and ESCS (1.3%).

^a:not included in the model for reading or science as it was not statistically significant. (ref.) = reference group.

In developing this model, the interactions between ‘session’ and each level 1 background variable were examined. After controlling for student and school-level background variables, the coefficient for session does not reach statistical significance on PISA reading or science performance. However, the coefficient for ‘session’ on the mathematics scale is borderline statistically significant and the interaction between ‘session’ and ‘gender’ was statistically significant on the mean mathematics score. This interaction can be seen in Figure 4.2 which shows that being tested in the Spring was more strongly associated with lower mathematics scores for females compared to males. Based on the model coefficients, and holding all other variables constant, a male’s mathematics score in the Spring would be 504.7 compared to 494.7 in the Autumn. In contrast, a female’s score in the spring would be 494.3 compared to 499.7 in the Autumn. This model is developed further at the end of Chapter 5.

Figure 4.1: Interaction: Gender and Session on mathematics performance



4.6. Summary of Key Points

Overall performance

The mean scores for reading, mathematics and science between Spring and Autumn PISA testing were not statistically significantly different at either the .01 level or .05 level. Except for Third Year students, there was no statistically significant difference between Spring and Autumn for student-level subgroups. It was noted that Third Year students in Spring had completed the majority of the Junior Cycle programme compared to Third Year students tested in the Autumn, who had only completed two years of the Junior Cycle programme. Hence, expectedly, Third Year students in Spring had a statistically significantly higher score compared to the Autumn across all three domains; on the other hand, Transition Year students showed very little difference between Autumn and Spring testing.

The gender gap in reading is wider in Autumn compared to Spring. The gender gap in mathematics changed from males achieving a higher score in the Spring to females performing better in the Autumn (although the gap is not statistically significant). The gender gap in science was wider in Autumn than in Spring.

Proficiency levels

Performance on the PISA proficiency levels is comparable across Spring and Autumn. In general for the high-achievers (not considering the differences between Third Year students), there was no statistically significant difference for any of the student subgroups examined, in

reading, mathematics or science. Focusing on low-achievers, there was found to be no difference between any of the student subgroups in reading or science; however, there was a higher percentage of low-achieving males in mathematics in the Autumn compared to the Spring. While examining proficiency levels, the other subgroup whose performance may be associated with testing done in the Autumn comprises students in the low-medium ESCS quartile. There were statistically significant differences between them and the students in the lowest ESCS quartile in the Spring testing period but the difference between them at Autumn testing was not statistically significant; this was seen across all domains.

Teachers' expectations of their students

There were mixed views from teachers on how they thought their students would perform at Autumn compared to Spring testing. This may be due to a proportion of the teachers sampled in the study reporting that they were unfamiliar with PISA. Approximately one quarter of teachers said that all their students (high, low and average) would do better in the Spring, citing greater accumulation of knowledge, more academic time, long summer break (SLL), and students being more settled in Spring time as potential reasons, though responding teachers may have assumed the same students would be tested on both occasions. Nearly one in five teachers reported that there would be no difference for any of their students, citing that their students are engaged, motivated, focused throughout the year, and that the tests are not curriculum based. A further 17.4% of all teachers reported that there would be no difference for their high-achievers, but that their average- and low- achievers would do better in the Spring.

Performance on reading subscales

Across the three process subscales on the reading scale (locate, understand and evaluate) and the two source subscales (single and multiple text), there were no differences between Spring and Autumn.

Student performance on clusters of items

The results from the item-level analysis showed that the average equated percent correct score on the 244 reading items in the Spring was 63.8% compared to 63.7% in the Autumn, a mean percentage difference of 0.1. The average percent correct on mathematics items is relatively stable. However, there were differences noted between the genders. Females had a higher average percent correct score across all items in the Autumn (46.8%) compared to the Spring (45.5%), (statistically) significantly different at .05 level. In contrast, males had a higher

average percent correct score in the Spring (47.4%) compared to the Autumn (45.8%). The average percent correct on science items was also relatively stable. There are statistically significant differences at the .05 level on the science system ‘earth and space’ and ‘complex multiple choice – computer-scored’ items for all students and for females, with a higher average percent correct scores in the Spring compared to the Autumn.

An examination of ‘session’ while controlling for student- and school-level background variables

After conducting a ‘means-as-outcomes’ model, comparable to the model presented by Ferraro et al. (2009) using Spring and Autumn PISA data for the US, the coefficient for session did not reach statistical significance, i.e. controlling for other school background variables that were examined in the chapter, the time of year was not associated with the achievement of students on PISA reading, mathematics or science. The model was further developed and it was found that after controlling for student- and school-level background variables, the coefficient for session still did not reach statistical significance on reading or science performance in PISA. However, the interaction between ‘session’ and ‘gender’ was statistically significant on the mean mathematics achievement score, when controlling all other student and school-level background variables. This indicates that being tested in the Spring was more strongly associated with lower mathematics scores for females compared to males.

The following chapter examines factors associated with performance on PISA tests including an examination of topics/skills/learning outcomes covered by teachers in the first six weeks of the academic year. The chapter concludes with a multi-level model examining whether time of testing has an association with performance while controlling for student- and school-level background variables and other variables associated with performance on PISA.

Chapter 5 A Consideration of Factors Associated with Performance on PISA tests

This first section of this chapter aims to investigate how Summer Learning Loss might be mitigated by examining the topics/skills/learning outcomes covered by teachers in the first six weeks of the academic year, those that have been revisited and the time spent by teachers revisiting topics/skills/learning outcomes. This is followed by an examination of ‘opportunity to learn’ from the students’ perspectives, which includes exposure to content and the learning environment (specific to English class). The following three sections investigate the differences between Spring and Autumn on PISA measures related to engagement, motivation and other learning outcomes. Finally, a multi-level model is presented examining whether testing in Spring or Autumn has an association with performance, while controlling for student- and school-level background variables considered in Chapter 4, as well as variables such as ‘skipping a whole day in the two week before PISA testing’, ‘enjoyment of reading’ and ‘life satisfaction’, examined in this chapter.

5.1. Reports from Teachers on Content Covered and Time Spent Revisiting in the First Six Weeks of the Academic Year

At the Autumn testing, a sample of teachers teaching English, mathematics and science subjects were presented with a series of questions designed to obtain their perspectives about PISA and on the possible outcomes if PISA testing took place in Autumn rather than Spring. As noted, there is research that suggests that some students experience a loss of academic skills and knowledge over the course of the summer holidays. This section will provide results for the second research question: **RQ2: To what extent might summer learning loss be mitigated as a factor associated with the performance of 15-year olds in Ireland taking PISA tests in the Autumn?** To learn about strategies employed by teachers when students return to school after the summer break, teachers were asked questions about the content covered in the first six weeks of the academic year, the content that was revisited after the summer break and time spent revisiting these topics/skills/learning outcomes. Responses to these questions are now presented in the following sections.

5.1.1. Content taught in the classroom at the beginning of academic year

Although PISA is not a curriculum-based test, many of the contexts/processes underpinning PISA questions are similar to those found in the curricula taught in Irish schools (Merriman, et

al., 2014). To understand achievement results in PISA tests, it is helpful to understand what is taught and when. In the Autumn testing, teachers were asked to list up to three topics/skills/learning outcomes that they covered since the beginning of the academic year to the time of PISA testing in the Autumn of that year. While this is not an analysis of the complete taught curriculum, it is an element of the intended curriculum in the first six weeks of the academic year. The following three sections examine the topics/skills/learning outcomes in the three subjects, English, mathematics and science covered in the first six weeks of the academic year as reported by the teachers of these subjects in the Autumn study.

Topics/skills/learning outcomes covered by English teachers

English teachers listed up to three topics/skills/learning outcomes that they covered in the first six weeks of the academic year with their Third Year, Fourth Year (TY) and Fifth Year students (Table 5.1). Approximately 52.7% of these teachers reported that they covered ‘writing skills’, which included ‘creative’, ‘descriptive’, ‘functional’ and ‘personal’ writing, ‘letter’, ‘speech’ and ‘report’ writing and ‘diary entries’. Another common topic covered by the teachers was ‘poetry’ (41.2%). This comprised of ‘poetry appreciation’, ‘poetic techniques’ and ‘unseen poetry’. The topic ‘drama’, which includes ‘Shakespeare-characters’, ‘setting’, ‘plot’, ‘dramatic terminology’, and ‘soliloquy’ was reported to have been covered by 32.8% of the teachers.

Table 5.1: Topics/skills/learning outcomes taught by English teachers to Third Year students in the first six weeks of the academic year, by school-level variables (percentages)

<i>Topics/Skills/Learning Outcomes:</i>	All (n=98)	Girls’ sec. (n=17)	Boys’ sec. (n=17)	Comm./ Comp. (n=12)	Mixed sec. (n=20)	ETB vocational (n=32)	Non- DEIS (n=58)	DEIS (n=40)
Writing Skills	52.7	55.6	39.7	64.4	40.1	61.2	51.8	54.2
Poetry	41.2	50.2	43.8	39.5	42.9	34.5	41.2	41.2
Drama	32.8	35.5	35.4	34.3	34.3	28.5	34.2	30.8
Comprehension/ Understanding	19.3	19.6	5.7	26.8	11.2	28.2	19.6	18.9
Grammar	16.9	44.9	15.3	6.9	6.7	12.6	11.3	25.0
Novel/Fiction	16.9	22.3	18.7	6.8	20.4	14.7	20.3	11.9
Communication	10.4	11.5	16.3	16.4	3.3	8.6	13.0	6.6
Media studies	9.7	0.0	4.1	18.5	14.4	11.7	5.6	15.6
Organisation skills	7.9	0.0	30.9	3.3	8.5	1.6	11.3	3.0
Literacy skills unspecified	5.4	0.0	8.2	15.0	0.0	6.3	7.6	2.1
Composition	4.2	5.5	4.1	6.9	0.0	5.0	2.8	6.1

Note. Teachers could select up to three topics/skills/learning outcomes, therefore percentages will not sum to 100%.

English teachers in boys' secondary schools teaching Third Year students were more likely to teach 'organisation skills' (30.9%) in the first six weeks of the academic year compared to English teachers in other school sector types (less than 9% of teachers in the other school types reported covering this topic/skill). 'Organisation skills' include 'planning out answer', 'Point, Illustration, Explanation (P.I.E)' and 'drafting, planning, editing'. The topic 'grammar' was coded to include 'punctuation', 'spelling', 'use of capital letters' and 'apostrophes' and was reported by 44.9% of the teachers in girl's secondary schools. These teachers were more likely to teach 'grammar' to their Third Year students in the first six weeks of the academic year compared to English teachers in other school sector types. Similar percentages of teachers in DEIS and non-DEIS schools reported covering 'writing skills', 'poetry', 'drama' and 'understanding and comprehension' at the beginning of the academic year.

Similar to the topics/skills/learning outcomes covered by English teachers with their Third Year students, Table 5.2 shows that 'writing skills' was reported by 39.5% of English teachers teaching Transition Year students.

Table 5.2: Topics/skills/learning outcomes taught by English teachers to TY students in the first six weeks of the academic year, by school-level variables (percentages)

<i>Topics/Skills/Learning Outcomes:</i>	All (n=63)	Girls' sec. (n=9)	Boys' sec. (n=9)	Comm./ Comp. (n=9)	Mixed sec. (n=16)	ETB vocational (n=20)	Non- DEIS (n=41)	DEIS (n=21)
Writing Skills	39.5	52.8	61.2	47.0	39.7	20.2	36.6	45.0
Media studies	19.2	40.4	7.8	22.1	23.8	9.5	21.5	14.7
Analysis of text	17.4	30.8	23.9	5.5	24.5	7.8	17.0	18.4
Communication	16.5	10.6	26.4	5.5	4.8	29.0	15.5	18.3
Novel/Fiction	13.6	6.8	0.0	12.1	14.9	22.3	5.6	28.9
Comparative	13.1	9.6	0.0	18.8	25.7	7.8	14.0	11.2
Poetry	11.5	22.3	7.8	0.0	21.2	5.4	15.0	5.0
Drama	9.6	11.6	7.8	7.6	15.6	5.4	12.0	5.0
Reading	9.0	0.0	24.1	0.0	0.0	17.6	8.6	9.7
Comprehension/ Understanding	5.3	10.3	0.0	4.8	0.0	9.9	3.2	9.4
Composition	2.6	0.0	0.0	0.0	0.0	8.0	0.0	7.5
Literacy skills unspecified	2.5	10.6	0.0	7.0	0.0	0.0	3.8	0.0
Project work	2.4	0.0	0.0	5.0	0.0	5.4	2.6	2.0
Other	1.9	0.0	0.0	14.0	0.0	0.0	2.9	0.0
Organisation skills	1.1	0.0	7.8	0.0	0.0	0.0	1.7	0.0
Grammar	1.0	0.0	0.0	7.6	0.0	0.0	1.6	0.0

Note. Teachers could select up to three topics/skills/learning outcomes, therefore percentages will not sum to 100%.

Transition Year sees the introduction of other topics/skills/learning outcomes such as ‘analysis of text (reported by 17.4% of English teachers) which includes ‘critical thinking’, ‘reviews’ and ‘analysing and appreciating styles of writing’. ‘Media studies’, which comprises ‘film appreciation’, ‘film analysis’ and ‘vocabulary associated with film’ was reported by 19.2% of English teachers. ‘Comprehension/understanding’ was reported by a very small percentage of teacher teaching Transition Year, although this is a skill that could be covered under a number of other topics/skills/learning outcomes such as ‘drama’ and ‘poetry’, or even ‘analysis of text’.

English teachers in DEIS schools teaching Transition Year students were more likely to cover ‘novels/fiction’ in the first six weeks of the academic year (28.9%) compared to English teachers in non-DEIS schools (5.6%), a difference that is statistically significant ($p=.015$, Fisher's Exact Test (FET)).

Topics/skills/learning outcomes covered by the largest percentage of English teachers teaching Fifth Year students were similar to those covered by teachers teaching Third Year students, with 48.9%, 43.5% and 37.1% of the teachers reporting that they covered ‘writing skills’, ‘poetry’ and ‘drama’, respectively. ‘Comprehension/Understanding’ was reported by 24.1% of English teachers, slightly more than teachers teaching Third Year students (19.3%). Similar percentages were reported by English teachers in DEIS and non-DEIS schools and also across the types of school sector (see Appendix L, Table L1).

Topics/skills/learning outcomes covered by mathematic teachers

Approximately 46% of mathematic teachers reported that they covered ‘algebra’ with their Third Year students in the first six weeks of the academic year (Table 5.3). A large percentage of the teachers did not specify the type of algebra; however, of those who did, 11.4% (of all mathematics teachers) reported covering ‘factorising’. Similar percentages of teachers reported covering ‘geometry/trigonometry’ (37.1%) and ‘numbers’ (38.1%) with their Third Year students. Within ‘geometry/trigonometry’, 14.8% of all the teachers did not specify the type of geometry, 7.9% reported ‘coordinate geometry’ and 11.6% reported covering ‘trigonometry’ with their Third Year students. Similar proportions of teachers reported covering ‘number systems’ (12.0%) and ‘sets’ (12.0%).

Table 5.3: Topics/skills/learning outcomes taught by mathematic teachers to Third Year students in the first six weeks of the academic year, by school-level variables (percentages)

<i>Topics/Skills/Learning Outcomes:</i>	All	Girls' sec.	Boys' sec.	Comm./ comp.	Mixed sec.	ETB vocational	Non-DEIS	DEIS
	(n=143)	(n=27)	(n=22)	(n=17)	(n=34)	(n=44)	(n=95)	(n=48)
<i>Algebra</i>	46.1	31.6	68.3	53.2	42.9	44.1	44.4	49.4
Algebra unspecified	32.1	19.6	46.3	27.6	27.2	38.3	26.5	43.2
Equations	4.6	3.1	8.6	10.9	3.9	1.7	6.1	1.6
Factorising	11.4	9.7	18.9	16.0	17.5	2.4	14.6	5.0
Graphs	2.5	4.8	0.0	8.8	0.0	1.7	2.3	2.8
Quadratic	5.0	0.0	13.8	5.0	10.0	0.0	5.9	3.1
<i>Functions*</i>	16.6	11.7	15.8	21.9	19.6	15.7	17.9	13.8
Functions	16.6	11.7	15.8	21.9	19.6	15.7	17.9	13.8
<i>Geometry/Trigonometry</i>	37.1	30.8	28.5	46.0	14.4	59.2	34.6	42.2
Construction	6.2	3.5	3.5	0.0	4.7	12.9	4.2	10.2
Coordinate geometry	7.9	12.1	7.6	5.0	2.2	10.9	7.0	9.8
Geometry unspecified	14.8	3.5	11.4	29.3	1.2	28.6	15.8	12.9
Surds	0.9	0.0	0.0	5.5	0.0	0.9	0.7	1.3
Synthetic geometry	1.8	3.1	0.0	0.0	0.0	5.6	2.3	2.4
Trigonometry	11.6	18.3	6.0	10.8	8.6	12.7	10.2	14.3
<i>Number</i>	38.1	42.9	31.4	38.7	36.0	39.6	36.3	41.6
Applied measure	3.7	6.4	0.0	0.0	8.3	1.7	2.9	5.2
Area/volume	8.3	11.4	12.0	4.7	0.0	12.5	9.0	7.1
Arithmetic	5.6	12.0	4.3	9.3	0.0	5.2	4.8	7.2
Financial	3.6	3.5	0.0	8.8	3.5	3.5	5.4	0.0
Indices/Integers	4.8	3.6	4.3	10.6	1.2	6.5	4.0	6.4
Number systems	12.0	12.1	7.6	5.4	21.5	9.4	7.5	21.1
Sets	12.0	15.9	7.6	0.0	11.4	16.8	10.1	15.8
<i>Statistics/ Probability</i>	18.5	17.7	19.8	17.3	14.2	22.0	19.8	15.8
Probability	8.2	4.4	12.2	0.0	8.5	11.3	7.4	9.6
Representing data	1.5	0.0	3.1	4.2	0.0	1.7	1.4	1.6
Statistics	11.2	13.3	4.5	13.1	5.7	16.7	12.7	8.3
<i>Other Maths</i>	3.4	2.5	10.9	4.3	0.0	2.7	4.4	1.6
Other Maths	3.4	2.5	10.9	4.3	0.0	2.7	4.4	1.6

Note. Teachers could select up to three topics/skills/learning outcomes, therefore percentages will not sum to 100%. *While the strand 'Functions' is combined with algebra in the Junior Certificate Mathematics specifications it is not for the Leaving Certificate and to differentiate from the elements of 'algebra', it has been coded separately.

Across the school types, a larger percentage of mathematic teachers in ETB vocational schools reported covering topics/skills/learning outcomes within 'geometry/trigonometry' (59.2%) compared to community/comprehensive schools (46.0%), girls' secondary schools (30.8%), boys' secondary schools (28.5%) and mixed secondary schools (14.4%) ($\chi^2=18.401$ $df=4$ $p=.001$). Slightly more mathematic teachers in DEIS schools reported covering 'algebra' (49.4%) compared to teachers in non-DEIS schools (44.4%). This was also the case for 'geometry/trigonometry' (42.2% reported by teachers in DEIS schools compared to 34.6% in non-DEIS schools) and 'numbers' (41.6% reported by teachers in DEIS schools compared to 36.3% in non-DEIS schools). In contrast, 'functions' and 'statistics/probability' were covered

by a slightly higher percentage of teachers in non-DEIS schools compared to DEIS schools. However, the differences reported between teachers in non-DEIS and DEIS schools across the topics/skills/learning outcomes were not statistically significant.

Table 5.4 presents the overall strands taught to TY and Fifth Year students in the first six weeks of the academic year. Compared to 46.1% of teachers teaching Third Year students, only 37.7% of mathematic teachers teaching Fourth Year (TY) students reported to have covered ‘algebra’. Correspondingly, the topics/skills/learning outcomes within ‘functions’, ‘geometry/trigonometry’ and ‘numbers’ were covered by a larger percentage of teachers teaching Third Year students compared to teachers teaching TY students (‘functions’ 16.6% and 3.2%, respectively, ‘geometry/trigonometry’ 37.1% and 26.3%, respectively, and ‘numbers’ 38.1% and 18.2%, respectively). Similar percentages of teachers teaching TY students and Third Year students reported having covered ‘statistics/probability’ (17.8% and 18.5%, respectively). ‘Problem solving’, was reported by 11.8% of mathematic teachers teaching TY students and this was not reported by any of the mathematic teachers teaching Third Year students⁶² (Appendix L, Table L2). Just over one-in-three mathematic teachers in girls’ secondary schools teaching TY students reported covering ‘problem solving’ compared to 16.3% of teachers in mixed secondary, and less than 6% of teachers in the three other school sector types. A higher percentage of mathematic teachers in DEIS schools (23.3%) reported covering ‘problem solving’ in the first six weeks of the academic year compared to teachers in non-DEIS schools (5.3%) ($p=.016$ FET). A higher percentage of teachers teaching TY students in DEIS schools also reported covering ‘number systems’ (25.8%) and ‘coordinate geometry’ (29.4%) compared to teachers in non-DEIS schools (6.4% and 9.8%, respectively) ($p=.006$ FET and $p=.029$ FET, respectively).

A large percentage of mathematics teachers teaching Fifth Year students reported to have covered ‘algebra’ (57.1%). Approximately 33.2% of the teachers reported having covered ‘numbers’ and 17% reported covering ‘geometry/trigonometry’ topics/skills learning outcomes in the first six week of the academic year. Across all the school types, similar percentages of mathematic teachers reported to have covered ‘algebra’ with the topic ‘equations’ reported by between 18.8% and 28.1% of all teachers (Appendix L, Table L3). A higher percentage of teachers in non-DEIS schools reported to have covered ‘geometry/trigonometry’ (21.7%) compared to 7.5% of teacher in DEIS schools ($p=.027$ FET).

⁶² Problem-solving is not a strand in Third Year but integrated into the strands as a process.

Table 5.4: Overall strands taught by mathematic teachers to Fourth Year (TY) and Fifth Year students in the first six weeks of the academic year, by school-level variables (percentages)

<i>Topics/Skills/Learning Outcomes:</i>	All	Girls' sec.	Boys' sec.	Comm./ comp.	Mixed sec.	ETB vocational	Non-DEIS	DEIS
Teachers teaching Fourth Year/TY	(n=104)	(n=21)	(n=16)	(n=13)	(n=20)	(n=34)	(n=67)	(n=38)
Algebra	37.7	27.1	28.3	38.4	36.2	49.5	37.3	38.6
Functions	3.2	6.1	0.0	0.0	10.4	0.0	3.9	2.0
Geometry/Trigonometry	26.3	38.3	14.9	32.3	20.0	25.8	17.5	41.8
Number	18.2	30.6	4.6	10.3	15.9	21.4	11.9	29.2
Statistics/ Probability	17.8	17.7	15.1	14.5	12.3	23.4	16.6	19.7
Other Maths	16.7	31.1	11.8	2.3	26.1	10.3	12.9	23.3
Teachers teaching Fifth Year	(n=163)	(n=32)	(n=27)	(n=21)	(n=33)	(n=50)	(n=110)	(n=53)
Algebra	57.1	64.0	68.5	61.0	53.7	47.3	57.9	55.6
Functions	6.7	12.6	3.4	11.8	6.8	2.5	9.2	1.4
Geometry/Trigonometry	17.0	16.3	21.6	20.7	18.1	12.8	21.7	7.5
Number	33.2	26.8	35.4	35.6	15.1	46.9	30.9	37.9
Statistics/ Probability	7.5	7.3	4.8	3.1	0.0	15.7	4.6	13.4
Other Maths	4.0	5.3	4.7	6.1	0.0	4.5	4.3	3.3

Note. Teachers could select up to three topics/skills/learning outcomes; therefore, percentages will not sum to 100%. List of full topics/skills/learning outcomes in Appendix L, Tables L2, L3.

Topics/skills/learning outcomes covered by science teachers

Approximately 67.1% of science teachers reported covering topics/skills/learning outcomes in the strand 'biological' with their Third Year students in the first six weeks of the academic year (Table 5.5). Topics/skills/learning outcomes within 'physical', 'chemical' and 'earth/space' were reported by similar percentages of science teachers with their Third Year students (27.6%, 24.6%, and 22.2%, respectively). Within 'biological', broadly similar percentages of science teachers reported covering 'human health' (31.5%), 'biodiversity' (25.0%), and 'reproduction' (24.9%). 'Chemical reactions' was reported to have been covered by the largest percentages of science teachers within the strand 'chemical' and the topic/skill 'electricity' was reported to have been covered by 18.9% of the science teachers with their Third Year students in the physical science category.

Across the school types, approximately 80% of teachers in ETB vocational schools reported covering topics/skills/learning outcomes in the strand 'biological' with their Third Year students compared to 78.0% of teachers in boys' secondary schools, 68.0% of teachers in mixed secondary schools, 66.5% in girls' secondary schools and 31.7% in community/comprehensive schools ($\chi^2=14.193$ $df=4$ $p=.007$). Approximately 38.7% of all science teachers in DEIS schools reported covering the topic/skill 'reproduction' with their

Third Year students in the first six weeks of the academic year compared to science teachers in non-DEIS schools (18.8%) ($p=.022$ FET). Within the strand ‘chemical’ 12.5% of science teachers in DEIS schools reported covering ‘acids/bases’ with their Third Year students compared to 1.9% of science teachers in non-DEIS schools ($p=.029$ FET).

Table 5.5: Topics/skills/learning outcomes taught by science teachers to Third Year students in the first six weeks of the academic year, by school-level variables (percentages)

<i>Topics/Skills/Learning Outcomes:</i>	All	Girls’ sec.	Boys’ sec.	Comm./ comp.	Mixed sec.	ETB Vocational	Non- DEIS	DEIS
	(n=118)	(n=24)	(n=17)	(n=19)	(n=23)	(n=36)	(n=82)	(n=36)
<i>Biological</i>	67.1	66.5	78.0	31.7	68.0	80.0	62.6	77.2
Human health	31.5	22.7	29.9	18.3	31.5	45.0	30.9	32.8
Biodiversity	25.0	23.5	39.2	10.4	28.0	24.9	25.2	24.7
Reproduction	24.9	25.8	7.4	12.1	21.6	41.6	18.8	38.7
Human/Plant structure	16.5	18.6	29.3	3.0	21.6	12.9	13.1	24.3
<i>Chemical</i>	24.6	30.4	17.3	35.6	11.6	26.7	25.0	23.6
Chemical reactions	10.9	16.8	4.7	8.5	7.0	13.8	14.8	2.3
Atomic structure	6.5	11.6	8.7	0.0	2.7	7.8	5.4	8.8
Acids/Bases	5.1	0.0	0.0	20.5	0.0	6.3	1.9	12.5
Substances	4.3	9.6	0.0	6.6	1.8	3.2	6.2	0.0
Periodic table	4.2	4.3	8.6	3.5	2.7	3.4	3.6	5.6
<i>Earth/Space</i>	22.2	28.2	11.0	24.0	20.8	23.7	22.4	21.9
Earth/Space	9.4	11.6	5.6	4.5	14.7	9.0	9.0	10.4
H2O/CO2 cycle	6.8	4.0	0.0	1.5	15.7	9.0	9.8	0.0
Conservation	6.3	14.0	5.4	6.6	0.0	5.6	6.7	5.6
Energy sustainability	4.2	8.6	0.0	11.5	3.3	0.0	3.4	5.9
<i>Physical</i>	27.6	37.6	23.5	18.6	25.8	28.7	25.2	32.9
Electricity	18.9	23.5	11.4	17.1	15.2	22.9	19.4	17.9
Energy	7.0	14.8	12.1	1.5	10.6	0.0	7.2	6.7
Mechanics	5.2	2.5	5.7	0.0	10.6	5.8	2.9	10.2
Light	1.5	7.4	0.0	0.0	0.0	0.0	0.0	4.8
Other physical	0.7	0.0	0.0	4.3	0.0	0.0	1.0	0.0
<i>Other science</i>	8.1	2.9	24.3	21.9	2.8	0.0	9.1	5.9
Research skills	6.7	2.9	16.9	19.6	2.8	0.0	7.5	4.7
Other science	2.0	0.0	11.3	2.3	0.0	0.0	2.4	1.2

Note. Teachers could select up to three topics/skills/learning outcomes therefore percentages will not sum to 100%.

Similar to teachers of Third Year students, Table 5.6 shows that a large percentage of science teachers also cover topics/skills/learning outcomes in the strand ‘biological’ with their TY students, although it is substantially lower (67.1% with Third Year and 34.3% with TY students). Comparing science teachers in DEIS and non-DEIS school, approximately 63.2% of teachers in DEIS reported having covered topics/skills/learning outcomes in this strand

(‘biological’) compared to 24.1% of teachers in non-DEIS schools ($p=0.001$ FET). The main difference in the topics/skills/learning outcomes covered by science teachers with their TY students compared to those covered with Third Year students is within ‘other science’. This strand covers topics/skills/learning outcomes such as ‘research skills’ (such as ‘scientific method’, ‘forensic science’, ‘use of microscope’ and ‘laboratory skills/safety’) and ‘project work’ (such as ‘preparation for science Fest competition’, ‘making science videos’ and ‘garden design’). Approximately 30.9% of science teachers reported covering ‘research skills’ with their TY students in the first six week of the academic year (compared to 6.7% with Third Year students). Across the schools types, 42.5% of science teachers in girls’ secondary schools, 39.1% in boys’ secondary schools and 36.7% in ETB vocational schools reported covering ‘research skills’ with Transition Year students; slightly fewer teachers in community/comprehensive and mixed secondary schools report covering this skill (Appendix L, Table L4). A larger percentage of science teachers in DEIS schools reported covering ‘project work’ (15.6%) compared to those in non-DEIS schools (1.5%) ($p=.016$ FET) (Appendix L, Table L4).

Table 5.6: Overall strands taught by science teachers to Fourth Year and Fifth Year students in the first six weeks of the academic year, by school-level variables (percentages)

	All	Girls’ sec.	Boys’ sec.	Comm./ comp.	Mixed sec.	ETB Vocational	Non- DEIS	DEIS
<i>Teachers teaching TY students</i>	(n=99)	(n=18)	(n=16)	(n=15)	(n=18)	(n=32)	(n=74)	(n=26)
Biological	34.3	30.5	32.8	28.5	34.1	39.8	24.1	63.2
Chemical	13.7	32.9	10.3	4.5	16.8	7.0	14.2	12.4
Earth/Space	11.6	6.9	11.1	18.4	7.5	13.8	11.1	13.0
Physical	17.1	25.7	7.0	4.9	22.5	19.6	21.5	4.5
Other science	34.3	47.2	44.2	25.2	6.3	41.8	33.6	36.3
<i>Teachers teaching Fifth year students</i>	(n=141)	(n=26)	(n=23)	(n=17)	(n=25)	(n=49)	(n=104)	(n=37)
Biological	50.9	56.7	24.7	54.3	32.3	68.3	45.8	65.3
Chemical	14.9	18.8	29.9	7.8	15.4	8.1	16.0	11.9
Earth/Space	6.0	3.9	0.0	14.2	5.5	7.2	6.1	5.5
Physical	26.0	25.2	29.4	14.3	44.5	19.6	24.4	30.3
Other science	34.4	37.1	31.7	38.3	28.2	35.9	33.3	37.3

Note. Teachers could select up to three topics/skills/learning outcomes; therefore, percentages will not sum to 100%. List of full topics/skills/learning outcomes in Appendix L, Tables L4, L5.

A large percentage of science teachers teaching Fifth Year students reported having covered topics/skills/learning outcomes in the strand ‘biological’ (50.9%) with fewer covering the topics/skills/learning outcomes in the ‘physical’ (26.0%) and ‘chemical’ (14.9%) categories (Table 5.6). Across the school types, however, only 24.7% of science teachers in boys’ secondary schools reported covering topics/skills/learning outcomes in the strand ‘biological’

compared to 68.3% of teachers in ETB vocational schools, 56.7% in girls' secondary schools, 54.3% in community/comprehensive schools and 32.3% in mixed secondary schools ($\chi^2=16.228$ $df=4$ $p=0.003$). Across all science teachers, topics/skills/learning outcomes in the strand 'earth/space' were reported by 6.0%, while 34.4% of them reported covering topics/skills/learning outcomes in the strand 'other' in the first six week of the academic year. Like teachers teaching Transition Year students, a large percentage of science teachers teaching Fifth Year students covered 'research skills' (29.3%) (Appendix L, Table L5).

5.1.2. Topics/skills/learning outcomes revisited at the beginning of the academic year that had previously been taught

Teachers were asked to record whether the topics/skills/learning outcomes covered in the first six weeks of the academic year involved revisiting material previously covered for each of the three grades they teach, Third Year, TY and Fifth Year. Their responses to the open-ended question were coded to 'no, all new', 'mostly new', 'yes, mostly', 'yes' and some teachers teaching Fifth Year students giving a response of 'yes and developed'. With small numbers in the 'mostly new', 'yes, mostly' and 'yes and developed' categories, these were combined and two categories were created for teachers' response to topics/skills/learning outcomes covered in the first six weeks of the academic year: '1. New topics/skills/learning outcomes' and '2. Revisited topics/skills/learning outcomes'.

Table 5.7 shows that there are similar percentages of teachers across the grade levels revisiting topics/skills/learning outcomes in the first six weeks of the academic year (83.0% Third Year teachers, 83.2% TY teachers and 84.5% Fifth Year teachers).

Table 5.7: Percentage of teachers revisiting topic/skills/learning outcomes previously covered, by subject and grade taught

	Teachers teaching 3rd year		Teachers teaching TY		Teachers teaching 5th year	
	New (n=44)	Revisited (n=214)	New (n=29)	Revisited (n=143)	New (n=45)	Revisited (n=245)
Across all 3 subjects	17.0	83.0	16.8	83.2	15.5	84.5
Maths	10.8	89.2	6.5	93.5	3.8	96.2
Science	36.3	63.7	21.6	78.4	25.9	74.1
English	6.2	93.8	24.8	75.2	15.7	84.3

Across teachers working with Third Year students, science teachers were more likely to cover new topics/skills/learning outcomes (36.3%) compared to mathematic teachers (10.3%) and English teachers (6.2%). Across teachers working with TY students, mathematics

teachers were more likely to revisit topics/skills/learning outcomes in the first six weeks of the academic year (93.5%) compared to English (75.2%) and science teachers (78.4%).

Table 5.8 shows that the topics/skills/learning outcomes mainly revisited by maths teachers were within the category ‘algebra’, for English teachers, ‘poetry’ was the topic/skill that was reported to have been revisited the most (in particular, teachers teaching Third and Fifth Year students) and for science -related teachers, revisited topics/skills/learning outcomes were mainly within ‘biological’.

Table 5.8: Revisited topics/skills/learning outcomes reported by teachers by grade taught (percentages based on total topics/skills/learning outcomes listed)

English	Third Year		Transition Year		Fifth Year	
	n teachers=81		n teachers=34		n teachers=73	
	n topics	%	n topics	%	n topics	%
Analysis of text	9	7.0	7	14.3	5	4.8
Communication	5	3.9	5	10.2	1	1.0
Comprehension/Understanding	6	4.7	1	2.0	14	13.5
Drama	16	12.4	3	6.1	17	16.3
Grammar	14	10.9	1	2.0	3	2.9
Literacy skills	5	3.9	1	2.0	0	0.0
Media studies	2	1.6	5	10.2	0	0.0
Novel/fiction	8	6.2	3	6.1	0	0.0
Poetry	36	27.9	5	10.2	33	31.7
Writing skills	28	21.7	11	22.4	28	26.9
Reading	0	0.0	3	6.1	0	0.0
Comparative	0	0.0	3	6.1	3	2.9
Other	0	0.0	1	2.0	0	0.0
Total topics revisited	129	100.0	49	100.0	104	100.0
Mathematics	n teachers=84		n teachers=70		n teachers=118	
	n topics	%	n topics	%	n topics	%
Algebra	53	46.5	35	50.0	72	61.0
Functions	6	5.3	1	1.4	4	3.4
Geometry/Trigonometry	31	27.2	17	24.3	11	9.3
Number	15	13.2	4	5.7	25	21.2
Statistics/probability	9	7.9	13	18.6	6	5.1
Other mathematics	0	0.0	0	0.0	0	0.0
Total topics revisited	114	100.0	70	100.0	118	100.0
Science	n teachers=44		n teachers=49		n teachers=73	
	n topics	%	n topics	%	n topics	%
Biological	30	50.8	23	39.0	44	46.8
Chemical	14	23.7	8	13.6	9	9.6
Earth and Space	5	8.5	1	1.7	2	2.1
Physical	9	15.3	14	23.7	22	23.4
Other science	1	1.7	13	22.0	17	18.1
Total topics revisited	59	100.0	59	100.0	94	100.0

Note. Topics in this table refers to topics/skills/learning outcomes.

While a large percentage of teachers reported revisiting topic/skills/learning outcomes in the first six weeks of the academic year, some teachers noted that, in the course of revisiting, they also further developed the topic or skill. The questionnaire did not record this consistently; however, the time spent revisiting and when the revisiting occurred were recorded and are examined in the next section.

5.1.3. Time spent revisiting topics/skills/learning outcomes at the beginning of the academic year

This section examines the time spent revisiting topics/skills/learning outcomes at the beginning of the academic year. Teachers were asked to record the number of classes they had in a week, the length of class time and the number of these classes they spent revisiting topics/skills/learning outcomes in the first six weeks of the new academic year. From this, the percentage of time spent revisiting topics/skills/learning outcomes was calculated for each subject teacher and associated grade level.

Table 5.9 shows that the average percent of teaching time spent by teachers of English, mathematics, and science subjects in the first six weeks of the academic year. For science teachers, the proportion of time spent revisiting topic/skills/learning outcomes with their Third Year students was 12.8% compared to 19.1% reported by mathematics teachers (significantly different at .05 level) and compared to 25.5% reported by English teachers (significantly different at .01 level). The pattern is slightly different for teachers teaching Transition Year students where there was an average of 14% of time teaching spent revisiting recorded by science teachers compared to 30.3% by mathematics teachers (significantly different at .01 level) but not statistically significantly different to the average time spent by English teachers (15.3%). Similar to teachers teaching Third Year students, science teachers teaching Fifth Year students spent an average of 11.8% of teaching time revisiting compared to 20.3% by mathematics teachers and 17.6% by English teachers (the difference for both comparisons is statistically significant at .01 level).

Whilst there are differences in the average time spent by teachers in DEIS schools and non-DEIS schools revisiting topics/skills/learning outcomes at the start of the academic year, none of them are significantly different. Similarly, while mathematics teachers in girls' secondary schools spend slightly more time at the beginning of the academic year revisiting topics/skills/learning outcomes, the time spent is not statistically significantly more than teachers in other school types.

Table 5.9: Average percent of time spent by teachers revisiting topics/skills/learning outcomes in the first six weeks of the academic year by background variables

	English				Mathematics				Science (ref.)			
	n	Mean	SD	(SE)	n	Mean	SD	(SE)	n	Mean	SD	(SE)
<i>Teaching Third Year students</i>												
All	87	25.5	21.8	(2.3)	104	19.1*	20.1	(2.0)	91	12.8	14.7	(1.5)
Girls Secondary (ref.)	15	32.2	31.0	(8.0)	17	24.3	28.1	(6.8)	18	13.6	22.0	(5.2)
Boys Secondary	14	20.7	9.5	(2.5)	18	22.7	22.1	(5.2)	16	16.2	16.7	(4.2)
Community/ Comprehension	11	23.1	19.4	(5.9)	14	21.7	18.1	(4.8)	12	5.5	6.1	(1.8)
Mixed Secondary	20	22.8	15.1	(3.4)	19	20.8	22.5	(5.2)	17	16.4	13.3	(3.2)
Vocational	27	27.2	25.3	(4.9)	37	13.1	11.8	(1.9)	28	11.0	9.8	(1.8)
Non-DEIS (ref.)	51	24.0	21.3	(3.0)	66	20.9	23.0	(2.8)	62	12.9	16.6	(2.1)
DEIS	36	27.6	22.5	(3.8)	38	16.0	13.1	(2.1)	29	12.5	10.1	(1.9)
<i>Teaching Fourth Year/TY students</i>												
All	43	15.3	24.3	(3.7)	71	30.3	25.4	(3.0)	60	14.0	22.7	(2.9)
Girls Secondary (ref.)	7	26.6	45.2	(17.1)	14	36.3	25.8	(6.9)	13	15.0	26.9	(7.5)
Boys Secondary	6	9.9	16.7	(6.8)	11	22.8	18.4	(5.5)	12	17.9	14.1	(4.1)
Community/ Comprehension	7	24.3	28.8	(10.9)	6	22.3	26.0	(10.6)	7	13.9	32.1	(12.1)
Mixed Secondary	10	6.1	7.2	(2.3)	14	27.6	26.2	(7.0)	11	12.3	16.8	(5.1)
Vocational	13	13.5	14.6	(4.1)	26	33.4	27.7	(5.4)	17	11.6	25.6	(6.2)
Non-DEIS (ref.)	24	20.5	30.2	(6.2)	41	30.3	26.8	(4.2)	46	12.6	20.5	(3.0)
DEIS	19	8.4	10.6	(2.4)	31	30.2	24.0	(4.3)	15	18.4	29.0	(7.5)
<i>Teaching Fifth Year students</i>												
All	84	17.6	13.1	(1.4)	112	20.3	22.2	(2.1)	106	11.8	16.2	(1.6)
Girls Secondary (ref.)	14	14.7	8.5	(2.3)	21	28.7	30.3	(6.6)	19	14.9	29.9	(6.9)
Boys Secondary	12	16.9	14.3	(4.1)	21	15.8	16.0	(3.5)	19	12.9	13.4	(3.1)
Community/ Comprehension	9	12.9	16.3	(5.4)	14	19.8	21.0	(5.6)	11	17.9	17.4	(5.3)
Mixed Secondary	18	19.9	12.0	(2.8)	20	14.5	15.9	(3.6)	18	9.1	8.1	(1.9)
Vocational	32	19.2	14.0	(2.5)	36	21.4	22.5	(3.7)	39	9.2	8.7	(1.4)
Non-DEIS (ref.)	50	15.8	12.1	(1.7)	72	22.6	23.5	(2.8)	79	11.6	17.7	(2.0)
DEIS	35	20.3	14.1	(2.4)	40	16.3	19.2	(3.0)	27	12.4	11.2	(2.1)

Note. (ref.) = reference group. Bold indicates significant difference at .01 level and * indicates significant difference at .05 level. No correction is made here for multiple comparisons.

As noted in the previous section, a lot of topics/skills/learning outcomes were revisited when teachers came back after the summer break; however, across all the teachers, on average 18.5% of their teaching time was spent revisiting topics/skills/learning outcomes in the first six weeks of the academic year. Table 5.10 shows that for the teachers who reported revisiting topics/skills/learning outcomes at the beginning of the academic year, the majority reported that the revisiting occurred in the first two weeks. Similar percentages were reported in DEIS and non-DEIS schools and by teachers in the various school sector types (Appendix L, Table L6).

Table 5.10: Teachers who reported revisiting topics/skills/learning outcomes and the time revisiting occurred (percentages)

	Teachers teaching Third Year students			Teachers teaching Fourth Year/TY students			Teachers teaching Fifth Year students		
	English	Maths	Science	English	Maths	Science	English	Maths	Science
<i>If revisiting occurred it was mainly...</i>	(n=75)	(n=107)	(n=88)	(n=30)	(n=71)	(n=50)	(n=78)	(n=123)	(n=104)
First 2 weeks of academic year	74.8	66.5	66.0	67.4	76.5	75.5	69.2	72.3	65.4
First 4 weeks of academic year	8.0	6.3	0.8	12.4	6.0	3.0	9.0	9.1	7.9
First 6 weeks of academic year	10.1	15.0	15.1	7.7	13.5	7.9	3.0	8.4	10.7
Mix of weeks in the first 6 weeks of academic year	7.1	12.2	18.1	12.5	3.9	13.6	18.8	10.3	16.0

5.2. Opportunity to Learn (OTL) from the Student Perspective

This section examines the third research question: **RQ3: To what extent might Opportunity to Learn be a factor associated with the performance of 15-year olds in Ireland taking PISA tests in the Autumn?** Included is an examination of student exposure to content and the learning environment (by subject domain), elements of ‘Opportunity to Learn’ from the students’ perspectives, encompassing their reports on exposure to content and the learning environment. In PISA 2018, the main domain was reading; therefore, the focus of this section is on the students’ perspective of their English class (the data are from the PISA 2018 student questionnaire).

5.2.1. Exposure to domain-specific content

Exposure to content can be examined by investigating the strategies and skills learnt in reading and understanding texts. Section 5.3 below will cover the strategies of *understanding and remembering, summarising and assessing credibility*. This section covers the types of reading material read at school in the month previous to testing, length of text read for school, reading tasks, and strategies for online reading.

Types of reading material

PISA 2018 asked students how often they read several types of texts for school during the last month with reference to a four-point scale (*not at all, once, two or three times, and many times*).

Texts referred to in the question included diagrams or maps, fiction (novels, short stories), texts that included tables or graphs, and digital texts including links. Approximately 27.9% of students in the Spring reported that they read fiction texts for school *many times* during the previous month, compared to 34.5% at Autumn testing (Table 5.11). Similarly, digital texts including links were reported by a higher percentage of students in the Autumn compared to the Spring (18.5% and 13.2%, respectively). In contrast, texts that include diagrams or maps and texts that include tables or graphs were reported by higher percentages of students in the Spring compared to the Autumn (34.7% and 26.4%, respectively). While the same pattern can be seen across most of the background characteristics (gender, year level, ESCS, language, and school type) with statistically significant differences between the Spring and Autumn (no effect size greater than $h=0.26$), there were no statistically significant differences for Third Year and Transition Year students on the types of reading material read in the month before the Spring or Autumn testing (Appendix L, Table L7).

Table 5.11: Percentage of students who reported reading selected text formats in school 'many times' in the previous month and overall mean score for reading, Spring and Autumn testing

<i>Students in school who 'many times during the last month' read...</i>	Spring					Autumn					Spring-Autumn			
	n	%	SE	Mean	(SE)	n	%	SE	Mean	(SE)	% Diff	SE Diff	Mean Diff	SE Diff
All students														
Texts that include diagrams or maps	1,935	34.7	(0.7)	528.29	(2.7)	509	26.4	(1.4)	518.55	(7.4)	8.3	(1.6)	9.74	(7.8)
Fiction (e.g., novels, short stories)	1,542	27.9	(0.9)	522.88	(3.6)	659	34.5	(1.9)	523.61	(5.5)	-6.6	(2.1)	-0.73	(6.6)
Texts that include tables or graphs	1,881	33.9	(0.7)	530.94	(2.6)	483	24.6	(1.0)	520.01	(6.8)	9.3	(1.2)	10.93	(7.3)
Digital texts including links	720	13.2	(0.6)	514.37	(4.4)	755	18.5	(1.2)	521.93	(7.8)	-5.4	(1.3)	-7.56	(9.0)

Note. Bold indicates statistical significant differences at .01 level.

Length of text read for school

In PISA 2018, students were asked how many pages were in the longest piece of text they had to read for their English lessons with response options of *one page or less*, *between 2-10 pages*, *between 11-50 pages*, *between 51-100 pages*, *between 101-500 pages*, and *more than 500 pages*. Responses were re-coded to: *up to 10 pages*, *11-100 pages* and *101 or more pages*. Across OECD countries, performance on reading literacy was strongly associated with the length of texts read in English classes and, at proficiency levels 5 and 6, students reported reading lengthy texts (OECD, 2021). Table 5.12 shows a similar pattern between performance and length of text with students who read *up to 10 pages* achieving a mean reading score of

494.5 in the Spring testing and those who had read *101 or more pages* achieving a mean score of 546.3. Table 5.12 also shows that there is a statistically significant difference reported by students on the length of text read in the Autumn compared to the Springtime. Approximately 42.4% of students reported reading *101 or more pages* in the Spring compared to 24.1% of the students tested in the Autumn (effect size $h=0.39$). This pattern was the same for all student and school-level characteristics (Appendix L, Table L8).

Table 5.12: Percentage of students reporting longest piece of text they have read in their English lessons and overall mean score for reading, Spring and Autumn testing

<i>How many pages was the longest piece of text you had to read for your English lessons?</i>	Spring (n=5,509)				Autumn (n=1,945)				Spring-Autumn			
	%	SE	Mean	(SE)	%	SE	Mean	(SE)	% Diff	SE Diff	Mean Diff	SE Diff
All students												
Up to 10 pages	36.4	(0.8)	494.5	(2.6)	54.2	(1.9)	512.0	(5.1)	-17.9	(2.1)	-17.4	(5.7)
11-100 pages	21.2	(0.6)	506.6	(3.4)	21.6	(1.3)	511.6	(5.7)	-0.4	(1.4)	-5.0	(6.7)
101 or more pages	42.4	(0.9)	546.3	(2.6)	24.1	(1.5)	533.0	(6.7)	18.3	(1.7)	13.3	(7.2)

Note. Bold indicates statistical significant differences at .01 level.

Reading tasks

Students in PISA 2018 were asked to indicate what activities their teacher usually asked them to complete after reading a book or chapter for their English class. Table 5.13 lists the various reading activities in English classes during the school year that were presented to students and shows the comparison between Spring and Autumn. Descriptive activities such as 'list and write a short description of the main characters' and 'select a passage you liked or disliked and explain why' were completed by a higher percentage of students in the Spring compared to the Autumn (percentage score difference of 12.5% and 7.3%, respectively, significant at .01 level with corresponding effect size $h=0.31$ and $h=0.15$, respectively). Several of the reading-related activities have been noted to have the potential to promote learning at the highest proficiency level (Medina & McGregor, 2019). Such an activity as 'discuss in small groups with other students who read the same book/ chapter' which encourages more critical thinking rather than just comprehending and making connections with personal experience saw no statistical significant difference between Spring and Autumn on the proportion of students reporting the activity (58.6% and 57.4%, respectively). However, a higher percentage of students in the Spring reported that they were asked to 'compare the book with other books or texts on a similar topic' (60.3%) compared to students in the Autumn (51.7%), the difference being statistically significant at the .01 level (effect size $h=0.17$). A further activity that requires more cognitive capabilities, that of answering questions about the book or the chapter, also saw a statistically

significant difference (at the .05 level) between the Spring and Autumn on the percentage of students reporting this (87.4% and 84.1%, respectively, effect size $h=0.09$).

Table 5.13: Percentage of students reporting their teacher asked them to complete various reading activities in English classes during the school year and overall mean score for reading, Spring and Autumn testing

<i>When you have to read, does the teacher ask you to...</i>	Spring				Autumn				Spring-Autumn			
	%	SE	Mean	(SE)	%	SE	Mean	(SE)	% Diff	SE Diff	Mean Diff	SE Diff
Write a summary of the book/ chapter	78.0	(0.8)	513.6	(2.4)	71.5	(2.1)	510.1	(4.0)	6.5	(2.2)	3.4	(4.6)
List and write a short description of the main characters	85.3	(0.6)	516.4	(2.2)	72.8	(1.4)	512.4	(4.3)	12.5	(1.6)	4.1	(4.8)
Discuss in small groups with other students who read the same book/ chapter	58.6	(1.1)	513.1	(2.8)	57.4	(1.5)	509.5	(4.5)	1.3	(1.9)	3.6	(5.3)
Give your personal thoughts about the book/chapter	85.1	(0.6)	519.8	(2.1)	80.8	(1.0)	516.2	(4.6)	4.2	(1.1)	3.6	(5.1)
Answer questions about the book or the chapter	87.4	(0.7)	519.2	(2.2)	84.1	(1.5)	515.6	(4.6)	3.4*	(1.7)	3.6	(5.1)
Compare the content of the book or the chapter with your own experience	33.8	(0.8)	495.3	(3.2)	33.9	(1.1)	487.3	(4.9)	-0.1	(1.4)	7.9	(5.9)
Compare the book with other books or texts on a similar topic	60.3	(0.9)	519.9	(2.4)	51.7	(1.8)	509.8	(5.2)	8.6	(2.1)	10.0	(5.7)
Select a passage you liked or disliked and explain why	67.3	(0.8)	510.8	(2.3)	60.0	(1.4)	506.2	(4.5)	7.3	(1.6)	4.6	(5.0)
Write a text related to what you have read	58.8	(0.8)	511.2	(2.5)	54.1	(1.6)	510.0	(4.8)	4.6	(1.8)	1.3	(5.5)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. The range of sample size for these reading activities: Spring $n=5,488-5,513$ Autumn $n=1,924-1,932$.

Table 5.14 shows that across the various student- and school-level characteristics a higher percentage of students reported that they were asked to ‘compare the book with other books or texts on a similar topic’ in the Spring compared to students in the Autumn.

Table 5.14: Percentage of students reporting their teacher asked them to complete reading activities (that require more cognitive capabilities) in English classes during the school year, Spring and Autumn testing

When you have to read, does the teacher ask you to...	Spring						Autumn						Spring-Autumn					
	Discuss in small groups with other students who read the same		Answer questions about the book or the chapter		Compare the book with other books or texts on a similar topic		Discuss in small groups with other students who read the same		Answer questions about the book or the chapter		Compare the book with other books or texts on a similar topic		Discuss in small groups with other students who read the same		Answer questions about the book or the chapter		Compare the book with other books or texts on a similar topic	
	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE	%	SE
Male	55.9	(1.5)	87.5	(0.8)	62.0	(1.1)	57.0	(1.6)	83.9	(1.5)	53.6	(1.7)	-1.1	(2.2)	3.6*	(1.7)	8.3	(2.0)
Female	61.3	(1.5)	87.4	(0.9)	58.6	(1.3)	57.7	(2.2)	84.3	(2.5)	49.8	(2.9)	3.6	(2.7)	3.1	(2.7)	8.8	(3.2)
First / Second Year	70.0	(4.4)	96.8	(1.6)	61.5	(4.8)	54.1	(17.2)	89.3	(13.0)	47.9	(16.5)	15.9	(17.7)	7.5	(13.1)	13.6	(17.2)
Third Year	58.5	(1.4)	91.0	(0.7)	63.3	(1.3)	55.7	(2.7)	92.6	(1.7)	51.9	(2.5)	2.8	(3.1)	-1.7	(1.9)	11.4	(2.8)
Transition Year	58.1	(1.7)	78.4	(1.5)	51.6	(1.5)	57.6	(1.6)	79.2	(2.5)	50.8	(2.4)	0.6	(2.3)	-0.8	(3.0)	0.8	(2.8)
Fifth/Sixth Year	58.4	(2.3)	89.2	(1.8)	66.1	(2.9)	59.1	(3.3)	85.2	(2.3)	53.8	(3.6)	-0.7	(4.0)	4.0	(2.9)	12.4	(4.6)
Lowest ESCS	55.5	(1.4)	88.2	(1.0)	56.2	(1.4)	56.4	(2.6)	83.1	(2.2)	51.5	(2.8)	-0.9	(2.9)	5.2*	(2.4)	4.7	(3.2)
Low-Med. ESCS	59.6	(1.7)	88.4	(1.1)	59.7	(1.5)	58.6	(2.4)	83.5	(2.0)	47.8	(2.6)	1.0	(3.0)	5.0*	(2.3)	11.9	(3.0)
Med-High ESCS	58.3	(1.8)	85.0	(1.1)	61.8	(1.7)	56.9	(1.8)	88.7	(1.8)	54.5	(2.3)	1.4	(2.6)	-3.7	(2.1)	7.3*	(2.8)
Highest ESCS	60.8	(1.7)	87.8	(1.1)	63.2	(1.5)	57.9	(3.2)	81.1	(3.2)	53.3	(2.2)	2.9	(3.6)	6.8*	(3.4)	9.9	(2.7)
Native	57.7	(1.2)	87.2	(0.7)	60.0	(1.0)	56.1	(1.7)	83.4	(1.8)	51.5	(2.0)	1.7	(2.1)	3.8	(1.9)	8.4	(2.2)
Immigrant & Eng./Irish	61.3	(2.3)	87.9	(1.4)	64.6	(2.2)	63.1	(4.0)	84.0	(2.5)	56.3	(2.7)	-1.9	(4.6)	3.9	(2.9)	8.3*	(3.5)
Immigrant & other lang.	62.2	(2.1)	88.9	(1.4)	59.3	(2.2)	59.4	(3.2)	87.2	(2.2)	49.3	(5.2)	2.8	(3.8)	1.6	(2.6)	10.1	(5.7)
Girls' secondary	67.2	(2.6)	86.6	(1.4)	57.5	(2.2)	58.4	(3.1)	81.9	(5.1)	44.6	(5.0)	8.9*	(4.0)	4.7	(5.2)	12.9*	(5.5)
Boys' secondary	49.3	(3.5)	87.5	(1.9)	60.4	(1.7)	52.2	(2.9)	82.2	(2.6)	54.7	(3.0)	-3.0	(4.6)	5.3	(3.2)	5.7	(3.4)
Com./comp.	58.2	(2.7)	88.8	(1.2)	61.3	(1.9)	56.7	(5.3)	84.7	(3.7)	48.5	(5.0)	1.5	(5.9)	4.1	(3.9)	12.8*	(5.4)
Mixed secondary	55.8	(2.6)	85.7	(1.4)	62.1	(2.2)	55.7	(2.6)	85.8	(3.7)	56.3	(2.4)	0.1	(3.6)	-0.1	(3.9)	5.8	(3.3)
ETB vocational	59.1	(1.8)	88.3	(1.4)	60.5	(1.8)	61.1	(2.6)	85.1	(1.3)	53.8	(3.6)	-2.0	(3.2)	3.2	(1.9)	6.6	(4.0)
Non-DEIS	58.8	(1.3)	87.1	(0.7)	60.5	(1.1)	56.6	(1.5)	84.4	(1.8)	50.6	(2.1)	2.1	(2.0)	2.7	(2.0)	9.9	(2.4)
DEIS	58.2	(2.1)	88.5	(1.3)	59.6	(1.2)	59.5	(3.4)	83.2	(2.4)	54.9	(2.9)	-1.3	(4.0)	5.3	(2.8)	4.7	(3.1)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

There were no gender differences in the percentages of students reporting that they were asked to ‘compare a book with other books or text’ between the Spring and Autumn testing. However, a significantly higher percentage of students (at the .01 level) in Third Year, Fifth Year, students in the low-medium and highest ESCS quartile, native students and students in non-DEIS schools reported that they were asked to do this activity in the Spring compared to the Autumn (effect sizes ranged $h=0.15$ to $h=0.25$). A statistically significantly higher percentage of male students reported that they were asked to ‘answer questions about the book or the chapter’ in the Spring compared to the Autumn (87.5% and 83.9%, respectively, effect size $h=0.10$).

Strategies for online reading

Students were asked whether they had been taught various strategies for online reading and study over their entire school experience. Linking prior knowledge with current learning has been considered as part of the ‘opportunity to learn’ process as it could be related to the type of learning that takes place (Gee, 2008). A statistically significantly higher percentage of students in the Autumn indicated that they had been taught six of the seven strategies compared to the Spring (Table 5.15). There was a statistically significant difference of 7.6 points in the percentage of students reporting that they were taught ‘how to compare different web pages and decide what information is more relevant for your schoolwork’, a 6.6% difference on the strategy ‘how to detect whether the information is subjective or biased’ and a 6.4% difference on ‘how to decide whether to trust information from the internet’. It may be that teachers cover these skills in the Autumn, in the expectation that they will not need to be re-taught again in the Spring.

Table 5.15: Percentage of students who had been taught various online reading strategies since starting school and overall mean score for reading, Spring and Autumn testing

	Spring				Autumn				Spring-Autumn			
	%	(SE)	Mean	(SE)	%	(SE)	Mean	(SE)	% Diff	(SE Diff)	Mean Diff	(SE Diff)
How to use keywords when using a search engine	44.3	(0.9)	500.1	(2.9)	48.5	(1.3)	499.6	(4.9)	-4.1*	(1.6)	0.5	(5.7)
How to decide whether to trust information from the internet	58.2	(0.9)	513.6	(2.7)	64.5	(1.8)	516.0	(4.3)	-6.4	(2.0)	-2.4	(5.1)
How to compare different web pages and decide what information is more relevant for your schoolwork	45.7	(0.8)	506.2	(2.8)	53.2	(1.6)	506.7	(4.6)	-7.6	(1.8)	-0.5	(5.4)
To understand the consequences of making information publicly available online	83.1	(0.7)	525.7	(2.4)	82.5	(1.3)	521.9	(4.3)	0.5	(1.5)	3.8	(5.0)
How to use the short description below the links in the list of search results	35.1	(0.8)	492.2	(2.9)	39.5	(1.4)	488.5	(5.1)	-4.4	(1.6)	3.8	(5.9)
How to detect whether the information is subjective or biased	59.1	(0.9)	522.5	(2.6)	65.7	(1.7)	521.6	(4.1)	-6.6	(1.9)	0.9	(4.9)
How to detect phishing or spam emails	28.0	(0.9)	498.7	(3.2)	33.4	(1.5)	502.9	(6.4)	-5.4	(1.8)	-4.1	(7.1)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. The range of sample size for these reading activities: Spring n=5,492-5,519 Autumn n=1,934-1,942. Effect sizes <0.15.

Table 5.16 shows the percentage difference between Spring and Autumn for students who had been taught various online reading strategies since they started school by student level variables.⁶³ Students in the highest ESCS quartile showed no percentage difference between the Spring and Autumn across all the seven strategies that were presented to them. This was also the case for Transition Year, Fifth Year and Sixth Year students and immigrant students who normally spoke English/Irish at home. Immigrant students who spoke another language had a statistically significant percentage difference (at .05 level) on only two of the strategies, ‘decide whether to trust information from the internet’ and ‘compare different web pages-information is more relevant’ (effect sizes $h=0.23$ and $h=0.25$, respectively). Third year students who had just gone into Third Year in the Autumn had a statistically significantly higher percentage on six of the seven online reading strategies since starting school compared to the Third Year students who were testing in Spring (range of effect sizes $h=0.17$ to $h=0.38$).

⁶³ School-level variables are not examined as the reference is across the entire school experience, and students will have changed schools.

Table 5.16: Percentage difference between Spring and Autumn for students who had been taught various online reading strategies since starting school by student level variables

<i>Online reading strategies...</i>	Spring-Autumn													
	How to use keywords when using a search engine		Decide whether to trust information from the internet		Compare different web pages- information is more relevant		Consequences of making information publicly available		Using the short description below the links		How to detect whether the information is subjective or biased		How to detect phishing or spam emails	
	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
Male	-6.5	(-2.3)	-6.5*	(-2.6)	-10.6	(-2.5)	-1.2	(-2.3)	-7.4	(-2.2)	-8.1	(-2.6)	-8.2	(-2.2)
Female	-1.8	(-1.9)	-6.2*	(-2.9)	-4.6*	(-2.3)	2.2	(-1.6)	-1.5	(-2.0)	-5.1*	(-2.3)	-2.6	(-2.2)
First / Second Year	5.3	(-17.8)	13.3	(-17.2)	-3.8	(-13.1)	7.9	(-13.4)	-4.6	(-13.0)	-3.7	(-10.9)	5.5	(-14.3)
Third Year	-8.6*	(-3.4)	-11.9	(-2.8)	-18.8	(-3.5)	2.3	(-2.5)	-8.7	(-2.3)	-14	(-2.9)	-10.1	(-2.4)
Transition Year	3.2	(-2.0)	-2.0	(-2.8)	2.5	(-2.6)	0.9	(-2.0)	2.4	(-2.6)	-2.2	(-2.7)	-0.6	(-2.9)
Fifth/Sixth Year	-1.7	(-3.9)	-2.4	(-3.7)	-0.4	(-3.4)	-0.9	(-3.5)	-2.2	(-3.5)	0.9	(-4.7)	3.4	(-3.9)
Lowest ESCS	-4.5	(-2.6)	-7.0	(-2.3)	-7.3	(-2.4)	0.6	(-2.3)	-5.7*	(-2.7)	-7.5	(-2.6)	-5.7	(-2.5)
Low-Medium ESCS	-6.2*	(-2.6)	-8.6*	(-3.8)	-10.5	(-3.1)	0.2	(-2.5)	-4.0	(-3.0)	-5.2	(-2.9)	-4.6	(-3.1)
Medium-High ESCS	-4.7	(-3.0)	-8.1	(-2.9)	-9.9	(-2.8)	1.3	(-2.4)	-5.4*	(-2.6)	-9.4	(-3.5)	-7.8	(-2.8)
Highest ESCS	-1.4	(-2.7)	-2.2	(-3.0)	-2.2	(-2.7)	0.4	(-3.2)	-2.3	(-2.4)	-4.5	(-3.2)	-3.8	(-2.9)
Native	-3.7*	(-1.8)	-6.6	(-2.3)	-7.6	(-2.0)	0.3	(-1.6)	-4.3*	(-1.7)	-7.8	(-2.1)	-5.2	(-2.0)
Immigrant & Eng./Irish	-2.8	(-4.7)	-1.0	(-4.6)	-5.0	(-4.7)	5.2	(-4.0)	-4.6	(-3.6)	-2.2	(-5.1)	-3.3	(-4.7)
Immigrant & other lang.	-7.9	(-4.2)	-10.6*	(-4.5)	-12.3*	(-4.8)	-0.5	(-3.1)	-5.8	(-4.6)	-1.8	(-4.5)	-7.5	(-5.4)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. Full details in Appendix L, Table L9.
School level variables are not included as the reference is across the entire school experience, students will have changed schools.

5.2.2. The English learning environment

Students' perceptions of the quality of instruction in their English class were sought on the PISA 2018 student questionnaire (Spring and Autumn) by asking them how often teachers implemented certain activities during English classes, including teacher stimulation of reading engagement, provision of teacher feedback, teacher-directed instruction, adaptive instruction and aspects of disciplinary climate in English class (e.g., waiting for the class to quieten down). Separate indices were constructed by the OECD for each of these elements, with OECD averages typically set at or close to 0, and standard deviations at 1. There was no difference on any of these aspects of the perceived learning environment in Spring compared to Autumn (Table 5.17).

Table 5.17: Students' perception of the learning environment in their English class, Spring and Autumn testing

<i>Mean score for all students on the index of...</i>	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
Teachers' stimulation of reading engagement	0.06	(0.02)	0.05	(0.03)	0.02	(0.03)
Teacher feedback	0.30	(0.02)	0.28	(0.04)	0.03	(0.04)
Teacher-directed instruction	-0.20	(0.02)	-0.21	(0.04)	0.01	(0.04)
Adaptive instruction	-0.01	(0.02)	-0.04	(0.03)	0.03	(0.04)
Disciplinary climate in English class	0.04	(0.03)	0.05	(0.04)	-0.01	(0.05)

Positive values on the index of 'teachers' stimulation of reading engagement' mean that the students perceived their teacher provided greater stimulation than did the average student across OECD countries. The mean scores in Ireland were almost equal between the two testing periods, 0.06 in the Spring testing and 0.05 in the Autumn testing. Similarly, there was found to be no difference on the mean score on this index across the various student and school background variables (Appendix L, Table L10). However, examining the individual items within the index, a higher percentage of male students, students in the highest ESCS quartile and students in non-DEIS school in the Spring reported that their teacher showed them how the information in texts builds on what they already know, compared to the Autumn (males 55.7% and 52%, respectively; students in the highest ESCS quartile 58.4% and 50.6%, respectively and students in non-DEIS schools 55.6% and 51.6%, respectively, effect sizes $h < 0.16$). Correspondingly, in the Spring, 58.4% of students in the highest ESCS quartile reported that

their teacher posed questions that motivate students to participate actively compared to 50.6% in the Autumn (significantly different at the .05 level, effect size $h=0.12$) (Appendix L, Table L11).

The mean score on the index of ‘teacher feedback’ in the Spring testing was 0.30 compared to 0.28 in the Autumn, the difference is not statistically significantly different. There was also no statistically significant difference on the mean scores on the index between Autumn and Spring for the various student- and school-level background variables (Appendix L, Table L12). In general, there were no statistical significant differences on the percentages of student reports on the individual items that comprise the index between Spring and Autumn or across the various student- and school-level characteristics (Appendix L, Table L13).

The mean score on the index ‘teacher-directed instruction’⁶⁴ for the Spring testing was -0.20 and slightly, but not statistically significantly lower in the Autumn (-0.21), which suggests that students in both the Spring and the Autumn perceived their teacher to provide teacher-directed instruction less frequently compared to other students across the OECD. There were no differences across background variables (Appendix L, Table L14). However, examining the items within the index, in the Spring a larger percentage of students in the highest ESCS quartile reported that their teacher ‘asks questions to check whether we have understood what was taught’ (74.6%) compared to 69.2% at Autumn testing (the difference statistically significant at the .05 level, effect size $h=0.12$) (Appendix L, Table L15). Approximately 26.8% of Third Year students in the Spring reported that ‘at the beginning of a lesson, the teacher presents a short summary of the previous lesson’ compared to 33.5% in the Autumn (the difference statistically significantly at the .01 level, effect size $h=0.15$), while the reverse was true for Transition Year students (28.6% in the Spring compared to 23.0% in the Autumn, the difference statistically significantly at the .01 level, effect size $h=0.13$).

The mean score on the index of adaptive instruction in the Spring was -0.01, which is just below the OECD average and not statistically significantly different from the Autumn score of -0.04, with no statistically significant differences across background variables (Appendix L, Table L16). However, the item ‘the teacher adapts the lesson to my class’s needs and knowledge’ showed a statistically significant difference for students in the highest ESCS quartile between Spring and Autumn (57.2% in the Spring compared to 49.7% in the Autumn reported that their teacher adapts the lesson many lessons/every lesson or almost every lesson).

⁶⁴ The term teacher-directed instruction can have different meanings but according to the OECD, it describes a teaching style which includes structuring practices such as well-organised and goal oriented lessons, clarity of presentation, and close monitoring of student understanding (OECD, 2009).

Just over 40% of male students in Springtime reported that the teacher ‘changes the structure of the lesson on a topic that most students find difficult to understand’ compared to 36.9% in the Autumn. The effect size for both these differences was less than $h=0.2$ (Appendix L, Table L17).

The index of disciplinary climate⁶⁵ (within the English class) had a mean score in the Spring of 0.04, which was just above the OECD average and not statistically significantly different from the Autumn score of 0.05, with no statistical significant differences across background variables (Appendix L, Table L18). Across the individual items within the index, there was no major differences between Spring and Autumn across the various student backgrounds and school types (Appendix L, Table L19).

Table 5.18 presents correlations of students’ perceptions of the learning environment in their English class with performance on PISA. At both the Spring and Autumn testing, there were weak⁶⁶ relationships with reading achievement for ‘teacher feedback’, ‘teacher-directed instruction’ and ‘adaptive instruction’ and performance on reading literacy. Teachers’ stimulation of reading engagement had a weak to moderate relationship with achievement in reading at the Spring testing ($r=0.12$) and a weak relationship at the Autumn testing ($r=0.09$). While ‘disciplinary climate’ in English class had a weak to moderate relationship with performance on reading at both testing periods.

Table 5.18: Correlations of students’ perceptions of the learning environment in their English class indicators with performance on PISA, Spring and Autumn testing

	Spring				Autumn			
	r	SE	t	p*	r	SE	t	p*
Teachers’ stimulation of reading engagement	0.12	(0.02)	7.8	<.001	0.09	(0.02)	3.8	<.001
Teacher feedback	0.04	(0.02)	2.4	0.018	0.04	(0.02)	1.7	ns
Teacher-directed instruction	-0.10	(0.02)	-6.5	<.001	-0.09	(0.02)	-4.2	<.001
Adaptive instruction	0.09	(0.02)	5.7	<.001	0.05	(0.02)	2.1	0.038
Disciplinary climate in English class	0.13	(0.02)	6.6	<.001	0.12	(0.03)	4.6	<.001

Note. Significant correlations at .05 level are in bold.

*Calculating p value from t score, $df=80$, number of variance strata associated with balanced repeated replication (BRR) method of variance estimation.

⁶⁵ Disciplinary climate has also been named ‘behavioural climate’ (Medina and McGregor, 2019).

⁶⁶ Correlation coefficients are interpreted in this study as follows: > .56=strong; .41 - .55=moderate-to- strong; .26 - .40=moderate; .11-.25=weak-to-moderate; <.10=weak.

On the whole, aspects of the learning environment in English classes, as perceived by students, are similar for Spring and Autumn, and their associations with achievement are also broadly similar.

5.3. Engagement

The fourth research question will be examined in this section: **RQ4: Do 15-year-olds' level of engagement with school differ between the Spring and Autumn terms?** The behavioural, emotional and cognitive engagement of students who participated in PISA testing in Spring and Autumn 2018 are examined.

5.3.1. Behavioural engagement

The questions that PISA uses to measure behavioural engagement are students' reports on how often they *skip a whole school day*, *skip some classes* and *arrive late for school* in the two weeks leading up to the day on which they take the PISA test. PISA 2012 distinguished between skipping school 'without permission' and absence from school 'due to illness or an appointment' (Perkins et al, 2013); however, in PISA 2018 this distinction was not made. Table 5.19 shows more students *skipping a whole day* in the two weeks before PISA testing in the Autumn compared to the two weeks before PISA testing in the Spring. Almost 29% of students involved in Autumn testing reported *skipping 1 or 2 days* compared to 24.2% in Spring testing (a statistically significant difference at the .01 level, effect size $h=0.10$). Similar percentages reported *skipping 3 or more days* prior to both Autumn and Spring testing (6.1% and 5.7%, respectively).

Table 5.19: Percentages of students *skipping a whole day, skipping class and arriving late for school* two weeks prior to PISA testing, Spring and Autumn testing

	Spring		Autumn		Spring-Autumn	
	%	SE	%	SE	% Diff	SE Diff
<i>Skip a whole day</i> (n=4,628)			(n=1,671)			
None	70.1	(0.8)	65.4	(1.3)	4.7	(1.5)
1 or 2 days	24.2	(0.7)	28.5	(1.3)	-4.3	(1.5)
3 or more days	5.7	(0.3)	6.1	(0.5)	-0.4	(0.6)
<i>Skip class</i> (n=4,618)			(n=1,668)			
None	72.3	(1.0)	68.3	(1.6)	4.1*	(1.9)
1 or 2 days	20.6	(0.8)	23.5	(1.2)	-3.0*	(1.4)
3 or more days	7.1	(0.5)	8.2	(1.0)	-1.1	(1.1)
<i>Arrive late</i> (n=4,619)			(n=1,668)			
None	66.4	(1.0)	66.3	(1.8)	0.1	(2.1)
1 or 2 days	24.5	(0.8)	23.8	(1.3)	0.7	(1.5)
3 or more days	9.2	(0.5)	9.9	(1.0)	-0.8	(1.1)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

There was also a statistically significant difference (at the .05 level) in the percentages of students reporting that they had *skipped class 1 or 2 days* in the two weeks prior to PISA testing in the Spring and Autumn (20.6% and 23.5%, respectively, effect size $h=0.10$). There were no statistical significant differences in the percentages of students *arriving late* for school in the two weeks prior to PISA Spring or Autumn testing.

Examining the behavioural engagement of the various student subgroups, a statistically significant higher percentage of males reported *skipping 1-2 whole days* prior to Autumn testing (27.6%) compared to Spring testing (21.5%) (effect size $h=0.16$), whereas similar proportions of females reported this level of absence in Spring and Autumn (26.7% and 29.4%, respectively) (see Table 5.20 for percentage differences).

Table 5.20: Percentage difference between Spring and Autumn for students who *skip a whole day* and who *skip class* two weeks prior to PISA testing, by background variables

	Difference between Spring and Autumn - <i>skip a whole day</i>						Difference between Spring and Autumn - <i>skip a class</i>					
	None		1 or 2 whole days		3 or more whole days		None		1 or 2 days		3 or more days	
	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
Male	7.2	(-2.1)	-6.1	(-2.0)	-1.1	(-1.1)	7.5	(2.7)	5.0*	(2.2)	-2.4	(-1.7)
Female	2.3	(-2.0)	-2.6	(-2.0)	0.3	(-0.8)	0.8	(2.3)	-1.0	(1.9)	0.2	(-1.1)
First / Second Year ¹	11.7	(-21.6)	-21.5	(-21.3)	9.8	(-3.1)	-6.5	(14.1)	1.3	(13.9)	5.2	(-2.5)
Third Year	3.1	(-2.7)	-4.4	(-2.4)	1.4	(-1.3)	4.8	(2.9)	-4.1	(2.5)	-0.7	(-1.6)
Transition Year	-2.5	(-2.5)	0.7	(-2.4)	1.8	(-1.0)	-6.9*	(2.9)	2.8	(2.2)	4.2*	(-1.7)
Fifth/Sixth Year	6.4	(-3.3)	-3.7	(-2.8)	-2.7	(-2.1)	5.0	(3.5)	-3.2	(3.3)	1.7	(-2.2)
Lowest ESCS	8.2	(-2.7)	-7.8	(-2.8)	-0.5	(-1.8)	3.8	(3.6)	-0.8	(3.2)	-3.0	(-2.1)
Low-Medium ESCS	5.5	(-3.4)	-5.2	(-3.5)	-0.4	(-1.4)	3.9	(2.9)	-3.3	(2.4)	-0.6	(-1.6)
Medium-High ESCS	2.6	(-2.9)	-3.4	(-3.1)	0.7	(-1.6)	3.9	(3.2)	-3.8	(2.8)	-0.1	(-1.7)
Highest ESCS	2.8	(-3.4)	-1.4	(-3.0)	-1.5	(-1.3)	5.2	(2.9)	-4.5	(2.4)	-0.7	(-1.8)
Native	5.2	(-1.6)	-5.2	(-1.6)	0.1	(-0.7)	4.2*	(2.0)	3.2*	(1.5)	-1.0	(-1.2)
Immigrant & Eng./Irish	-1.6	(-5.0)	2.8	(-4.2)	-1.3	(-2.7)	2.3	(3.8)	-0.9	(3.4)	-1.4	(-2.5)
Immigrant & other lang.	0.6	(-3.9)	-0.6	(-3.7)	-0.1	(-2.6)	-1.7	(4.6)	1.0	(4.7)	0.7	(-2.9)
Girls' secondary	0	(-2.9)	-1.4	(-2.9)	1.4	(-1.3)	-4.7	(3.7)	1.0	(3.2)	3.7*	(-1.6)
Boys' secondary	9.4*	(-3.8)	-8.7*	(-3.6)	-0.7	(-1.5)	1.7	(5.9)	0.7	(4.0)	-2.4	(-2.7)
Comm./comp.	1.5	(-3.9)	-0.9	(-3.3)	-0.6	(-1.9)	4.8	(4.5)	-3.9	(3.1)	-0.9	(-3.7)
Mixed secondary	8.8	(-3.5)	-6.7	(-3.6)	-2.1	(-1.5)	10.6*	(4.4)	-6.0	(3.2)	-4.6	(-2.5)
ETB vocational	5.3	(-2.9)	-4.9	(-3.4)	-0.4	(-1.2)	7.3	(2.6)	5.5*	(2.6)	-1.8	(-1.8)
Non-DEIS	3.9*	(-1.9)	-3.0	(-1.8)	-0.9	(-0.7)	4.6*	(2.3)	-3.4	(1.7)	-1.2	(-1.3)
DEIS	7.3*	(-2.8)	-8.4*	(-3.3)	1.2	(-1.4)	2.3	(-2.9)	-1.8	(-2.4)	-0.5	(-2.1)

Note. ¹While the differences between Spring and Autumn for First/Second Year students are significant they are not substantial due to the small number of students. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. For full details see Appendix L, Tables L20, L21.

Considerably more students in the lowest ESCS quartile reported *skipping 1 or 2 whole days* in the two weeks prior to the Autumn testing (34.0%) compared to the two weeks prior to Spring testing (26.2%). This was similar for native students (29.0% and 23.7%, respectively), with differences statistically significant at the .01 level for both groups and corresponding effects sizes small ($h < 0.2$). At the school level, significantly higher percentages of students from boys' secondary schools and DEIS schools recorded *skipping 1 or 2 whole days* prior to the Autumn testing compared to the Spring testing (8.7% and 8.4% point differences, respectively, statistically significant at the .05 level, effect size small, ($h < 0.2$)).

Table 5.20 also presents the percentage differences between Spring and Autumn for students *skipping class* two weeks prior to PISA testing, broken down by the student and school subgroups. There was a 4.2 percentage point difference (statistically significant at the .05 level,

effect size small ($h < 0.2$)) for Transition Year students *skipping class 3 or more days* in favour of Spring, indicating there is a higher percentage of Transition Years students skipping class in the Spring compared to the Autumn.

An examination of the behaviour of students arriving late to school revealed no statistical significant differences for any student subgroups except for First/Second year students, who comprised less than 1% of PISA Autumn students. There were no statistical significant differences between the Spring and Autumn testing for students attending the different school types (girls' secondary, boys' secondary etc. or DEIS and non-DEIS school) (Appendix L, Table L22).

5.3.2. Emotional engagement

This section covers two areas of emotional engagement, sense of belonging at school and teacher-student relationship in English classes.

Sense of belonging at school

The indicator used in the PISA data to measure emotional engagement is the index of sense of belonging at school. Positive values on this scale mean that the students have a greater sense of belonging than the average student in OECD countries. While there was a slight decrease on the mean score on the index between the Spring and Autumn (-0.15 and -0.17), indicating a slightly greater sense of belonging at school in the Spring compared to the Autumn, the difference is not statistically significant (Table 5.21).

Table 5.21: Mean scores on the index of ‘sense of belonging’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
All students	-0.15	(0.01)	-0.17	(0.02)	0.01	(0.02)
Male	-0.09	(0.02)	-0.12	(0.02)	0.03	(0.03)
Female	-0.22	(0.02)	-0.22	(0.03)	0.00	(0.03)
First / Second Year	-0.31	(0.09)	-0.02	(0.16)	-0.29	(0.19)
Third Year	-0.13	(0.01)	-0.19	(0.04)	0.05	(0.04)
Transition Year	-0.15	(0.02)	-0.12	(0.03)	-0.03	(0.04)
Fifth/Sixth Year	-0.27	(0.03)	-0.27	(0.05)	0.00	(0.06)
Lowest ESCS	-0.19	(0.02)	-0.25	(0.03)	0.06	(0.04)
Low-Medium ESCS	-0.17	(0.03)	-0.24	(0.03)	0.08*	(0.04)
Medium-High ESCS	-0.15	(0.03)	-0.07	(0.04)	-0.08	(0.04)
Highest ESCS	-0.11	(0.02)	-0.10	(0.04)	-0.01	(0.05)
Native	-0.15	(0.01)	-0.15	(0.02)	0.00	(0.02)
Immigrant & Eng./Irish	-0.11	(0.04)	-0.13	(0.08)	0.02	(0.09)
Immigrant & other lang.	-0.25	(0.04)	-0.35	(0.06)	0.10	(0.07)
Girls’ secondary	-0.17	(0.03)	-0.12	(0.05)	-0.05	(0.06)
Boys’ secondary	-0.10	(0.03)	-0.01	(0.03)	-0.09*	(0.04)
Community/ comprehensive	-0.17	(0.02)	-0.26	(0.04)	0.09*	(0.05)
Mixed secondary	-0.11	(0.04)	-0.23	(0.03)	0.12*	(0.05)
ETB vocational	-0.18	(0.03)	-0.18	(0.03)	0.00	(0.04)
Non-DEIS	-0.15	(0.01)	-0.14	(0.02)	-0.01	(0.03)
DEIS	-0.16	(0.03)	-0.25	(0.03)	0.09*	(0.05)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Examining the student subgroups, students from the low-medium ESCS quartile had a mean index score in the Autumn of -0.24 compared to -0.14 in Spring, indicating a greater sense of belonging in the Spring (statistically significant at the .05 level, effect size small ($d=0.08$)). Similarly, students from community/comprehensive, mixed secondary and DEIS schools all had significantly lower mean scores in Autumn compared with Spring. However, students from boys’ secondary school had a mean index score in the Autumn of -0.01 compared to -0.10 in the Spring, indicating a statistically significantly greater sense of belonging in the Autumn compared to the Spring.

Examining the individual items within the index, Third Year students, students from the lowest ESCS quartile, students attending mixed secondary and those attending DEIS schools all had a higher percentage *agreeing/strongly agreeing* to ‘I feel like I belong at school’ in the Spring compared to the Autumn, contributing to a greater sense of belonging in school in the Spring (Appendix L, Table L23).

Teacher-student relationships

Teacher-student relationships are examined in relation to the extent to which students perceive their teacher supports them in their English class (the index of ‘teacher support’). While there was a slight decrease on the mean score on the index between the Spring and Autumn (0.16 and 0.10, respectively), indicating that students perceived a slighter greater sense of ‘teacher support’ in the Spring compared to the Autumn, the difference is not statistically significant (Table 5.22). However, students from the highest ESCS quartile reported greater support from their teachers in the Spring compared to the Autumn (0.18 score difference statistically significantly different at .01 level, effect size small ($d=0.18$)).

Table 5.22: Mean scores on the index of ‘teacher support’ in English class by key subgroups, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
All students	0.16	(0.02)	0.10	(0.04)	0.06	(0.04)
Male	0.21	(0.03)	0.12	(0.05)	0.09	(0.06)
Female	0.11	(0.02)	0.07	(0.04)	0.04	(0.05)
First / Second Year	0.34	(0.09)	0.53	(0.25)	-0.19	(0.27)
Third Year	0.21	(0.03)	0.17	(0.03)	0.04	(0.04)
Transition Year	0.06	(0.03)	0.03	(0.05)	0.03	(0.06)
Fifth/Sixth Year	0.08	(0.05)	0.16	(0.06)	-0.07	(0.08)
Lowest ESCS	0.14	(0.03)	0.11	(0.06)	0.03	(0.07)
Low-Medium ESCS	0.15	(0.03)	0.15	(0.07)	0.01	(0.08)
Medium-High ESCS	0.14	(0.03)	0.11	(0.06)	0.03	(0.07)
Highest ESCS	0.19	(0.03)	0.01	(0.04)	0.18	(0.05)
Native	0.16	(0.02)	0.10	(0.04)	0.05	(0.04)
Immigrant & Eng./Irish	0.15	(0.05)	-0.01	(0.08)	0.16	(0.09)
Immigrant & other lang.	0.17	(0.05)	0.17	(0.10)	0.00	(0.11)
Girls’ secondary	0.07	(0.03)	0.00	(0.08)	0.06	(0.08)
Boys’ secondary	0.18	(0.06)	0.19	(0.10)	-0.01	(0.11)
Community/ comprehensive	0.17	(0.05)	0.04	(0.07)	0.12	(0.08)
Mixed secondary	0.22	(0.06)	0.14	(0.05)	0.08	(0.08)
ETB vocational	0.17	(0.04)	0.11	(0.08)	0.06	(0.09)
Non-DEIS	0.14	(0.02)	0.05	(0.04)	0.09*	(0.05)
DEIS	0.20	(0.03)	0.23	(0.07)	-0.03	(0.08)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Examining the items within the index, the percentage of students from the highest ESCS quartile reporting that their teachers’ ‘help students with their learning’ and ‘continue teaching until the students understands every/most lessons’ were higher in Spring compared to the

Autumn. In contrast, a higher percentage of students in DEIS schools in the Autumn reported that their teachers' 'help students with their learning' compared to the Spring (Appendix L, Table L24).

5.3.3. Cognitive engagement

Metacognition, an awareness of and ability to use appropriate strategies when engaging with texts, is especially relevant when considering student performance in reading literacy. In this section, students' awareness of three reading strategies are examined: understanding and remembering; summarising; and assessing credibility of sources.

Understanding and remembering

The index of understanding and remembering was constructed by the OECD drawing on students' ratings of strategy usefulness. The mean score in Spring testing was 0.05 compared to 0.04 for Autumn testing, indicating no statistical significant differences in the awareness of effective strategies (Appendix L, Table L25). There were also no statistically significant differences across the key subgroups between Spring and Autumn testing. However, for some of the component strategies, there were considerable differences between key subgroups (Appendix L, Table L26). There was stronger endorsement of the statement of 'after I read the text, I discuss its content with other people' in the Autumn than the Spring among females, Transition Year students, and students in ETB vocational schools. A higher percentage of Transition Year students reported that they 'underline important parts of the text' in the Autumn than in the Spring (a statistically significant difference at the .05 level, effect size small ($h=0.10$)) and Fifth/Sixth Year endorsed 'summarise the text in my own words' more in the Autumn than the Spring (6.8 percentage score difference, statistically significantly different at .05 level, effect size small ($h=0.14$)). Hence, students taking PISA were more likely to endorse individual strategies deemed effective for understanding and remembering in the Autumn than in the Spring.

Summarising

A composite index of summarising strategies was constructed by the OECD with a mean score of 0.0 and a standard deviation of 1. The mean score for both the Spring testing and Autumn testing was 0.10 and no statistically significant differences for key subgroups were identified (Appendix L, Table L27). Examining the individual strategies showed some slight variation between the student and school subgroups (Appendix L, Table L28). A higher percentage of students endorsed the strategy 'before writing the summary, I read the text as many times as

possible' (a strategy not viewed by the OECD as being effective for summarising) in the Spring testing among immigrant students who have another language (9.3 percent score difference, statistically significant at the .05 level, effect size small ($h=0.21$)) and students from mixed secondary schools (7.9 percent score difference, statistically significant at the .01, effect size small ($h=0.18$)). A higher percentage of students from DEIS schools endorsed 'I read through the text, underlining the most important sentences. Then I write them in my own words as a summary' in the Autumn than the Spring (statistically significantly different at the .05 level, effect size small ($h=0.14$)). Again, students were more likely to endorse specific strategies associated with effective summarisation in the Autumn, compared to the Spring.

Assessing credibility of sources

A new metacognition scenario was introduced in the PISA 2018 study which focused on an important process of online reading – checking the quality and the credibility of sources. Students were asked to evaluate the appropriateness of various strategies for assessing the credibility of an email using a 6-point scale ranging from 'not appropriate' to 'very appropriate'. A composite index of assessing credibility was constructed by the OECD with a mean score of 0.0 and a standard deviation of 1. The mean score for the Spring testing was 0.21 compared to 0.13 in Autumn testing, with a statistically significant difference at the .05 level, effect size small ($d=0.08$) (Table 5.23). This indicates that, students involved in Autumn testing had a lower awareness of the appropriate strategies to use when assessing the credibility of sources than students in the Spring testing, though the size of the difference was small (about 0.08 of a standard deviation). Students from the lowest ESCS quartile had a negative score on the index at Autumn testing (-0.12) compared to 0.06 at Spring testing (the difference statistically significant at the .01 level, effect size small ($d=.06$)). Immigrant students who spoke another language also had a negative score at Autumn testing (-0.12) compared to 0.07 at Spring testing, a difference that is statistically significant at the .05 level (effect size $d=0.05$).

Table 5.23: Mean scores on the index of ‘assessing credibility’ by key subgroups, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
All students	0.21	(0.01)	0.13	(0.03)	0.08*	(0.04)
Male	0.12	(0.02)	0.05	(0.05)	0.08	(0.06)
Female	0.29	(0.02)	0.21	(0.03)	0.08*	(0.04)
First / Second Year	-0.24	(0.09)	-0.27	(0.32)	0.03	(0.34)
Third Year	0.22	(0.02)	0.08	(0.06)	0.14*	(0.06)
Transition Year	0.27	(0.03)	0.22	(0.04)	0.05	(0.05)
Fifth/Sixth Year	0.02	(0.05)	-0.02	(0.04)	0.04	(0.06)
Lowest ESCS	0.06	(0.03)	-0.12	(0.04)	0.18	(0.05)
Low-Medium ESCS	0.14	(0.03)	0.09	(0.06)	0.04	(0.06)
Medium-High ESCS	0.24	(0.03)	0.26	(0.06)	-0.02	(0.06)
Highest ESCS	0.41	(0.03)	0.30	(0.06)	0.10	(0.06)
Native	0.25	(0.02)	0.18	(0.03)	0.07	(0.04)
Immigrant & Eng./Irish	0.06	(0.05)	0.00	(0.11)	0.06	(0.12)
Immigrant & other lang.	0.07	(0.05)	-0.12	(0.06)	0.19*	(0.08)
Girls’ secondary	0.39	(0.02)	0.25	(0.07)	0.14	(0.07)
Boys’ secondary	0.16	(0.04)	0.19	(0.08)	-0.03	(0.09)
Community/comprehensive	0.12	(0.03)	0.14	(0.11)	-0.02	(0.11)
Mixed secondary	0.31	(0.05)	0.04	(0.07)	0.27	(0.09)
ETB vocational	0.09	(0.03)	0.07	(0.06)	0.03	(0.06)
Non-DEIS	0.28	(0.02)	0.19	(0.04)	0.09*	(0.04)
DEIS	-0.03	(0.02)	-0.04	(0.05)	0.02	(0.06)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Examining the individual items within the index, two of the strategies were found to be more strongly endorsed as ‘very appropriate’⁶⁷ to a statistically significant extent in the Spring compared to the Autumn. The first one, to ‘answer the email and ask for more information about the smartphone’, was identified as not being useful by 31.8% of students in the Autumn compared to 34.7% in the Spring (statistically significant, .05 level, effect size $h=0.06$). The second one, to ‘delete the email without clicking on the link’ showed a 3.3 percentage score difference favouring Spring (30.4 % of students in the Autumn reported that this is a very appropriate strategy compared to 33.7% in the Spring, statistically significant at the .05 level, effect size small ($h=0.07$)) (Appendix L, Table L29). A higher percentage of students endorsed a less useful strategy ‘I click on the link to fill out the form as soon as possible’ as ‘very appropriate’ at Autumn testing compared to the Spring testing amongst five key subgroups (females, Transition Year students, lowest ESCS students, native students and students in girls secondary schools). In contrast, there was a higher percentage of students in four key subgroups

⁶⁷ ‘Very appropriate’ is defined here as 5/6 on the 6-point Likert-type scale, where 1 is not appropriate at all.

(lowest ESCS, immigrant with English/Irish, mixed secondary, non-DEIS) who endorsed a more useful strategy ‘I delete the email without clicking on the link’, at Spring testing compared to Autumn testing (all differences statistically significant at least at the .05 level).

5.3.4. Relationship between performance and engagement

Research has shown a relationship between student performance and engagement (Fredricks et al., 2004). At Spring testing, students who did not *skip a whole day* two weeks prior to the PISA testing scored significantly higher (at the .01 level) in reading, mathematics and science than students who *skipped 1 or 2 days* and those who *skipped 3 or more days* (Table 5.24). While this pattern was similar at Autumn testing for reading and science, the mean mathematics score for students who did not *skip a whole day* was only significantly different at the .05 level from students who *skipped 1 or more whole days*.

Table 5.24: Relationship between frequency of school attendance in the two weeks prior to PISA testing and overall mean score in reading, mathematics and science, Spring and Autumn

	Spring						Autumn					
	Reading		Maths		Science		Reading		Maths		Science	
	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)	Mean	(SE)
<i>Students who 'skip a whole day'</i>												
None (ref.)	530.4	(2.5)	509.8	(2.5)	507.7	(2.5)	527.0	(3.6)	505.5	(3.3)	505.0	(3.6)
1 or 2 days	513.0	(3.6)	492.4	(3.2)	490.5	(3.6)	508.5	(6.9)	489.2*	(6.4)	485.2	(6.2)
3 or more days	469.6	(6.0)	458.8	(5.1)	449.1	(5.9)	479.2	(13.0)	475.3*	(11.1)	470.4	(12.2)
<i>Students who 'skip class'</i>												
None (ref.)	527.0	(2.5)	505.7	(2.5)	504.9	(2.4)	526.2	(4.5)	503.9	(4.0)	503.4	(4.4)
1 or 2 days	513.6	(3.7)	496.1*	(3.6)	490.4	(3.8)	508.4	(5.5)	492.8	(5.3)	487.1*	(5.8)
3 or more days	506.2	(5.6)	492.0*	(5.3)	482.9	(5.2)	484.7	(10.3)	473.5	(9.1)	471.6	(8.5)
<i>Students who 'arrive late'</i>												
None (ref.)	534.5	(2.3)	512.0	(2.3)	511.4	(2.3)	527.4	(5.4)	506.5	(3.3)	505.7	(3.5)
1 or 2 days	507.2	(3.9)	489.9	(3.7)	486.2	(3.9)	512.4	(3.5)	493.9	(6.7)	490.6	(7.1)
3 or more days	482.5	(5.4)	472.2	(5.4)	459.9	(5.7)	480.1	(7.8)	465.0	(10.6)	460.1	(12.4)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

The relationship between frequency of *skip[ping] a class* in the two weeks prior to PISA testing and reading performance was the same for both Spring and Autumn testing for different levels of skipping classes. However, performance on mathematics in Spring testing was significantly higher (at the .05 level) for students who did not *skip a class* (505.7) compared with those who *skipped 1 or two days* (496.1) and *3 or more days* (492.0); at Autumn testing,

the math achievement of those who *did not skip a class* was only significantly different from those who *skipped class 3 or more days*.

Students at Spring testing who did not *arrive late* in the two weeks prior to PISA testing in the Spring scored significantly higher on all three domains compared to students who *arrived late 1 or 2 days* and those who *arrived late 3 or more days*. However, at Autumn testing, students who did not *arrive late* in the two weeks prior to PISA testing only scored significantly higher on all three domains than students who *arrived late 3 or more days*.

At both the Spring and Autumn testing there were weak⁶⁸ relationships between ‘sense of belonging’ and performance in reading, mathematics and science (Table 5.25). The relationship between ‘sense of belonging’ and mathematics performance was positive at Spring testing and negative at Autumn testing. The relationship between teacher support in English class and reading was also weak and not significant in both testing periods. There are moderate, but significant, relationships with reading performance and the indices understanding and remembering ($r=.27$) and summarising ($r=.38$) in Spring testing, with similar relationship at Autumn testing ($r=.29$ and $r=.38$, respectively). Assessing credibility is also positively related to performance in reading with significant correlations in the moderate-to-strong range for both the Spring testing ($r=.46$) and Autumn testing ($r=.45$).

Table 5.25: Correlations of emotional and cognitive engagement constructs with performance on PISA, Spring and Autumn testing.

	Spring				Autumn			
	r	SE	t	p*	r	SE	t	p*
<i>Sense of belonging with</i>								
Reading	-.01	0.01	1.0	ns	-.01	0.03	0.33	ns
Mathematics	.01	0.01	1.0	ns	-.01	0.03	0.33	ns
Science	-.02	0.01	2.0	.048	-.01	0.03	0.33	ns
<i>Perceived teacher support in English class with</i>								
Reading	.02	0.02	1.0	ns	.01	0.02	0.50	ns
<i>Reading performance with</i>								
Understanding and remembering	.27	(0.01)	27.0	<.001	.29	(0.02)	14.5	<.001
Summarising	.38	(0.01)	38.0	<.001	.38	(0.02)	19.0	<.001
Assessing credibility	.46	(0.01)	46.0	<.001	.45	(0.02)	22.5	<.001

Note. Significant correlations at .05 level are in bold.

*Calculating p value from t score, $df=80$, number of variance strata associated with balanced repeated replication (BRR) method of variance estimation.

⁶⁸ Correlation coefficients are interpreted in this study as follows: > .56=strong; .41 - .55=moderate-to- strong; .26 - .40=moderate; .11-.25=weak-to-moderate; <.10=weak.

5.3.5. Teachers' views on their students' engagement

As part of the questionnaire administered in Autumn testing schools, teachers were presented with a series of six questions on the engagement of their Third, Fourth and Fifth Year students. Based on their experience, they were to rate on a scale of 1-4 whether they '*strongly agree*' (a code 1) to '*strongly disagree*' (a code 4) (or a code 5 for '*don't know*') with six statements related to the engagement of their students with reference to the subject they mainly taught (e.g. English, mathematics or science). In relation to statements about 'behavioural engagement' ('My students tend to skip classes more in the Autumn than the Spring' and 'My students tend to arrive late to class more in the Autumn than the Spring'), a large percentage of teachers reported that they 'didn't know'. (Table 5.26). This pattern was similar for all teachers in respect of their Third Year, Transition Year and Fifth Year students, with percentages ranging from 18.1% to 21.8%.

Table 5.26: Teachers who *agreed/disagreed* on six statements related to the engagement of their students (percentages)

	Third Year (n~266-270):			Transition Year (n~190-195):			Fifth Year (n~266-270):		
	S. Agree/ Agree	S. Disagree/ Disagree	Don't know	S. Agree/ Agree	S. Disagree/ Disagree	Don't know	S. Agree/ Agree	S. Disagree/ Disagree	Don't know
1. My students tend to skip classes more in the Autumn than the Spring	14.5	65.5	20.1	12.6	66.1	21.3	14.2	67.6	18.1
2. My students are more engaged with learning in the Autumn than the Spring	27.9	64.6	7.5	42.0	47.7	10.3	37.8	56.0	6.2
3. My students seem to be less enthusiastic about learning in the Autumn than the Spring	24.4	66.2	9.4	16.1	71.6	12.3	19.1	73.0	7.9
4. My students tend to arrive late to class more in the Autumn than the Spring	11.5	69.1	19.3	7.1	71.1	21.8	9.3	70.8	19.8
5. My students are more likely to complete their homework in the Autumn than the Spring	30.1	61.6	8.3	37.1	52.5	10.3	34.2	58.3	7.6
6. My students seem to engage better with study in the Autumn, compared with the Spring	18.9	69.7	11.5	28.1	57.3	14.6	26.9	60.4	12.8

Note. For items 2, 5 and 6, if teachers report 'agree' then they perceive their students to be more engaged in the Autumn. For items 1, 3 and 4, if teachers report 'agree', then they perceive their students to be more engaged in the Spring.

There was a higher percentage of teachers of Transition Year students (42.0%) reporting that their students were more engaged with learning in the Autumn than the Spring compared to teachers of Fifth Years (37.8%) and Third Years (27.9%). Similarly, slightly more teachers of Transition Years reported that their students seem to engage better with study (28.1%) and complete their homework (37.1%) in the Autumn compared with the Spring, compared to teachers of Fifth Years (26.9% and 34.2%, respectively) and Third Years (18.9% and 30.1%, respectively). The subscale, ‘engagement is better in the Autumn’ created from these three items⁶⁹ has a mean score of 54.7 for teachers of Transition Year students compared to 61.4 for teachers of Third Years and 57.6 for those teaching Fifth Years (Table 5.27). A lower mean score on the subscale indicates a perception by teachers of greater engagement of their students in the Autumn. Similarly, a lower mean score on the subscale ‘engagement is better in the Spring’ indicates a perception by teachers of greater engagement of their students in the Spring. Comparing the two subscales, teachers perceive their students in Third Year, TY and Fifth Year to be more engaged in the Autumn than the Spring (Table 5.26).

Table 5.27: Teachers' perception of their students in Third Year, Fourth Year/TY and Fifth Year, engagement is better in the Spring and engagement is better in the Autumn

	Engagement is better in the Spring				Engagement is better in the Autumn			
	N	Mean	SD	(SE)	N	Mean	SD	(SE)
Third Year	271	66.8	19.7	(1.2)	271	61.4	21.2	(1.3)
Fourth Year/TY	196	68.6	18.3	(1.3)	195	54.7	22.1	(1.6)
Fifth Year	290	69.1	19.3	(1.1)	290	57.6	23.7	(1.4)

Note. A lower mean score indicates higher perceived engagement.

5.4. Motivation

Research question 5 is examined in this section: **RQ5: Do 15-year-olds' level of motivation differ between the Spring and Autumn terms?** In PISA 2018, data were collected on a number of measures of student motivation: students' perception of their ability, intrinsic motivation, motivation to master tasks and general fear of failure. These will be examined when comparing levels of motivations between the Spring and Autumn PISA testing.

5.4.1. Students' perception of their ability

This section considers three constructs associated with self-efficacy or competence measured in the PISA 2018 assessment: general self-efficacy, perceived competence in reading, and

⁶⁹ See section 3.6 for details on the two subscales created on teachers' perception of their students' engagement.

perceived difficulty in reading. Students' perceptions of their ability encompasses general self-efficacy, perceived competence in reading, and perceived difficulty in reading. There was no difference in students' perception of their ability across the three indicators measured in the Spring compared to the Autumn (Table 5.28).

Table 5.28: Mean scores on three indicators of students' perception of their ability, Spring and Autumn testing

<i>Mean score for all students on the index of...</i>	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
General self-efficacy	-0.04	(0.01)	-0.03	(0.02)	-0.01	(0.03)
Perceived competence in reading	0.12	(0.01)	0.07	(0.04)	0.05	(0.04)
Perceived difficulty in reading	0.00	(0.01)	0.04	(0.03)	-0.03	(0.04)

General self-efficacy

In both the Spring and Autumn testing, the mean index score for general self-efficacy (sometimes referred to as resilience) in Ireland at Spring and Autumn testing was slightly below the average across OECD countries (-0.04, and -0.03, respectively) and there was no statistical significant difference between the scores (Table 5.28, Table 5.29). Positive values on this index mean that the student reported higher self-efficacy than the average student in OECD countries. Students from the low-medium ESCS quartile had a higher score on the general index of self-efficacy (-0.05) at Spring testing compared to Autumn testing (-0.17), a score difference of 0.12 which is statistically significant at the .05 level (effect size $d=0.13$). No other student group examined had a statistical significant difference on the index of general self-efficacy between the Spring and Autumn testing.

Table 5.29: Mean scores on the index of ‘general self-efficacy’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
All students	-0.04	(0.01)	-0.03	(0.02)	-0.01	(0.03)
Male	0.03	(0.02)	0.04	(0.03)	-0.01	(0.04)
Female	-0.11	(0.01)	-0.10	(0.03)	-0.01	(0.03)
First / Second Year	0.05	(0.09)	-0.31	(0.26)	0.36	(0.28)
Third Year	-0.05	(0.02)	-0.07	(0.05)	0.02	(0.05)
Transition Year	-0.03	(0.02)	-0.02	(0.03)	-0.01	(0.04)
Fifth/Sixth Year	-0.07	(0.04)	-0.02	(0.05)	-0.05	(0.07)
Lowest ESCS	-0.16	(0.02)	-0.12	(0.04)	-0.04	(0.05)
Low-Medium ESCS	-0.05	(0.02)	-0.17	(0.03)	0.12	(0.04)
Medium-High ESCS	-0.02	(0.02)	0.06	(0.04)	-0.07	(0.05)
Highest ESCS	0.05	(0.02)	0.10	(0.06)	-0.05	(0.06)
Native	-0.06	(0.01)	-0.04	(0.03)	-0.03	(0.03)
Immigrant & Eng./Irish	0.06	(0.04)	0.00	(0.06)	0.06	(0.07)
Immigrant & other lang.	0.03	(0.04)	-0.02	(0.05)	0.04	(0.07)
Girls’ secondary	-0.08	(0.02)	-0.08	(0.04)	-0.01	(0.04)
Boys’ secondary	0.02	(0.04)	0.06	(0.04)	-0.05	(0.06)
Community/comprehensive	-0.03	(0.03)	-0.05	(0.05)	0.02	(0.06)
Mixed secondary	0.01	(0.02)	-0.02	(0.05)	0.03	(0.06)
ETB vocational	-0.09	(0.02)	-0.06	(0.07)	-0.03	(0.07)
Non-DEIS	-0.04	0.01	-0.02	0.03	-0.02	(0.03)
DEIS	-0.05	0.03	-0.07	0.05	0.02	(0.06)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Examining the individual items within the index, only one had a statistically significant difference (at .05 level) on the percentage of students agreeing or disagreeing between the Spring and Autumn, with 93.7% of students in the Spring *agreed/strongly agreed* that they can usually manage one way or another compared to 92.3% in the Spring (Appendix L, Table L30). At Spring testing, a statistically significantly higher percentage of native students and students in DEIS schools (93.8% and 93.7%, respectively) *agreed/strongly agreed* that they ‘usually manage one way or another’ compared to the Autumn (92.2% and 90.7%, respectively). The corresponding effect sizes for all these differences are small ($h < 0.2$).

Domain specific self-efficacy

PISA 2018 examines students’ perceived competence in reading, which involves how well they believe they are able to understand and comprehend texts. In both the Spring and Autumn testing, the mean index score for perceived competence in reading was 0.12 and 0.07, respectively, with no statistical significant difference between the scores (Table 5.30).

Table 5.30: Mean scores on the index of ‘perceived competence in reading’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
All students	0.12	(0.01)	0.07	(0.04)	0.05	(0.04)
Male	0.11	(0.02)	0.06	(0.04)	0.05	(0.04)
Female	0.13	(0.02)	0.08	(0.05)	0.05	(0.06)
First / Second Year	-0.15	(0.08)	-0.57	(0.26)	0.42	(0.27)
Third Year	0.14	(0.02)	0.00	(0.06)	0.14*	(0.06)
Transition Year	0.13	(0.03)	0.14	(0.04)	-0.01	(0.05)
Fifth/Sixth Year	0.06	(0.06)	0.02	(0.07)	0.04	(0.09)
Lowest ESCS	-0.15	(0.03)	-0.26	(0.07)	0.11	(0.07)
Low-Medium ESCS	0.04	(0.02)	-0.04	(0.06)	0.08	(0.06)
Medium-High ESCS	0.17	(0.03)	0.26	(0.05)	-0.09	(0.06)
Highest ESCS	0.43	(0.03)	0.32	(0.05)	0.11*	(0.06)
Native	0.11	(0.02)	0.05	(0.03)	0.06	(0.04)
Immigrant & Eng./Irish	0.34	(0.05)	0.28	(0.09)	0.07	(0.10)
Immigrant & other lang.	0.05	(0.04)	0.07	(0.12)	-0.03	(0.12)
Girls’ secondary	0.18	(0.03)	0.07	(0.11)	0.11	(0.11)
Boys’ secondary	0.15	(0.04)	0.05	(0.07)	0.09	(0.08)
Community/comprehensive	0.06	(0.04)	0.17	(0.05)	-0.10	(0.07)
Mixed secondary	0.24	(0.04)	0.04	(0.09)	0.20*	(0.10)
ETB vocational	0.03	(0.03)	0.05	(0.07)	-0.02	(0.07)
Non-DEIS	0.17	(0.02)	0.10	(0.04)	0.07	(0.04)
DEIS	-0.03	(0.03)	-0.01	(0.08)	-0.03	(0.09)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Third Year students had a mean index score in the Autumn of 0.00 compared to 0.14 in the Spring, indicating a greater sense of perceived competence in the Spring compared to the Autumn (statistically significant at the .05 level). Similarly, students from the highest ESCS quartile and students from mixed secondary schools had a higher score in the Spring compared to the Autumn (score differences of 0.11 and 0.20 respectively, statistically significant at the .05 level). Analysis of perceived competence in reading by student background variables indicated no statistical significant differences at the .01 level; however, students in mixed secondary schools showed a statistically significant difference at the .05 level between the two testing periods in their competence to read fluently (79.2% in the Spring compared to 69.5% in the Autumn) (Appendix L, L31). The corresponding effect sizes for these differences are small, ranging from $d=0.11$ to $d=0.19$.

PISA 2018 also examines students’ perceived difficulty in reading. In both the Spring and Autumn testing, the mean index scores for perceived difficulty in reading were 0.00 and

0.04, respectively, with no statistical significant difference between the scores.⁷⁰ Consequently, there was only one of the key subgroups where there was a statistical significant difference between the two testing periods. Students in the medium-high ESCS quartile had a mean score of -0.01 in the Spring and -0.14 in the Autumn, indicating their perceived difficulty in reading is greater in the Spring than the Autumn, with a corresponding effect size less than $d=0.2$ (Appendix L, Table L32). There was no difference on the percentages of students agreeing or disagreeing on the three items related to students' perceived difficulty in reading between the Spring and Autumn testing, with no statistically significant differences in the proportions for the majority of student groups (Appendix L, Table L33).

5.4.2. Intrinsic motivation – domain specific

The construct used to examine intrinsic motivation in PISA 2018 is domain specific, the enjoyment of reading. The mean scores on the index for enjoyment of reading⁷¹ in Spring and Autumn were -0.07 and -0.13, respectively, with no statistical significant difference between the scores (Table 5.31). Female students had a mean index score in the Spring of 0.19 compared to 0.07 in the Autumn, indicating a greater enjoyment of reading in the Spring compared to the Autumn (statistically significant at the .05 level). A similar pattern is observed for students from the highest ESCS quartile, and students in girls' secondary and mixed schools. Immigrant students with English/Irish and students from non-DEIS schools had a statistically significantly higher mean score in the Spring compared to the Autumn (score differences of 0.24 and 0.11 respectively, statistically significant at the .01 level). The corresponding effect sizes for these mean differences are small, ranging from $d=0.09$ to $d=0.15$).

⁷⁰ Positive values on the index indicate greater perception of difficulty than the average student across OECD countries.

⁷¹ Positive values on this scale mean that the student enjoyed reading to a greater extent than the average student across OECD countries.

Table 5.31: Mean scores on the index of ‘enjoyment of reading’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
All students	-0.07	(0.02)	-0.13	(0.03)	0.06	(0.04)
Male	-0.34	(0.02)	-0.33	(0.04)	0.00	(0.04)
Female	0.19	(0.02)	0.07	(0.05)	0.12*	(0.05)
First / Second Year	-0.15	(0.10)	-0.28	(0.31)	0.13	(0.32)
Third Year	-0.07	(0.02)	-0.13	(0.04)	0.06	(0.05)
Transition Year	-0.06	(0.03)	-0.09	(0.05)	0.03	(0.06)
Fifth/Sixth Year	-0.12	(0.06)	-0.26	(0.07)	0.14	(0.09)
Lowest ESCS	-0.33	(0.04)	-0.37	(0.06)	0.04	(0.07)
Low-Medium ESCS	-0.16	(0.03)	-0.19	(0.04)	0.03	(0.05)
Medium-High ESCS	-0.07	(0.03)	-0.08	(0.05)	0.01	(0.06)
Highest ESCS	0.28	(0.03)	0.12	(0.06)	0.16*	(0.06)
Native	-0.11	(0.02)	-0.16	(0.04)	0.04	(0.04)
Immigrant & Eng./Irish	0.17	(0.06)	-0.07	(0.07)	0.24	(0.09)
Immigrant & other lang.	0.11	(0.05)	0.07	(0.08)	0.04	(0.10)
Girls’ secondary	0.25	(0.04)	0.03	(0.08)	0.22*	(0.09)
Boys’ secondary	-0.32	(0.04)	-0.30	(0.05)	-0.02	(0.07)
Community/comprehensive	-0.17	(0.05)	-0.05	(0.05)	-0.11	(0.07)
Mixed secondary	0.06	(0.06)	-0.19	(0.09)	0.24*	(0.11)
ETB vocational	-0.20	(0.03)	-0.17	(0.07)	-0.04	(0.08)
Non-DEIS	0.00	(0.02)	-0.11	(0.04)	0.11	(0.04)
DEIS	-0.31	(0.03)	-0.20	(0.08)	-0.11	(0.08)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Examining the individual items within the index, similar student subgroups reported being more intrinsically motivated in the Spring compared to the Autumn, in line with small differences on the index of enjoyment of reading (Appendix L, L34). In addition, a higher percentage of Third Years *agreed/strongly agreed* that they ‘read only to get information that they need’ in the Autumn compared to the Spring, indicating that they are more intrinsically motivated in the Spring compared to the Autumn.

5.4.3. Reason for doing the task/action

PISA 2018 defines a positive attitude towards competition as ‘the dispositional desire to outperform others’, while the motivation to master tasks is defined as ‘the dispositional desire to work hard to achieve a goal’ (OECD, 2019c, p.163).

Motivation to master tasks

At both the Spring and Autumn testing, the mean index scores in Ireland on the motivation to master task⁷² were -0.09 and -0.11 respectively, with no statistically significant difference between the scores (Table 5.32). First/Second Year and Third Year students, students from the low-medium ESCS quartile and immigrant students who spoke another language all had a higher score on the motivation to master task index in the Spring compared to the Autumn (differences statistically significant at the .05 level, with corresponding effect size, $d < 0.2$).

Table 5.32: Mean scores on the index of ‘motivation to master tasks’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring-Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
All Students	-0.09	0.01	-0.11	0.03	0.02	(0.03)
Male	-0.14	0.02	-0.17	0.04	0.03	(0.04)
Female	-0.04	0.02	-0.05	0.04	0.02	(0.04)
First / Second Year	-0.09	0.09	-0.45	0.16	0.36*	(0.18)
Third Year	-0.09	0.02	-0.20	0.06	0.11*	(0.06)
Transition Year	-0.04	0.03	-0.06	0.04	0.02	(0.05)
Fifth/Sixth Year	-0.23	0.04	-0.12	0.07	-0.12	(0.08)
Lowest ESCS	-0.23	0.03	-0.26	0.05	0.02	(0.06)
Low-Medium ESCS	-0.08	0.03	-0.16	0.04	0.09*	(0.04)
Medium-High ESCS	-0.07	0.02	-0.11	0.05	0.04	(0.05)
Highest ESCS	0.03	0.03	0.09	0.07	-0.06	(0.07)
Native	-0.10	0.01	-0.11	0.03	0.01	(0.03)
Immigrant & Eng./Irish	-0.04	0.04	0.01	0.09	-0.04	(0.10)
Immigrant & other lang.	-0.01	0.04	-0.18	0.06	0.17*	(0.08)
Girls’ secondary	-0.02	0.03	-0.06	0.08	0.04	(0.08)
Boys’ secondary	-0.13	0.04	-0.11	0.04	-0.02	(0.06)
Community/comprehensive	-0.11	0.02	-0.15	0.07	0.04	(0.07)
Mixed secondary	-0.04	0.03	-0.04	0.08	0.00	(0.08)
ETB vocational	-0.14	0.02	-0.17	0.05	0.03	(0.06)
Non-DEIS	-0.06	0.01	-0.11	0.03	0.05	(0.04)
DEIS	-0.17	0.03	-0.11	0.05	-0.06	(0.06)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Examining the items within the index⁷³ a higher percentage of male students in Spring *agreed/strongly agreed* that they find satisfaction in working as hard as they can compared to the Autumn (3.5% score difference). Correspondingly, in the Spring, a higher percentage of Third Year students *agreed/strongly agreed* that part of the enjoyment they get from doing

⁷² Positive values on this scale mean that students expressed greater motivation to master tasks than the average student across OECD countries.

⁷³ The item ‘If I am not good at something, I would rather keep struggling to master it than move on to something I may be good at’ was not included in the index.

things is when they improve on past performance compared to Third Year students tested in the Autumn (Appendix L, L35).

Attitudes towards competition

At both Spring and Autumn testing, the mean index score on the attitudes towards competition⁷⁴ for students in Ireland was 0.16, indicating no difference (Appendix L, Table L36). Similarly, there was no statistically significant differences for any of the key subgroups on the index of attitudes towards competition.

Examining the individual items within the index, there was a score difference of 9.5% between the Spring and the Autumn among immigrant students with English/Irish on the statement ‘I try harder when I’m in competition with other people’ in favour of the Spring testing group. The percentage of students in girls’ secondary schools *agreeing/strongly agreeing* that it is important for them to perform better than other people on a task was higher in the Spring than the Autumn (Appendix L, L37).

5.4.4. General Fear of Failure

The fear of failing may incite a person to avoid taking/doing a task or taking on a challenging situation (OECD, 2019c), thereby regulating their actions, an indicator of self-regulation. The mean index scores for ‘fear of failure’⁷⁵ in Spring and Autumn testing was 0.21 and 0.20, respectively, with no statistically significant difference between the scores (Table 5.33). Third Year students were the only key subgroup examined that had a statistically significantly higher mean index score in the Spring (0.20) compared to the Autumn (0.05), indicating a greater ‘fear of failure’ in the Spring (statistically significant at .01 level, effect size $d=0.15$). On the individual item within the index, ‘when I am failing, I am afraid that I might not have enough talent’, 62.5% of Third Year students reported that they *agreed/strongly agreed* with the statement compared to 57.2% in the Autumn (Appendix L, Table L38).

⁷⁴ Positive values in the index indicate more favourable attitudes towards competition than did the average student across OECD countries.

⁷⁵ Positive values in this index mean that the student expressed a greater fear of failure than did the average student across OECD countries.

Table 5.33: Mean scores on the index of ‘general fear of failure’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring-Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
All Students	0.21	0.01	0.20	0.03	0.01	(0.03)
Male	-0.04	0.02	-0.05	0.04	0.00	(0.04)
Female	0.45	0.02	0.44	0.04	0.01	(0.05)
First / Second Year	0.07	0.10	0.24	0.34	-0.17	(0.36)
Third Year	0.20	0.01	0.05	0.05	0.15	(0.05)
Transition Year	0.26	0.03	0.31	0.04	-0.05	(0.05)
Fifth/Sixth Year	0.14	0.04	0.12	0.07	0.02	(0.08)
Lowest ESCS	0.13	0.03	0.15	0.05	-0.02	(0.06)
Low-Medium ESCS	0.22	0.03	0.21	0.05	0.02	(0.06)
Medium-High ESCS	0.20	0.02	0.19	0.05	0.01	(0.05)
Highest ESCS	0.27	0.03	0.28	0.06	-0.01	(0.07)
Native	0.21	0.01	0.21	0.03	0.01	(0.04)
Immigrant & Eng./Irish	0.22	0.04	0.16	0.08	0.06	(0.09)
Immigrant & other lang.	0.12	0.05	0.20	0.08	-0.08	(0.10)
Girls’ secondary	0.48	0.03	0.41	0.08	0.08	(0.09)
Boys’ secondary	0.03	0.03	-0.11	0.09	0.14	(0.10)
Community/comprehensive	0.17	0.02	0.20	0.07	-0.03	(0.07)
Mixed secondary	0.17	0.04	0.26	0.06	-0.09	(0.08)
ETB vocational	0.14	0.02	0.19	0.05	-0.05	(0.06)
Non-DEIS	0.24	0.02	0.21	0.04	0.04	(0.04)
DEIS	0.09	0.03	0.19	0.08	-0.09	(0.08)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

5.4.5. Motivation and performance on PISA

General self-efficacy has a weak positive, but significant, relationship to achievement in reading, mathematics and science at the Spring testing compared to a weak and not significant relationship to achievement in reading and mathematics at the Autumn testing (Table 5.34). Perceived confidence in reading has a moderate to strong and significant relationship with achievement in reading at both the Spring ($r=0.49$) and Autumn testing ($r=0.49$). Perceived difficulty in reading has a moderate negative and significant relationship with achievement in reading at both the Spring ($r=-0.39$) and Autumn testing ($r=-0.32$).

Table 5.34: Correlations of motivational constructs (indices) with performance on PISA, Spring and Autumn testing

	Spring				Autumn			
	r	SE	t	p*	r	SE	t	p*
<i>General self-efficacy with...</i>								
Reading	0.05	0.02	2.5	.014	0.04	0.03	1.3	ns
Mathematics	0.08	0.02	4.0	<.001	0.05	0.03	1.7	ns
Science	0.07	0.02	3.5	<.001	0.08	0.03	2.7	.008
<i>Perceived confidence in reading with...</i>								
Reading	0.49	0.01	49.0	<.001	0.46	0.02	23.0	<.001
<i>Perceived difficulty in reading with...</i>								
Reading	-0.39	0.01	-39.0	<.001	-0.32	0.02	-16.0	<.001
<i>Enjoyment of reading with...</i>								
Reading	0.44	0.01	44.0	<.001	0.39	0.02	19.5	<.001
<i>Attitudes towards competition with...</i>								
Reading	0.08	0.01	8.0	<.001	0.06	0.02	3.0	.003
Mathematics	0.15	0.02	7.5	<.001	0.09	0.02	4.5	<.001
Science	0.11	0.02	5.5	<.001	0.12	0.02	6.0	<.001
<i>Motivation to master tasks with...</i>								
Reading	0.11	0.01	11.0	<.001	0.10	0.03	3.3	<.001
Mathematics	0.12	0.02	6.0	<.001	0.12	0.03	4.0	<.001
Science	0.10	0.02	5.0	<.001	0.13	0.03	4.3	<.001
<i>General fear of failure with...</i>								
Reading	0.11	0.01	11.0	<.001	0.15	0.03	5.0	<.001
Mathematics	0.03	0.02	1.5	ns	0.08	0.03	2.7	.008
Science	0.05	0.01	5.0	<.001	0.11	0.03	3.7	<.001

Note. Significant correlations at .05 level are in bold.

*Calculating p value from t score, $DF=80$, number of variance strata associated with balanced repeated replication (BRR) method of variance estimation.

Correlations of ‘attitudes towards competition’ and ‘motivation to master tasks’ with achievement in reading, mathematics and science range are weak or weak to moderate but significant at both the Spring and Autumn testing. General fear of failure has a weak relationship with achievement in mathematics; however, the relationship is significant at Autumn testing compared to the Spring testing.

5.4.6. Teachers’ perceptions of their students’ motivation

Teachers were asked if they *agreed/disagreed* on whether their students are more motivated to achieve in the Autumn than the Spring. Just under one in five teachers (approximately 18%) reported that they *didn't know*, with similar percentages across all three subject teacher groups (Table 5.34). However, a substantial percentage of the teachers *strongly disagreed/disagreed* that their students were more motivated to achieve in the Autumn than the Spring (percentages range 60.2% to 64.3% across the three subject teacher groups). When asked to compare their Third Year students with their Fifth Year students in Autumn, nearly half of the teachers

strongly disagreed/disagreed that their students in Third Year were more focused on their schoolwork than their Fifth Year students. However, when asked to compare their Third Year students in Autumn with their Transition Year students, over eight in ten teachers *strongly agreed/agreed* that their Third Year students were more focused on their schoolwork than their Transition Year students.

Table 5.35: Teachers' agreement/disagreement on various statements of motivation by subject questionnaire was answered in relation to (percentages)

	English (n~133-135)			Mathematics (n~141-143)			Science (n~130-133)		
	S. Agree/ Agree	S. Disagree/ Disagree	Don't know	S. Agree/ Agree	S. Disagree/ Disagree	Don't know	S. Agree/ Agree	S. Disagree/ Disagree	Don't know
In the Autumn, my students in Third Year are more focused on their schoolwork than Transition Year students	84.7	6.9	8.4	88.4	7.5	4.1	87.5	3.9	8.6
In the Autumn, my students in Third Year are more focused on their schoolwork than Fifth Year students	40.5	53.8	5.7	47.4	45.9	6.7	34.3	56.0	9.7
Focusing on achieving Learning Outcomes enhances the performance of my students on assessments such as PISA	69.0	3.5	27.4	62.1	4.2	33.7	71.3	3.8	24.9
Studying for state examinations enhances the performance of my students on assessments such as PISA	68.5	2.6	29.0	70.2	11.7	18.1	66.0	4.7	29.4
Motivation to achieve depends on the test my students are doing (e.g. PISA test, class test, State Exam)	87.8	7.5	4.7	80.9	14.9	4.2	77.5	18.1	4.5
Motivation to achieve depends on the year my student are in	81.6	17.8	0.7	80.1	15.4	4.5	78.7	20.5	0.7
My students are more motivated to achieve in the Autumn than the Spring	22.7	60.2	17.1	17.5	64.3	18.1	17.7	62.1	20.2
My students are more motivated to perform well on state examinations than on tests that have lower stakes for them (e.g. PISA)	90.0	8.6	1.4	87.5	7.7	4.9	87.1	9.7	3.3

As a large proportion of PISA-eligible students in the Spring testing are in Third year, preparing for their Junior Cycle, teachers were asked if their students are more motivated to perform well on state examinations than on tests that have lower stakes for them (e.g. PISA). A very high percentage of teachers *strongly agreed/agreed* that this was the situation. This was also confirmed with the high percentage of teachers who *strongly agreed/agreed* on the statement that motivation to achieve depends on the test their students are doing (e.g. PISA test, class test, State Exam).

Finally, while the PISA assessment is not curriculum based, the 'learning outcomes' in the Junior Cycle have been compared to the many dimensions of PISA. Teachers were asked if focusing on achieving 'learning outcomes' enhances the performance of their students on assessments such as PISA and (a similar question) if studying for state examinations enhances the performance of their students on assessments such as PISA. A substantial percentage of teachers (across the three subject groups, percentages ranged 18.1% to 33.7%) reported that they *didn't know* to both of these statements. This may be a reflection of the unfamiliarity teachers have with the PISA assessment, as noted earlier.

5.5. Other School Outcomes

The final two research questions of this study will be examined in this section: **RQ6: Do 15-year-olds' sense of well-being differ between the Spring and Autumn terms? RQ7: Is there a difference in the school learning environment (school climate) between the Spring and Autumn terms?**

5.5.1. Wellbeing

PISA 2018 included three indicators of students' wellbeing, that of 'life satisfaction', eudemonia (a sense of meaning and purpose in life) and subjective wellbeing: positive emotions. Table 5.36 shows that, of the three indicators, only the affective element of the subjective wellbeing (positive feelings) saw a statistically significant (albeit very small effect size, $d=0.07$) increase (at the .05 level) from Spring testing (-0.09) to the Autumn testing (-0.16) to the Spring testing. This indicates that students in the Spring reported slightly more positive feelings than students in the Autumn.

Table 5.36: Mean scores on three measures of wellbeing: ‘life satisfaction’, ‘assessed eudemonia’ and ‘subjective wellbeing: positive affect’, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
<i>Mean score for all students</i>						
Life satisfaction	6.74	(0.05)	6.69	(0.08)	0.04	(0.09)
Eudemonia: meaning in life	-0.18	(0.01)	-0.22	(0.03)	0.04	(0.03)
Subjective wellbeing: positive affect	-0.09	(0.01)	-0.16	(0.03)	0.07*	(0.03)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Female students had a mean index score for ‘positive feelings’ in the Autumn of -0.16 compared to -0.09 in Spring, indicating somewhat more ‘positive feelings’ reported by females in the Spring testing compared to the Autumn testing (statistically significant at the .05 level) (Table 5.37). Similarly, students from the low-medium ESCS quartile, immigrant students with another language, students from community/ comprehensive schools, ETB vocational schools and students from DEIS schools all reported a statistically significant higher score on the index of ‘positive feelings’ in the Spring compared to those tested in the Autumn. The corresponding effect size for these differences were small, $d < 0.2$.

The extent to which students expressed positive feelings was more distinct for some feelings more than others. Of the three emotions included in the positive feelings, ‘happy feelings’ varied more between Spring and Autumn testing (Appendix L, L39). In the Autumn 41.2% of students reported that they were *always happy* compared to 45.3% in the Spring. There was only a slight difference between Spring and Autumn on student reports of being *always joyful* and a 3.3% difference on student reports of being *always cheerful*. Across the various student subgroups examined, females, Transition Year students, students in the highest ESCS quartile and native students all reported higher percentages of being *always happy* in the Spring compared to the Autumn.

Table 5.37: Mean scores on the index of ‘positive feelings’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
All students	-0.09	(0.01)	-0.16	(0.03)	0.07*	(0.03)
Male	-0.09	0.02	-0.15	0.04	0.06	(0.04)
Female	-0.09	0.02	-0.17	0.04	0.09*	(0.05)
First / Second Year	0.00	0.08	0.01	0.26	-0.01	(0.28)
Third Year	-0.10	0.02	-0.18	0.05	0.08	(0.05)
Transition Year	-0.07	0.03	-0.13	0.04	0.05	(0.05)
Fifth/Sixth Year	-0.13	0.04	-0.23	0.06	0.10	(0.08)
Lowest ESCS	-0.14	0.03	-0.19	0.05	0.05	(0.06)
Low-Medium ESCS	-0.09	0.02	-0.21	0.05	0.13*	(0.05)
Medium-High ESCS	-0.10	0.03	-0.11	0.06	0.01	(0.06)
Highest ESCS	-0.03	0.03	-0.13	0.06	0.10	(0.06)
Native	-0.09	0.02	-0.13	0.03	0.04	(0.03)
Immigrant & Eng./Irish	-0.09	0.05	-0.21	0.05	0.12	(0.07)
Immigrant & other lang.	-0.11	0.06	-0.31	0.08	0.20*	(0.10)
Girls’ secondary	-0.09	0.03	-0.14	0.08	0.05	(0.09)
Boys’ secondary	-0.11	0.03	-0.04	0.04	-0.07	(0.05)
Community/ comprehensive	-0.07	0.04	-0.22	0.04	0.15	(0.05)
Mixed secondary	-0.11	0.04	-0.14	0.05	0.04	(0.07)
ETB vocational	-0.08	0.03	-0.21	0.06	0.14*	(0.07)
Non-DEIS	-0.09	0.02	-0.14	0.03	0.05	(0.04)
DEIS	-0.09	0.03	-0.23	0.05	0.13*	(0.06)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

5.5.2. General learning environment

This section covers the general learning environment as opposed to the learning environment in English class, which was covered in Section 5.2.2. Included in the general learning environment will be an examination of students’ attitude towards school/learning activities and their perception of competitiveness and cooperation at school. Also included are students’ reports of bullying (seen as a hidden activity and thereby considered a hidden indicator of school climate). Table 5.38 shows that, of the four indicators examined that are related to the general learning environment, only the ‘attitude toward school/learning activities’ saw a statistically significant difference (at the .01 level) between Spring (0.12) and Autumn (0.00), effect size was small, $d=0.12$. This indicates that students had a more positive ‘attitude toward school/learning activities’ in the Spring compared to Autumn. Males and students from the highest ESCS quartile had statistically significantly higher mean scores (at the .01 level) on

this index in the Spring compared to the Autumn (mean difference .013 and 0.16, respectively). The corresponding effect size for these differences were small, $d < 0.2$. Appendix L, Table L40).

Table 5.38: Mean score on four indices measured in PISA related to the general learning environment, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean DIFF	(SE DIFF)
Attitude towards school/learning activities	0.12	(0.02)	0.00	(0.03)	0.11	(0.03)
Perception of competitiveness at school	0.20	(0.02)	0.23	(0.03)	-0.03	(0.04)
Perception of cooperation at school	-0.17	(0.02)	-0.16	(0.03)	-0.01	(0.03)
Student's experience of being bullied	0.13	(0.02)	0.13	(0.03)	0.00	(0.03)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

The index of 'attitude towards school/learning activities' included three items, namely 'trying hard at school will help me get a good job', 'trying hard at school will help me get into a good college' and 'trying hard at school is important'. A higher percentage of students *strongly agreed/agreed* that 'trying hard at school will help me get a good job' in the Spring (89.0%) compared to the Autumn (85.2%), as can be seen in Table 5.39. This was also the case for the item 'trying hard at school is important' (89.9% and 86.8%, respectively). The percentage of males *strongly agreeing/agreeing* on the item 'trying hard at school is important', was higher in the Spring (87.4%) compared to the Autumn (83.1%). A higher percentage of Fifth Year students (88.3%) in the Spring *strongly agreed/agreed* that 'trying hard at school is important' compared to the Fifth Year students in the Autumn (82.8%). There was differences in attitude between Spring and Autumn across all three items for students in the highest ESCS quartile and immigrant students with another language. The corresponding effect sizes for these differences were small to moderate, $h < 0.29$ for all differences.

Table 5.39: Percentage differences between Spring and Autumn about statements on their attitude toward school/learning activities index by background variables

<i>Strongly Agree/Agree</i>	Spring - Autumn					
	Trying hard at school will help me get a good job		Trying hard at school will help me get into a good college		Trying hard at school is important	
	% Diff	SE Diff	% Diff	SE Diff	% Diff	SE Diff
All students	3.8	(1.2)	0.7	(0.8)	3.1	(0.9)
Male	4.3	(1.6)	0.6	(1.0)	4.3	(1.1)
Female	3.2*	(1.4)	0.8	(0.9)	1.9	(1.3)
First / Second Year	9.7	(11.6)	10.4	(12.8)	10.9	(15.0)
Third Year	3.6*	(1.8)	-0.1	(1.1)	2.3	(1.5)
Transition Year	2.1	(1.7)	1.1	(1.2)	1.9	(1.6)
Fifth/Sixth Year	5.9	(3.2)	0.5	(1.9)	5.5*	(2.5)
Lowest ESCS	3.0	(1.8)	0.8	(1.5)	5.0*	(2.3)
Low-Medium ESCS	4.7	(2.5)	-0.1	(1.5)	1.2	(2.1)
Medium-High ESCS	1.6	(1.4)	-0.8	(1.3)	1.4	(2.0)
Highest ESCS	5.6*	(2.5)	2.5*	(1.1)	4.5*	(1.8)
Native	2.4	(1.3)	-0.1	(1.0)	2.6*	(1.1)
Immigrant & Eng./Irish	4.2	(3.0)	-0.3	(2.0)	0.4	(2.8)
Immigrant & other lang.	9.7	(3.2)	5.7*	(2.2)	7.2	(2.4)
Girls' secondary	2.2	(1.4)	0.6	(0.9)	-0.9	(1.2)
Boys' secondary	3.5	(2.5)	0.6	(1.5)	4.8	(1.6)
Community/comprehensive	4.4	(2.9)	0.3	(1.4)	6.5	(1.1)
Mixed secondary	6.7	(4.0)	4.2	(3.6)	6.0	(3.2)
ETB vocational	2.6	(2.1)	-1.3	(1.4)	0.9	(1.8)
Non-DEIS	3.0*	(1.4)	0.76	(1.1)	3.8	(1.1)
DEIS	6.0*	(2.4)	0.36	(1.6)	0.8	(1.6)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. Full details in Appendix L, Table L41.

The index of 'students' perception of competitiveness at school' recorded no difference between Spring and Autumn across all students; however, Fifth/Sixth Year students at Autumn testing had a higher mean score on the index compared to students at the same grade levels in the Spring (0.25 and -0.02, respectively), indicating that students felt there was more competition in the Autumn compared to the Spring (Appendix L, Table L42). Similarly, there was no differences between Spring and Autumn on the index of students' perception of cooperation at school and only students in mixed secondary schools tested in the Spring reported a higher mean score on the index than those tested in the Autumn (Appendix L, Table L43). Correspondingly, there was no statistical significant differences between Spring and Autumn on the index of students' experiences of being bullied (Appendix L, Table L44).

5.5.3. Other school outcomes and performance

At both the Spring and Autumn testing there were weak⁷⁶ relationships between three of the four general learning environment indices examined in this study, ‘perception of competitiveness at school’, ‘perception of cooperation at school’ and ‘student's experience of being bullied’ and performance on reading, mathematics and science (Table 5.40). The relationship between students’ ‘attitude towards school/learning activities’ and performance was weak to moderate at both the Spring and Autumn testing. Similarly, the wellbeing index, ‘eudemonia: meaning in life’, had a weak to moderate relationship with achievement in reading, mathematics and science in Autumn and Spring.

Table 5.40: Correlations of wellbeing indices and general learning environment with performance on PISA, Spring and Autumn testing.

<i>Wellbeing indices</i>	Spring				Autumn			
	r	(SE)	t	p*	r	(SE)	t	p*
<i>Life satisfaction</i>								
Reading	-0.05	(0.02)	-3.1	0.002	0.01	(0.03)	0.2	ns
Mathematics	0.02	(0.02)	1.0	ns	0.01	(0.03)	0.4	ns
Science	-0.03	(0.02)	-1.7	ns	0.01	(0.03)	0.5	ns
<i>Eudemonia: meaning in life</i>								
Reading	-0.20	(0.01)	-13.7	<.001	-0.15	(0.02)	-6.3	<.001
Mathematics	-0.16	(0.01)	-11.0	<.001	-0.12	(0.03)	-4.6	<.001
Science	-0.19	(0.01)	-13.2	<.001	-0.12	(0.03)	-4.8	<.001
<i>Subjective wellbeing: positive affect</i>								
Reading	-0.07	(0.01)	-5.0	<.001	-0.05	(0.03)	-2.0	0.048
Mathematics	-0.05	(0.02)	-3.1	0.002	-0.05	(0.02)	-2.2	0.030
Science	-0.08	(0.01)	-5.2	<.001	-0.07	(0.03)	-2.5	0.014
<i>General learning environment indices</i>								
<i>Attitude towards school/learning activities</i>								
Reading	0.11	(0.01)	8.8	<.001	0.12	(0.02)	5.7	<.001
Mathematics	0.12	(0.01)	8.5	<.001	0.11	(0.03)	4.1	<.001
Science	0.10	(0.02)	6.4	<.001	0.12	(0.03)	4.6	<.001
<i>Perception of competitiveness at school</i>								
Reading	0.03	(0.02)	1.6	ns	0.02	(0.03)	0.9	ns
Mathematics	0.03	(0.02)	1.3	ns	0.03	(0.03)	1.3	ns
Science	0.00	(0.02)	0.2	ns	0.04	(0.02)	1.7	ns
<i>Perception of cooperation at school</i>								
Reading	0.04	(0.02)	2.0	0.048	0.04	(0.03)	1.6	ns
Mathematics	0.08	(0.02)	4.3	<.001	0.07	(0.03)	2.7	0.008
Science	0.01	(0.02)	0.5	ns	0.04	(0.03)	1.6	ns
<i>Student's experience of being bullied</i>								
Reading	-0.03	(0.02)	-1.8	ns	-0.03	(0.03)	-1.2	ns
Mathematics	-0.02	(0.02)	-0.9	ns	-0.02	(0.03)	-0.8	ns
Science	-0.02	(0.02)	-0.9	ns	0.02	(0.03)	0.8	ns

Note. Significant correlations at .05 level are in bold.*Calculating *p* value from *t* score, *df*=80 (number of variance strata associated with balanced repeated replication (BRR) method of variance estimation).

⁷⁶ Correlation coefficients are interpreted in this study as follows: > .56=strong; .41 - .55=moderate-to- strong; .26 - .40=moderate; .11-.25=weak-to-moderate; <.10=weak.

5.6. An Examination of ‘Session’ while Controlling School, Student Level Background Variables and Other Learning Outcomes

This section develops the model presented at the end of Chapter 4 where the time of testing variable (‘session’) was examined when student- and school-level background variables were controlled. The new model includes the other learning outcomes associated with achievement that were examined in this chapter to determine if, when all these indicators are controlled, there is an association with time of testing (Autumn or Spring) and achievement in PISA.

Table 5.41 presents the final models (one each for reading, mathematics and science) which include only those variables that were statistically significant when all variables were added to each model together. Included in the model on reading performance are variables measuring elements of ‘Opportunity to Learn’ such as exposure to content (e.g., length of text read, write a summary of the book/chapter and a number of strategies for online reading) and the learning environment. Variables measuring engagement, motivation and wellbeing are also included in the model, indicating that, when having controlled for all other variables in the model, these indicators have a statistically significant relationship with reading performance. However, the main coefficient of interest is that of ‘session’ and the data indicate that when all other variables of interest are controlled, it is not statistically significantly related to reading performance. The interaction of this variable with all other level 1 learning outcome variables in the model were examined and the coefficient on the interaction between ‘perceived difficulty in reading’ * ‘session’ indicated a borderline significant interaction that could warrant further investigation (Appendix L, Table L45). Similar to the reading model, variables measuring engagement, motivation and other learning outcomes were statistically significant on science performance when all variables were added to the model. Again controlling for these variables, ‘session’ did not reach statistical significance in the model on science performance. A statistically significant borderline interaction between ‘3 or more whole days skipped’ * ‘session’ might merit further investigation (Appendix L, Table L45). Examining the model on mathematical performance, the coefficient related to the interaction between ‘session’ and ‘gender’, that was seen as significant when only the level 1 and level 2 background variables was included (Chapter 4, Section 4.5, Table 4.18) no longer reaches statistical significance when variables measuring engagement, motivation and other variables associated with performance were added to the model. There was found to be no statistical significant interactions with session and the other level 1 learning variables in the model on mathematical

performance. The results from these models indicates that ‘session’ does not have a statistically significant relationship with reading, mathematics or science performance in PISA.

Table 5.41: Random intercept model on reading, mathematics and science performance on PISA with student- and school-level background variables, and other factors associated with performance

	Reading			Mathematics			Science		
	Coefficient	SE	p-value	Coefficient	SE	p-value	Coefficient	SE	p-value
Intercept	541.33	6.01	<.001	511.16	6.78	<.001	513.26	6.41	<.001
Level 1 (Within School)									
Gender (ref. = Male)	0.69	2.80	0.804	-0.21	4.85	0.965	-4.51	3.63	0.214
Immigrant Language Status (ref.=Native)									
Immigrant with English	-4.11	3.51	0.242	-1.89	3.87	0.625	6.11	4.07	0.133
Immigrant with other language	-11.21	3.92	0.004	4.72	4.87	0.332	6.85	4.68	0.143
ESCS	11.41	1.50	<.001	21.52	1.55	<.001	23.51	1.61	<.001
Session ^{by} Gender	a	a	a	-10.71	5.71	0.061	a	a	a
Level 2 (Between School)									
DEIS school status (ref.=Non-DEIS)	-16.92	4.53	<.001	-26.63	5.08	<.001	-27.92	5.69	<.001
School Sector Gender (ref.=Vocational)									
Girls secondary	2.06	4.69	0.66	3.63	6.39	0.57	0.88	7.37	0.905
Boys secondary	2.74	4.93	0.578	9.36	6.64	0.159	2.47	6.84	0.718
Community/Comprehensive	-1.42	4.24	0.738	1.84	5.47	0.736	2.10	5.64	0.709
Mixed secondary	3.32	6.05	0.584	8.33	6.51	0.201	5.97	7.73	0.44
Session (ref.=Autumn)	-2.71	3.03	0.37	8.53	5.03	0.09	4.98	4.20	0.236
Other Level 1 (Within School)									
Exposure to content									
Longest piece of text (ref.=up to 10 pages)									
10-100 pages	-4.42	3.16	0.162	a	a	a	a	a	a
101 or more pages	10.58	2.54	<.001	a	a	a	a	a	a
Write a summary of the book/ chapter (ref.=No)	-7.02	2.42	0.004	a	a	a	a	a	a
Compare the content of the book or the chapter with your own experience (ref.=No)	-12.78	2.29	<.001	a	a	a	a	a	a
Select a passage you liked or disliked and explain why (ref.=No)	-7.57	2.35	0.001	a	a	a	a	a	a
How to use keywords when using a search engine (ref.=No)	-9.08	2.42	<.001	a	a	a	a	a	a
To understand the consequences of making information publicly available online (ref.=No)	15.25	2.93	<.001	a	a	a	a	a	a
How to use the short description below the links in the list of search results (ref.=No)	-19.38	2.84	<.001	a	a	a	a	a	a
How to detect whether the information is subjective or biased (ref.=No)	5.62	2.16	0.009	a	a	a	a	a	a

Condt. Table 5.41: Random intercept model on reading, mathematics and science performance on PISA with student- and school-level background variables, and other factors associated with performance

	Reading			Mathematics			Science		
	Coefficient	SE	p-value	Coefficient	SE	p-value	Coefficient	SE	p-value
English Learning Environment									
Teachers' stimulation of reading engagement	9.50	1.61	0	a	a	a	a	a	a
Teacher-directed instruction	-6.18	1.24	0	a	a	a	a	a	a
Engagement									
Skipped a whole day in 2 weeks before PISA testing (ref.=No whole days skipped)^									
1-2 whole days skipped	a	a	a	-7.87	3.20	0.014	-7.69	3.50	0.028
3 or more whole days skipped	a	a	a	-22.97	5.47	<.001	-26.57	5.60	<.001
Arrived late to school in 2 weeks before PISA testing (ref.=No days late)^									
1-2 late days	-8.10	2.83	0.004	-13.49	3.09	<.001	-15.13	3.25	<.001
3 or more late days	-12.26	4.39	0.005	-26.86	4.94	<.001	-33.00	5.66	<.001
Understanding and remembering	5.88	1.26	<.001	a	a	a	a	a	a
Summarising strategies	10.99	1.33	<.001	a	a	a	a	a	a
Assessing credibility	17.14	1.09	<.001	a	a	a	a	a	a
Motivation									
Perceived competence in reading	18.99	1.50	<.001	a	a	a	a	a	a
Perceived difficulty in reading	-4.57	1.66	0.006	a	a	a	a	a	a
Enjoyment of reading	10.06	1.14	<.001	a	a	a	a	a	a
General self-efficacy (resilience)	a	a	a	8.44	1.75	<.001	11.60	1.98	<.001
Attitudes towards competition	a	a	a	4.54	1.38	0.001	3.84	1.50	0.01
Motivation to master tasks	a	a	a	5.51	1.47	<.001	6.70	1.62	<.001
Other School Outcomes									
Life satisfaction	1.71	0.58	0.003	a	a	a	1.66	0.67	0.013
Eudemonia: meaning in life	-10.60	1.30	<.001	-15.18	1.50	<.001	-20.32	1.69	<.001
Subjective wellbeing: positive affect	-4.45	1.27	<.001	-5.56	1.48	<.001	-9.01	1.54	<.001
Attitude towards school/learning activities	a	a	a	4.40	1.29	0.001	4.51	1.47	0.002
R-Squared									
Within-schools	0.504			0.165			0.179		
Between-schools	0.363			0.468			0.371		

Note. ^a not included in the final model. [^]Missing indicator included to retain data.

Final reading model based on 6,018 students; final mathematics model based on 6,711 students; final science model based on 6,676 students.

5.7. Summary of Key Points

Topics/skills/learning outcomes taught

For teachers of English teaching Third and Fifth Year students, ‘writing’, ‘poetry’ and ‘drama’ were the topics/skills/learning outcomes reported to have been the focus of most attention in the first six weeks of the academic year. While ‘comprehension/understanding’ was specifically not reported as frequently as the three topics/skills/learning outcomes just noted, it is considered that this would be covered by teachers indirectly through other topics/skills/learning outcomes. Regarding English teachers teaching Transition Year students, the broader spectrum of topics/skills/learning outcomes covered in TY can be seen in the topics/skills/learning outcomes reported, notably ‘media studies’ and ‘analysis of text’. Across the school types, the only difference of significance is the larger percentage of teachers in DEIS schools reporting to have focused on ‘novel/fiction’ with their students in the first six weeks of the academic year compared to teachers in non-DEIS schools.

A large proportion of the mathematic teachers in the sample reported covering ‘algebra’ with their Third Year, Transition Year and Fifth Year students. The most notable differences seen across the topics/skills/learning outcomes covered by mathematics teachers relate to Transition Year. In particular, larger proportions of teachers in DEIS schools reported covering ‘coordinate geometry’, ‘number systems’ and ‘problem solving’ with their Transition Year students compared to those in non-DEIS schools.

In the first six weeks of the academic year, topics/skills/learning outcomes in the category ‘biological’ were most often reported by science teachers across the three grades examined, with teachers teaching Third Year students the largest group. ‘Earth/space’ was reported by similar proportions of science teachers as ‘chemical’, and ‘physical’ with their Third Year students; however, the proportion of teachers reporting that they had covered this with their Transition Year and Fifth Year students was the lowest compared to the other topics/skills/learning outcomes. The broader spectrum of topics/skills/learning outcomes covered in Transition Year can be seen with the introduction of more ‘research skills’ and ‘project work’. As with mathematics, there are a number of differences in the topics/skills/learning outcomes covered by science teachers in DEIS schools compared to teacher in non-DEIS schools (larger proportion of teachers in DEIS schools covered topics/skills/learning outcomes in the ‘biological’ strand and project work).

Topics/skills/learning outcomes revisited

Across all three grades, ‘algebra’ was reported to have been revisited by the largest proportion of mathematic teachers. ‘Poetry’ was the topic most reported to have been revisited by English teachers of Third and Fifth Year students, and ‘biological’ topics/skills/learning outcomes was reported to have been revisited the most by science teachers across all three grades examined. ‘Earth/space’ was mainly reported as a new topic/skill/learning outcome by teachers working with Third Years, with very few teachers teaching TY and Fifth Year students reporting to have covered this either as a new or revisited in the first six weeks of the academic year. It might be noted that ‘earth/space science’ is new on the Junior Cycle specification since 2016, and does not appear on the Leaving Certificate science syllabi.

Time spent revisiting

Across the three subjects and three grades, mathematic teachers teaching Transition Year students spent the most amount of time revisiting topics/skills/learning outcomes in the first six weeks of the academic year (on average 30.3%). This was followed by English teachers teaching Third Years who spent on average a quarter of their time revisiting topics/skills/learning outcomes, with all other teachers surveyed reporting approximately 20% or less of their teaching time revisiting topics/skills/learning outcomes in the first six weeks of the academic year. Across all teachers, on average, 18.5% of their teaching time was spent revisiting topics/skills/learning outcomes in the first six weeks of the academic year. For those who reported revisiting topics/skills/learning outcomes in the first six weeks of the academic year, the majority reported that the revisiting occurred in the first two weeks. The time spent revisiting potentially could have mitigated any Summer Learning Loss, in particular Transition Year students studying mathematics, the largest group in the PISA Autumn sample (52.6%).

Opportunity to learn from student perspective

In Spring a larger proportion of students reported reading texts that include diagrams/maps/tables or graphs compared to the Autumn, when more students reported reading texts that include fiction or digital text. A larger proportion of students reported reading longer pieces of text in the Spring compared to the Autumn. Some reading activities that requires more cognitive capabilities (such as ‘compare the book with other books or texts on a similar topic’) were reported to have been completed more in the Spring than the Autumn. However, there was no difference between the testing periods on some of these activities (such as ‘discuss in small

groups with other students who read the same text'). When students were considering the online reading strategies they had been taught over their entire school experience, it was the students in the higher grades and students from the highest ESCS quartile who reported similar instructional experiences with online reading skills, whether they did PISA in Spring or Autumn.

There was no statistically significant difference in the learning environment in Spring compared to Autumn. Across the various subgroups, the students from the highest ESCS quartile appeared to experience greatest change in various aspects of the learning environment in the Spring compared to the Autumn (in the Spring a greater percentage reported that their teacher 'shows how information builds on what they know', 'poses questions that motivate'; 'asks questions to check that students understood' and 'adapts the lesson to the class's needs' compared to the Autumn).

Engagement

There was a statistically significant difference in the behavioural engagement of students in the Springtime compared to the Autumn where more students reported skipping a whole day or skipping classes in the two weeks prior to PISA testing in the Autumn compared to the Spring. Males, students in the lowest ESCS quartile, native students and students from boys' secondary schools and DEIS schools are more likely to skip a whole day of school in the Autumn compared to the Spring.

In general, students tested in the Spring showed no statistically significant difference in their levels of emotional engagement to those tested in the Autumn (based on the indicators used in PISA, sense of belonging at school and teacher support in English class). However, variation was found across the various student and school background variables in their levels of emotional engagement. Students from the low-medium ESCS quartile, from community/comprehensive schools, mixed secondary and DEIS schools appeared to experience a greater sense of belonging in the Spring compared to the Autumn, with students from boys' secondary schools indicating a greater sense of belonging in the Autumn compared to the Spring. Students from the highest ESCS quartile reported greater support from their teachers in the Spring compared to the Autumn.

There was no statistically significant differences in the awareness of effective strategies for understanding and remembering and summarising between the two testing periods. Students involved in Autumn testing had a lower awareness of the appropriate strategies to use when assessing the credibility of sources than students in the Spring testing, and this was the case for a number of the student subgroups examined.

From the teachers' perspectives, an overall indicator of their perceptions of their students' engagement showed their students to be more engaged in the Autumn than the Spring. More specifically, teachers perceived their Transition Year students to be more engaged in the Autumn than the Spring. This may reflect the nature of TY activities across the two periods (more in-class work in the Autumn, more out-of-school activities, and less continuity in Spring).

Motivation

There was no difference in students' perception of their ability between those taking part in Autumn and Spring testing; although, there were some differences for some of the student subgroups (for example, students in the low-medium ESCS quartile had greater resilience in the Spring compared to those in the Autumn and Third Year students and students from the highest ESCS quartile had a greater sense of perceived competency in reading in the Spring compared to the Autumn).

While there was no statistically significant difference between Spring and Autumn on the mean overall index score for enjoyment of reading, there were some student subgroups who reported a greater enjoyment of reading in the Spring compared to the Autumn (females, students from the highest ESCS quartile and migrant students with English/Irish as another language).

The attitude towards competition and their motivation to master a task was similar for students tested in the Autumn compared to Spring. Across the student subgroups examined, Third Year students, students from the low-medium ESCS quartile and migrant students who spoke another language expressed more favourable attitudes towards competition in the Spring compared to the Autumn. Some students (males and Third Years) were more motivated to master some tasks (individual items within the index) in the Spring compared to the Autumn.

Students tested in the Autumn reported a similar score on the index of general fear of failure as those tested in the Spring. However, Third Year students who had just sat their Junior Cycle mocks (Springtime) expressed a greater fear of failure than Third Year students tested in the Autumn who have just started into the final year of their Junior Cycle programme.

Just under one-fifth of teachers *didn't know* if their students would be more motivated in the Autumn compared to the Spring, while about three in five *strongly disagreed/disagreed* that their students were more motivated to achieve in the Autumn than the Spring.

Other school outcomes

Students in the Spring reported more positive feelings than students in the Autumn on the index of subjective wellbeing: positive emotions, with no differences on the two other indicators of

wellbeing used in PISA 2018 (life satisfaction and eudemonia). Across the student subgroups, this difference between Spring and Autumn was significant for females, students from the low-medium ESCS quartile, migrant students with another language, students in community/comprehensive schools, ETB vocational schools and students in DEIS schools. Of the three emotions included in the positive feelings, happy feelings varied more between Spring and Autumn testing (compared to joyful and cheerful).

Examining the general learning environment, students tested in the Spring had a more positive attitude toward school/learning activities compared to those tested in the Autumn. Across the student subgroups, males and students from the highest ESCS quartile had higher mean scores on this index in the Spring compared to the Autumn.

Relationship between time of PISA testing and performance

A set of multi-level models examined the association of time of year ‘session’ on the reading, mathematics and science scale while controlling key school and student background variables examined in Chapter 4, along with other level 1 learning outcome variables considered in this chapter that are associated with performance. The results indicate that the time of year does not have an association with the achievement of students in PISA reading, mathematics or science. The final model of reading explained 36.3% of the variance in performance between schools and 50.4% of the variance within schools. The respective estimates for mathematics were 46.8% and 16.5% and for science 37.1% and 17.9%. A small number of significant interactions between time of testing and level 1 variables were observed.

These findings will be discussed further in the final chapter. Before that, attention needs to be focused on the extent to which school principals view time of testing as a factor associated with performance in PISA.

Chapter 6 School Principals' and Teachers' Views on Moving PISA Testing to the Autumn

This chapter seeks to examine principals' and teachers' perceptions about changing PISA testing from Spring to Autumn. Their reports provide a context in which to interpret the results from the student data. Section 6.1 presents the results from the thematic analysis of the qualitative data gathered from the principals during the semi-structured interview. Quotes are used for illustrative purposes and themes are highlighted. Section 6.2 presents results from an open-ended question presented to teachers asking them about factors that might explain any potential difference in performance due to changing PISA testing from the Spring to the Autumn. Section 6.3 provides a summary of the key points. It should be noted that none of these participants were aware of the achievement outcomes for the Spring and Autumn testing when the interviews or completion of questionnaires took place.⁷⁷

6.1. Insights from Principals

The approach taken to examining the qualitative data gathered from the semi-structured interview with the principals was Thematic Analysis (TA). It is considered an appropriate approach to research people's views, opinions, knowledge, experiences, or values from a set of qualitative data. According to Braun and Clarke (2006), TA is best thought of as a spectrum of methods - from types that prioritise coding accuracy and reliability to reflexive approaches that emphasise the subjectivity of data interpretation. In conducting this thematic analysis, a deductive approach was first taken, which involved examining the data using themes already identified in the literature. These themes related to the general questions that were asked during the interviews with principals. An inductive approach was then taken when examining the codes and generating initial themes. The research themes were then progressively refined. The thematic analysis was conducted to identify the factors (themes) that school principals felt were important in understanding student performance if moving PISA testing to the Autumn. Figure 6.1 presents an overview of the two research aims of the thematic analysis. The first aim examines factors that could be associated with student performance at a Spring and Autumn testing. Two themes were developed 'Spring is a better time to do PISA testing' and 'Autumn is a better time to do PISA testing'. Within the second theme a subtheme was included, 'Preference for Autumn testing'.

⁷⁷ See Section 3.3 and Section 3.4 for the timeline of administration.

Figure 6.1: An overview of the two research questions and the over-arching themes that were identified in answering these questions

Research aims:	Factors that could be associated with student performance at a Spring and Autumn testing: Theme 1: Spring is a better time to do PISA testing (27) Theme 2: Autumn is a better time to do PISA testing (41) (sub-theme) Preference for Autumn testing (78)	Insights into why performance on PISA does not differ across Spring and Autumn testing: Theme 3: Continuity of school life (140) Theme 4: PISA support from education stakeholders (108) Theme 5: School responsibility to support students (75)
	Theme 6: Concerns that might indirectly be related to PISA performance in the future (33)	

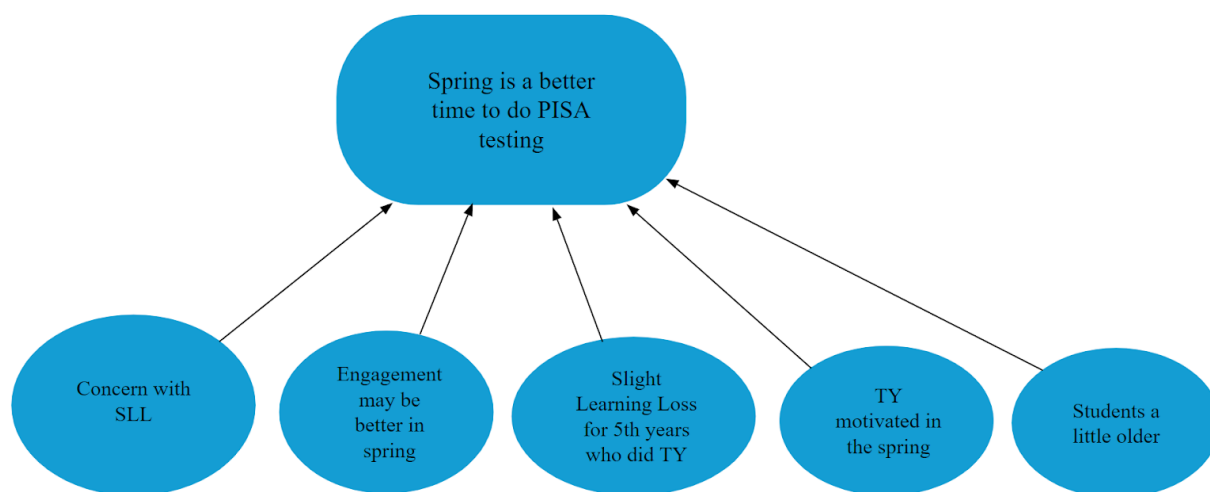
Note. The numbers in brackets indicate the number of codes within the theme.

The second aim of the thematic analysis was to identify themes/insights into why performance of 15-year-olds in Ireland does not differ across Spring and Autumn administrations of the PISA tests. Themes 3, 4, and 5 provide some insights. The final theme presents concerns that might indirectly be related to PISA performance in the future. These themes will now be presented in more detail. Due to the small number of interviews, the referencing of the example quotes will take the form of Transcript 1 through to Transcript 6.

6.1.1. Theme 1: Spring is a better time to do PISA testing

Figure 6.2 presents the theme ‘Spring is a better time to do the PISA testing’, including the factors that could be associated with student performance in PISA if testing were to occur in the Autumn. The theme comprises of five categories, ‘concern with SLL’, ‘engagement may be better in Spring’, ‘slight learning loss for Fifth Years who did TY’, ‘TY motivated in the Spring’ and ‘students a little older’.

Figure 6.2: Theme 1: Spring is a better time to do PISA testing



Note. While the number of times a code occurs in a category is not of primary concern in thematic analysis, the size of the shape implies greater or fewer occurrences. This approach has been applied to all figures presenting themes.

The first category included in this theme is ‘concern with Summer Learning Loss’. When talking about SLL during the interviews, one principal mentioned that particular groups of students might have issues if tested in the autumn, such as boys, (Transcript 1) and another principal noted students with learning difficulties:

About 27-28 percent of our students would receive those [resources], and of our students who went forward for PISA this year, there was only one who we felt wouldn’t be able to sit it due to specific emotional behavioural difficulties...everyone else did do it, and of those students I would probably be more conscious that there would be a learning loss (Transcript 2)

The literature on SLL indicates that teachers spend time revisiting topics at the start of the academic year. One principal noted that while there might be more revisiting of maths than other subjects, it was the technical and fundamental issues of a subject that would be revisited. An example was given in the subject of history where a principal noted that ‘*I was a history teacher and I can see that there are things that are important, technically, to revisit in terms of writing style, essay, and paragraph construction*’ (Transcript 1).

‘Engagement may be better in Spring’ was another factor identified as to why Spring is a better time to do PISA testing. One principal reported that ‘*new students may not have a sense of belonging if they have only just started new in the school, not just First Year students but others who would be starting into any of the older year groups*’ (Transcript 3). The teacher-student relationship over the course of the year was also noted by a principal:

In general, I would see that the student-teacher relationship is probably stronger at this time of year [interview took place in the Spring] than it would've been before, because they've settled into their classes, their form teachers know them a bit better, they're that bit further on in the course and have spent a huge amount of time with their teachers that they wouldn't have spent by week 6 (Transcript 1)

A factor noted by some of the principals in doing PISA testing in the Autumn was the potential of a slight Learning Loss for Fifth Year students at the beginning of the academic year who had participated in the optional Transition Year programme the previous academic year: *'...a difference with TYs, because they're not on a structured curriculum, as say 5th years would be. So you might find a bit of a loss there'* (Transcript 2). This factor was also considered by a principal to be an issue with parents:

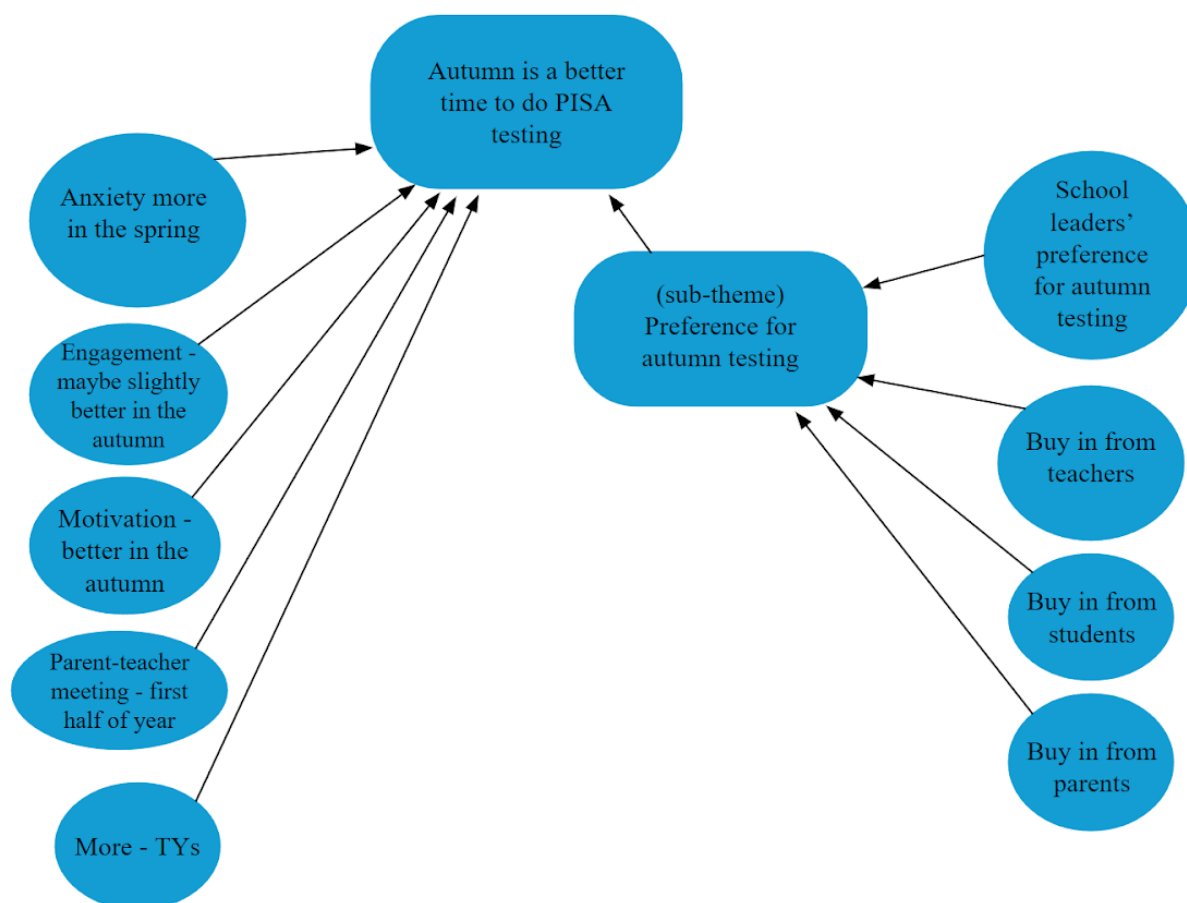
I had a meeting with parents during the week in relation to this, that's how I know - they said it took a fair bit of time to get back to the swing of things in 5th year after Transition Year (Transcript 4)

A final factor identified was that Transition Year students become more motivated about the TY programme as the year progress. An illustration of this is noted in Transcript 1, *'some of the TYs are flying, they've had a great experience in the play and they're doing really well. Some are creeping towards the end and looking forward to it'*.

6.1.2. Theme 2: Autumn is a better time to do PISA testing

In contrast to the first theme, Theme 2 (Autumn is a better time to do the PISA testing) presents details on the issues raised by principals when testing occurs in the Spring (Figure 6.3). This theme also contains a sub-theme 'preference for Autumn testing'.

Figure 6.3: Theme 2: Autumn is a better time to do PISA testing (Sub-theme: Preference for Autumn testing)



The first factor identified as a reason for testing in the autumn was principals' opinion that anxiety would manifest itself more often in Spring than in Autumn. More specifically, anxiety was reported to occur more with formal exams than with class tests, for example, Transcript 3 notes: *'Yes, that [schoolwork-related anxiety] is an issue. It tends to arise in the approach to formal exam periods'*. A quote from Transcript 2 is another example of principals noting the presence of anxiety in the Spring: *'You'd probably find the Spring time would have more anxiety. Whereas a set form of assessment that we use in the Autumn is less anxious for them'*.

Some principals commented that attendance may be slightly better in the Autumn. In particular, a principal noted that Transition Year students may be more engaged in the Autumn than the Spring where the *'...problem with TYs is the ones who haven't engaged with the programme. As the year progresses, they might be more likely to skip'* (Transcript 2). One other principal noted that:

For TYs, maybe you might even find that some of the more jaded among them would perform better in the Autumn than in the Spring. We've pretty good engagement with TY but you're always going to find some students who aren't engaging as much as you'd like or who have gone back into their shell maybe, and might perform better in the Autumn (Transcript 1)

Principals commented that motivation may be better in the Autumn for Third Year students compared to the Spring term having just done *the mocks*. One principal noted '*they probably start having difficulties coming up to Christmas. In the Spring, they're looking at their mocks and maybe feeling quite daunted by it*' (Transcript 6). Another principal commented that some students '*get demotivated after the mocks, for example, because they throw the towel in, they feel that it's an indication that they're not coping. It's a self-fulfilling prophecy*' (Transcript 2). But, according to another principal, it goes further than just doing *the mocks*, the students are also starting to go back over topics: '*it's not as straightforward as a teacher encouraging a student to be engaged with new material-that's relatively straightforward. Whereas going back over stuff that they know, that they didn't like the first time*' (Transcript 1).

A topic discussed in the interviews was parent-teacher meetings. One school principal (Transcript 3) noted that these parent-teacher meetings had '*a slight impact generally on performance*' with another principal noting that '*You're always going to see a bit of a difference*' (Transcript 2) in regard to student performance. The final factor identified as to why Autumn is a better time to do PISA testing was that over half of the principals interviewed mentioned that the parent-teacher meetings are often held in the first half of the school year.

Sub-theme: Preference for Autumn testing

As part of Theme 2, a sub-theme was identified 'Preference for Autumn testing' (Figure 6.3). One of the main concerns, which prompted an investigation into conducting PISA in the Autumn, was anecdotal comments from principals about Spring term being a very busy time in the school calendar. All the principals commented that there are many organisational demands in the Spring, and it was '*extremely busy at this time of year [interview conducted in the Spring], there are so many things happening*' (Transcript 2). One principal commented:

*The Spring is now - if someone turned around to me and said, look, can we run a PISA test this week, or just before Easter, I would've - *sighs*. Whereas, it wasn't a big deal, when we had it, which I think was October (Transcript 5)*

Principals mentioned several events/activities that occur in the Spring term such as orals, '*home economics and music practicals*' (Transcript 3) along with sports, '*sport, which is more variable because you enter in cup fixtures in this term and it's less specific when they're going*

to take place' (Transcript 3). The CBAs were mentioned by some principals and one principal noted:

We're only learning now about the CBAs, and the roll out of their CBAs. We'll have all the subjects in from next September. So, from, I would imagine, late October/early November, almost to the end of the year, teachers are going to be involved with 2nd and 3rd years, conducting CBAs (Transcript 5)

All the principals commented that there were fewer organisational demands in Autumn. Comments such as: 'it's less pressurised in the Autumn than from January on, when there's very much a focus, and all the other things' (Transcript 4) and 'I felt the Autumn was much better for us. There wasn't as much surrounding the school going on' (Transcript 6). It was also mentioned by one principal that there were more options on which day the PISA test could be administered:

The Autumn one was very straightforward to organise, there was nothing standing in the way of it. It was 'pick a date', we could've picked any of a number of dates, and it was very straightforward for us (Transcript 1).

A final factor identified was that there would be more 'buy in' to do the PISA test if conducted in the Autumn. This includes 'buy in' from teachers, students and parents:

..in terms of the Autumn vs. Spring, teachers don't like missing class and missing their students around the Springtime, in the lead-in to - whether it's summer exams, whether it's - there's that little bit of pressure to get the courses finished (Transcript 5)

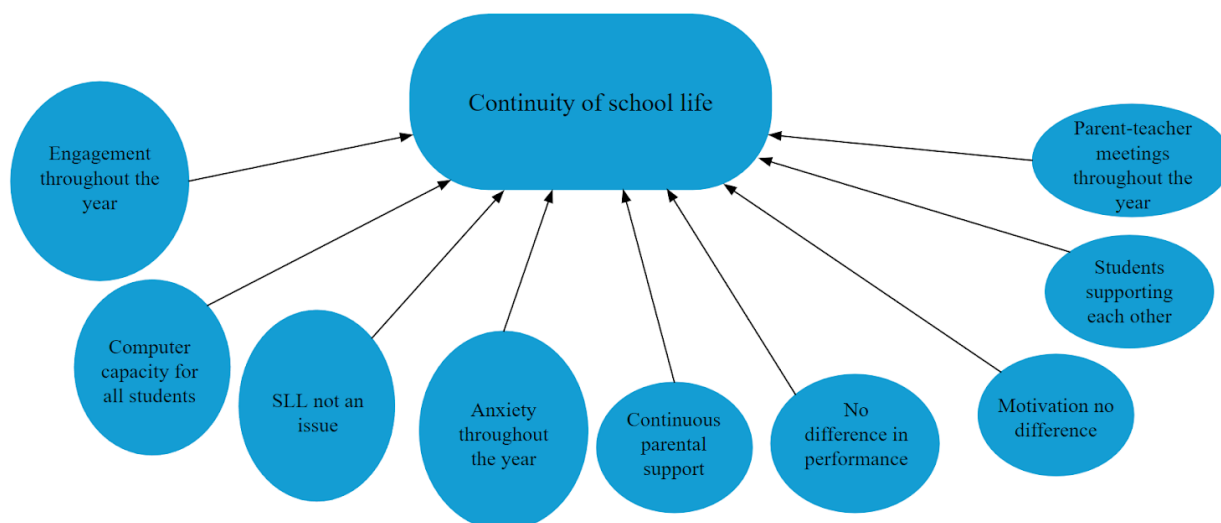
I suppose, to be frank, that there will be students, particularly amongst 3rd years, who wouldn't want to take a day out of school to do this. That reluctance might have an effect. Certainly, in October, there was nothing on the horizon for them to be missing. A day in October, in their minds, is not the same as a day in March or April (Transcript 1)

Their preference, I think, would definitely be in the Autumn. You'd generally get to hear then, parents complaining that they missed such-and-such, and it's an important term and so forth. I'd have thought it's less pressurised in the Autumn (Transcript 4).

6.1.3. Theme 3: Continuity of school life

Figure 6.4 presents the third theme 'Continuity of school life' showing insights from principals into why there was no difference on student performance between a Spring and Autumn PISA administration.

Figure 6.4: Theme 3. Continuity of school life



The first category included in this theme is ‘Engagement throughout the year’. Engagement was mentioned by some of the principals as not varying throughout the year. Comments such as *‘there wouldn’t be a difference between Autumn and Spring’* (Transcript 4) and they did not see *‘the student engagement waning particularly’* (Transcript 1). One element of student engagement that was mentioned was the student-teacher relationship, where teachers kept with the same students as much as possible. In particular, regarding students in Third Year, one principal mentioned that *‘all things being equal, have the same teacher as before. Unless something has happened, a teacher has moved school’* (Transcript 2). The majority of students, according to a number of principals, have a high ‘sense of belonging’ at any time of the year, with one principal noting that they had received statistics on the ‘sense of belonging’ in the school and gave this example:

It doesn’t seem to be an issue, we had a WSC MLL in May 2016, the whole school inspection model. A cohort of the students were interviewed, I can’t remember what the percentage was, but it came out very high, the sense of belonging and enjoyment of school. That’s something, certainly our students - you’re never going to say kids love school, but they don’t dislike coming to school (Transcript 5)

All the principals interviewed reported that they had capacity for all students to have access to computers in the school and would therefore not be disadvantaged in participating in the PISA test, which is computer based. One principal mentioned that students would be *‘quite good with technology’* (Transcript 4). Two principals mentioned that some of the weaker students would not have been as engaged with a paper test:

The setting of the exam, in terms of a computer and screen based test, I think it was much more welcome by the kids, it wasn't as daunting (Transcript 6).

I think students would fare better on the computer system than maybe the ones who were weaker would fare less well on a paper-based system. I think it'd put them off straightaway, once they saw a test coming in paper. They might think - Oh God (Transcript 6)

One of the main concerns with carrying out the PISA test in the Autumn was the issue of Summer Learning Loss (SLL). One principal interviewed mentioned that *'SLL is not something we identify specifically. I think we just tend to anticipate it as part of a cycle (Transcript 1).* Returning to school after the summer holidays is not just about the academic aspects and a number of the principals mentioned that: *'the school needs time to settle in' (Transcript 2); 'dealing with misbehaviour' (Transcript 5), and with the 'wellbeing of the students' (Transcript 5).* In order to address SLL, principals were asked about revisiting done in the first few weeks of the academic year. One principal noted that *'in every student, yeah, you'll have to do a little re-teaching at the beginning of the year to get you back to where you were in May' (Transcript 2).* However, it was mentioned by a number of principals that throughout the year when a new topic is introduced, the foundations or aspects of the topic are more often than not covered again in class:

I think, because the courses are so structured, I think there is built-in revision within different topics anyway, going back and overlapping. Even with maths, a lot of the grounding for that in 5th year will be used again in 6th year. They're revisiting anyway, whether it's conscious or not. It's just loss over time (Transcript 6)

I'm sure, that they do forget. And that's why, very often, if you're going on to a particular topic, you might do a little revision session of something that might have been relevant to the topic.....throughout the year, but even, in all years that could happen (Transcript 5)

Principals expressed the opinion that anxiety had become more prevalent in recent years and that it was not solely at a particular time of the year. One principal noted that *'If there are students who are prone to anxiety, it doesn't matter what time of year it is. I see that in particular here, there are quite a lot of anxious students. They would've been anxious from the very beginning' (Transcript 4).*

Classroom Based Assessments (CBAs) were introduced into the Junior Cycle to take some focus off external examination and to allow students to demonstrate their understanding of concepts and skills in ways that may not be possible in a written exam (NCCA, 2021). However,

one of the reasons given by the principals for the increase in anxiety was the introduction of CBAs:

I do know that the original thinking in relation to the Junior Cycle, and the new Junior Cycle with these CBAs was to keep it kind of low-key. That is not the case. Certainly not in this school. It has become a huge thing (Transcript 4)

The CBAs, I think one of the philosophies, ideas, behind the Junior Cycle is that we don't want to over-assess our students. It's to communicate the idea that the CBA - I've tried to compare it to, it's like when you come to the end of a particular section, you might assign a project. It's basically homework, but it's homework that has a due date of a week and a half, or two weeks down the line. It's no more or less important than that type of homework, but at the moment, I think, with the newness of the CBAs (Transcript 5)

'Continuous parental involvement in the school' is another category included in this theme (Continuity of school life). A number of principals mentioned various aspects of parental involvement with the school:

If you have parents who are really engaged, and value education, that engagement is going to be the same from the time they start until the time they leave (Transcript 4)

It's not so much about monitoring the homework, it's more that parents know what's happening (Transcript 5)

Parents are as grade-driven as some kids are (Transcript 6)

[parents] providing feedback to principals about the programme (Transcript 4)

'Motivation' was mentioned by a few principals as not changing between the Spring and Autumn. One principal gave the example: *'the 3rd years would have a motivation to get good grades. There'd be no difference, they'd be stuck right in from the beginning'* (Transcript 4). Finally, 'students supporting each other' was identified as a factor in enabling the school life to have the continuity throughout the school year. There are several ways mentioned by principals demonstrating how students support each other:

There's a mentor programme where 4th years kind of adopt a 1st year (Transcript 5)

The huge numbers of students are playing on these teams with students from years above and below. There is certainly a community to that more than just the people around you in your class, and a small school is conducive to that (Transcript 1).

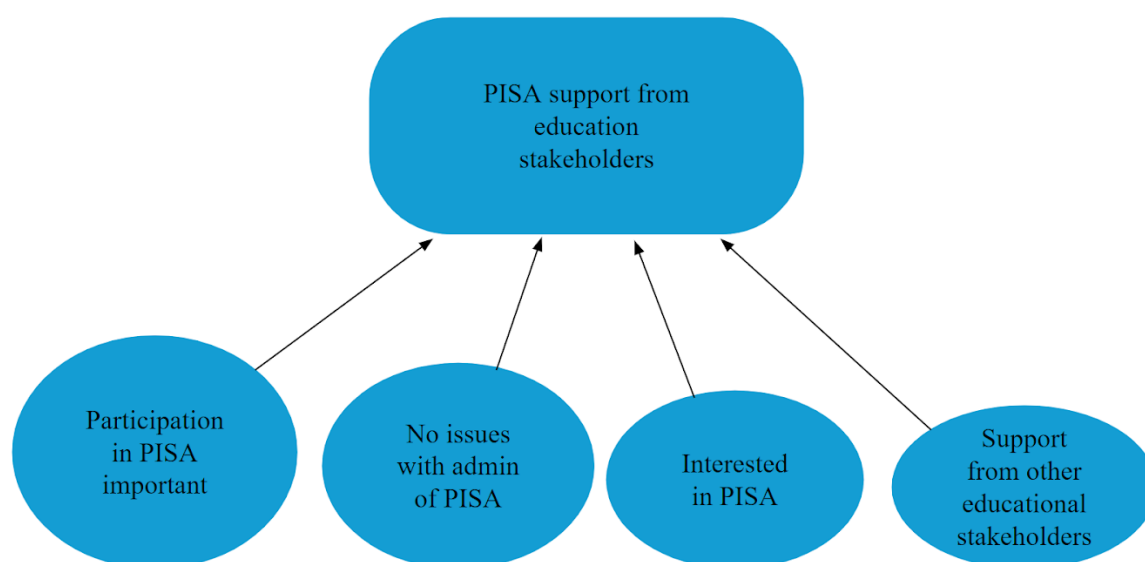
We're going to start working on a structure so that you've got the year groups, think of the year groups running horizontally, and we're going to start a house system running vertically next year. Our classes are - the nomenclature, the naming of the classes is number based, so you've 1.1 in 1st year, 2.1, 3.1, 4.1, 5.1

and 6.1. Doesn't relate to their ability, it's mixed ability. But we're looking at having housing structures, we're looking at it that way. So the students in 6.1 and 5.1 will look after 1.1, 2.1 and so on, and we'll have some little reward at the end of the year for whoever has the most positive contribution to the school (Transcript 5).

6.1.4. Theme 4: PISA support from education stakeholders

This theme encapsulates the importance of participating in the PISA study, the interest in it from school educational stakeholders and how the administration of PISA in the school is not a difficult task (Figure 6.5).

Figure 6.5: Theme 4: PISA support from education stakeholders



Participation in PISA was considered important by all the principals interviewed. They saw it as good for benchmarking nationally: *'I suppose you'd like to see- in terms of the age ranges - where they lie in comparison to the average in Ireland'*, (Transcript 5) and internationally: *'would find benchmarking data to be the most useful: where does your school fit within the international comparison'*, (Transcript 3). The ERC provides feedback to schools and one principal noted that the feedback the school receives *'can be used to benchmark their school against the national average...and that can be shared with teachers, parents and Boards of Managements, which allows for discussion and should prompt debate on how the school is progressing'* (Transcript 3). Another principal noted *'the value of shaping policy, shaping curricular development, shaping programmes, shaping everything'* (Transcript 2).

Principals mentioned the importance of presenting the value and significance of PISA to students when asked to participate. It was mentioned by one principal:

That the PISA test should be conducted in a good formal environment...it encourages the students and it concentrated all our minds (Transcript 2)

The principal also noted that:

If the results are a kick up the behind then we need it, but for the reason of the outcome, not the process...When we do this, let's get what we would consider as the real story, rather than the story which came about because of poor preparation, poor motivation, poor value attachment (Transcript 2)

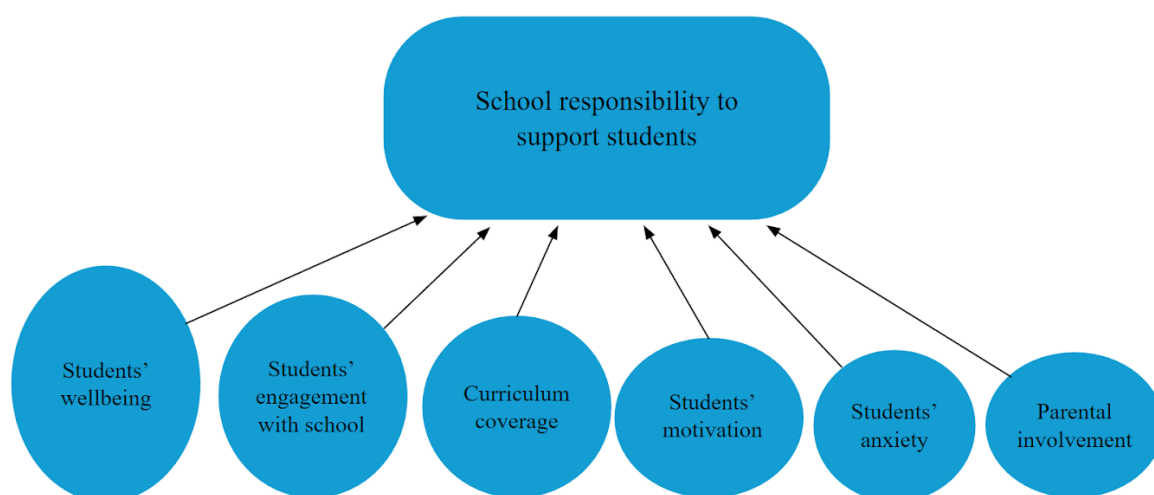
Finally, one school stated that all the schools were encouraged by the patron body to take part in PISA if they were selected:

It should be said, to be fair to our patron, that when it came about that PISA tests were going to be conducted nationally, and some of our schools in our body-the ETB - did promote good practice around the testing...and any schools that were chosen for participation were encouraged to facilitate it (Transcript 2).

6.1.5. Theme 5: Schools' responsibility to support students

A fifth theme derived from the interviews with principals was 'School responsibility to support students'. This theme includes schools supporting students with various aspects of their school and everyday life, including wellbeing, engagement with school, motivation, and anxiety (Figure 6.6).

Figure 6.6: Theme 5: School responsibility to support students



Principals commented that while there were times when the focus on student wellbeing was stronger, initiatives related to the issue occurred throughout the school year: *'there is Health Week, but throughout the year we have a promotion of positive mental health, between assemblies, RSE and SPHE, chaplaincy and guidance counsellors. We have those things in place'* (Transcript 1). Some principals mentioned that various people, groups and organisations have helped plan and organise the wellbeing programme. Examples such as the *'student council'* (Transcript 5) and *'guest speakers'* (Transcript 6) were given.

It was noted by the principals that there are various activities organised throughout the school year such as *'friendship weeks'* (Transcript 5), *'several school trips'* (Transcript 2) and *'year group assemblies'* (Transcript 2) which have helped support students.

There was no direct question about the curriculum coverage but an element that was noted by principals was the Transition Year programme. TY provides a variety of activities enabling students build on their skills:

Things like computer skills, or presentations, and being able to speak articulately and confidently would be more of a focus for me (Transcript 4)

Depending on the socioeconomics, there are certain skills that may be more important depending on the cohort of students you're providing the course for. That would determine the type of course that I would provide, the cohort of students that you have sitting in front of you (Transcript 4)

Then they have what you would call the options - Engineering, they would opt into these, Home Ec, Music, Physics. Under personal development, they've personal development time, then they've specialisms. They'll do coding (Transcript 6)

A number of the principals commented that the Junior Cycle Programme motivates the students and encourages a love of learning: *'I'd say that our job as a school is to push them and motivate them'* (Transcript 2). A comment from one principal about the Junior Cycle was *'they all get their tests back and all that, which is a good exercise for them'* (Transcript 6) and another noted that:

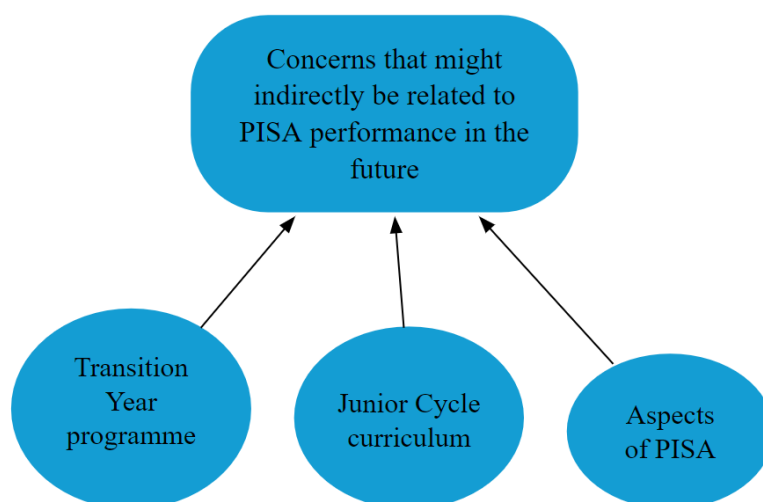
We do get, as part of the term reports, the tutor looks at all the results, and can make comments, and let the year head know if there's problems with a certain kid. That way, if someone is feeling that they're struggling, they're putting in the work but not getting the rewards, they'd be encouraged to come along and talk to somebody, you know? (Transcript 2)

Finally, in supporting students, one principal noted that the teachers and principals actively monitor the volume of class tests being done to *'avoid any undue anxiety'* (Transcript 1).

6.1.6. Theme 6: Concerns that might indirectly be related to PISA performance

Principals were prompted with questions about the Junior Cycle and TY Programmes and how they might relate to PISA. The final theme (Concerns that may affect performance on PISA in the future) relates to concerns about the JC curriculum and the TY programme (Figure 6.7).

Figure 6.7: Theme 6: Concerns that might indirectly be related to PISA performance in the future



There is a concern among some principals that the standards of the Junior Certificate are dropping, and a reason given is *‘the move to a common level in subjects is automatically going to bring standards down. If it’s common level, it has to be accessible to everyone. The high-achievers will be coasting’* (Transcript 2). It was also remarked that English (which was the first subject introduced in the Junior Cycle programme) *‘does not prepare students as effectively for Leaving Certificate English’* (Transcript 3). Some of the principals noted that the CBAs take *‘more of the academic calendar, the year, than we have’* (Transcript 5) and it was noted that students do fewer extra-curricular activities as a result:

In terms of after-school, where you would’ve had quite a lot of people who’d be engaged with sports after school, it was noticeable that one of the PE teachers, I’d say it’s the case right across the board, was mentioning that the CBAs are having a negative effect in terms of them getting out and doing the extra activities (Transcript 4)

The changes and challenges to the JC just noted mean that some TY programmes in schools are being examined with the aim of incorporating some elements of the Leaving Certificate programme into the Transition Year programme. It should be noted that while there was no mention of the amount of LC included in the TY programme, one principal noted that

'the extra few classes in 5th year are helping it a little, as well as, maybe, the bending in TY. It's a huge course, the LC' (Transcript 6). Another principal gave the example of the mathematics curriculum:

The Maths programme, particularly at Higher Level is so broad, it's very difficult, it adds to anxiety, if they've got to try and do that in a 2 year programme. Absolutely, I think they should. I make no bones about it and I make no apologies for it. There should be an element of Leaving Certificate content in Maths (in Transition Year). Not only in Maths, but particularly in Maths, because of the broadness of that particular course at Higher Level (Transcript 4)

It was reported by principals that Transition Year has been considered a 'doss year' (Transcript 3) and some of the principals noted that it must be organised and have a structure for it to be more effective:

The issue is, in my view and in the view of the parents and the students, they get out of the habit of study, and it's very difficult to get back into the habit...they are too young to get out of the habit of study, if there isn't an element of study in it, and a structure in the programme (Transcript 4)

Principals interviewed were supportive of the PISA study, but it was remarked that *'you've got to be careful about learning lessons from someplace else ... you've got to understand their whole educational system'* (Transcript 3). It was also noted that *'it's how we use the information. You have to accept that, yeah, statistics can be used to show anything. It depends how you use them, you can argue anything'* (Transcript 5). The principals stated that while they were happy to participate in PISA, there was an awareness that the sample should be representative, and one principal questioned whether other countries were as inclusive:

But in other countries, there wouldn't be as much integration and inclusion as we have here. Does that not go against us then, in terms of standings?... That would be my only one because different countries deal with SEN in different ways, deal with their students in different ways. I'm not so sure that other countries would be following the programme as strictly as we did (Transcript 6)

The next section presents the teachers' perspective on PISA testing at different times of the year.

6.2. Teachers' Perspectives

Teachers were asked at the end of the questionnaire if there was any other comments they had about PISA testing. They were asked, in particular, if they thought there might be any other factors that might explain any potential difference in performance due to changing PISA testing from the Spring to the Autumn. It was hoped that the question would provide an opportunity to gain insight on all the opinions about PISA testing in the Spring or the Autumn. While the coding

of the question was inductive, similar codes/categories emerged as were reported on in the thematic analysis of the semi-structured interviews with the principals.

Slightly under one-third of the teachers in the sample provided a response (Table 6.1). The responses of those who provided additional comments were categorised into eight categories. Approximately 19% of the teachers who responded reported that they were *‘not familiar with PISA’*. This category included responses such as *‘my knowledge of PISA testing is limited’*; *‘short of hearing PISA results on media when they are published they are not something I know very much about’* and *‘most teachers and students know very little about PISA and when taking tests are probably not informed about how it influences educational policy’*.

Table 6.1: Teachers’ additional comments on PISA testing at different times of the year

<i>Teachers provided</i>	(n)	%
No additional comments	280	67.6
Additional comments	135	32.4
Of those who gave a response:		
Autumn a better time to do a PISA test	18	13.2
Spring a better time to do a PISA test	23	17.4
Different factors for the different year groups	28	21.0
No difference in performance on PISA	17	12.3
Other factors associated with performance other than time of year	17	12.5
Mixed opinion	2	1.2
Other	5	3.4
Not familiar with PISA	25	18.9

There were three categories from the teachers’ responses similar to categories that were developed from the thematic analysis of the semi structured interviews with the principals: ‘no difference in performance in PISA’; ‘Autumn a better time to do a PISA test’ and ‘Spring a better time to do a PISA test’. Approximately 12% of the teachers who responded to the question reported that there would be no difference in performance in PISA. Responses such as *‘I cannot see any difference in my students’ attendance, motivation, results etc. in Autumn v Spring’* and *‘I don’t see much difference between my students’ attendance, engagement and performance between Autumn and Spring’* were included in this category. The motivation of students was considered as occurring uniformly throughout the year. Similar to the principals, teachers also reported that *‘students who want to achieve will do so no matter what’* or *‘these students want to do well at all times’*. The difference in the type of test that PISA is was also noted: *‘PISA testing aims to get students to use their reasoning skills rather than merely test their recall of curriculum content’*. Responses included in the category *‘Autumn a better time to do a PISA test’*

(reported by 13.2% of the teachers who provided a comment) were similar to those provided by the principals. These responses include the calmer time at the start of the year, the view that students are busier with extra-curricular activities inside and outside of school at Spring, more motivation at Autumn time and students are more focused. The third category that was also recorded with the principals' data was *'Spring a better time to do a PISA test'*. This was reported by 17.4% of the teachers who provided a comment to the question and included responses such as *'in Spring, students are more settled in to the year'*, *'as the year goes on a better relationship can develop between teacher/students'* and *'students are more practised at school life and routine by Spring'*. Concern with summer learning loss with comments such as *'learning loss and decline in attention to detail over the summer months'* and *'in Autumn time students in DEIS band 1 school: JCSP, low average, weak OL class/ tend not to engage'* were also included in this category. Finally, the weather was noted as a factor for conducting PISA testing in the Spring *'in Spring time dark evenings gone, students out getting more fresh air and are out and about'*.

Two further categories developed from the teachers' responses were: 'different factors for the different year groups' and 'other factors associated with performance other than time of year' reported by 21% and 12.5%, respectively by those teachers who gave a comment. The category 'different factors for the different year groups' takes account of the differences between students at different grades. Teachers compared Third Years and Fifth years to Transition Years where there is more of a focus on exams for Third- and Fifth-Year students. Comments such as student are *'more focussed when exam times (state exams) are imminent'*, *'3rd year are more focused in Spring before their exams'* and *'students in 3rd year in Spring will perform better than 4th years in October/November'*. The difference between students in Fifth Year and Transition Year was also noted with the statement that *'5th year in the Autumn much more motivated after TY'*. Other factors that were noted that could be associated with performance other than time of year was *'day of the week - some days are very academic for students'*; *'family / personal circumstances at the time of testing'*, *'some children panic when they are singled out and especially when they don't feel they can prepare for a test'* and *'performance depends on the student, high-achievers should perform better in Spring, low-achievers should perform better in Autumn'*.

A small number of responses were coded to 'other' and were more general about the PISA test such as *'in general, PISA results are not an indicator of student achievements in schools'*; *'it would be beneficial to schools that are selected for PISA testing to see the results of*

those students’ and ‘I feel there is a deficit between PISA, NCCA Examinations and Commission and Maths teachers association’.

6.3. Summary of Key Points

While the results from the thematic analysis may not be generalisable, they do provide insights/explanations into why the performance of 15-year-olds in Ireland does not differ across Spring and Autumn administrations of the PISA tests. The first two themes identified from the thematic analysis provided factors that could be related to student performance in a Spring or Autumn testing. In having a Spring testing there is less of a concern of SLL, and engagement/motivation were considered better in the spring. These findings were also reflected in the teacher data. Similarly in conducting PISA in the Autumn some principals and teachers noted that it avoids the busy Spring term, and students are more motivated and focused.

The next three themes identified in the thematic analysis provided insights/explanations into why the performance of 15-year-olds in Ireland does not differ across Spring and Autumn administrations of the PISA tests. The first of these was the ‘Continuity of school life’. Principals noted such factors as engagement, motivation, and continuous parental support occurring throughout the school year which potentially allows for a more stable school environment for students. Just over one in ten teachers also were of the opinion that there would be no difference in performance when all these factors occur uniformly throughout the year. The second theme identified was ‘PISA support from education stakeholder’. This incorporates the opinions of principals that if the value and significance of PISA is presented to all, students will be encouraged and engaged with the test. The final theme identified was ‘School responsibility to support students’. This theme suggests that schools support students through various avenues such as wellbeing programmes, keeping them engaged with school, monitoring anxiety and through the curriculum, which in turn creates a more stable environment.

Chapter 7 Conclusion

The empirical study at the heart of this thesis was designed to examine the performance of 15-year-olds in Ireland when the administration of PISA reading, mathematics and science tests were moved from the Spring to the Autumn. This chapter provides a brief overview of the research questions and research design. Attention is then turned to a summary of the key findings and conclusions that can be drawn from the empirical study. The final sections of the chapter are focused on the study limitations, the implications of the findings and suggestions for further research. The thesis concludes with a short epilogue that seeks to capture the core contribution of this thesis.

7.1. Overview of the Research Questions and Research Study Design

PISA, a study of the Organisation for Economic Cooperation and Development (OECD), is administered to 15-year-old students, assessing their achievement in reading, mathematics and science every three years. In Ireland, PISA has traditionally been administered in schools in March/April, which is the earliest feasible time permitted by the international project timeline. It is a busy time for schools, and Ireland is not unique in experiencing challenges associated with the administration of PISA in the early Spring. By 2018, two northern hemisphere countries (United States and the United Kingdom) had moved their PISA testing from the Spring to the Autumn in an effort to improve response rates. While an analysis showed no association with performance in the United States from moving to the Autumn (Ferraro et al., 2009), in an Irish context, this has not been examined and hence the current study was required. The overarching research question was: *‘Would the performance of 15-year-olds in Ireland differ if the PISA tests were administered during the Autumn term rather than the Spring term?’* In studying this research question, relevant factors such as Summer Learning Loss, Opportunity to Learn and other learning-related variables were also examined.

The PISA 2018 Main Study (Spring testing) was carried out in Ireland in March and April 2018 and Autumn testing was carried out in October and November 2018. Both testing periods followed the same technical standards for PISA 2018 testing (OECD, 2020b) with the one main difference being sample sizes. A representative sample of 157 schools in Ireland was selected to

participate in PISA 2018 Spring testing, and 57 other schools⁷⁸ were subsequently sampled for the Autumn testing. The response rates at school and student levels were equivalent across Spring and Autumn. To complement the data on achievement and other school and student variables obtained in the two testing windows, additional data were gathered by the researcher from a sample of teachers (questionnaires) and a selection of principals (semi-structured interviews) in a subsample of schools involved in Autumn testing.

7.2. Key Findings and Conclusions

While participation rates were not the reason for a move to Autumn testing at this time, the analysis indicated that school participation rates were about the same in Spring and Autumn, with no differences in school or student response rates. The response rate for schools was 100% in the Spring and in the Autumn after replacements⁷⁹ it was also 100%. In Spring 2018, the unweighted student response rate was 82.5%, and it was 82.0% in the Autumn of 2018. PISA requires a minimum weighted participation (response) rate of 85% of originally sampled schools (Westat, 2016), which both testing windows achieved. Non-participation rates for different reasons (ineligibility, withdrawal, special educational needs, unexplained absence) were equivalent across Spring and Autumn.

PISA is an age-based assessment and therefore students are distributed over different grades. Moving PISA to the Autumn in Ireland means that there is a different distribution of sampled students across the grades. In the Autumn testing, Third Year (Grade 9) students accounted for approximately 27% of the students tested, while students in Transition Year (an optional Grade 10) accounted for 57%. This differs from Spring, where approximately 62% of the participating students were in Third Year and a further 28% were in Transition Year (TY). Moving PISA to the Autumn means that there were far fewer Third Year students (who were in their final year of the Junior Cycle programme) in the PISA sample and those that were included were not in the final months of exam preparation. The Transition Year, where there is less of a focus on examinations and assessment (Clerkin, 2016), accounted for a larger percent of the students in the PISA sample in the Autumn.

⁷⁸ This is in line with requirements for subnational entities in PISA. For the purpose of Autumn testing in Ireland, it is considered an adjudicated region for which the international contractors fully implement quality assurance and quality control mechanisms (OECD, 2020b).

⁷⁹ Four schools were replaced, as at the time of inviting schools to participate, as they had already been selected to take part in the TIMSS Field Trial in Spring 2018.

7.2.1. Moving PISA testing from Spring to Autumn and student performance

An examination of student performance at Spring and Autumn PISA testing showed that the mean scores for reading, mathematics and science were not statistically significantly different at the .01 level. In previous cycles, with the exception of 2009⁸⁰ cycle, Ireland's mean reading scores prior to 2018 ranged between 515.5 and 526.7, with the scores in Spring and Autumn 2018 falling within this range (518.1 and 515.8 respectively) (Figure 7.1). Again, excluding the 2009 cycle, Ireland's mean scores in mathematics ranged between 501.5 and 503.7 with the Spring and Autumn 2018 falling slightly outside this (499.6 and 496.7 respectively). While there was no statistical significant difference on science performance between Spring and Autumn 2018, the mean scores were slightly lower than in PISA 2015 (496.1 and 495.1 respectively). This was also the case across OCED countries, mathematics and science were lower in 2018 compared to previous cycles (OECD, 2019b).

Figure 7.1: Mean performance scores for PISA 2018 Autumn and Spring plotted with the baseline figures of previous cycles

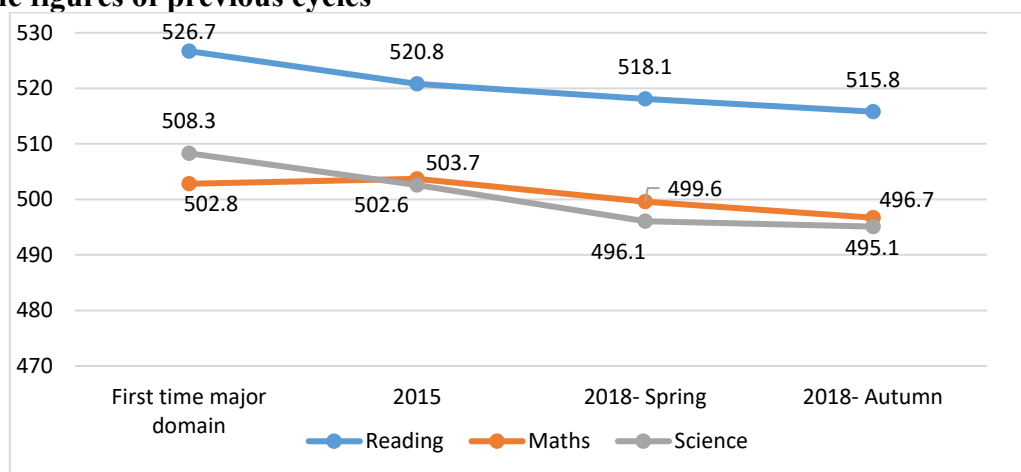


Table 7.1 presents a summary of the findings carried out when comparing performance on PISA tests conducted in Spring and Autumn. Students' performance on PISA was examined by comparing mean performance scores on the overall reading, mathematics and science scales between the Spring and Autumn PISA testing periods. There were no statistically significant differences. Third Year students were the only student subgroup where performance on the three scales was statistically significantly higher in the Spring compared to the Autumn.

⁸⁰ See Chapter 2, for further details.

Table 7.1: Summary of statistically significant differences when comparing performance on PISA tests conducted in Spring and Autumn, by background variables

		Gender			Grade			ESCS Quartiles				Immigrant language status		
		All students	Male	Female	3rd	TY	5th/6th	Lowest	Low-Med	Med-High	Highest	Native	Immig. & Eng./Irish	Immig. & other lang.
Overall performance on...	Reading	↔	↔	↔	↑	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Mathematics	↔	↔	↔	↑	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Science	↔	↔	↔	↑	↔	↔	↔	↔	↔	↔	↔	↔	↔
Low Achievers (%)	Reading	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Mathematics	↔	↓	↔	↓	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Science	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
High Achievers (%)	Reading	↔	↔	↔	↑	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Mathematics	↔	↔	↔	↑	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Science	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Reading Subscales (mean score)	Locate	↔	↔	↔	↑	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Understand	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Evaluate	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Single	↔	↔	↔	↔	↔	↔	↔	↑	↔	↔	↔	↔	↔
	Multiple	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Average percent correct	Reading	-	-	-	-	-	-	-	-	-	-	-	-	-
	Mathematics	↔	↑	↓	-	-	-	-	-	-	-	-	-	-
	Science	↔	↔	↔	-	-	-	-	-	-	-	-	-	-

Note. School level background variables have not been examined individually as most of the variability is within the schools rather than between the schools, see Table 3.13

- No statistically tests/analysis conducted.

↔ No statistically significant difference between Spring and Autumn.

↑ Statistically significantly (at either .01 level or .05 level) higher in Spring compared to Autumn.

↓ Statistically significantly (at either .01 level or .05 level) lower in Spring compared to Autumn.

Shaded cell indicates effect size $d > 0.2$ or $h > 0.2$.

Examining performance in terms of low-achievers (proficiency level below Level 2), performance was comparable across Spring and Autumn for all such students. Across the student subgroups, there was a statistically significant lower percentage of low-achieving males on the mathematics scale in the Spring compared to the Autumn. This was similar for low-achieving Third Years.

Examining performance in terms of high-achievers (proficiency level at Level 5 and above), performance was at the same level for across Spring and Autumn for all such students. Across the student subgroups, there was a statistically significant higher percentage of high-achieving Third Years on the reading scale and mathematics scale in Spring compared to Autumn.

Student performance on reading literacy was also reported by five reading subscales. Across all students, there were no statistically significant differences on any of five reading subscales. Across the student subgroups, Third Year students had a statistically significant higher mean score on the process locate subscale in the Spring compared to the Autumn. Students in the low-medium ESCS quartile scored statistically significantly higher on the single text subscale in the Spring compared to the Autumn.

Student performance was also examined by comparing percent correct scores on item types. Across all students, there was no statistically significant difference on the average percent score on science items and mathematics items between Spring and Autumn. Females had a lower average percent score across all mathematics items in the Spring compared to the Autumn, while males had a higher average percent score across all mathematics items in the Spring compared to the Autumn.

Taking into account the clustered nature of the data, multi-level modelling was also carried out to examine performance differences across testing windows in 2018. The initial models were similar to that conducted by Ferraro et al. (2009), controlling for school background characteristics. It was found that the time of year was not associated with PISA reading and science performance while controlling for key student and school background variables examined in the study. However, the coefficient for session on the mathematics performance was borderline statistically significant, and the interaction between ‘session’ and ‘gender’ was statistically significant. This interaction shows that being tested in the Autumn was more strongly associated with lower mathematics scores for males compared to females. These models were developed further to include other level 1 learning outcome variables that had an association with performance. The reading model included variables measuring exposure to content (e.g.

longest piece of text read), English learning environment (e.g. teachers' stimulation of reading engagement), engagement in school (e.g. skipping a whole day of school in the two weeks before PISA testing), motivation (e.g. enjoyment of reading) and other school outcomes (eudemonia: meaning in life). As mathematics and science were minor domains in PISA 2018, the final models for these did not include domain specific indicators, though they did include engagement (e.g. skipping a whole day of school in the two weeks before PISA testing), motivation (e.g. general self-efficacy) and other student variables (e.g. eudemonia: meaning in life). These final models indicate that, while controlling for the school and student background variables and other level 1 variables that are associated with performance which were examined in this study, time of year when PISA testing occurs is not associated with overall student performance. Furthermore, while there were a small number of significant interactions between time-of-testing ('session') and some level 1 variables, item parameters were small. While the final models on reading, mathematics and science performance on PISA presented in Chapter 5 concern the examination of 'session' on performance, many variables correlate with one another and re-affirm the associations between DEIS status, student ESCS, gender, endorsement of reading comprehension strategies etc. in explaining performance on PISA.

7.2.2. Factors associated with performance across Autumn and Spring PISA testing

Table 7.2 presents a summary of the statistically significant differences when comparing other factors associated with performance on PISA tests conducted in Spring and Autumn. The first factor considered is 'Opportunity to Learn'. Across all students, in the Spring a larger proportion of students reported reading texts that include diagrams/maps/tables or graphs compared to the Autumn when more students reported reading fiction and digital texts. A statistically significant higher percentage of students reported to have read '*101 or more pages of a text*' in the Spring compared to the Autumn. A statistically significant higher percentage of student reported being asked by their teacher to carry out reading activities that require more cognitive capabilities in Spring compared to Autumn. Across all students, there were no statistically significant differences on indicators of students' perceived learning environment between Spring and Autumn. This included teachers' stimulation of reading engagement, teacher feedback and teacher-directed instruction. There were no statistically significant differences between Spring and Autumn on five of the indicators of engagement with school examined in this study. There was a statistically significant higher percentage of students reporting that they did not *skip a whole day* in the two weeks prior to PISA testing in the Spring compared to the Autumn. Of the seven indicators examined in this study to measure motivation, there were no statistically

significant differences between Spring and Autumn. Across all students there was a statistically significant higher mean score on the index of subjective wellbeing: positive affect in the Spring compared to the Autumn. Of the four indicators examined in this study to measure the general learning environment, only the attitude toward school/learning activities had a statistically significant higher score in the Spring compared to the Autumn. The remainder of this section will present the findings across the key student sub-groups.⁸¹

⁸¹ School level background variables have not been presented individually as most of the variability is within the schools rather than between the schools, see Table 3.13.

Table 7.2: Summary of statistically significant differences when comparing other factors associated with performance on PISA tests conducted in Spring and Autumn, by background variables

		Gender			Grade		ESCS Quartiles				Immigrant Language Status			
		All	Males	Female	3rd	TY	5th/6th	Low	L-M	M-H	High	Native	Immig+ E/I	Immig+oth lang
RQ3	Texts- diagrams or maps	↑	↔	↑	↔	↔	↔	↑	↑	↔	↑	↑	↑	↔
	Fiction (e.g., novels,)	↓	↓	↔	↔	↔	↔	↔	↓	↓	↓	↓	↔	↓
	Texts- tables or graphs	↑	↑	↑	↔	↔	↑	↑	↑	↑	↑	↑	↑	↔
	Digital text- links	↓	↔	↔	↔	↔	↔	↓	↔	↓	↓	↓	↓	↔
	101 or more pages	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
	Discuss in small groups	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Answer Q's about book/chapter	↑	↑	↔	↔	↔	↔	↑	↔	↑	↑	↔	↔	↔
	Compare books	↑	↔	↔	↑	↔	↑	↔	↑	↑	↑	↑	↑	↔
	Teachers' stimulation	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Teacher feedback	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Teacher-directed instruction	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Adaptive instruction	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Disciplinary climate English	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
RQ4	Did not skip a whole day	↑	↑	↔	↔	↔	↔	↑	↔	↔	↔	↑	↔	↔
	Did not skip class	↑	↑	↔	↔	↓	↔	↔	↔	↔	↔	↑	↔	↔
	Did not arrive late	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Sense of belonging	↔	↔	↔	↔	↔	↔	↔	↑	↔	↔	↔	↔	↔
	Teacher-student support	↔	↔	↔	↔	↔	↔	↔	↔	↔	↑	↔	↔	↔
	Understanding-remembering	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Summarising	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Assessing credibility- sources	↑	↔	↑	↑	↔	↔	↑	↔	↔	↔	↔	↔	↑

Note. Table continued on next page

Condt. Table 7.2: Summary of statistically significant differences when comparing other factors associated with performance on PISA tests conducted in Spring and Autumn, by background variables

		Gender		Grade			ESCS Quartiles				Immigrant Language Status			
		All	Males	Female	3rd	TY	5th/6th	Low	L-M	M-H	High	Native	Immig+ E/I	Immig+oth lang
RQ5	General self-efficacy	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Perceived competence- reading	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Perceived difficulty- reading	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Enjoyment of reading	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Attitudes towards competition	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Motivation to master task	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	General fear of failure	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
RQ6	SWB: positive affect	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
RQ7	Attitude school/learning	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Perception of compete	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Perception of coop	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
	Bullied	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔

Note. **RQ3**. Opportunity to Learn (OTL) **RQ4**. Engagement **RQ5**. Motivation **RQ6**. Wellbeing **RQ7**. School learning environment.

- No statistically tests/analysis conducted.

↔No statistically significant difference between Spring and Autumn.

↑Statistically significantly (at either .01 level or .05 level) higher in Spring compared to Autumn.

↓ Statistically significantly (at either .01 level or .05 level) lower in Spring compared to Autumn.

Shaded cell indicates effect size $d > 0.2$ or $h > 0.2$.

Male students

The mean scores for males on the reading, mathematics and science scales were higher in the Spring compared to the Autumn, though the differences were not statistically significant. There was a statistically significantly higher percentage of low-achieving males in the Autumn on the mathematics scale compared to the Spring. While there was a statistically significant interaction between ‘session’ and ‘gender’ on the mean mathematics score when controlling for student and school-level background variables, the interaction was not statistically significant when other level 1 learning outcomes associated with performance were added.

With respect to some of the other factors, the behavioural engagement of males, as measured by PISA, shows that a statistically significantly higher percentage reported *not skipping 1-2 whole days* prior to Spring testing compared to Autumn testing. Table 7.2 also shows that male students had a statistically significant higher mean score on the index attitude to school/learning activities in the Spring compared to Autumn. Regarding the motivation to master tasks, a statistically significantly higher percentage of male students *agreed/strongly agreed* that they found satisfaction in working as hard as they can in Spring compared to Autumn.

This study indicated that moving PISA testing to the Autumn in Ireland may disadvantage male students, in particular low-achieving male students on the mathematics scale. This interaction between ‘session’ and ‘gender’ on the mean mathematics score and the engagement/motivation of males at different times of the year are important issues that requires further investigation.

Female students

Table 7.2 indicates that the mean scores for females on the reading, mathematics and science scale were not statistically significantly different across Spring and Autumn. While the difference in performance on the mathematics scale was not statistically significant across the testing windows, females not only scored higher in the Autumn (500.1) than the Spring (496.7), but they also achieved at a higher level than males (a reversal of the Spring testing).

With respect to other factors such as the behavioural engagement, emotional engagement and general self-efficacy, there were no statistically significant differences on these scores for female students tested in the Spring compared to those tested in the Autumn. However, female students reported greater enjoyment of reading in the Spring compared to the Autumn (statistically significant). This finding was similar to that reported by Opdenakker, Maulana and den Brok (2012), who found that girls report higher autonomous motivation (i.e. intrinsic motivation) over time. Table 7.2 also shows that female students had a statistically significant

higher mean score on the indices attitude to school/learning activities and subjective wellbeing: positive affects in the Spring compared to Autumn.

In conclusion, the results from this study indicate that time of PISA testing is not associated with the performance of females. While females had more positive feelings and a greater enjoyment of reading in Spring compared to males, the main difference between the genders was in their behavioural engagement, with a higher absence rate in Autumn for males and no difference between the testing periods for females.

Third Year students

As would be expected, Third Year students tested in Autumn, who still have most of a school year to go before completing the Junior Cycle programme and associated assessments, scored statistically significantly lower, across all domains, than Third Year students tested in Spring, who had nearly completed the Junior Cycle programme and were ready to take the Junior Cycle state examinations.

Findings from the teacher data found that while there was revisiting of curriculum content done with Third Year students in the first six weeks of the academic year, it was mainly done in the first two weeks. The topic/skill/learning outcome reported to have been revisited the most by teachers of English was ‘poetry’, mathematics teachers reported revisiting ‘algebra’ the most, and science teachers reported the topic/skill/learning outcome revisited the most was ‘biology’. However, a large proportion of science teachers reported that they were covering new topics/skills/learning outcomes with their Third Year students in the first six weeks of the academic year.

With reference to some of the reading activities that Third Year students were asked to engage in, a statistically significantly higher percentage of them reported that they were asked to ‘compare a book with other books or texts on a similar topic’ in the Spring (63.3%) compared to the Autumn (51.9%). This task may require more cognitive capabilities than other tasks presented to students in the PISA test such as describing characters. There was no overall difference in the English Learning Environment reported by Third Year students. There was also no difference between Spring and Autumn in Third Years’ behavioural engagement in terms of *skipping classes/whole days* or not in the two weeks prior to PISA testing or in their emotional engagement. Third Year students had a statistically significantly greater sense of perceived competence in reading at Spring compared Autumn. Third Year students who had just sat their Junior Cycle mock exams expressed a greater fear of failure than Third Year students tested in

the Autumn who have just started into the final year of their Junior Cycle programme, with the difference statistically significant.

In conclusion, the findings from this study indicate that while the performance of Third Year students in the Autumn is statistically significantly lower than Third Year students tested in the Spring, the results show a greater ‘fear of failure’ for Third Years tested in the Spring compared to those tested in the Autumn. It would seem that testing in the Autumn favours Third Year students more in this regard as the Junior Cycle exam is further away. Also, as noted earlier, there are proportionately fewer Third Year students in the PISA sample for Autumn testing.

Transition Year students

Transition Year students tested in the Autumn scored higher than Transition Year students tested in the Spring across all domains (1.5 higher on the reading scale, 0.8 higher on the mathematics scale and 2.2 points higher on the science scale), although not statistically significantly higher. Transition Year students still scored significantly higher than students at the other grade levels at Autumn testing across all domains, as was also the case with the Spring testing.

Examining the topics/skills/learning outcomes reported to have been covered by teachers teaching Transition Year students in the first six weeks of the academic year shows the introduction of ‘media studies’ and ‘analysis of text’ (which includes ‘critical thinking’, ‘reviews’ and ‘analysing and appreciating styles of writing’). Within the mathematics curriculum, topics/skills/learning outcomes reported to have been covered by the teachers was the introduction to ‘problem solving’, which was not reported by any of the mathematic teachers teaching Third Year students (perhaps indicating less conscious instructional attention to problem solving at that level). There was also the introduction of ‘other skills’ such as ‘research skills’ reported by science teachers. Regarding revisiting topics/skills/learning outcomes, mathematic teachers teaching TY students reported spending an average 30.3% of their teaching time in the first six weeks of the academic year revisiting topics/skills/learning outcomes. This compares with mathematics teachers teaching Third Year and Fifth Year students where approximately 20% or less of their teaching time was spent revisiting topics/skills/learning outcomes in the first six weeks of the academic year.

With respect to some of the other factors such as behavioural engagement, there was a 4.2 percentage increase (significant at the .05 level) among Transition Year students *skipping class 3 or more days* in the Spring compared to the Autumn. Examining teachers’ reports on their students’ engagement, there was a higher percentage of teachers of Transition Year students (42.0%) *strongly agreeing/agreeing* that their students were more engaged with learning in the

Autumn than the Spring, compared to teachers teaching Fifth Years (37.8%) and Third Years (27.9%). Similarly, slightly more teachers teaching Transition Years *strongly agreed/agreed* that their students seemed to engage better with study (28.1%) and completed their homework (37.1%) in the Autumn, than teachers teaching Fifth Years (26.9% and 34.2%, respectively) and Third Years (18.9% and 30.1%, respectively). When asked to compare their Third Year students with their Transition Year students, over eight in ten teachers across English, mathematics and science, *strongly agreed/agreed* that their Third Year students were more focused on their schoolwork than their Transition Year students.

In summary and on the basis of findings derived from this study, the move to testing in the Autumn does not appear to be associated with the performance of Transition Year students in a negative way. The results of teacher interviews noted the introduction of new topics/skills/learning outcomes presented to TY students. The time spent re-visiting at the beginning of the academic year potentially could have mitigated any Summer Learning Loss, in particular for Transition Year students studying mathematics. Many of the low-achieving males who did not do so well in mathematics in the Autumn, as noted above, may not be part of this group as they tend not to do TY. The lack of targeted revision and the behavioural engagement of males may have contributed to lower performance of male students in mathematics in the Autumn. The results, both from the students' and teachers' perspectives, would indicate that the engagement of Transition Year students is better in the Autumn than the Spring. Nevertheless, it should be noted that the nature of TY experiences may also evolve over the school year, with more trips, work experience activities and cultural activities (plays) in the Spring, compared with the Autumn, and these are key features of TY.

Fifth/Sixth Year Students

Fifth/Sixth Year students accounted for 8.5% of students when PISA was administered in Spring compared to 20.5% in Autumn. Due to the optional Transition Year programme in schools, students in Fifth Year will have either come straight from Third Year or will have completed Transition Year. Fifth/Sixth Year students tested in the Autumn scored lower than Fifth/Sixth Year students tested in the Spring across all domains, although not statistically significantly lower. Topics/skills/learning outcomes covered by teachers teaching English, mathematics and science teachers were similar to those covered by teachers teaching Third Year students with similar amounts of time spent revisiting. Similar to Third Year students, there was also no statistically significant difference between Spring and Autumn in their behavioural engagement in terms of skipping classes/whole days or not in the two weeks prior to PISA testing or in their

emotional engagement. A higher percentage of Fifth Year students (88.3%) in the Spring *strongly agreed/agreed* that 'trying hard at school is important' compared to the Fifth Year students in the Autumn (82.8%). In summary Fifth/Sixth year students have similar characteristics to Third Year students with regard to engagement and their lower performance in the Autumn may be due to the mix of students (some having completed TY and others not) starting Fifth Year.

Students across the ESCS quartiles

While there were differences across all ESCS quartiles on the reading, mathematics and science scale between Spring and Autumn, none were statistically significant. The largest differences between Spring and Autumn were for students in the low-medium quartile (score differences of +9.4 on the reading scale, +7.8 on the mathematics scale and +7.3 on the science scale in Spring).

The differences in the performance of students in the low-medium ESCS quartile can be seen when examining the differences in performance of the low-achieving students *within* the testing periods. Across the three domains, the percentage of low-achieving students in the low-medium ESCS quartile was statistically significantly different and higher from the lowest ESCS quartile in Spring but not in the Autumn, where there was no statistically significant difference between the proportions of low-achievers in the two subgroups.

Focusing on the students in the lower two ESCS quartiles, more students in the lowest ESCS quartile reported *skipping 1 or 2 whole days* in the two weeks prior to the Autumn testing compared to the two weeks prior to Spring testing. Students from the low-medium ESCS quartile had a mean score on the sense of belonging index statistically significantly higher in the Spring compared to those tested in the Autumn. Linked to ESCS, a higher percentage of students from DEIS schools reported that their teachers in *every/most of their lessons* 'help students with their learning' compared to the Spring. Table 7.2 shows that, students from the low-medium ESCS quartile tested in the Spring reported greater resilience (general self-efficacy), motivation to master tasks, subjective-wellbeing: positive affects and attitudes towards school/learning activities than those tested in the Autumn.

The findings from this study indicate that students in the lower ESCS quartiles did not perform as well on the PISA tests in the Autumn compared to the Spring although the differences were not statistically significant. Students in the lower-medium ESCS quartile who were tested in the Spring have greater engagement and motivation compared to those students tested in the Autumn.

Migrant students

Across the three domains, while migrant students (both those with English or Irish at home, and those with another language) had higher mean scores in the Spring compared to the Autumn, the scores were not statistically different (Table 7.2). The differences in the performance of migrant students can be seen when comparing how they perform against native students *within* the two testing periods. The mean reading score of ‘immigrant students who spoke English or Irish’ at home was not statistically different from that of native students in the Spring testing; however, the mean reading score difference between the two groups in the Autumn was statistically significantly different and performance was lower for the immigrant group. This suggests that the Autumn testing may have disadvantaged the ‘immigrant students with English and Irish at home’ on the reading literacy scale.

There was no statistical significant difference between Spring and Autumn for migrant students in their behavioural engagement with school. In contrast, a larger percentage of native students reported *skipping 1 or 2 whole days* in the two weeks prior to the Autumn testing compared to Spring testing, with the difference significant at the .01 level. Migrant students with English/Irish had a statistically significantly higher mean score on the index of enjoyment of reading in the Spring compared to the Autumn. Migrant students may have had the time to become more familiar with the language and develop an enjoyment of reading. Migrant students who spoke another language had a higher score on the ‘motivation to master tasks’ index in the Spring compared to the Autumn (statistically significant) and they also had more positive feelings in the Spring compared to the Autumn, also a statistically significant difference.

The findings from this study indicate that there was no statistically significant difference between the performance of migrant students (those with English and Irish and with another language) in the Spring and those tested in the Autumn. They were more intrinsically motivated in the Spring. However, compared to native students, their behavioural engagement is no different in the Autumn compared to Spring.

7.2.3. Factors that help to explain why outcomes from PISA Autumn and Spring testing were similar

In seeking to understand why there was no overall difference in performance, the contextual backgrounds of the students were examined, along with the data from the thematic analysis of the semi-structured interviews with the principals and from teachers who completed a questionnaire as part of the Autumn study.

Mitigating against Summer Learning Loss (SLL)

One of the main concerns with conducting Autumn testing in Ireland was the possibility of Summer Learning Loss (SLL). Very little research on SLL has been carried out in Ireland and the research that has been conducted, particularly in the United States, mainly involved children in the early years of schooling (primary schools). The lack of research in this area was one of the key reasons which prompted the use of a mixed methods approach in this study, in particular, interviews with the principals from a sample of schools in the Autumn study. According to some principals, SLL was not something that was really monitored in the schools, and returning to school after the summer holidays was not just about the academic aspects but also helping the students to ‘*settle in*’. In dealing with any potential SLL, it was noted that there was revisiting of topics/skills/learning outcomes done in the first few weeks of the new academic year but that it was considered by the principals to be for only a short period and that ‘*there is built-in revision within different topics*’ throughout the year. While SLL was not considered as a big issue by the principals in this study, it should be noted that there were no interviews conducted with principals in DEIS (very disadvantaged) schools.

In mitigating against SLL in the first few weeks of the academic year, teachers can revisit topics/skills/learning outcomes. Just over eight in ten teachers in the sample reported revisiting topics/skills/learning outcomes in the first six weeks of the academic year across all grades; moreover, the average percent of their teaching time spent revisiting was less than 20%. For those who reported revisiting topics/skills/learning outcomes at the beginning of the academic year, the majority reported that the revisiting occurred in the first two weeks. This is slightly less than was reported in a study conducted in the United States (NSLA, 2013,) where teachers were reported to have spent 3-4 weeks re-teaching the previous year's skills at the beginning of a new school year.

While PISA is not curriculum-based, there is a similarity between the content in PISA tests and topics included in the Junior Cycle programme in Ireland. As part of an examination of SLL, teachers were asked to record the topic/skills/learning outcomes covered in the first six weeks of the academic year, to provide a measure of exposure to content. The three topics/skills/learning outcomes covered by English teachers (mainly with Third Years and Fifth Years) at the beginning of the academic year, were ‘writing’, ‘poetry’ and ‘drama’. This may reflect the cumulative nature of the Junior Cycle and Leaving Certificate English curricula, where content covered in Second and Fifth years may be formally examined at the end of the Third and Sixth years, and hence needs regular review. ‘Understanding and comprehension’ was

also reported but not to the same extent; however, this topic/skill/learning outcome may also be covered indirectly when teachers are reviewing ‘poetry’, ‘drama’ or ‘novels/fiction’.

Mathematics teachers across the three grades examined tended to cover Algebra in the first six weeks. Topics/skills/learning outcomes within ‘Geometry/Trigonometry’ were covered by almost four in ten teachers teaching Third Year students, with smaller proportions of teachers teaching Transition Year and Fifth Year covering this topic in the beginning of the academic year. While there seemed to be more focus by teachers on the Algebra early in the school year, there were no statistically significant differences in mean percent correct scores between Spring and Autumn on the four content categories in mathematics (‘change and relationships’; ‘quantity’; ‘space and shape’ and ‘uncertainty and data’).

Just over two-thirds of Science teachers reported covering Biology in the first six weeks of the academic year. Earth and Space, Chemical and Physical were reported by approximately 22% to 27% of teachers teaching Third Year students. Fewer teachers reported covering Earth and Space with their Transition Year and Fifth Year students, which may be reflected in the slightly higher average percent correct on the ‘Earth and Space’ items achieved by students in Spring (53.2%) compared to Autumn (51.8%). The difference is statistically significant at the .05 level. It should also be noted that across the three domains covered by PISA, it was the science teachers (across all the three years examined) who were more likely to cover new topics/skills/learning outcomes in the first six weeks of the academic year.

In summary, the content covered by teachers in the first six weeks of the academic year, while a mixture of new and revisited, does not appear to be associated with the overall performance of students sitting the PISA test in the Autumn. Although overall performance on the science scale was not associated with time of testing, the strand ‘Earth and Space’ was covered by fewer teachers with their Transition Year students (the largest group in the Autumn testing) and was also more likely to be reported as a new topic with Third Year students.

Continuity of school life

A theme identified from the principals’ data, ‘continuity of school life’, was seen as a factor that could help with understanding why there was no difference in performance between Spring and Autumn. Continuity of school life means that various aspects of student life are held constant throughout the school year, for example student engagement with school. Some principals noted that they were keen to keep track of student wellbeing and were always keen to get feedback from studies in which they participate, which measure these indicators. From the student data, students tested in the Spring showed no statistically significant difference in their levels of

emotional engagement to those tested in the Autumn (based on the indicators for sense of belonging and teacher support in English class). While some research indicates that changes in the student-teacher relationship can be an issue during adolescence (Goodenow, 1993; Smyth, 2013; Opdenakker et al., 2012), the principals in this study noted that keeping teachers with the same students as much as possible, for example, through three years of the Junior Cycle programme, encourages positive teacher-student relationships. However, from the student data in this study, a statistically significant difference in the behavioural engagement of students was observed across Spring Autumn testing, with more students reporting that they *skipped a whole day or classes* in the two weeks prior to PISA testing in the Autumn compared to the Spring.

Principals noted that motivation was constant throughout the year. Issues such as anxiety were mentioned by principals as not solely happening at a particular time of the year: *'if there are students who are prone to anxiety, it doesn't matter what time of year it is'*. This was also the finding from the student data. There were no statistically significant differences between Spring and Autumn on the mean scores for students' enjoyment of reading, students' perception of their ability, general self-efficacy, perceived competence in reading, perceived difficulty in reading and general fear of failure.

The principals also noted that there was continuous parental involvement in schools and structures in place to encourage students to support each other. Results from the student data found that on three of the four indicators related to the general learning environment measured in PISA, there were no statistically significant differences between Autumn and Spring testing.

The results from both the student data and interviews with principals indicated stability between the two testing periods.

School responsibility to support students

The theme 'School responsibility to support students' was identified in the thematic analysis as a factor that could help understand why there was no difference in performance between Spring and Autumn. The theme includes factors such as schools supporting students with various aspects of their school and everyday life, including wellbeing, engagement with school, motivation, and anxiety. The principals mentioned various activities organised throughout the school year such as *'friendship weeks'*, *'school trips'* and *'year group assemblies'* to help support students. Of the three indicators of student wellbeing, only the affective element of subjective wellbeing (positive feelings) saw a small but statistically significant decline (at the .05 level) between Spring testing (-0.09) and Autumn testing (-0.16) across all students. Principals also noted that, while their schools have access to computers, it is the teachers who drive the use of

computers. Encouraging the use of computers enables students to build their knowledge, competency, and skills in this 21st century digital era. The Transition Year programme was noted by principals as offering a variety of activities that help students build on their skills, which also keeps them motivated. The Junior Cycle was noted by principals to motivate the students and encourage a love of learning. It was also mentioned by principals that students were supported when teachers monitor the volume of class tests being done to avoid any undue anxiety. Some principals mentioned that the school needs to keep parents involved and this was done through parent-teacher meetings, which they noted help with the academic and emotional development of the students.

Support for PISA from education stakeholders

The theme ‘PISA support from education stakeholders’ encapsulates the importance of participating in the PISA study. Principals in this study noted that conducting the PISA test in a positive environment showed the importance of the study to the students and encouraged them to put effort into doing the test, whether it be the Autumn or Spring. One principal noted that all the schools were encouraged by their patron body to take part in PISA if they were selected, noting that the support for PISA is not just at school level. Principals noted that participation was good for benchmarking nationally and internationally.

Conclusion

The opportunity to move PISA to the Autumn was based on the premise that there would be no difference on average performance on the reading, mathematics and science scales because PISA is not a curriculum-based test and the sample is adjusted based on age (i.e. all students tested would be between 15 years and 3 months to 16 years and 2 months depending on time of testing). The results from this study indicate that, overall, there was no difference on performance between Spring and Autumn testing. To strengthen the argument to move to Autumn testing, findings from the student, teacher and principals’ reports showed an obvious lack of SLL, with broad topics/skills/learning outcomes covered early in the school year in the three domains assessed. It was also noted that the continuity of school life, and the responsibility of schools to support students meant that students would respond positively to PISA, regardless of when it was administered. Finally, it was reported that the support from educational stakeholders promotes a positive attitude to participation in PISA, regardless of when it is administered.

7.3. Limitations of the Study

Given that, insofar as possible, all procedures and testing conditions were kept constant across the Spring and Autumn studies, the main caveat concerning the analyses in this study relates to the differences in the sample sizes. The Spring sample had 157 schools assessing 5,577 students and the Autumn sample, although fully representative, had a smaller sample of 57 schools, assessing 1,988 students. As noted earlier, Ireland was regarded as an adjudicated region by the Educational Testing Service for Autumn testing, and hence it applied procedures used to gather data in such regions during a PISA main study assessment (for example, Northern Ireland has been an adjudicated region in PISA). The cost of implementing a full-scale survey for the second time in the same year would not have been feasible, from either logistical or financial points of view. Another factor constraining the size of the sample in the Autumn is the relatively small pool of PISA eligible post-primary schools in Ireland. In 2018, there was 694 eligible schools and, after a sample for a PISA Main Sample study had been selected, along with a PISA Field Trial sample, and a Main study sample for TIMSS 2019, the pool of remaining eligible post-primary schools was very small. To take variation in sample sizes into account, standard errors were generated⁸² for each statistic. As the sample size gets closer to the true size of the population, the sample means cluster more and more around the true population mean (Cohen et al., 2011). Therefore, the smaller Autumn sample, although fully representative, is less precise, and will in turn give rise to somewhat larger standard errors than in Spring. While the application of the standard errors in the generation of confidence intervals (whether at 95% or 99%) is necessary in testing for significant differences, there is the potential to lose out on important differences. An example of this is in the comparison of the performance of native and migrant students, where there was a statistically significantly higher percentage of high-achievers among native students in the Spring but the difference was not statistically significant in the Autumn. The larger standard error in the Autumn may have had an impact on this interpretation. This means that the structure of the adjudicated sample works well when comparing overall performance between Spring and Autumn, but may work less when the focus switches to the comparison of subgroups, especially smaller ones. With regard to the specificity of the research, the likelihood of a Type 1 error increases as the number of comparisons between Spring and

⁸²As noted in Chapter 3, the IEA IDB Analyser applies a macro to the analysis and corrects the standard error to account for both measurement error (i.e., each student attempts only a portion of the total test item pool) and sampling error (i.e., taking into account that, in both Spring and Autumn, achievement estimates are based on samples of post-primary schools rather than the full population of post-primary schools).

Autumn increases. It should also be noted that, whilst statistically significant differences were reported, the effect sizes were small to moderate, indicating that the differences were minor.

While the qualitative element of this study was the minor element of the mixed methods approach taken, it provided insights into factors that help explain similarities and differences in performance across the two testing periods. The sample of principals was purposive and those who responded to the invitation to interview were probably more favourably disposed to carrying out of large-scale studies such as PISA. However, as is often noted, one of the limitations of qualitative research is that the results cannot be extended to a wider population (Myers, 2000) (principals in Ireland in this instance). Meyers (2000) notes that a more personal understanding of the situation can contribute valuable knowledge to the research. However, while interviews were conducted with principals working in most of the school types, it was not possible to undertake an interview with principals representing DEIS (disadvantaged) schools.

The validity of the interview responses was supported by cross-referencing or triangulating (Anderson, 2010). In the case of the current study, the data obtained from the students (the quantitative data) examining the outcome variable *fear of failure* showed no statistical significant difference between Spring and Autumn. This triangulates with the view expressed by principals during interviews that anxiety has become more prevalent over the last number of years and does not arise solely at a particular time of the year. In sum, while the qualitative elements of the current study have limitations, they have also contributed to the understanding of performance in Spring and Autumn on the PISA tests, thereby justifying the mixed methods approach taken.

A limitation of PISA more generally and, in particular, in the current study, is the information about the classroom teaching and learning interactions. Some of the most central things that matter in education such as critical thinking, self-management, resourcefulness, and relationship skills that are hard to measure using students' responses to questionnaires, can be detected by teachers using their own judgments (Rizga, (2016) as cited by Araujo et al., 2017). In this study, a teacher questionnaire was administered to a sample of teachers teaching English, mathematics and science subjects, but the main focus was on examining the topics/skills/learning outcomes addressed in the first six weeks of the academic year and the time spent revisiting them. The questionnaire was limited in its scope in terms of the number of questions that was presented so as not to overburden the participants. Other questions could have been presented, such as the extent to which teaching practices are adjusted in the Spring compared to the Autumn,

if there are adjustments made at particular grades for particular groups of students during the year, their students' resourcefulness, personal history and personal activities.

While the validity of the items/constructs in PISA had been thoroughly checked by expert groups and reliability tests were implemented (see, for example, the PISA 2018 technical report, OECD, 2020b, Chapter 16), this research study was limited to the use of those constructs measured in the PISA study. There are other indicators of engagement that have been used in Ireland such as, 'the amount of time spent on homework', 'messed in class', 'had to do extra work as punishment (including lines)', and 'had to do detention (after school or at lunch-time)'. The 'amount of time spent on homework has been found to be highly predictive of student performance at second level in education (Thornton et al., 2016). The number of minutes allocated to homework in reading/English, maths and science could be interpreted as a measure of engagement and may differ between Spring and Autumn. While considering the limitations of the measures used in PISA, the validity of comparing the measures over a six-month period is worth noting.

Finally, the findings of this study were based on reading as a major domain and mathematics and science as minor domains for both the Spring and Autumn testing. In recent cycles, the distinction between major and minor domains has begun to become less distinct, with much larger numbers of items used for minor domains. However, it is difficult to determine whether the findings would be similar if mathematics was the major and the other two the minor domains, as will be the framework for PISA 2022.

7.4. Implications of the Study

Following the findings earlier in this chapter, this section examines the implications for principals, teachers and students and for policy makers.

For principals, teachers and students

In June 2021, the Educational Research Centre made an application to the OECD to move the PISA 2022 Main Study to Autumn 2022. As part of the application, the initial results of the current study (Denner, 2020) were included, indicating that there was no statistically significant difference in the overall performance on the PISA reading, mathematics or science scales when PISA 2018 was conducted in the Autumn, compared with the Spring. The application was successful.

The issues that could be alleviated by moving to Autumn testing were noted in Chapter 1. In schools, particularly for the students, the staff and management of schools, challenges such

as: management and completion of Classroom-Based Assessments (for Junior Cycle certification), mock exams (in preparation for the Junior Cycle final exam) and practical exams had to be factored into scheduling decisions when testing occurred in the Spring. Concerns around these issues, when planning PISA test day, may now be alleviated.

With the move to Autumn testing, the distribution of students in the different grades will mean that there are fewer PISA eligible students preparing for state examinations in the same school year. Also, the students in Third Year who are selected to participate in the Autumn testing will have some distance between October and the final written exam in June, compared to the Third Year students who had been tested in the Spring in previous cycles, who had less than three months.

A key concern with conducting PISA testing in the Autumn was the potential of Summer Learning Loss. Very little research has been conducted in Ireland on the topic and the data from this study would indicate that testing six weeks into the academic year appears not to be associated with change in overall performance on PISA. However, this study points to a number of issues around the engagement of students in learning following the summer break, including the behavioural engagement of males, where there was a statistically significant larger percentage who reported skipping a whole day in the two weeks before the PISA test in the Autumn compared to the Spring. Similarly, students in the low and low-medium ESCS quartiles have a more negative ‘attitude to school’, lower ‘sense of belonging’, lower level of ‘general self-efficacy’ and less ‘positive feelings’ compared to students tested in the Spring. While students in these lower ESCS quartile perceive greater levels of support in relation to their learning in the Autumn compared to the Spring, these other learning outcome issues could be addressed by schools and teachers as students settle back after the summer break. Additionally, in the Spring term, more attention may need to be given to those students who are participating in the Transition Year programme to ensure that they continue to be fully engaged in learning.

A final area where principals and teachers could consider giving attention to is in relation to the appropriate strategies to use when assessing the credibility of sources. There was a statistically significantly lower awareness among students tested in the Autumn of the appropriate strategies to use when assessing the credibility of sources than students in the Spring. Consideration should be given by principals and teachers to raising students' awareness of a range of print and online reading strategies from the beginning of post-primary schooling, using a range of appropriate texts.

For policy-makers

The results from this study show that the overall mean scores on the PISA reading, mathematics and science scales are similar whether PISA is administered in the Spring or the Autumn. Similarly, the percentages of students below proficiency Level 2 (low-achievers) and the percentage of those at level 5 and above (high-achievers) were also similar in both testing periods. It is reasonable to conclude then that achievement of the national targets established in the National Strategy to Improve Literacy and Numeracy 2011-2020 (DES, 2011; 2017a) can be evaluated beyond 2020 using data gathered in the Autumn. Similarly, in relation to the targets set in the Strategy for DEIS post-primary schools, the results of the current study indicate that, while the percentages of low-achieving students in DEIS schools by domain are slightly higher in the Autumn testing compared to the Spring, the differences are not statistically significant. Also, there is no statistically significant difference across the two testing periods in the rather low percentages of high-achievers in DEIS schools. This indicates that the data gathered in the Autumn can be used to evaluate the achievement of these targets, and to set new ones, similar to what has been done with Spring data.

While the Strategy notes that there is a gender gap in the performance on reading (in favour of females) and on mathematics (in favour of males), Autumn testing showed slight increases on these gaps and even a reversal on the mathematics scale, where females performed better than males in the Autumn (though not to a statistically significant extent). It was noted in the Strategy that there was a need to increase females' interest in mathematics; however, while this should always be an objective for both males and females, improving the performance of the lower-achieving males may require that greater attention be paid to behavioural engagement, especially in the Autumn term. Consideration should be given to establishing target levels of proficiency for male and female students, in particular the percentage of low-achieving males (of whom there was a statistically significantly larger proportion in the Autumn testing compared to the Spring).

The Literacy and Numeracy Strategy notes that schools should prioritise the needs of EAL students, and children whose first language is not English or Irish. This is especially important for DEIS schools as they cater for large numbers of children for whom English or Irish is not spoken at home (DES, 2017b). The results of the current study indicate that the PISA Autumn testing did not favour the immigrant students. Consideration should be given by policy makers to provide more resources for teachers/schools to focus on students from immigrant background to help them settle in after the summer break. In addition, the DoE could set up summer programmes to support the learning of immigrant students.

Finally, how the Covid-19 pandemic will interact with PISA 2022 is unknown at this stage. A major implication of having conducted the study is that baseline data for PISA Autumn testing are now available for use in future comparisons.

7.5. Recommendations for Further Research

Building on the multi-level model conducted in this study, further research on the inter-relationships among variables could be examined including treating other learning outcomes as dependent variables and testing the relationship of ‘Session’ (Spring and Autumn) on each one. Consideration could also be given to implementing structural equation modelling (SEM). This is a multivariate statistical analysis technique for exploring relations between latent constructs and measured variables (Hartwell et al., 2019). It could help with understanding the relationships of motivational and engagement variables with performance in Spring and Autumn, in particular male behavioural engagement and the significant difference in the performance of low-achieving males in mathematics in the Autumn compared to the Spring.

The idea underpinning Transition Year at a policy level is that students should be allowed time to devote their attention to developing their interests and enhancing personal and social maturity without the academic pressures of high-stakes exams (Clerkin, 2018). While acknowledging the purpose of the Transition Year programme, the results from this study indicate that the mean scores for TY students are relatively similar in Autumn and Spring, notwithstanding some age differences. It should also be noted that Transition Year students performed significantly higher than other grades at both Spring and Autumn testing. However, a systematic study of the value of Transition Year to students in terms of learning in mathematics and science could well be recommended, with the same students being assessed at the beginning and end of TY. Included would be an examination of different students groups (such as males/females, those from different ESCS backgrounds and/or DEIS and non-DEIS schools). Transition Year is unique to Ireland and is not available in most other countries that participate in PISA, and hence an examination of the learning outcomes over the one year programme would be important. It might also be noted that the future of TY at this time is unclear, as children spend more time in early childhood settings, and reach the end of Junior Cycle at a later age than heretofore.

PISA is considered a low-stakes test for the students involved and further study could examine the level of effort put forward by 15-year-olds in both testing periods through the use of log files. Effort can be measured by student self-reports or, more objectively, it can be based

on item response times in computer-based tests (Attali, 2016). This would also be useful in providing evidence of scale reliability, as well as the comparability of test results.

The scope of the data collected from the teachers was limited in the data collected, in particular the nuances of the classroom environment. In a recent report on reading literacy in Ireland in PISA 2018 (Shiel et al., 2022), students' management of their own learning was identified as an area of weakness and there was an indication that a relatively low percentage of students were in schools in which principal teachers agreed that teachers work with parents and the wider community to support children's literacy. A more in-depth study with teachers might tease out the nuances around these aspects of the classroom/school environments.

7.6. Epilogue

In Ireland, the Department of Education's mission is to 'facilitate children and young people, through learning, to achieve their full potential and contribute to Ireland's social, economic and cultural development' (DoE, 2021, p.5). In implementing elements of this mission, it uses the benchmarks provided by PISA relating to students' knowledge, skills and competencies that will equip them for success in education and the world of work. This is in line with the view noted by Breakspear (2014) that PISA should be used as a resource for policy-making. Other resources, including the voices of the principals, teachers and other stakeholders, that provide insights into what matters for education, should be used as part of the decision-making process. The major contribution of this study is that it provides strong evidence indicating that moving PISA testing to the Autumn can be achieved secure in the knowledge that policy makers will continue to have access to high quality data and that school principals and teachers are likely to be strongly supportive of the initiative. This is very good news for the Irish educational system and for everyone dedicated to ensuring the best of outcomes for Irish students.

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Appendix A: International Large Scale Assessments

Table A1: Selection of International Large Scale Assessments, with details on participation

Year	Assessment	Sponsor	Ages/Grade Level	No. Countries	Ireland's Participation
1964	First International Mathematics Study (FIMS)	IEA	aged 13/ final year of secondary school	11	
1970	First International Science Study (FISS)	IEA	aged 13/14/ final year of secondary school	20	
1980	Second International Mathematics Study (SIMS)	IEA	1st year/6th Year aged 13/14/ final year of secondary school	21	Yes
1984	Second International Science Study (SISS)	IEA	aged 13/14/ final year of secondary school	24	
1989	International Assessment of Education Progress I	ETS	aged 13	6	Yes
1991	International Assessment of education Progress II	ETS	aged 9 and 13	20	Yes
1991	Reading Literacy Study	IEA	aged 9 and 14		Yes
1994	International Adult Literacy Survey (IALS)	OECD	Adults (aged 16-64)		
1995	Third in International Maths and Science Study (TIMSS)	IEA	4th class/2nd Year	29/46	Yes
1999	Trends in International Maths and Science Study (TIMSS)	IEA	2nd Year	38	
2000	Programme for International Student Assessment (PISA)	OECD	aged 15	43	Yes
2001	Progress in International Reading Literacy Study (PIRLS)	IEA	4th class	34	
2003	Programme for International Student Assessment (PISA)	OECD	aged 15	41	Yes

2003	Trends in International Maths and Science Study (TIMSS)	IEA	4th class/2nd Year	26/47	
2006	Progress in International Reading Literacy Study (PIRLS)	IEA	4th class	40	
2006	Programme for International Student Assessment (PISA)	OECD	aged 15	57	Yes
2007	Trends in International Maths and Science Study (TIMSS)	IEA	4th class/2nd Year	37/50	
2009	Programme for International Student Assessment (PISA)	OECD	aged 15	75	Yes
2011	Progress in International Reading Literacy Study (PIRLS)	IEA	4th class	45	Yes(4th class only)
2011	Trends in International Maths and Science Study (TIMSS)	IEA	4th class/2nd Year	50/42	
2012	Programme for International Student Assessment (PISA)	OECD	aged 15	65	Yes
2015	Programme for International Student Assessment (PISA)	OECD	aged 15	73	Yes
2015	Trends in International Maths and Science Study (TIMSS)	IEA	4th class/2nd Year	49/38	Yes
2016	Progress in International Reading Literacy Study (PIRLS)	IEA	4th class	49	Yes
2018	Programme for International Student Assessment (PISA)	OECD	aged 15	79	Yes

Note. Data combined and adapted from:
(Singer, Braun & Chudowsky, 2018, pp. 2-4).
(Shiel, Kellaghan & Moran, 2010, p. 134).
(National Centre for Education Statistics, 2018a).
(National Centre for Education Statistics, 2018b).
(National Centre for Education Statistics, 2018c).

Appendix B: PISA 2018 Cognitive Item Type

Table B1: Distribution of PISA 2018 reading literacy items by process, text format, situation and item format

	Trend Items		New Items		Total MS Item	
	(n)	%	(n)	%	(n)	%
Cognitive Process (reported as subscales)						
Locate information (prior to 2018 -Access & Retrieve)	14	19.0	36	21.0	50	20.0
Understand (prior to 2018 - Integrate & Interpret information)	41	57.0	90	52.0	131	54.0
Reflect & evaluate	17	24.0	47	27.0	64	26.0
Text Format						
Continuous	44	61.0	114	66.0	158	65.0
Non-continuous	21	29.0	9	5.0	30	12.0
Mixed	7	10.0	50	29.0	57	23.0
Situation						
Personal	22	31.0	38	22.0	60	24.0
Educational	22	31.0	32	18.0	54	22.0
Occupational	16	22.0	10	6.0	26	11.0
Public	12	17.0	86	50.0	98	40.0
Multiple	0	0.0	7	4.0	7	3.0
Item Format						
Simple Multiple Choice	22	30.0	104	60.0	126	51.0
Complex Multiple Choice	9	13.0	23	13.0	32	13.0
Open Response: Human Coded	36	50.0	46	27.0	82	33.0
Open Response: Computer	5	7.0	0	0.0	5	2.0
Total	72	100.0	173	100.0	245	100.0

Table B2: Distribution of PISA 2018 mathematics literacy items by process, text format, situation and item format

	Total Item Pool	
	(n)	%
Process		
Formulating situations mathematically	24	29.0
Employing mathematical concepts, facts and procedures	35	43.0
Interpreting, applying and evaluating mathematical outcomes	23	28.0
Content		
Change and relationships	21	26.0
Space and shape	19	23.0
Quantity	21	26.0
Uncertainty and data	21	26.0
Context		
Personal	13	16.0
Occupational	20	24.0
Societal	28	34.0
Scientific	21	26.0
Item Format		
Simple Multiple Choice	20	24.0
Complex Multiple Choice	15	18.0
Open Response: Human Coded	21	26.0
Open Response: Computer Coded	26	32.0
Total	82	100.0

Table B3: Distribution of PISA 2018 science literacy items by process, text format, situation and item format

	Total MS Item Pool	
	(n)	%
Competencies		
Evaluate and design scientifically	30	26.0
Explain phenomena scientifically	49	43.0
Interpret data and evidence	36	31.0
Knowledge		
Content	49	43.0
Epistemic	19	17.0
Procedural	47	41.0
Systems		
Physical	38	33.0
Living	47	41.0
Earth and Space	30	26.0
Item Format		
Simple Multiple Choice	33	29.0
Complex Multiple Choice	47	41.0
Open Response: Human Coded	32	28.0
Open Response: Computer Coded	3	2.0
Total	115	100%

Appendix C: Teacher Questionnaire

For questions 4c - 5c you have been selected to fill out this questionnaire in relation to:

English



PISA 2018 Autumn Study

Teacher Questionnaire

This questionnaire is for teachers of English, Mathematics and Science subjects in schools participating in the PISA 2018 Autumn Study. The study is investigating the performance of students who undertake PISA testing at different times of the year (Spring and Autumn) and is part of a doctoral research study being undertaken by Sylvia Denner. The supervisors are Prof. Michael O'Leary (Dublin City University) and Dr. Gerry Shiel (Educational Research Centre). The study is sponsored by the ERC.

The Project

PISA, the Programme for International Student Assessment, is a project of the Organisation for Economic Co-operation and Development (OECD) that assesses the skills and knowledge of 15- and 16-year-olds in Reading literacy, Science, and Mathematics. In Ireland, the Educational Research Centre (ERC) administers PISA on behalf of the Department of Education and Skills (DES). This PISA 2018 Autumn Study is being implemented to assess the feasibility of conducting PISA in the Autumn in future cycles. Currently, it is administered in the Spring. This questionnaire is designed to obtain teachers' perspectives about PISA and on the possible outcomes if PISA testing changed from Spring to Autumn. The questionnaire asks for your views on PISA, the work you do at the beginning of the academic year, revisiting concepts and skills, the curriculum taught and student motivation and engagement.

What involvement will require

Your involvement will require completing this questionnaire which will take about 15-20 minutes. Your participation is voluntary and there is no potential risk to you from participating in the study.

Confidentiality

During analysis and reporting, it will not be possible to identify individual teachers as the data will be aggregated. Teacher names used for administration purposes will be deleted after PISA testing in your school. Your name does not appear on the questionnaire and will not be associated with it. Data will therefore be anonymised. Only a school identification number (assigned for this study) will appear on the questionnaire to allow for subsequent aggregation of data to school level. Within legal limits, all responses are treated as confidential.

Data Protection and GDPR

As part of GDPR (General Data Protection Regulation), the data will not be used for any purpose other than those outlined here. Please contact Sylvia Denner (sylvia.denner@erc.ie) as the person in charge of the data) if you request modifications or removal of your data. All data which will be saved

on a secure folder on a password protected server at the Educational Research Centre. For further information on GDPR see <http://gpdrandyo.ie/>.

Benefits

Your school will receive a short report on the nationally aggregated data from this questionnaire when analysis is complete (early 2020). More detailed analyses will be included for a PhD being undertaken by Sylvia Denner. The data will help improve the administration of PISA and the dissemination of outcomes in future cycles.

Further Information

If you have any queries about this questionnaire, please discuss them with your PISA school contact person or phone Sylvia Denner at (01) 8065237 or contact her at PISAAUTUMN@erc.ie. If you want to contact a person who is independent of the study, please email rec@dcu.ie. Information about PISA may be found on the ERC (www.erc.ie/pisa) and OECD PISA (<http://www.oecd.org/pisa>) websites.

Informed Consent Form Participation in PhD research project

Project: Assessing the performance of students who take the PISA tests at different times of the year (Spring and Autumn)

Principal supervisor: Prof Michael O'Leary (michael.oleary@dcu.ie)

PhD candidate: Sylvia Denner (sylvia.denner@erc.ie)

Clarification of the purpose of the research

The purpose of this doctoral research project is to explore the feasibility of changing PISA testing from the Spring, when it currently happens in most participating countries, including Ireland, to Autumn. In addition to the core aspect of PISA testing (student assessment and online school questionnaire) and supplementary interviews with a sample of school principals, this project involves obtaining teachers' perspectives about PISA and their views on the possible outcomes and other consequences of moving PISA testing to Autumn. The questionnaire asks about familiarity of PISA, re-teaching subjects at the beginning of the academic year, the curriculum taught and student motivation and engagement. Data will not be used for any purpose other than those outlined here.

Participant (Teacher) – please complete the following (Circle Yes or No for each question)

<i>I have read the Plain Language Statement (information on the front page of questionnaire)</i>	Yes	No
<i>I understand the information provided</i>	Yes	No
<i>I have had an opportunity to ask questions and discuss this study</i>	Yes	No
<i>I have received satisfactory answers to all my questions</i>	Yes	No
<i>I am aware that I may withdraw from the Research Study at any point</i>	Yes	No
<i>I am aware that I may request modifications or removal of my data</i>	Yes	No

Data Confidentiality

The resultant data as noted above will be saved on a password-protected folder on a secure server in the Educational Research Centre, to which only the researcher and supervision team will have access. The data are subject to GDPR and all responses are treated as confidential, within the legal limits.

Please note: Your completion of this instrument confirms that you understand the purpose of this study and that you freely consent to participate in it.

About You

1a. For how many years, including the current school year, have you been teaching?

(Please exclude career breaks.) _____ years This is my 1st year teaching ☐₇₇

1b. For how many years, including the current school year, have you been teaching in this school?

(Please exclude career breaks.) _____ years This is my 1st year teaching ☐₇₇

1c. Do you work full-time or part-time at this school?

(Please tick only one box.)

Full-time ☐₁

Part-time (50-90% of full time hours) ☐₂

Part-time (less than 50% of full time hours) ☐₃

1d. What subjects do you teach? (Please tick all that apply.)

Mathematics ☐₁ Science or Science-related subject⁸³ ☐₂ English ☐₃

1e. What years do you currently teach? (Please tick all that apply.)

1st year ☐₁ 2nd year ☐₂ 3rd year ☐₃ 4th year/TY ☐₄ 5th year ☐₅ 6th year ☐₆

About the Programme for International Student Assessment (PISA)

2a. To what extent are you familiar with the following aspects of PISA?

	Not at all familiar	Somewhat familiar	Extremely familiar	Not Applicable
(i) The PISA study generally	☐ ₁	☐ ₂	☐ ₃	☐ ₄
(ii) The PISA assessment framework for Mathematics	☐ ₁	☐ ₂	☐ ₃	☐ ₄
(iii) The PISA assessment framework for Science	☐ ₁	☐ ₂	☐ ₃	☐ ₄
(iv) The PISA assessment framework for Reading	☐ ₁	☐ ₂	☐ ₃	☐ ₄
(v) The PISA 2015 results for Ireland (published in December 2016)	☐ ₁	☐ ₂	☐ ₃	☐ ₄

2b. How do you think your students would perform on PISA tests in general, if testing took place in the Autumn rather than in the Spring (same age cohort⁸⁴)?

	Would perform better in the Autumn	Would perform better in the Spring	There would be no difference in performance
The high-achievers	☐ ₁	☐ ₂	☐ ₃
The average-achieving students	☐ ₁	☐ ₂	☐ ₃
The low-achievers	☐ ₁	☐ ₂	☐ ₃

⁸³ Senior Cycle science-related subjects: Biology, Physics, Chemistry, Physics & Chemistry, Agricultural Science etc.

⁸⁴ At the time of testing (whether it is Autumn or Spring) students will be between 15 years and 3 months and 16 years and 2 months approximately and will be drawn from a range of year levels (mainly Third Year, Transition Year, Fifth Year).

2c. Please provide a brief explanation of your responses to question 2b.

Revisiting concepts/skills after the Summer Break

How many class periods do you teach in these subjects per week and what is the length of the class period?

3a

(Please enter N/A in any cell not applicable.)

	English		Mathematics		Science-related subject	
	Number of class periods per week	Number of <u>minutes</u> per class period	Number of class periods per week	Number of <u>minutes</u> per class period	Number of class periods per week	Number of <u>minutes</u> per class period
Third Year						
TY/Fourth Year						
Fifth Year						

There is research that suggests that some students experience a loss of academic skills and knowledge over the course of the summer holidays. This is known as 'Summer Learning Loss'. The following two questions focus on revisiting concepts/skills after the summer break, to address possible learning loss.

3b On average, how many class periods in the first six weeks of this academic year have you devoted to revisiting concepts and skills covered in previous academic years?

(Please enter N/A in any cell not applicable.)

(If this is your first year teaching please skip to question 4a.)

	English	Mathematics	Science-related subject
	Number of class periods	Number of class periods	Number of class periods
Third Year			
TY/Fourth Year			
Fifth Year			

3c. If any of your time in question 3a was greater than '0', when did this revision time mainly occur?

(Please tick all that apply.)

	First two weeks September	Last two weeks September	First two weeks October
Third Year	☐ ₁	☐ ₂	☐ ₃
TY/Fourth Year	☐ ₁	☐ ₂	☐ ₃
Fifth Year	☐ ₁	☐ ₂	☐ ₃

Curriculum Taught

- 4a** PISA is not a curriculum-based test; however, many of the contexts/processes underpinning PISA questions are similar to those found in the curricula taught in Irish schools. To understand achievement results in PISA tests, it is helpful to understand what is taught and when.

Please list up to 3 topics/skills/learning outcomes that you covered since the beginning of this academic year.

(Please enter N/A in any cell not applicable.)

	English	Mathematics	Science-related subject
Third Year			
TY/Fourth Year			
Fifth Year			

- 4b** Of the topics you listed in question 4a, did any topic involve the revisiting of material previously covered?

(Please answer for each grade. If you do not teach the grade write 'N/A' and if all new material covered write 'all new'.)

(If this is your first year teaching, please skip to question 4c.)

Third Year

TY/Fourth Year

Fifth Year

**Please answer questions 4c - 5b below in relation to:
English**

4c Do you use PISA materials (assessment framework/released PISA questions) for the following areas of your work?

		Never	Once a year	Once a term
(i)	Planning at subject department level (e.g. drawing on the PISA assessment framework to identify key skills)	☐ _1	☐ _2	☐ _3
(ii)	As a reference or as part of my preparation of teaching content for classes	☐ _1	☐ _2	☐ _3
(iii)	Asking students to complete released PISA questions in class or for homework	☐ _1	☐ _2	☐ _3

4d To what extent do you think it is appropriate to use PISA materials as part of your work?

To a great extent	To some extent	To a limited extent	Not at all	Don't know
☐ _1	☐ _2	☐ _3	☐ _4	☐ _5

4e To what extent do you think the current Junior Cycle curriculum specification for English has been influenced by the PISA assessment framework?

To a great extent	To some extent	To a limited extent	Not at all	Don't know
☐ _1	☐ _2	☐ _3	☐ _4	☐ _5

4f Thinking about the students you teach in English, who could be selected for PISA when they are in Third Year in March/April (Spring, prior to JC) or in October/November (Autumn) when they could be in Transition Year, would you expect them to perform better in the Spring or the Autumn?

Better in Spring than in Autumn	About the same	Better in Autumn than in Spring	Do not teach this year group
☐ _1	☐ _2	☐ _3	☐ _4

4g Thinking about the students you teach in English, who could be selected for PISA when they are in Third year in March/April (Spring, prior to JC) or in October/November (Autumn) when they could be in Fifth Year (having skipped TY), would you expect them to perform better in the Spring or the Autumn?

Better in Spring than in Autumn	About the same	Better in Autumn than in Spring	Do not teach this year group
☐ _1	☐ _2	☐ _3	☐ _4

Student Motivation

5a To what extent do you agree or disagree with the following statements about your students' motivation to achieve in your English classes? In general..

(Please tick one box in each row.)

	Strongly Agree	Agree	Disagree	Strongly Disagree	Don't Know
(i) In the Autumn, my students in <u>Third Year</u> are more focused on their schoolwork than <u>Transition Year</u> students.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
(ii) In the Autumn, my students in <u>Third Year</u> are more focused on their schoolwork than <u>Fifth Year</u> students.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
(iii) Focusing on achieving Learning Outcomes enhances the performance of my students on assessments such as PISA.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
(iv) Studying for state examinations enhances the performance of my students on assessments such as PISA.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
(v) Motivation to achieve depends on the test my students are doing (e.g. PISA test, class test, State Exam).	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
(vi) Motivation to achieve depends on the year my student are in.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
(vii) My students are more motivated to achieve in the Autumn than the Spring.	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5
(viii) My students are more motivated to perform well on state examinations than on tests that have lower stakes for them (e.g. PISA).	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

Student Engagement

5b Based on your experience, to what extent do you agree or disagree with the following statements related to the engagement of students in your English classes.

(For each grade please indicate on a scale of 1-4 of whether you strongly agree (a code 1) to strongly disagree (a code 4) or a code 5 for don't know)

Strongly Agree **1** Agree **2** Disagree **3** Strongly Disagree **4** Don't Know **5**

		3rd Year 1,2,3,4 or 5	TY/4th Year 1,2,3,4 or 5	5th Year 1,2,3,4 or 5
(i)	My students tend to skip classes more in the Autumn than the Spring.			
(ii)	My students are more engaged with learning in the Autumn than the Spring.			
(iii)	My students seem to be less enthusiastic about learning in the Autumn than the Spring.			
(iv)	My students tend to arrive late to class more in the Autumn than the Spring.			
(v)	My students are more likely to complete their homework in the Autumn than the Spring.			
(vii)	My students seem to engage better with study in the Autumn, compared with the Spring.			

Please write below any other comments you have about PISA testing. We are particularly interested in your views on any other factors you think might explain any potential difference in performance due to changing PISA testing from the Spring to the Autumn.

Thank you for taking the time to complete this questionnaire.

Appendix D: Sampling

Table D1: Stratification variables used in PISA 2018 Spring and Autumn testing
Explicit stratification variables

School type (3)	'01' 'Community/ Comprehensive' '02' 'Secondary' '03' 'Vocational'.
School Size (3);	'01' small (less than 45 PISA eligible students) '02' medium (46 -84 PISA eligible students) '03' large (greater than 85 PISA eligible
Implicit stratification variables	
School gender composition (4)	'01' '0% girls' '02' 'Mixed, less girls than boys' '03' 'Mixed, more girls than boys' '04' '100% girls'
Socioeconomic quartile (4);	'01' 'Most SES advantaged quartile' '02' 'Second most SES advantaged quartile' '03' 'Second least SES advantaged quartile' '04' 'Least SES advantaged quartile'

D2. National Desired Target Population

- PISA 2018 Technical Standard 1.7: The *PISA Defined Target Population* covers 95% or more of the *PISA Desired Target Population*. That is, *school-level exclusions* and *within-school exclusions* combined do not exceed 5% (OECD, 2020b).
- Using the most recently available data on student population, the desired national target population in Ireland was 61,188 (DES, 2016).
- Not included for Ireland were island schools and non-aided commercial' grind schools which meant that the school level exclusion came to 0.10%.
- The expected percentage of students not covered due to within-school exclusions (e.g., due to special education needs) was calculated from the previous cycle of PISA in 2015 at 2.90% and so the coverage of the National Defined Target population for the PISA Spring testing was reported in as 59,354 (97% of the National Desired Target Population). This was also the national desired target population for the Autumn testing, based on the most up-to-date data available when the sampling was carried out.
- The school sampling frame for Spring the Autumn testing was the enrolment data for the academic year 2016/2017 for all 15-year-old students born in 2001. The data were

supplied by the DES. They provided the best available estimate of the number of PISA-eligible 15-year-old students enrolled in a school for both the Spring and Autumn testing at the time of sampling for each studies.

Table D3: Distribution of PISA eligible student population and initial sample allocation - Spring and Autumn

Population figures			Initial sample allocation Spring Study				Initial sample allocation Autumn Study			
Explicit Strata labels	% of total ENR	Tot. No. of Schools	No. schools to sample	Adjusted *	Est. No. students	% eligible students expected in sample	No. schools to sample	Adjusted *	Est. No. students	% eligible students expected in sample
	%	(n)	(n)	(n)	(n)	%	(n)	(n)	(n)	%
Community-comp/up to 45	0.5	9	1	1	44	0.7	0	1*	44	2.0
Community-comp/46 - 85	2.5	23	4	4	176	2.7	1	1	44	2.0
Community-comp/86 or more	14.0	64	21	21	924	14.0	7	7	308	13.7
Secondary/up to 45	2.8	54	4	4	176	2.7	1	1	44	2.0
Secondary /46 - 85	11.1	107	17	17	748	11.3	6	6	264	11.8
Secondary /86 or more	40.8	208	61	61	2684	40.7	20	20	880	39.2
Vocational/up to 45	3.3	70	5	5	220	3.3	2	2	88	3.9
Vocational/46 - 85	7.6	76	11	11	484	7.3	4	4	176	7.8
Vocational/86 or more	17.5	83	26	26	1144	17.3	9	9	396	17.6
Grand Total	100.0	694	150	150	6600	100.0	50	51	2244	100.0

Note. *If the number of schools in the initial sample does not include at least one school the sample is adjusted to include at least one school in the stratum.

Table D4: Results of the Small School Analysis (SSA) for the Spring and Autumn studies

Initial Allocation			Results of SSA-Spring Study				Results of SSA-Autumn Study			
Explicit Strata labels	Spring	Autumn	No. of small school expected to sample	No. of medium school expected to sample	No. of large school expected to sample	Min. no. of schools to sample	No. of small school expected to sample	No. of medium school expected to sample	No. of large school expected to sample	Min. no. of schools to sample
	(n)	(n)	(n)	(n)	(n)	(n)	(n)	(n)	(n)	(n)
Community-comp/up to 45	1	1	2	1	1	3	0	1	1	2
Community-comp/46 - 85	4	1	0	0	4	4	0	0	1	1
Community-comp/86 or more	21	7	0	0	21	21	0	0	7	7
Secondary/up to 45	4	1	1	4	1	6	0	1	0	1
Secondary /46 - 85	17	6	0	0	17	17	0	0	6	6
Secondary /86 or more	61	20	0	0	61	61	0	0	20	20
Vocational/up to 45	5	2	2	6	0	8	2	2	0	4
Vocational/46 - 85	11	4	0	0	11	11	0	0	4	4
Vocational/86 or more	26	9	0	0	26	26	0	0	9	9
Grand Total	150	50	4	11	142	157	2	4	48	54

D5. Probability Proportional to Size (PPS)

The final part of the stage 1 in the sampling of schools involves carrying out the sampling using a procedure called sampling Probability Proportional to Size (PPS). This is broken down into five steps outlined below.

- 1. A sampling interval for each stratum was identified (I) based on the total measure of size for all schools in the sampling frame for each specified explicit stratum divided by the number of schools to be sampled from the specified explicit stratum, which was the number allocated to the explicit stratum.
- 2. A random number was generated for each explicit stratum (RN).
- 3. Selection Numbers were calculated ($I * RN$).
- 4. Schools within each explicit stratum were sorted by the implicit stratification scheme (Gender and SES).
- 5. A Measure of Size (MOS) was generated that was equal to the enrolment estimate unless enrolment was less than the TCS , in which case the measure of size was set equal to the target cluster size (44). This allowed for the compilation of a cumulative measure of size in each explicit stratum.

D6. Sampling of Students using KeyQuest.

Verification by school of PISA eligible students:

- To ease the administrative burden on schools, a data agreement contract was set up between the Department of Education and Skills and the Educational Research Centre whereby the DES prepared lists of students who were PISA-eligible in the selected schools and provided these to the ERC.
- These lists of PISA-eligible students were sent to the schools for verification and any student who was no longer attending the school was deleted from the list and any PISA eligible student who had since joined the school was added.
- At this stage there were no exemptions (e.g., because a student had limited language proficiency) or refusals allowed.

Sampling students in KeyQuest:

- Student list are imported into KeyQuest.
- 44 students randomly sampled in each school (unless the number eligible was less than 44 and then all were selected).
- Students are then assigned one of the 36 available test forms (see section on Assessment Design above).
- After student sampling, KeyQuest produced the necessary forms for the administration of the test: student tracking forms (full listing of sampled students); session attendance forms (dividing students into 2 sessions in each school for the administration of the test); and student login forms that the students use to log in to the test.

Appendix E: Semi-structured interview, Principals

E1. Topics for Semi-structured interview schedule for Principals

Background questions (check questions asked at first interview)

How long are you a principal in this school? _____

Were you a principal before in another school? Y/N. If yes, How long? _____

Have you participated in PISA before (not including Autumn 2018)? Y/N

If yes when? _____

The purpose of this research study is to explore the feasibility of changing PISA testing from Spring to Autumn. As you know PISA tests 15-year-olds and this means that students from different grades are tested. This interview then hopes to get a better understanding of the demands on schools, on staff and the students at different times of the year that may impact on the administration of PISA and the performance of students

So to begin with, schools are very busy places and I have a card here that lists some but definitely not all of the organisational demands on the school. Prompt: Classroom based assessments, orals, practicals, sports, Transition Year work placements, musicals (show card 1).

- What time of the year - Autumn or Spring - makes the most organisational demands on you?

Sometimes Transition Year classes in English, Mathematics and Science may be cancelled so that students can participate in other Transition year activities.

- Does this happen more often in the Spring than in the Autumn?
- Does it have an impact on student learning?

Personal demands on staff

- Did you oversee PISA in your school or did you nominate another staff member?
Prompt: why that decision, demands on staff, would it have been someone else if the testing happened in the Spring
- How much time was spent getting ready for PISA testing?
- In general, how would you compare the demands on school staff in the Autumn with that of Spring in your school?
- The DES provides a day's substitution for the PISA testing. Does this help with the administration of PISA in your school? (prompt: enough money, enough personnel)
- Would this be different if it was conducted in the Spring?

You may remember there was a teacher questionnaire completed at the time of testing and I am now going to show you some of the preliminary results across schools.

- What do think of how the teachers rated their students' performance when asked to compare Autumn and Spring testing? (show Card 3)
- What do you think of the time spent revisiting topics- percent of time? (show Card 4)
- What do you think of the time when this revisiting occurs? (show Card 5)

If Summer Learning Loss hasn't been mentioned -As you know PISA testing in the Autumn commenced 6 weeks after the students had returned to school after the summer holidays.

- Is there any evidence of Summer Learning Loss in your school?
- And if so does it affect different subjects (Maths, English, Science)
- And if so does it affect different student groups? (show card with the different groups: grade, gender, SES)
- (If there is evidence of Summer Learning Loss) Is there anything the schools does to address it?

We have talked about the organisational demands and the demands in school on staff, so now I would like to focus on the students (if not already spoken about)

- Overall, do you think there would be a difference between Spring and Autumn in terms of when students might perform better on the PISA test?
- Do you think student engagement differs in the Autumn compared to the Spring? Prompt different student characteristics

Looking at different aspects of engagement

- Do you think there would be a change in a students' sense of belonging in school between the Autumn the Spring? Prompt different student characteristics, size of school?
- Do you think the teacher-student relationship changes in the Autumn as the Spring? Prompt different student characteristics –TY/5th Year new teachers?
- Are there students skipping classes more in the Spring than the Autumn?
- Are there students arriving late to school more in the Spring than the Autumn?
- Do students complete homework at the same rate throughout the year?
- Is there a policy of parents signing homework diaries and checked by class teacher/tutor? Does this change between the Autumn and the Spring?
- Does student motivation differ between the Autumn and the Spring? Prompt different student characteristics, grades?

Looking at two aspects of motivation 'interest in or enjoyment to learning' and 'motivation to get good grades and praise'

- Do you think there is a difference between the Autumn and Spring in students' interest in or enjoyment of learning? Prompt different student characteristics
- Do you think there is a difference between the Autumn and Spring in students' motivation to get good grades? Prompt praise from teachers/parents? different student characteristics, focus for different grades
- Thinking about schoolwork-related anxiety and coping with stressful events, would you say the Autumn or Spring is a more stressful time for students in your school? Prompt different student characteristics
- Some research says that anxiety is the natural consequence of testing overload, do teachers in your school carry out tests in class regularly or only at the end of term?
- How were or were students in your school prepared for the PISA test?

The research says a healthy body equals a healthy mind

- Is there a health programme for all students in the school and does it occur throughout the year? Prompt PE, participation in sport generally focus at times of year?

in general,

- Is there a wellbeing programme in your school?
- Are there elements of it carried out at different times of the year?

Parents

- When do you have parent teacher meetings for 3rd 4th and 5th Years?
- Do these have an impact on student performance?

So having talked about different the aspects of the organisational demands, demands on the staff member administering PISA in your school and student demands (and if it hasn't come up about their preference),

- Is there anything else you can think of that may have an impact on student performance if PISA were to be implemented in the Autumn or the Spring?
- do you have a preference for conducting PISA in the Autumn or Spring? Why?

I am now going to ask some general questions about participation in international tests and knowledge of PISA tests.

- Do you feel that participation in international tests is important? Prompt for your school, education community?
- And specifically about PISA, how do you feel about participating in that study?
- How familiar are you with the outcomes of previous PISA assessments (e.g., PISA 2015?)

(if not familiar with the outcomes of PISA skip this one –as it would be hard to compare)

- How do you think performance in PISA (the national results) compare to Junior Certificate results?
- Have you read any national or international reports related to PISA in recent years? If so, which ones and where did you get them?
- How familiar are you with the PISA frameworks for Maths/English/Science? How familiar are other staff members?

(if not familiar maybe hard to compare to next question on curriculum - skip)

- How does it compare to the curriculum covered in school?
- If there is a TY programme in the school, what type of curriculum is in place for Mathematics, English and Science related subjects? Are these core subjects taught throughout the TY ? How do teachers decide what to cover in these courses?
- Does the school use of PISA material for subject department planning?

When a school participates in PISA it receives feedback on PISA results after the official report is published (Dec 2019) so you will receive results for your school in Feb/March 2020, nearly 15 months after testing. When testing is carried out in the Spring, the schools would not receive their results for nearly 2 years. Data are aggregated to school level which isn't the way PISA results are to be read so the results to the school are to be seen as an indication of how the school is doing.

- Has your school received PISA-results in the past?
- If yes: How have these results been used? – prompt discussed PISA results with other teachers? - Board of Management? Parents? Was it useful?

- If no: What information would be useful?
- If testing in Spring results are nearly 2 years after testing, how useful is this?
- What information would be informative for principals after this length of time? (a focus on scores or questionnaire outcome?)

TIMSS (Trends in Mathematics and Science Study) is another international survey carried out in Ireland for 2nd Year students. Feedback from TIMSS then would be at that grade level compared to PISA which is based on 15-year-olds

- how would you compare the usefulness of the results from these two studies?

Transition of PISA to Computer-based Testing.

- Do students in your school have access to computers all the time or at specific times of the year?
- Do Maths Science or English teachers in your school use computers for teaching?
- What are your views on testing on computers, in particular PISA?
- Do you think students in this school might be advantaged or disadvantaged by the transition to computer-based testing on tests such as PISA?

Any other comments,

THANK YOU

E2. Prompt Cards for Semi-structured interview

Card 1. Demands on school <i>AUTUMN <u>versus</u> SPRING</i> • Classroom-based Assessments • Orals • Practicals • Sports • Transition Year work placements • Musicals • Other demands

Card 2.
Student Characteristics

- Grade
- Gender
- Socioeconomic status

Card 3.

Teachers rating their student's performance: Autumn vs Spring testing

- **High-achievers: no difference when PISA testing is carried out**
- **Low- and average-achievers: more teachers would rate them as performing better in the Spring**

What do you think?

How would your high-, average- and low-achievers perform on PISA:

		Perform better in Autumn	Perform better in Spring	no difference in performance
English Teacher:	High-achievers	15.6	21.9	62.5
	Average-achievers	21.9	50.0	28.1
	Low-achievers	33.3	40.0	26.7
Maths teacher:	High-achievers	6.3	43.8	50.0
	Average-achievers	15.6	68.8	15.6
	Low-achievers	21.9	43.8	34.4
Science related teacher:	High-achievers	3.4	37.9	58.6
	Average-achievers	6.9	65.5	27.6
	Low-achievers	10.3	51.7	37.9

Preliminary results only based on 25 % of respondents

Card 4.

Average percent of teachers' time spent revisiting topics in the first 6 weeks of the academic year

- **More time is spent revisiting topics in Maths for all years**
- **4th Year a revision year?**
- **In 5th Year -Maths required the most amount of teachers' time compared to English and Science-related subjects**

	Maths	English	Science-related
	Mean %	Mean %	Mean %
3rd	22.0	20.0	12.0
4th/TY	33.0	24.0	18.0
5th	27.0	15.0	21.0

Preliminary results only based on 25 % of respondents

Card 5.

When revisiting mainly occurred

- **3rd Year – English and Science revisiting occurs mainly in the first 2 weeks**
Maths is more spread out over the 6 weeks
- **4th Year – Revisiting occurs mainly in the first two weeks**
- **5th Year – Revisiting mainly occurs in the first two weeks**

Preliminary results only based on 25 % of respondents

Appendix F: Sample and Response rate of Principals

Table F1: Sample of Principals for interview

	Sample of Autumn schools		Sample minus far- removed schools		Sample for Principal interview	
	N	%	N	%	N	%
Community/Comp	12	21.1	6	26.1	2	20.0
Secondary	28	49.1	12	52.2	5	50.0
Vocational	17	29.8	5	21.7	3	30.0
	57	100.0	23	100.0	10	100.0

Table F2: Response rate from initial sample of principals

	Willing to participate	Refusal*	No response after letter and follow-up email	Total
Community/Comp	1	0	1	2
Secondary	2	2	1	5
Vocational	1	1	1	3
Total	4	3	3	10

Note. *Refusal: too busy/did not want to be involved/principal no longer in the school.

Appendix G: Plain Language Statement for Principals

Plain Language Statement for Principals

Participation in PhD research project

Project: Assessing performance of students who undertake PISA testing at different times of the year (Spring and Autumn)

Principal supervisor: Prof Michael O'Leary (michael.oleary@dcu.ie)

PhD candidate: Sylvia Denner (sylvia.denner@erc.ie)

The Project

The purpose of this doctoral research project is to explore the feasibility of changing PISA testing from Spring, when it currently happens, to Autumn. It is being sponsored by the Educational Research Centre. PISA, the Programme for International Student Assessment, is a project of the Organisation for Economic Co-operation and Development (OECD). It assesses the skills and knowledge of 15- and 16-year-olds in reading literacy, science, and mathematics every three years in about 80 countries and education systems. In addition to administering the core aspect of PISA testing (student assessment and online school questionnaire) and a supplementary teacher questionnaire, this project involves interviews with principals to obtain their perspectives about PISA and on the possible outcomes if PISA were to be administered in Autumn rather than Spring. The interview will be semi-structured and explore such topics as participation in International testing, participation in PISA, re-teaching subjects at the beginning of the academic year, the curriculum taught, student motivation and engagement, and use of PISA results at school level.

What involvement will require

If you agree to participate in this project, you will be interviewed by Sylvia Denner at a time of your convenience. The interview will be recorded to ensure accuracy of data analysis and for ease of interviewing. A copy of the transcript will be available on request. The interview will last approximately 50-60 minutes.

Potential risk

There is no risk for you from participation in the study greater than that encountered in everyday life.

Benefits

Your involvement will provide useful data which will help improve the administration of PISA and the dissemination of PISA outcomes in future cycles. The Department of Education and Skills is aware of the burden placed on schools in undertaking PISA. This study will provide input into its deliberations. Your school will receive a short report on the nationally aggregated data from the teacher and principal interview when analysis is complete (early 2020). Additional analysis of the data will be included in a PhD these being undertaken by Sylvia Denner through Dublin City University.

Voluntary and confidential participation

Your participation is voluntary and confidential. You are free to withdraw from participation any time during the study, without giving reason. The resultant data will be saved on a secure folder on a password protected server in the Educational Research Centre, to which only the researcher and supervision team will have access. The tapes will be destroyed within three years from date of interview. The transcripts will be anonymised at that time. No characteristics of the school other than broad location (e.g., south of Ireland), disadvantaged status and gender composition will be used during reporting that could identify the school. Moreover, such broad characteristics will not co-occur in the text in relation to a particular school, to ensure that the school cannot be identified. Confidentiality of information provided can only be guaranteed within the legal limitations of the law.

Data Protection and GPPR

As part of GDPR (General Data Protection Regulation) the data will not be used for any purpose other than those outlined here. Please contact Sylvia Denner (as the person in charge of the data) on the above email address if you request modifications or removal of your data which as noted will be saved on a secure folder on a password protected server in the Educational Research Centre. For further information on GDPR see <http://gpdrandyo.ie/>.

If participants have concerns about this study and wish to contact an independent person, please contact:

The Secretary, Dublin City University Research Ethics Committee, c/o Research and Innovation Support, Dublin City University, Dublin 9. Tel 01-7008000, e-mail rec@dcu.ie

Appendix H: Summary of indices used from the student data

Table H1. Summary of indices and scales.

		Spring			Autumn		Interpretation, higher score on the index indicates:
		Recodes when examining individual items	Cronbach's Alpha	Missingness	Cronbach's Alpha	Missingness	
<i>The Learning Environment</i>							
Index: Teachers' stimulation of reading engagement	4 point Likert scale (never or hardly ever, in some classes, in most classes and in all classes).	'in most' and 'in all classes' combined	0.831	1.3	0.827	2.3	Students perceive their teacher provides greater stimulation than the average student across OECD countries.
4 items included:	<i>The teacher encourages students to express their opinion about a text</i>						
	<i>The teacher helps students relate the stories they read to their lives</i>						
	<i>The teacher shows students how the information in texts builds on what they already know</i>						
	<i>The teacher poses questions that motivate students to participate actively</i>						
Index: Teacher feedback	4 point Likert scale (never or almost never, some classes, many classes and every class or almost every class).	'many classes' and 'every clas's or 'almost every class' combined	0.892	1.4	0.895	2.7	Students perceive their teacher provides greater feedback than the average student across OECD countries.
3 items included:	<i>The teacher gives me feedback on my strengths in this subject</i>						
	<i>The teacher tells me in which areas I can still improve</i>						
	<i>The teacher tells me how I can improve my performance</i>						
Index: Teacher-directed instruction	4 point Likert scale (every class, most classes, some classes and never or hardly ever).	'every class' and 'most classes' combined	0.771	0.8	0.772	1.9	Students perceive their teacher provides greater teacher-directed instruction than the average student across OECD countries.
4 items included:	<i>The teacher sets clear goals for our learning</i>						
	<i>The teacher asks questions to check whether we have understood what was taught</i>						
	<i>At the beginning of a lesson, the teacher presents a short summary of the previous lesson</i>						
	<i>The teacher tells us what we have to learn</i>						

Condt. Table H1. Summary of indices and scales.

Index: Adaptive instruction	4 point Likert scale (never or almost never, some classes, many classes and every class or almost every class).	'many classes' 'every class' and 'almost every class' combined	0.747	1.8	0.767	3.1	Students perceive their teacher adapts the instruction in English class more than the average student across OECD countries.
3 items included:	<i>The teacher adapts the lesson to my class's needs and knowledge</i> <i>The teacher provides individual help when a student has difficulties understanding a topic or task</i> <i>The teacher changes the structure of the lesson on a topic that most students find difficult to understand</i>						
Index: Disciplinary climate in English class	4 point Likert scale (every class, most classes, some classes and never or hardly ever).	'every class' and 'most classes' combined	0.895	0.7	0.885	1.9	Students perceive greater discipline in English class than the average student across OECD countries.
5 items included:	<i>Students don't listen to what the teacher says</i> <i>There is noise and disorder</i> <i>The teacher has to wait a long time for students to quiet down</i> <i>Students cannot work well</i> <i>Students don't start working for a long time after the lesson begins</i>						
Engagement							
Index: Sense of Belonging	4 point Likert scale (strongly agree, agree, disagree and strongly disagree).	'strongly agree' and 'agree' combined	0.83	3.7	0.832	4.9	Students perceive greater sense of belonging than the average student across OECD countries.
6 items included:	<i>Feel like an outsider or left out of things</i> <i>They make friends easily</i> <i>They feel that they belong at school</i> <i>They feel awkward and out of place at school</i> <i>They feel that other students like them</i> <i>They feel lonely</i>						
Index: Teacher support as perceived by the student	4 point Likert scale ('every lesson', 'most lessons', 'some lessons', 'never or hardly ever')	'every class' and 'most classes' combined	0.892	0.8	0.892	1.9	Students perceive greater teacher support than the average student across OECD countries.
4 items included:	<i>The teacher shows an interest in every student's learning</i> <i>The teacher gives extra help when students need it</i> <i>The teacher helps students with their learning</i> <i>The teacher continues teaching until the students understand</i>						

Condt. Table H1. Summary of indices and scales.

Simple questionnaire index: Understanding and Memorising	6-point scale ranging from 'not useful at all' to 'very useful'	'Very useful' recoded as 5/6 on the 6-point scale	-	5.2	-	6.5	Students more aware of the useful strategies to use than the average student across OECD countries (or the higher the number of times in which a student chose an expert-validated strategy over a less useful one).
6 items included:	<i>I concentrate on the parts of the text that are easy to understand.</i> <i>I quickly read through the text twice.</i> <i>After reading the text, I discuss its content with other people.</i> <i>I underline important parts of the text.</i> <i>I summarise the text in my own words.</i> <i>I read the text aloud to another person.</i>						
Simple questionnaire index: Summarising	6-point scale ranging from 'not useful at all' to 'very useful'	'Very useful' recoded as 5/6 on the 6-point scale	-	4.6	-	6.2	Students more aware of the useful strategies to use than the average student across OECD countries (or the higher the number of times in which a student chose an expert-validated strategy over a less useful one).
5 items included:	<i>I write a summary. Then I check that each paragraph is covered in the summary, because the content of each paragraph should be included</i> <i>I try to copy out accurately as many sentences as possible.</i> <i>Before writing the summary, I read the text as many times as possible.</i> <i>I carefully check whether the most important facts in the text are represented in the summary</i> <i>I read through the text, underlining the most important sentences. Then I write them in my own words as a summary</i>						
Simple questionnaire index: Assessing credibility	6-point scale ranging from 'not appropriate at all' to 'very appropriate'	'Very appropriate' recoded as 5/6 on the 6-point scale	-	5.7	-	7.0	Students more aware of the appropriate strategies to use than the average student across OECD countries (or the higher the number of times in which a student chose an expert-validated strategy over a less useful one).
5 items included:	<i>Answer the email and ask for more information about the smartphone</i> <i>Check the sender's email address</i> <i>Click on the link to fill out the form as soon as possible</i> <i>Delete the email without clicking on the link</i> <i>Check the website of the mobile phone operator to see whether</i>						

Condt. Table H1. Summary of indices and scales.

Motivation									
Index: General self-efficacy (Resilience)	4 point Likert scale (strongly agree, agree, disagree and strongly disagree).	'strongly agree' and 'agree' combined	0.729	3.3	0.743	4.4	Students reported higher self-efficacy than than the average student across the OECD		
	<i>I usually manage one way or another.</i>								
	<i>I feel proud that I have accomplished things.</i>								
5 items included:	<i>I feel that I can handle many things at a time.</i>								
	<i>My belief in myself gets me through hard times.</i>								
	<i>When I'm in a difficult situation, I can usually find my way out of it.</i>								
Index: Students' perceived competence in reading	4 point Likert scale (strongly agree, agree, disagree and strongly disagree).	'strongly agree' and 'agree' combined	0.854	2.2	0.864	3.3	Students indicated greater perception of competence than the average student across OECD countries.		
	<i>I am a good reader</i>								
3 items included:	<i>I am able to understand difficult texts</i>								
	<i>I read fluently</i>								
Index: Students' perceived difficulty in reading	4 point Likert scale (strongly agree, agree, disagree and strongly disagree).	'strongly agree' and 'agree' combined	0.762	2.3	0.765	3.5	Students indicated greater perception of difficulty than the average student across OECD countries.		
	<i>I have always had difficulty with reading</i>								
3 items included:	<i>I have to read a text several times before completely understanding it</i>								
	<i>I find it difficult to answer questions about a text</i>								
Index: Enjoyment of reading	4 point Likert scale (strongly agree, agree, disagree and strongly disagree).	'strongly agree' and 'agree' combined	0.887	1.1	0.880	1.9	Students enjoyed reading to a greater extent than the average student across OECD countries.		
	<i>I read only if I have to.</i>								
	<i>Reading is one of my favourite hobbies.</i>								
5 items included:	<i>I like talking about books with other people.</i>								
	<i>For me, reading is a waste of time.</i>								
	<i>I read only to get information that I need.</i>								

Condt. Table H1. Summary of indices and scales.

Index: Attitudes towards competition	4 point Likert scale (strongly agree, agree, disagree and strongly disagree). <i>I enjoy working in situations involving competition with others.</i> <i>It is important for me to perform better than other people on a task.</i> <i>I try harder when I'm in competition with other people.</i>	'strongly agree' and 'agree' combined	0.772	2.4	0.782	3.4	Students expressed more favourable attitudes towards competition than the average student across OECD countries.
3 items included:							
Index: Motivation to master tasks	4 point Likert scale (strongly agree, agree, disagree and strongly disagree). <i>I find satisfaction in working as hard as I can.</i> <i>Once I start a task, I persist until it is finished.</i> <i>Improving on how well I did in the past is part of the enjoyment I get when I do things.</i>	'strongly agree' and 'agree' combined	0.712	3.8	0.709	4.4	Students reported greater motivation than the average student across OECD countries.
3 items included:							
Index: General fear-of-failure	4 point Likert scale (strongly agree, agree, disagree and strongly disagree). <i>When I am failing, I worry about what others think of me.</i> <i>When I am failing, I am afraid that I might not have enough talent.</i> <i>When I am failing, this makes me doubt my plans for the future.</i>	'strongly agree' and 'agree' combined	0.843	3.0	0.843	4.0	Students expressed a greater fear of failure than the average student across OECD countries.
3 items included:							
Other school outcomes							
Simple questionnaire index: Life satisfaction	Scale from 0 to 10, where 0 means the worst possible life and 10 means the best possible life	-	-	2.1	-	2.8	Higher scores on the scale mean the best possible life - greater life satisfaction.
Index: Eudemonia	4 point Likert scale (strongly agree, agree, disagree and strongly disagree). <i>My life has clear meaning or purpose</i> <i>I have discovered a satisfactory meaning in life</i> <i>I have a clear sense of what gives meaning to my life</i>	-	0.856	3.9	0.862	4.7	Students reported greater meaning in life than the average student across OECD countries.
3 items included:							

Condt. Table H1. Summary of indices and scales.

Index: Subjective well-being: positive affect (emotions)	4 point Likert scale (never, rarely, sometimes, and always)	-	0.804	4.2	0.820	4.7	Students reported more positive feelings than the average student across OECD countries.
3 items included:	<i>Joyful</i> <i>Cheerful</i> <i>Happy</i>						
Index: Attitude towards school	4 point Likert scale (strongly agree, agree, disagree and strongly disagree).	'strongly agree' and 'agree' combined	0.884	1.8	0.872	3.1	Students valued schooling to a greater extent than the average student across OECD countries.
3 items included:	<i>Trying hard at school will help me get a good job.</i> <i>Trying hard at school will help me get into a good college.</i> <i>Trying hard at school is important.</i>						
Index: Perception of competitiveness at school	4 point Likert scale (not at all true, slightly true, very true, extremely true).	-	0.845	15.8	0.848	15.8	Students perceived their peers to compete with each other to a greater extent than the average student across OECD countries.
3 items included:	<i>Students seem to value competition.</i> <i>It seems that students are competing with each other.</i> <i>Students seem to share the feeling that competing with each other is important.</i>						
Index: Perception of cooperation at school	4 point Likert scale (not at all true, slightly true, very true, extremely true).	-	0.882	21.7	0.884	20.8	Students perceived their peers to co-operate to a greater extent than the average student across OECD countries.
3 items included:	<i>Students seem to value cooperation.</i> <i>It seems that students are cooperating with each other.</i> <i>Students seem to share the feeling that cooperating with each other is important.</i>						

Condt. Table H1. Summary of indices and scales.

Index: Student's experience of being bullied	4 point Likert scale (never or almost never, a few times a year, a few times a month, and once a week or more)	-	0.753	19.7	0.760	18.8	Students reported being more exposed to bullying at school than the average student across OECD countries.
3 items included:	<i>Other students left me out of things on purpose.</i> <i>Other students made fun of me.</i> <i>I was threatened by other students.</i>						

Note: Indices (index) are based on IRT scaling with Cronbach's Alpha provided

Appendix I: Thematic analysis- Codes and themes

Table I1: Final codebook from the systematic coding, first phase of the thematic analysis

Name	Files	References
1-A lot of organisational demands in the Spring	6	13
1-Autumn - better for students	2	3
1-Autumn - better for teachers	2	4
1-Autumn Preference	6	13
1-CBA - busy in Spring	5	8
1-Less organisational demands in the Autumn	4	9
1-Orals busy in Spring	3	3
1-Practicals - busy in Spring	3	6
1-Sports busy in Spring	2	3
1-Third 3rd year busy in Spring	1	1
1-TY - busier in Spring than the Autumn	5	12
3-PISA test - buy in from parents	2	3
3-PISA test - buy in from students	4	12
3-PISA test - buy in from teachers	2	3
3-PISA test - conducted in a good-formal environment	1	4
3-PISA test - didn't claim substitution	3	4
3-PISA test - interested in it	2	3
3-PISA test - job of DP rather than a class teacher	4	7
3-PISA test - met with students and gave info on the logistics of the test	2	3
3-PISA test - not onerous task	5	11
3-PISA test - organised by Principal-DP	5	7
3-PISA test - promoted by the patron bodies	1	2
3-PISA test - substitution pay sufficient	3	4
4-Performance - better in Spring - large cohort of students with learning difficulties	1	1
4-Performance - generally could see no difference	4	7
4-Performance - may be better in Autumn more - TYs	2	3
4-Performance - no difference age not curriculum based	4	4
4-Performance - no difference students are focused will do well anytime	2	3
4-Performance - perform better in Spring	1	1

Condt. Table I1: Final codebook from the systematic coding, first phase of the thematic analysis

Name	Files	References
5-SLL – issues for students with learning difficulties	1	2
5-SLL - more about wellbeing than performance	2	3
5-SLL - not something that is measured	3	6
5-SLL - parental encouragement	2	3
5-SLL - revisiting first few weeks -by 6 weeks students are settled in	4	12
5-SLL - revisiting maths more than other subjects	1	3
5-SLL - revisiting throughout the year	3	4
5-SLL - revisiting of technical -fundamental issues	2	4
5-SLL - slight association with on boys	1	1
5-SLL - slight association with modern language	1	1
5-SLL - slight Learning Loss for 5th years who did TY	3	6
6-Engagement - school -teachers work at	4	13
6-Engagement - teachers keep with the same students	2	2
6-Engagement - attendance slightly better in the Autumn	3	3
6-Engagement - homework same throughout the year	3	4
6-Engagement - majority have a high sense of belonging at any time	3	3
6-Engagement - maybe slightly better in the Autumn	1	3
6-Engagement - new students may not have sense of belonging	2	3
6-Engagement - no difference between Spring and Autumn	5	9
6-Engagement - parental involvement with homework	3	6
6-Engagement - skipping classes same throughout the year	5	7
6-Engagement - slightly less at beginning of year	1	2
6-Engagement - students supporting each other	3	3
6-Engagement - teacher-student relationship better as the year goes on	1	1
6-Engagement - teacher-student relationship good at any time	2	2
6-Engagement - various activities organised throughout the year	2	3
6-Engagement - wider community can help with engagement	1	2
6-Engagement -TY slightly more engaged in the Autumn than the Spring	3	5
7-Motivation - 3rd year can drop in Spring	3	7
7-Motivation - better in the Autumn	2	2
7-Motivation - can be up and down	1	2
7-Motivation - formative feedback from teachers	2	3
7-Motivation - from parents	1	2
7-Motivation - new JC encourages love of learning	1	1
7-Motivation - no difference	3	3
7-Motivation - school working with students to keeping them motivated	2	6
7-Motivation - students supporting each other	1	1

Condt. Table I1: Final codebook from the systematic coding, first phase of the thematic analysis

Name	Files	References
7-Motivation - TY motivated in the Spring	3	5
8-Anxiety - 3rd year more anxious in Spring	3	4
8-Anxiety - a little bit of nervousness is ok	4	6
8-Anxiety - becoming more prevalent	4	11
8-Anxiety - CBA nervousness	2	7
8-Anxiety - depends on the individual	2	3
8-Anxiety - more in the Spring	4	4
8-Anxiety - more with formal exams than class tests	5	6
8-Anxiety - parental pressure	2	2
8-Anxiety - rises with formal exams	1	2
8-Anxiety - school monitors volume of class tests being done	1	1
8-Anxiety - TY anxious with time management	1	1
9-Parent-teacher - parental involvement beneficial	4	5
9-Parent-teacher meeting - held first half of year	4	4
9-Parent-teacher meetings - throughout the year	1	1
10-Wellbeing - equipping students	3	7
10-Wellbeing - programme developed-organised by various stakeholders	3	4
10-Wellbeing -various activities organised	5	9
10-Wellbing - programme throughout the year	5	9
11-Participation in PISA - considered important	6	12
11-Participation in PISA - good assuming sample not skewed	3	6
11-Participation in PISA - good for benchmarking	6	10
11-Participation in PISA - good to look at own standards in school	4	6
11-Participation in PISA - need to be careful of interpretation results	2	2
11-Participation in PISA - not familiar with outcome but interested in them	3	4
11-Participation in PISA - part of the bigger picture	3	6
12-Feedback - given as graphs	1	1
12-Feedback - interested in attitudes	4	5
12-Feedback - that can be given to teachers-parents-BOM	5	8
12-Feedback - to benchmark the school against the national average	5	10
13-Computer usage – good for all	4	16
13-Computer usage - driven by particular teachers	4	6
13-Computer usage - driven by the subject	3	4
13-Computer usage - financial support from parents	1	1
13-Computer usage - have computers and building up capacity and usage	6	8
13-computer usage - student wouldn't be disadvantaged	5	9

Condt. Table I1: Final codebook from the systematic coding, first phase of the thematic analysis

Name	Files	References
14- Curriculum - concern with standards of new JC	2	5
14-Curriculum - aspects of LC covered in TY	4	9
14-Curriculum - JC and the challenges with CBAs	3	6
14-Curriculum - Parental involvement in the TY programme	4	6
14-Curriculum - TY- is and should be well organised	5	6
14-Curriculum - variety of TY programme covered	4	7
14-Curriculum -concern for the future of TY	1	2
14-Curriculum -student involvement in TY programme	1	1

Table I2: Final naming, refining and defining of the themes, fifth phase of the thematic analysis

Themes, categories, codes	Files	References
Theme 1: Spring a better time to do the PISA testing	5	27
<i>1- Concern with SLL</i>	3	12
SLL – associated with students with learning difficulties	1	3
SLL - revisiting maths more than other subjects	1	3
SLL - revisiting of technical -fundamental issues	2	4
SLL - slight association with boys	1	1
SLL - slight association with modern language	1	1
<i>2- Engagement may be better in Spring</i>	4	6
Engagement slightly less at beginning of year	1	2
New students may not have a good sense of belonging	2	3
Teacher-student relationship better as the year goes on	1	1
<i>3- Slight Learning Loss for 5th years who did TY</i>	3	5
<i>4- TY motivated in the Spring</i>	2	3
<i>5- Perform better in Spring student a little older</i>	1	1
Theme 2: Autumn a better time to do the PISA testing	6	41
<i>1- Anxiety more in the Spring</i>	6	14
Anxiety - 3rd year more anxious in Spring	3	4
Anxiety - more in the Spring	4	4
Anxiety - more with formal exams (Spring) than class tests	4	6
<i>2- Engagement - maybe slightly better in the Autumn</i>	4	11
Engagement - attendance slightly better in the Autumn	3	3
Engagement -TY slightly more engaged in the Autumn than the the Spring	3	5
<i>3- Motivation - better in the Autumn</i>	3	9
Motivation - 3rd year can drop in Spring	3	7
<i>4- Parent-teacher meeting - held first half of year</i>	4	4
<i>5- Performance - may be better in Autumn more - TYs</i>	2	3

Condt. Table I2: Final naming, refining and defining of the themes, fifth phase of the thematic analysis

Themes, categories, codes	Files	References
<i>Sub-theme (of Theme 2): Preference for Autumn testing</i>	6	78
<i>1- Principals' preference for Autumn testing</i>	6	55
<i>A-Spring busy</i>	6	46
<i>A lot of organisational demands in the Spring</i>	6	13
<i>CBA - busy in Spring</i>	5	8
<i>Orals busy in Spring</i>	3	3
<i>Practicals - busy in Spring</i>	3	6
<i>Sports busy in Spring</i>	2	3
<i>Third 3rd year busy in Spring</i>	1	1
<i>TY - busier in Spring than the Autumn</i>	5	12
<i>B-Less organisational demands in the Autumn</i>	4	9
<i>2- Buy in from teachers</i>	2	5
<i>Autumn - better for teachers</i>	2	4
<i>PISA test - buy in from teachers</i>	1	1
<i>3- Buy in from students</i>	5	15
<i>Autumn - generally better time for students</i>	2	3
<i>PISA test - buy in from students</i>	4	12
<i>4- Buy in from parents</i>	2	3
Theme 3: Continuity of school life	6	140
<i>1- Engagement throughout the year</i>	6	27
Engagement - teachers keep with the same students	2	2
Engagement - homework same throughout the year	3	4
Engagement - majority have a high sense of belonging at any time	3	3
Engagement - no difference between Spring and Autumn	5	9
Engagement - skipping classes same throughout the year	5	7
Engagement - teacher-student relationship good at any time	2	2
<i>2- Capacity and access to computers for all students</i>	6	26
Computer usage – good for all	4	12
Computer usage - have computers and building up capacity and usage	6	7
Computer usage - student wouldn't be disadvantaged	4	7

Condt. Table I2: Final naming, refining and defining of the themes, fifth phase of the thematic analysis

Themes, categories, codes	Files	References
Theme 3 (condt.): Continuity of school life	6	140
<i>3- SLL not an issue and revisiting throughout the year</i>	5	25
SLL - more about wellbeing than performance	2	3
SLL - not something that is measured	3	6
SLL - parental encouragement	1	1
SLL - revisiting first few weeks -by 6 weeks students are settled in	4	11
SLL - revisiting throughout the year	3	4
<i>4- Anxiety occurring throughout the year</i>	4	23
Anxiety - becoming more prevalent	4	11
Anxiety - CBA nervousness	2	7
Anxiety - depends on the individual	2	3
Anxiety - parental pressure to always do well	2	2
<i>5- Continuous parental support</i>	5	15
Computer usage - financial support from parents	1	1
Continual parental involvement with homework	3	6
Motivation - from parents	1	2
Parental involvement in the TY programme	4	6
<i>6- No difference in performance</i>	5	14
Performance - generally could see no difference	4	7
Performance - no difference age not curriculum based	4	4
Performance - no difference students are focused will do well anytime	2	3
<i>7- Motivation no difference throughout the year</i>	5	6
Motivation - can be up and down	1	2
Motivation - no difference	4	4
<i>8- Students supporting each other throughout the year</i>	2	3
Engagement - students supporting each other	2	2
Motivation - students supporting each other	1	1
<i>9- Parent-teacher meetings - throughout the year</i>	1	1

Condt. Table I2: Final naming, refining and defining of the themes, fifth phase of the thematic analysis

Themes, categories, codes	Files	References
<i>Theme 4: PISA support from education stakeholders</i>	6	108
<i>1- Participation in PISA important</i>	6	57
<i>Feedback - interested in attitudes</i>	4	5
<i>Feedback - that can be given to teachers-parents-BOM</i>	5	8
<i>Good for benchmarking</i>	6	32
<i>Benchmark the school against the national average</i>	5	10
<i>Part of the bigger picture</i>	3	6
<i>2- No issues with admin of PISA</i>	5	29
<i>Conducted in a good-formal environment</i>	1	4
<i>Job of DP rather than a class teacher</i>	4	7
<i>Met with students and gave info on the logistics of the test</i>	2	3
<i>Not onerous task</i>	5	11
<i>Substitution pay sufficient</i>	3	4
<i>3- Interested in PISA</i>	3	7
<i>Not familiar with outcome but interested in them</i>	3	4
<i>PISA test - interested in it</i>	2	3
<i>4- Support from other educational stakeholders</i>	1	2
<i>Theme 5: School responsibility to support students</i>	6	75
<i>1- Students' wellbeing</i>	5	24
Wellbeing - generally equipping students	3	7
Wellbeing -school get the involvement from various stakeholders	3	4
Wellbeing -various activities organised throughout the year	5	13
<i>2- Students' engagement with school</i>	4	16
Engagement - school -teachers work at	4	13
Engagement - various activities organised throughout the year	2	3
<i>3- Curriculum coverage</i>	6	13
Computer usage - driven by particular teachers	4	6
Computer usage - driven by the subject	3	4
Curriculum - variety of TY programme covered	4	7

Condt. Table I2: Final naming, refining and defining of the themes, fifth phase of the thematic analysis

Themes, categories, codes	Files	References
Theme 5 (Condt.): School responsibility to support students	6	75
<i>4- Students' motivation</i>	4	10
Motivation - formative feedback from teachers	2	3
Motivation - new JC encourages love of learning	1	1
Motivation - school working with students to keeping them motivated	2	6
<i>5- Students' anxiety</i>	4	7
Anxiety - a little bit of nervousness is ok	4	6
Anxiety - school monitors volume of class tests being done	1	1
<i>6- Parental involvement</i>	4	5
Theme 6: Concerns that might indirectly be related to PISA performance	5	33
<i>1- Transition Year programme</i>	5	14
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Appendix J: Ethical approval from DCU Research Ethics Committee

J1. Ethical approval from DCU Research Ethics Committee

Ollscoil Chathair Bhaile Átha Cliath
Dublin City University



Ms Sylvia Denner
School of Policy and Practice

25th September 2018

REC Reference: DCUREC/2018/153

Proposal Title: Assessing performance of students who undertake PISA
(the Programme for International Student Assessment) at
different times of the year (spring and autumn)

Applicant(s): Ms Sylvia Denner, Prof Michael O' Leary & Dr Gerry Shiel

Dear Colleagues,

This research proposal qualifies under our Notification Procedure, as a low risk social research project. Therefore, the DCU Research Ethics Committee approves this project.

Materials used to recruit participants should state that ethical approval for this project has been obtained from the Dublin City University Research Ethics Committee.

Should substantial modifications to the research protocol be required at a later stage, a further amendment submission should be made to the REC.

Yours sincerely,

A handwritten signature in blue ink that reads 'Dónal O'Gorman'.

Dr Dónal O'Gorman
Chairperson
DCU Research Ethics Committee



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Appendix K: Ancillary Tables for Chapter 4

Table K1: Percentages and standard errors of low- and high-achievers for science by student-level variables, Spring and Autumn testing

	Spring Testing		Autumn Testing		Spring - Autumn	
	%	(SE)	%	(SE)	% Diff	(SE Diff)
<i>Science – Low-achievers (below Level 2)</i>						
Male (ref.)	18.1	(1.2)	19.9	(2.1)	-1.8	(2.4)
Female	16.0	(1.1)	14.7*	(1.6)	1.3	(2.0)
First / Second Year	45.4	(6.1)	61.7	(13.7)	-16.3	(14.9)
Third Year	17.6	(0.9)	19.5*	(2.2)	-1.9	(2.4)
Transition Year (ref.)	12.2	(1.2)	12.2	(1.7)	0.0	(2.0)
Fifth/Sixth Year	22.3	(2.7)	26.4	(3.5)	-4.1	(4.4)
Lowest ESCS (ref.)	29.0	(1.7)	28.1	(3.3)	0.9	(3.7)
Low-Medium ESCS	17.5	(1.4)	20.8	(2.4)	-3.3	(2.7)
Medium-High ESCS	12.5	(1.1)	13.2	(1.6)	-0.7	(1.9)
Highest ESCS	7.8	(1.0)	7.0	(1.3)	0.8	(1.7)
Native (ref.)	16.1	(0.9)	16.5	(1.5)	-0.4	(1.7)
Immigrant & Eng./Irish	18.1	(2.1)	15.7	(3.6)	2.4	(4.2)
Immigrant & other lang.	17.0	(2.4)	20.2	(3.3)	-3.3	(4.0)
<i>Science – High-achievers (Level 5 and above)</i>						
Male (ref.)	6.8	(0.8)	6.0	(1.1)	0.7	(1.4)
Female	4.9*	(0.6)	4.8	(1.0)	0.2	(1.1)
First / Second Year	1.8	(1.6)	0.0	(0.0)	1.8	(1.6)
Third Year	5.5	(0.6)	3.3*	(1.2)	2.2	(1.3)
Transition Year (ref.)	7.5	(1.0)	7.4	(1.1)	0.1	(1.5)
Fifth/Sixth Year	3.6*	(1.2)	3.2*	(1.2)	0.4	(1.7)
Lowest ESCS (ref.)	2.3	(0.5)	1.3	(0.7)	1.0	(0.9)
Low-Medium ESCS	4.0	(0.7)	3.1	(1.0)	0.9	(1.2)
Medium-High ESCS	5.9	(0.9)	6.2	(1.3)	-0.3	(1.6)
Highest ESCS	11.4	(1.4)	11.4	(1.9)	0.0	(2.3)
Native (ref.)	5.8	(0.6)	5.8	(0.9)	-0.1	(1.1)
Immigrant & Eng./Irish	8.1	(1.8)	6.8	(2.6)	1.3	(3.2)
Immigrant & other lang.	6.0	(1.5)	2.9	(1.6)	3.1	(2.2)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

Table K2: Percentages and standard errors of low- and high-achievers for mathematics by school-level variables, Spring and Autumn testing

	Spring Testing		Autumn Testing		Spring - Autumn	
	%	(SE)	%	(SE)	% Diff	(SE Diff)
<i>Mathematics– Low-achievers (below Level 2)</i>						
Girls’ secondary	12.2	(1.6)	11.4	(2.9)	0.7	(3.3)
Boys’ secondary	13.7*	(2.1)	16.8	(4.9)	-3.0	(5.3)
Community/comprehensive	18.2	(1.8)	17.8	(2.5)	0.4	(3.1)
Mixed secondary	10.3	(1.7)	18.7	(4.6)	-8.4	(4.9)
ETB vocational (ref.)	21.0	(1.8)	23.1	(3.2)	-2.1	(3.7)
Non-DEIS (ref.)	11.8	(0.8)	13.5	(1.6)	-1.8	(1.8)
DEIS	28.1	(2.5)	31.3	(3.2)	-3.2	(4.1)
<i>Mathematics – High-achievers (Level 5 and above)</i>						
Girls’ secondary	7.5	(1.0)	9.0	(1.8)	-1.5	(2.1)
Boys’ secondary	10.7	(1.5)	13.2	(2.1)	-2.5	(2.6)
Community/comprehensive	7.2	(1.1)	7.5	(1.8)	-0.3	(2.1)
Mixed secondary	13.2	(2.5)	8.0	(2.4)	5.2	(3.4)
ETB vocational (ref.)	5.1	(0.9)	7.0	(1.3)	-1.8	(1.6)
Non-DEIS (ref.)	9.7	(0.9)	10.2	(1.1)	-0.5	(1.4)
DEIS	3.6	(0.7)	4.1	(1.1)	-0.5	(1.3)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable’s categories with alpha levels adjusted appropriately.

Table K3: Percentages and standard errors of low- and high-achievers for science by school-level variables, Spring and Autumn testing

	Spring Testing		Autumn Testing		Spring - Autumn	
	%	(SE)	%	(SE)	% Diff	(SE Diff)
<i>Science – Low-achievers (below Level 2)</i>						
Girls’ secondary	12.4	(1.7)	12.0	(2.9)	0.4	(3.4)
Boys’ secondary	16.9	(2.4)	16.7	(4.1)	0.2	(4.8)
Community/comprehensive	19.1	(1.7)	16.1	(1.9)	3.0	(2.6)
Mixed secondary	11.8	(1.8)	18.7	(4.7)	-6.9	(5.0)
ETB vocational (ref.)	22.3	(1.6)	21.0	(2.6)	1.3	(3.1)
Non-DEIS (ref.)	13.5	(0.9)	12.8	(1.3)	0.7	(1.6)
DEIS	28.2	(2.2)	30.4	(2.5)	-2.2	(3.3)
<i>Science – High-achievers (Level 5 and above)</i>						
Girls’ secondary	4.9	(1.0)	5.6	(1.9)	-0.7	(2.1)
Boys’ secondary	6.4	(1.1)	7.4	(1.8)	-0.9	(2.1)
Community/comprehensive	4.7	(1.0)	4.7	(1.7)	0.0	(2.0)
Mixed secondary	10.2	(2.4)	5.3	(2.0)	4.9	(3.1)
ETB vocational (ref.)	4.3	(0.7)	4.7	(1.4)	-0.4	(1.6)
Non-DEIS (ref.)	6.7	(0.7)	6.6	(0.8)	0.1	(1.1)
DEIS	3.1	(0.6)	2.0	(0.9)	1.1	(1.1)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable’s categories with alpha levels adjusted appropriately.

Table K4: Teachers' expectations of the performance on PISA of their high-achieving students' depending on testing period, by sector-gender school type.

<i>Subject teachers teaching..</i>		Better in the Autumn		Better in the Spring	No difference
		N	%	%	%
Girls' secondary	English	24	25.0	33.3	41.7
	Maths	20	5.0	60.0	35.0
	Science	15	0.0	40.0	60.0
	Maths and Science	18	0.0	55.6	44.4
Boys' secondary	English	20	5.0	30.0	65.0
	Maths	14	0.0	57.1	42.9
	Science	10	20.0	60.0	20.0
	Maths and Science	17	0.0	35.3	64.7
Community/ comprehension	English	16	18.8	18.8	62.5
	Maths	13	15.4	38.5	46.2
	Science	8	0.0	50.0	50.0
	Maths and Science	13	15.4	38.5	46.2
Mixed secondary	English	28	7.1	42.9	50.0
	Maths	25	20.0	28.0	52.0
	Science	15	0.0	26.7	73.3
	Maths and Science	19	10.5	42.1	47.4
ETB vocational	English	45	13.3	33.3	53.3
	Maths	35	0.0	60.0	40.0
	Science	31	9.7	38.7	51.6
	Maths and Science	23	0.0	69.6	30.4

Table K5: Teachers' expectations of the performance on PISA of their low-achieving students depending on testing period, by sector-gender school type

<i>Subject teachers teaching..</i>		Better in the Autumn		Better in the Spring	No difference
		N	%	%	%
Girls' secondary	English	25	28.0	64.0	8.0
	Maths	20	35.0	45.0	20.0
	Science	14	28.6	28.6	42.9
	Maths and Science	18	5.6	50.0	44.4
Boys' secondary	English	20	25.0	45.0	30.0
	Maths	14	0.0	57.1	42.9
	Science	9	11.1	77.8	11.1
	Maths and Science	17	0.0	47.1	52.9
Community/ comprehension	English	16	37.5	37.5	25.0
	Maths	12	25.0	41.7	33.3
	Science	8	0.0	50.0	50.0
	Maths and Science	13	7.7	69.2	23.1
Mixed secondary	English	26	11.5	42.3	46.2
	Maths	25	16.0	40.0	44.0
	Science	15	6.7	26.7	66.7
	Maths and Science	19	15.8	47.4	36.8
ETB vocational	English	45	17.8	62.2	20.0
	Maths	35	8.6	45.7	45.7
	Science	32	18.8	46.9	34.4
	Maths and Science	23	4.3	60.9	34.8

Table K6: Mean scores and standard errors on reading subscales by student gender (percentages included), Spring and Autumn testing

	Spring Testing			Autumn Testing			Spring -Autumn	
	%	Mean	(SE)	%	Mean	(SE)	Diff	SE Diff
Cognitive Locate								
Female	49.7	532.5	(3.1)	50.4	531.3	(4.2)	1.2	(5.2)
Male (ref.)	50.3	508.7	(3.0)	49.6	505.9	(5.8)	2.8	(6.6)
Cognitive Understand								
Female	49.7	522.0	(2.7)	50.4	520.3	(4.0)	1.7	(4.8)
Male (ref.)	50.3	498.3	(3.3)	49.6	495.8	(6.4)	2.5	(7.2)
Cognitive Evaluate								
Female	49.7	528.6	(2.9)	50.4	529.6	(4.7)	-1.0	(5.5)
Male (ref.)	50.3	509.9	(3.4)	49.6	507.9	(6.3)	2.0	(7.1)
Text Single								
Female	49.7	525.6	(2.9)	50.4	522.1	(4.4)	3.5	(5.3)
Male (ref.)	50.3	499.4	(3.2)	49.6	497.2	(6.2)	2.2	(7.0)
Text Multiple								
Female	49.7	526.1	(2.8)	50.4	527.2	(4.4)	-1.0	(5.2)
Male (ref.)	50.3	506.9	(3.1)	49.6	506.7	(5.9)	0.2	(6.7)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

Table K7: Mean scores and standard errors on reading subscales by student grade (percentages included), Spring and Autumn testing

	Spring Testing			Autumn Testing			Spring -Autumn	
	%	Mean	(SE)	%	Mean	(SE)	Diff	SE Diff
Cognitive Locate								
First / Second Year	2.0	440.4	(12.6)	0.6	400.9	(31.7)	39.5	(34.1)
Third Year	61.6	518.6	(2.7)	26.4	496.1	(5.3)	22.5	(6.0)
Transition Year (ref.)	27.9	537.9	(3.5)	52.6	540.2	(5.0)	-2.3	(6.1)
Fifth/Sixth Year	8.5	498.3	(5.6)	20.5	495.1	(8.8)	3.2	(10.4)
Cognitive Understand								
First / Second Year	2.0	427.2	(11.2)	0.6	410.2	(28.7)	16.9	(30.8)
Third Year	61.6	508.8	(2.6)	26.4	494.7	(5.4)	14.0	(6.0)
Transition Year (ref.)	27.9	527.4	(3.5)	52.6	528.1	(5.0)	-0.7	(6.1)
Fifth/Sixth Year	8.5	483.9	(6.0)	20.5	476.2	(8.5)	7.7	(10.4)
Cognitive Evaluate								
First / Second Year	2.0	442.7	(12.0)	0.6	417.7	(34.3)	24.9	(36.3)
Third Year	61.6	517.9	(2.7)	26.4	502.8	(6.1)	15.1	(6.7)
Transition Year (ref.)	27.9	536.8	(4.1)	52.6	540.2	(5.0)	-3.4	(6.5)
Fifth/Sixth Year	8.5	489.8	(5.9)	20.5	486.5	(8.7)	3.2	(10.5)
Text Single								
First / Second Year	2.0	426.8	(12.2)	0.6	387.3	(29.7)	39.4	(32.1)
Third Year	61.6	511.7	(2.6)	26.4	494.0	(5.3)	17.7	(5.9)
Transition Year (ref.)	27.9	528.3	(3.6)	52.6	530.8	(5.1)	-2.5	(6.3)
Fifth/Sixth Year	8.5	488.1	(5.7)	20.5	478.6	(8.9)	9.5	(10.5)
Text Multiple								
First / Second Year	2.0	436.1	(11.5)	0.6	414.1	(30.2)	22.0	(32.3)
Third Year	61.6	514.9	(2.5)	26.4	500.7	(5.3)	14.1	(5.8)
Transition Year (ref.)	27.9	534.9	(3.5)	52.6	537.5	(4.8)	-2.6	(6.0)
Fifth/Sixth Year	8.5	488.0	(5.4)	20.5	487.6	(8.8)	0.4	(10.3)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

Table K8: Mean scores and standard errors on reading subscales by student ESCS (percentages included), Spring and Autumn testing

	Spring Testing			Autumn Testing			Spring -Autumn	
	%	Mean	(SE)	%	Mean	(SE)	Diff	SE Diff
Cognitive Locate								
Lowest ESCS (ref.)	25.0	483.2	(3.4)	25.0	488.6	(6.7)	-5.5	(7.5)
Low-Medium ESCS	25.0	513.2	(3.4)	25.0	504.2	(5.3)	9.0	(6.3)
Medium-High ESCS	25.0	531.4	(3.0)	25.0	529.5	(6.1)	1.9	(6.8)
Highest ESCS	25.0	558.7	(3.0)	25.1	552.8	(5.6)	5.9	(6.3)
Cognitive Understand								
Lowest ESCS (ref.)	25.0	473.1	(3.4)	25.0	470.2	(6.6)	3.0	(7.4)
Low-Medium ESCS	25.0	501.7	(3.1)	25.0	492.7	(5.2)	9.0	(6.0)
Medium-High ESCS	25.0	520.3	(3.1)	25.0	523.6	(5.8)	-3.3	(6.5)
Highest ESCS	25.0	549.8	(3.1)	25.1	547.8	(5.2)	2.0	(6.1)
Cognitive Evaluate								
Lowest ESCS (ref.)	25.0	479.5	(3.4)	25.0	478.1	(6.5)	1.4	(7.4)
Low-Medium ESCS	25.0	508.9	(3.3)	25.0	500.5	(5.4)	8.3	(6.3)
Medium-High ESCS	25.0	530.0	(3.2)	25.0	535.6	(6.1)	-5.7	(6.9)
Highest ESCS	25.0	562.9	(3.7)	25.1	562.0	(5.9)	0.8	(7.0)
Text Single								
Lowest ESCS (ref.)	25.0	473.5	(3.3)	25.0	471.9	(6.8)	1.7	(7.5)
Low-Medium ESCS	25.0	504.0	(3.2)	25.0	492.0*	(5.1)	12.0*	(6.0)
Medium-High ESCS	25.0	523.2	(3.4)	25.0	526.1	(6.1)	-2.9	(7.0)
Highest ESCS	25.0	553.6	(3.3)	25.1	550.8	(5.5)	2.8	(6.4)
Text Multiple								
Lowest ESCS (ref.)	25.0	478.7	(3.3)	25.0	480.0	(6.3)	-1.3	(7.1)
Low-Medium ESCS	25.0	508.1	(3.1)	25.0	501.0*	(5.4)	7.1	(6.2)
Medium-High ESCS	25.0	526.6	(2.9)	25.0	532.2	(5.7)	-5.6	(6.4)
Highest ESCS	25.0	557.1	(3.2)	25.1	555.4	(5.3)	1.7	(6.2)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

Table K9: Mean scores and standard errors on reading subscales by student immigrant-language status (percentages included), Spring and Autumn testing

	Spring Testing			Autumn Testing			Spring-Autumn	
	%	Mean	(SE)	%	Mean	(SE)	Diff	SE Diff
Cognitive Locate								
Native (ref.)	82.1	523.8	(2.3)	81.4	523.4	(4.5)	0.4	(5.1)
Immigrant & Eng./Irish	9.0	523.1	(5.6)	8.5	512.5	(7.8)	10.6	(9.6)
Immigrant & other lang.	8.8	506.7*	(6.4)	10.1	495.3	(7.5)	11.4	(9.8)
Cognitive Understand								
Native (ref.)	82.1	514.3	(2.5)	81.4	513.2	(4.7)	1.0	(5.3)
Immigrant & Eng./Irish	9.0	509.9	(5.8)	8.5	497.3*	(6.6)	12.7	(8.8)
Immigrant & other lang.	8.8	491.2	(5.8)	10.1	490.0	(7.7)	1.2	(9.6)
Cognitive Evaluate								
Native (ref.)	82.1	523.7	(2.6)	81.4	524.0	(4.8)	-0.3	(5.4)
Immigrant & Eng./Irish	9.0	516.0	(5.8)	8.5	510.5	(8.3)	5.5	(10.1)
Immigrant & other lang.	8.8	500.6	(6.2)	10.1	496.8	(7.4)	3.8	(9.6)
Text Single								
Native (ref.)	82.1	516.8	(2.6)	81.4	514.9	(4.6)	1.8	(5.3)
Immigrant & Eng./Irish	9.0	513.2	(5.8)	8.5	500.5*	(7.3)	12.8	(9.3)
Immigrant & other lang.	8.8	491.0	(5.9)	10.1	488.6	(7.1)	2.5	(9.2)
Text Multiple								
Native (ref.)	82.1	520.4	(2.5)	81.4	521.9	(4.4)	-1.5	(5.0)
Immigrant & Eng./Irish	9.0	514.4	(5.4)	8.5	506.9*	(7.6)	7.5	(9.3)
Immigrant & other lang.	8.8	502.7	(5.4)	10.1	496.8	(7.0)	5.9	(8.8)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

Table K10: Mean scores and standard errors on reading subscales by school-sector status (percentages included), Spring and Autumn testing

	Spring Testing			Autumn Testing			Spring-Autumn	
	%	Mean	(SE)	%	Mean	(SE)	Diff	SE Diff
Cognitive Locate								
Girls' secondary	21.2	544.2	(4.4)	19.2	542.4	(8.0)	1.8	(9.1)
Boys' secondary	15.0	513.3	(6.1)	15.9	519.8	(11.2)	-6.5	(12.8)
Community/comprehensive	16.9	510.3	(3.6)	17.5	519.2	(6.2)	-8.9	(7.2)
Mixed secondary	17.4	537.8	(7.3)	19.0	511.7	(13.0)	26.1	(14.9)
ETB vocational (ref.)	29.5	503.3	(3.9)	28.3	505.7	(7.1)	-2.3	(8.1)
Cognitive Understand								
Girls' secondary	21.2	534.6	(3.8)	19.2	530.0	(7.2)	4.6	(8.2)
Boys' secondary	15.0	503.5	(6.2)	15.9	507.9	(11.9)	-4.4	(13.5)
Community/comprehensive	16.9	500.1	(4.0)	17.5	509.2	(6.8)	-9.1	(7.9)
Mixed secondary	17.4	527.9	(8.1)	19.0	502.3	(14.5)	25.6	(16.6)
ETB vocational (ref.)	29.5	491.4	(4.2)	28.3	496.1	(7.4)	-4.8	(8.5)
Cognitive Evaluate								
Girls' secondary	21.2	541.6	(4.3)	19.2	538.6*	(8.8)	3.0	(9.8)
Boys' secondary	15.0	516.3	(6.2)	15.9	521.5	(11.9)	-5.2	(13.4)
Community/comprehensive	16.9	506.9	(4.5)	17.5	521.1	(7.6)	-14.2	(8.8)
Mixed secondary	17.4	540.8	(9.0)	19.0	514.5	(15.0)	26.3	(17.5)
ETB vocational (ref.)	29.5	499.1	(4.6)	28.3	504.7	(7.1)	-5.7	(8.4)
Text Single								
Girls' secondary	21.2	539.2	(4.0)	19.2	533.3	(8.2)	6.0	(9.2)
Boys' secondary	15.0	505.3	(6.1)	15.9	510.2	(12.0)	-4.8	(13.5)
Community/comprehensive	16.9	500.6	(4.2)	17.5	509.2	(6.4)	-8.6	(7.7)
Mixed secondary	17.4	531.1	(8.1)	19.0	505.5	(14.4)	25.6	(16.5)
ETB vocational (ref.)	29.5	493.0	(4.2)	28.3	496.1	(7.5)	-3.1	(8.6)
Text Multiple								
Girls' secondary	21.2	538.3	(4.0)	19.2	535.9*	(8.5)	2.5	(9.4)
Boys' secondary	15.0	512.1	(6.4)	15.9	519.0	(11.4)	-6.9	(13.0)
Community/comprehensive	16.9	505.3	(4.1)	17.5	517.8	(5.4)	-12.5	(6.8)
Mixed secondary	17.4	535.4	(8.0)	19.0	512.9	(14.5)	22.6	(16.6)
ETB vocational (ref.)	29.5	498.6	(4.2)	28.3	504.9	(7.1)	-6.4	(8.2)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

Table K11: Mean scores and standard errors on reading subscales by DEIS status (percentages included), Spring and Autumn testing

	Spring Testing			Autumn Testing			Spring-Autumn	
	%	Mean	(SE)	%	Mean	(SE)	Diff	SE Diff
Cognitive Locate								
Non-DEIS (ref.)	75.9	532.8	(2.6)	74.4	531.2	(3.9)	1.6	(4.7)
DEIS	24.1	482.5	(4.8)	25.6	481.8	(6.3)	0.7	(8.0)
Cognitive Understand								
Non-DEIS (ref.)	75.9	522.9	(2.6)	74.4	521.1	(3.7)	1.8	(4.6)
DEIS	24.1	470.0	(5.2)	25.6	469.8	(7.1)	0.2	(8.8)
Cognitive Evaluate								
Non-DEIS (ref.)	75.9	532.5	(2.9)	74.4	532.1	(4.2)	0.4	(5.1)
DEIS	24.1	477.5	(5.4)	25.6	479.7	(6.7)	-2.1	(8.6)
Text Single								
Non-DEIS (ref.)	75.9	525.6	(2.8)	74.4	523.1	(4.0)	2.5	(4.9)
DEIS	24.1	471.4	(5.1)	25.6	470.3	(6.5)	1.1	(8.3)
Text Multiple								
Non-DEIS (ref.)	75.9	529.1	(2.7)	74.4	529.8	(3.9)	-0.7	(4.7)
DEIS	24.1	477.2	(5.1)	25.6	479.4	(6.4)	-2.2	(8.1)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level. (ref.) is the reference group within a variable's categories with alpha levels adjusted appropriately.

Appendix L: Ancillary Tables for Chapter 5

Table L1: Topics/skills/learning outcomes taught by English teachers to Fifth Year students in the first six weeks of the academic year, by school-level variables (percentages)

<i>Topics/Skills/Learning Outcomes:</i>	All	Girls' sec.	Boys' sec.	Comm./ Comp.	Mixed sec.	ETB vocational	Non-DEIS	DEIS
	(n=97)	(n=17)	(n=13)	(n=10)	(n=19)	(n=37)	(n=58)	(n=39)
Writing Skills	48.9	49.2	51.9	61.0	55.0	41.3	45.4	54.0
Poetry	43.5	41.4	37.0	44.7	62.5	36.5	38.4	50.9
Drama	37.1	26.2	41.6	34.6	54.3	32.5	35.4	39.6
Comprehension/ Understanding	24.1	22.9	35.4	8.4	23.9	25.1	20.9	28.9
Language genres	10.4	10.6	15.1	18.4	4.0	9.8	12.5	7.3
Grammar	6.1	0.0	15.5	7.6	0.0	8.4	2.5	11.3
Analysis of text	5.7	6.2	5.5	4.1	0.0	9.0	8.4	1.8
Other	5.7	5.7	0.0	0.0	4.0	10.0	9.5	0.0
Literacy skills unspecified	5.3	8.5	13.1	8.4	0.0	3.1	6.2	4.0
Reading	5.2	5.5	7.5	0.0	0.0	8.5	6.8	2.9
Communication	4.7	5.7	0.0	0.0	0.0	9.7	6.1	2.7
Novel/Fiction	3.1	0.0	0.0	0.0	7.4	4.2	3.8	2.0
Comparative	2.8	0.0	0.0	6.4	4.0	3.5	3.5	1.8
Media studies	2.4	0.0	0.0	0.0	0.0	6.1	0.0	5.8
Organisation	2.0	0.0	5.5	0.0	4.0	1.3	2.1	2.0

Note. Teachers could select up to three topics/skills/learning outcomes, therefore percentages will not sum to 100%.

Table L2: Topics/skills/learning outcomes taught by mathematic teachers to Transition Year (TY) students in the first six weeks of the academic year, by school-level variables (percentages)

<i>Topics/Skills/ Learning Outcomes:</i>	All	Girls' sec.	Boys' sec.	Comm./ Comp.	Mixed sec.	ETB vocational	Non- DEIS	DEIS
	(n=104)	(n=21)	(n=16)	(n=13)	(n=20)	(n=34)	(n=67)	(n=38)
<i>Algebra</i>	37.7	27.1	28.3	38.4	36.2	49.5	37.3	38.6
Algebra unspecified	27.6	16.9	17.0	33.5	17.6	42.7	26.1	30.1
Equations	8.5	6.9	7.2	2.3	8.9	12.3	10.7	4.7
Factorising	9.9	6.9	7.2	2.3	18.6	11.0	11.4	7.3
Graphs	0.6	2.9	0.0	0.0	0.0	0.0	0.9	0.0
Quadratic	3.6	6.1	4.0	4.9	0.0	3.4	5.6	0.0
<i>Functions</i>	3.2	6.1	0.0	0.0	10.4	0.0	3.9	2.0
Functions	3.2	6.1	0.0	0.0	10.4	0.0	3.9	2.0
<i>Geometry/ Trigonometry</i>	26.3	38.3	14.9	32.3	20.0	25.8	17.5	41.8
Construction	3.6	0.0	0.0	2.3	0.0	10.1	0.4	9.1
Coordinate geometry	16.9	34.3	4.6	30.0	13.9	8.7	9.8	29.4
Surds	0.9	0.0	5.7	0.0	0.0	0.0	1.4	0.0
Synthetic geometry	2.8	0.0	0.0	13.5	0.0	3.3	1.7	4.7
Trigonometry	4.8	8.4	4.6	0.0	6.1	3.7	5.6	3.4
<i>Number</i>	18.2	30.6	4.6	10.3	15.9	21.4	11.9	29.2
Area/volume	4.9	0.0	4.6	10.3	0.0	8.7	3.2	7.9
Arithmetic	2.6	0.0	0.0	0.0	0.0	8.1	1.6	4.5
Financial	2.0	0.0	0.0	0.0	0.0	6.2	0.6	4.5
Indices/Integers	1.5	4.0	0.0	0.0	0.0	2.2	1.3	1.9
Number systems	13.4	26.6	0.0	5.3	15.9	13.5	6.4	25.8
<i>Statistics</i>	17.8	17.7	15.1	14.5	12.3	23.4	16.6	19.7
<i>Probability</i>								
Probability	7.1	0.0	15.1	6.0	0.0	12.2	1.8	16.4
Statistics	16.1	17.7	15.1	14.5	12.3	18.4	16.0	16.4
Other statistics	2.3	0.0	0.0	0.0	0.0	7.2	0.0	6.5
<i>Other Maths</i>	16.7	31.1	11.8	2.3	26.1	10.3	12.9	23.3
Other Maths	2.9	0.0	7.8	2.3	7.6	0.0	4.6	0.0
Problem Solving	11.8	31.1	4.0	0.0	16.3	5.6	5.3	23.3
Cryptography								
Binary	3.4	0.0	0.0	0.0	9.8	4.6	5.3	0.0

Note. Teachers could select up to three topics/skills/learning outcomes, therefore percentages will not sum to 100%.

Table L3: Topics/skills/learning outcomes taught by mathematic teachers to Fifth Year students in the first six weeks of the academic year, by school-level variables (percentages)

<i>Topics/Skills/Learning Outcomes:</i>	All	Girls' sec.	Boys' sec.	Comm./ Comp.	Mixed Sec.	ETB vocational	Non-DEIS	DEIS
	(n=163)	(n=32)	(n=27)	(n=21)	(n=33)	(n=50)	(n=110)	(n=53)
<i>Algebra</i>	57.1	64.0	68.5	61.0	53.7	47.3	57.9	55.6
Algebra unspecified	36.8	45.6	47.9	45.0	31.8	25.0	38.1	33.9
Equations	23.4	24.9	28.1	20.3	26.8	18.8	21.3	27.6
Factorising	14.7	35.9	9.2	5.0	10.1	11.0	12.4	19.3
Graphs	0.6	0.0	3.4	0.0	0.0	0.0	0.8	0.0
Quadratic	5.8	2.9	0.0	19.7	4.8	5.6	6.3	4.6
<i>Functions</i>	6.7	12.6	3.4	11.8	6.8	2.5	9.2	1.4
Calculus	1.0	0.0	0.0	0.0	4.9	0.0	1.5	0.0
Functions	6.2	12.6	3.4	11.8	4.2	2.5	8.5	1.4
<i>Geometry/Trigonometry</i>	17.0	16.3	21.6	20.7	18.1	12.8	21.7	7.5
Coordinate geometry	12.8	10.6	21.6	13.2	11.0	10.5	15.4	7.5
Surds	2.2	2.7	0.0	7.5	0.0	2.3	3.2	0.0
Synthetic geometry	0.5	0.0	0.0	0.0	0.0	1.5	0.7	0.0
Trigonometry	3.7	3.1	3.4	0.0	12.8	0.0	5.6	0.0
<i>Number</i>	33.2	26.8	35.4	35.6	15.1	46.9	30.9	37.9
Area/volume	3.6	0.0	7.2	11.6	1.3	2.2	3.2	4.5
Arithmetic	4.9	0.0	6.9	6.7	0.0	9.6	2.4	10.2
Financial	2.0	0.0	0.0	0.0	0.0	6.5	0.7	4.7
Indices/Integers	9.6	8.9	13.8	6.8	4.4	12.3	8.5	11.8
Number systems	22.2	14.7	17.1	28.8	11.9	33.6	18.8	29.0
Fractions	3.1	6.4	4.8	0.0	0.0	3.4	3.0	3.2
<i>Statistics Probability</i>	7.5	7.3	4.8	3.1	0.0	15.7	4.6	13.4
Probability	2.1	4.3	4.8	0.0	0.0	1.5	3.1	0.0
Statistics	6.2	7.3	0.0	3.1	0.0	14.2	2.7	13.4
<i>Other Maths</i>	4.0	5.3	4.7	6.1	0.0	4.5	4.3	3.3
Other Maths	2.9	3.2	4.7	6.1	0.0	2.3	2.7	3.3
Problem Solving	1.1	2.2	0.0	0.0	0.0	2.2	1.6	0.0

Note. Teachers could select up to three topics/skills/learning outcomes, therefore percentages will not sum to 100%.

Table L4: Topics/skills/learning outcomes taught by science teachers to TY students in the first six weeks of the academic year, by school-level variables (percentages)

<i>Topics/Skills/Learning Outcomes:</i>	All	Girls' sec.	Boys' sec.	Comm./ Comp.	Mixed sec.	ETB vocational	Non-DEIS	DEIS
	(n=99)	(n=18)	(n=16)	(n=15)	(n=18)	(n=32)	(n=74)	(n=26)
<i>Biological</i>	34.3	30.5	32.8	28.5	34.1	39.8	24.1	63.2
Human health	15.9	10.2	13.9	11.9	30.0	13.9	10.5	31.2
Biodiversity	3.3	5.2	0.0	5.3	0.0	4.7	2.3	5.9
Human/Plant structure	21.5	30.5	18.0	16.8	17.3	22.6	16.6	35.4
Food Test	1.9	5.1	5.9	0.0	0.0	0.0	2.5	0.0
Other biology	1.8	0.0	8.0	3.8	0.0	0.0	1.7	2.1
<i>Chemical</i>	13.7	32.9	10.3	4.5	16.8	7.0	14.2	12.4
Chemical reactions	7.5	7.9	4.2	4.5	13.3	7.0	5.8	12.4
Atomic structure	6.2	16.9	0.0	4.5	13.3	0.0	5.1	9.4
Acids/Bases	1.8	3.7	0.0	0.0	0.0	3.3	2.4	0.0
Substances	3.0	12.7	4.2	0.0	0.0	0.0	4.1	0.0
Periodic table	3.5	10.2	6.1	0.0	3.5	0.0	4.7	0.0
Other chemical	1.8	9.7	0.0	0.0	0.0	0.0	2.4	0.0
<i>Earth/Space</i>	11.6	6.9	11.1	18.4	7.5	13.8	11.1	13.0
Earth/Space	2.2	0.0	0.0	5.5	0.0	4.3	1.1	5.4
H2O/CO2 cycle	0.7	0.0	4.2	0.0	0.0	0.0	0.9	0.0
Conservation	1.8	0.0	0.0	0.0	0.0	5.7	1.5	2.9
Energy sustainability	0.7	0.0	0.0	4.5	0.0	0.0	0.9	0.0
Horticulture/Farming	6.2	6.9	7.0	8.4	7.5	3.8	6.8	4.8
<i>Physical</i>	17.1	25.7	7.0	4.9	22.5	19.6	21.5	4.5
Electricity	4.8	4.6	0.0	0.0	4.1	9.9	6.5	0.0
Energy	3.9	0.0	0.0	4.9	0.0	9.9	4.7	1.7
Mechanics	4.5	3.3	0.0	0.0	18.5	1.7	6.1	0.0
Light	6.7	0.0	7.0	0.0	16.2	7.9	8.0	2.9
Other physical	7.7	25.7	0.0	0.0	16.2	0.0	10.4	0.0
<i>Other science</i>	34.3	47.2	44.2	25.2	6.3	41.8	33.6	36.3
Research skills	30.9	42.5	39.1	25.2	6.3	36.7	30.1	33.2
Other science	9.7	13.4	17.0	10.3	2.2	7.8	10.9	6.1
Project work	5.2	0.0	5.1	0.0	0.0	13.3	1.5	15.6

Note. Teachers could select up to three topics/skills/learning outcomes, therefore percentages will not sum to 100%.

Table L5: Topics/skills/learning outcomes taught by science teachers to Fifth Year students in the first six weeks of the academic year, by school-level variables (percentages)

<i>Topics/Skills/Learning Outcomes:</i>	All	Girls' sec.	Boys' sec.	Comm./ Comp.	Mixed sec.	ETB vocational	Non-DEIS	DEIS
	(n=141)	(n=26)	(n=23)	(n=17)	(n=25)	(n=49)	(n=104)	(n=37)
<i>Biological</i>	50.9	56.7	24.7	54.3	32.3	68.3	45.8	65.3
Human health	6.5	2.6	4.7	10.9	3.0	9.7	6.0	8.0
Biodiversity	8.2	0.0	5.5	7.0	6.0	15.4	5.7	15.3
Human/Plant structure	46.0	47.5	19.2	52.7	29.2	63.9	42.4	56.3
Food Test	20.0	32.0	10.3	17.9	6.3	25.8	19.6	21.2
Other biology	5.3	0.0	5.5	0.0	0.0	0.0	1.2	0.0
<i>Chemical</i>	14.9	18.8	29.9	7.8	15.4	8.1	16.0	11.9
Chemical reactions	8.9	10.6	20.3	2.5	2.6	8.1	10.9	3.3
Atomic structure	9.9	8.8	12.3	5.3	15.4	8.1	9.5	10.8
Acids/Bases	1.3	3.5	4.0	0.0	0.0	0.0	1.8	0.0
Periodic table	4.0	2.6	8.9	0.0	3.0	4.4	4.7	2.0
Other chemical	0.9	13.8	0.0	3.5	0.0	6.5	4.9	6.4
<i>Earth/Space</i>	6.0	3.9	0.0	14.2	5.5	7.2	6.1	5.5
Earth/Space	2.5	0.0	0.0	14.2	0.0	2.2	3.4	0.0
H2O/CO2 cycle	0.7	3.9	0.0	0.0	0.0	0.0	1.0	0.0
Horticulture/Farming	2.7	0.0	0.0	0.0	5.5	5.0	1.7	5.5
<i>Physical</i>	26.0	25.2	29.4	14.3	44.5	19.6	24.4	30.3
Electricity	6.4	0.0	0.0	6.9	15.4	8.1	2.7	16.9
Energy	2.5	6.9	4.8	0.0	0.0	1.1	3.3	0.0
Mechanics	10.7	13.0	16.3	0.0	22.0	5.1	12.4	6.0
Light	10.9	9.1	16.6	7.4	19.1	6.4	12.1	7.6
Other physical	1.7	6.4	0.0	0.0	3.0	0.0	1.6	2.0
<i>Other science</i>	34.4	37.1	31.7	38.3	28.2	35.9	33.3	37.3
Research skills	29.3	30.1	26.2	24.2	28.2	32.7	26.5	37.3
Other science	7.5	7.1	13.8	14.2	0.0	6.1	8.7	3.8

Note. Teachers could select up to three topics/skills/learning outcomes, therefore percentages will not sum to 100%.

Table L6: Teachers who reported revisiting topics/skills/learning outcomes and the time revisiting occurred by school background variables (percentages)

	All	Girls' sec.	Boys' sec.	Comm./ comp.	Mixed sec.	ETB vocational	Non-DEIS	DEIS
<i>All teachers teaching Third Year students</i>								
	(n=215)	(n=35)	(n=39)	(n=29)	(n=38)	(n=73)	(n=131)	(n=84)
First 2 weeks of academic year	69.0	62.3	85.7	52.3	82.4	63.0	68.5	69.7
First 4 weeks of academic year	6.2	4.5	1.7	3.3	7.5	9.9	3.3	10.7
First 6 weeks of academic year	13.1	21.7	10.1	14.2	6.4	13.5	13.9	11.8
Mix of weeks in the first 6 weeks of academic year	11.8	11.6	2.5	30.3	3.8	13.6	14.3	7.9
<i>All teachers teaching Fourth Year/TY students</i>								
	(n=119)	(n=24)	(n=17)	(n=13)	(n=20)	(n=46)	(n=71)	(n=48)
First 2 weeks of academic year	71.7	61.6	88.3	61.2	96.2	63.0	72.6	70.3
First 4 weeks of academic year	7.2	6.3	0.0	4.6	0.0	14.3	3.7	12.5
First 6 weeks of academic year	11.3	23.4	0.0	26.0	0.0	9.8	11.2	11.4
Mix of weeks in the first 6 weeks of academic year	9.8	8.6	11.7	8.1	3.8	12.9	12.5	5.8
<i>All teachers teaching Fifth Year students</i>								
	(n=241)	(n=43)	(n=36)	(n=29)	(n=40)	(n=93)	(n=151)	(n=90)
First 2 weeks of academic year	68.2	63.6	76.4	58.7	78.9	65.7	68.8	67.3
First 4 weeks of academic year	8.5	9.4	7.2	1.5	5.6	12.1	5.4	13.7
First 6 weeks of academic year	9.0	15	4.2	17.3	1.9	8.4	7.9	10.7
Mix of weeks in the first 6 weeks of academic year	14.2	11.9	12.1	22.5	13.6	13.8	17.9	8.2

Table L7: Percentage of students who reported reading selected text formats in school *many times* in the previous month by background variables, Spring and Autumn testing

<i>Students who 'many times during the last month' read...</i>	Spring								Autumn								Spring - Autumn							
	Texts- diagrams/ maps		Fiction (e.g., novels, short stories)		Texts- include tables or graphs		Digital texts including links		Texts- diagrams/ maps		Fiction (e.g., novels, short stories)		Texts- include tables or graphs		Digital texts including links		Texts- diagrams/ maps		Fiction (e.g., novels, short stories)		Texts- include tables or graphs		Digital texts including links	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE Diff)	%	(SE Diff)	%	(SE Diff)	%	(SE Diff)
Male	33.4	(0.8)	26.0	(1.2)	33.4	(0.9)	12.9	(0.7)	28.2	(2.6)	35.1	(2.2)	26.1	(1.4)	20.8	(1.7)	5.2	(2.8)	-9.1	(2.5)	7.3	(1.7)	-7.9	(1.8)
Female	36.0	(1.0)	29.9	(1.1)	34.4	(1.0)	13.4	(0.8)	24.7	(1.4)	33.9	(2.5)	23.1	(1.4)	16.3	(1.4)	11.3	(1.7)	-4.1	(2.7)	11.3	(1.7)	-2.8	(1.6)
First / Second Year	33.7	(4.0)	35.4	(4.6)	30.3	(4.6)	15.0	(3.1)	30.0	(10.5)	10.4	(6.8)	23.3	(11.0)	12.9	(8.9)	3.7	(11.2)	24.9	(8.2)	7.0	(11.9)	2.0	(9.4)
Third Year	43.0	(1.0)	28.7	(1.1)	40.3	(0.9)	10.8	(0.7)	39.0	(2.8)	28.6	(2.0)	36.6	(1.9)	14.6	(2.1)	4.0	(2.9)	0.1	(2.3)	3.7	(2.1)	-3.8	(2.2)
Transition Year	16.7	(1.1)	25.4	(1.5)	19.2	(1.1)	18.6	(1.2)	16.9	(1.5)	29.1	(1.5)	17.7	(1.5)	22.2	(1.8)	-0.3	(1.9)	-3.7	(2.1)	1.5	(1.9)	-3.6	(2.1)
Fifth/Sixth Year	33.6	(2.2)	29.1	(2.4)	37.2	(2.0)	12.2	(1.4)	34.3	(2.2)	27.9	(2.6)	26.8	(1.4)	14.4	(1.9)	-0.7	(3.1)	1.3	(3.5)	10.4	(2.5)	-2.2	(2.4)
Lowest ESCS	32.0	(1.3)	26.2	(1.2)	30.6	(1.2)	10.6	(1.0)	24.0	(1.8)	27.8	(2.8)	21.0	(2.2)	15.7	(2.4)	8.0	(2.2)	-1.6	(3.1)	9.7	(2.5)	-5.2*	(2.6)
Low-Medium ESCS	35.7	(1.4)	29.2	(1.7)	33.6	(1.4)	13.7	(1.2)	23.7	(1.8)	36.2	(2.8)	22.8	(1.4)	16.5	(2.0)	12.0	(2.3)	-7.0*	(3.2)	10.7	(2.0)	-2.8	(2.3)
Medium-High ESCS	33.5	(1.2)	29.0	(1.4)	35.0	(1.3)	13.3	(1.0)	29.7	(2.5)	36.6	(3.0)	27.0	(1.8)	19.5	(1.7)	3.9	(2.7)	-7.6*	(3.3)	8.1	(2.2)	-6.2	(2.0)
Highest ESCS	37.4	(1.5)	27.1	(1.4)	36.5	(1.4)	15.1	(1.1)	27.8	(3.1)	37.1	(2.7)	27.4	(2.3)	22.3	(2.6)	9.6	(3.5)	-10.0	(3.1)	9.1	(2.7)	-7.3*	(2.8)
Native	34.0	(0.7)	27.5	(0.9)	33.6	(0.7)	12.6	(0.6)	25.5	(1.5)	34.0	(2.0)	23.7	(1.3)	17.7	(1.4)	8.5	(1.7)	-6.5	(2.2)	9.9	(1.5)	-5.1	(1.6)
Immigrant & Eng./Irish	36.2	(2.4)	30.1	(2.2)	36.2	(2.3)	15.0	(1.7)	25.5	(3.2)	34.8	(5.2)	27.2	(3.5)	22.8	(3.4)	10.6	(4.0)	-4.7	(5.6)	9.0*	(4.2)	-7.7*	(3.8)
Immigrant & other lang.	38.4	(2.8)	28.7	(2.6)	33.9	(2.3)	16.2	(2.0)	33.2	(4.0)	37.8	(2.9)	30.3	(2.7)	19.5	(3.2)	5.2	(4.8)	-9.1*	(3.9)	3.7	(3.6)	-3.3	(3.8)
Girls' secondary	35.9	(1.8)	30.3	(1.9)	35.1	(2.0)	13.4	(1.2)	27.2	(1.9)	38.1	(5.2)	26.4	(2.9)	12.9	(2.2)	8.7	(2.7)	-7.9	(5.6)	8.7*	(3.5)	0.5	(2.6)
Boys' secondary	36.4	(1.6)	26.9	(2.2)	34.2	(1.8)	11.8	(0.9)	28.9	(6.6)	35.5	(3.8)	24.5	(2.9)	22.1	(3.4)	7.4	(6.8)	-8.6	(4.4)	9.8	(3.4)	-10.3	(3.6)
Community/ comprehensive	34.4	(1.1)	27.8	(1.9)	32.3	(1.4)	11.0	(0.9)	29.2	(2.9)	34.5	(4.0)	28.2	(2.8)	17.1	(2.7)	5.2	(3.2)	-6.6	(4.5)	4.0	(3.1)	-6.1*	(2.8)
Mixed secondary	33.3	(1.7)	26.8	(2.2)	34.6	(1.3)	14.7	(2.1)	26.5	(3.1)	36.7	(3.0)	23.4	(1.6)	19.7	(2.7)	6.9	(3.5)	-9.9	(3.7)	11.1	(2.1)	-5.0	(3.4)
ETB vocational	34.0	(1.3)	27.5	(1.6)	33.5	(1.3)	14.0	(1.2)	22.7	(1.8)	30.0	(4.1)	21.9	(1.3)	20.5	(2.4)	11.2	(2.2)	-2.4	(4.4)	11.6	(1.8)	-6.4*	(2.7)
Non-DEIS	35.6	(0.8)	28.0	(1.1)	34.3	(0.8)	12.7	(0.6)	26.8	(1.8)	35.1	(2.1)	24.3	(1.3)	19.2	(1.5)	8.8	(2.0)	-7.0	(2.4)	10.0	(1.5)	-6.5	(1.6)
DEIS	31.8	(1.3)	27.6	(1.4)	32.8	(1.6)	14.6	(1.5)	25.2	(1.9)	32.8	(4.4)	25.5	(1.3)	16.5	(1.8)	6.6	(2.3)	-5.2	(4.6)	7.4	(2.0)	-1.9	(2.3)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L8: Percentage of students who read *101 or more pages* of text for English class in the current school year by background variables, Spring and Autumn testing

	Spring		Autumn		Spring-Autumn	
	%	(SE)	%	(SE)	% Diff	(SE Diff)
All Students	42.4	(0.9)	24.1	(1.5)	18.3	(1.7)
Male	40.7	(1.0)	25.0	(1.7)	15.7	(2.0)
Female	44.1	(1.3)	23.3	(2.0)	20.8	(2.4)
First / Second Year	33.3	(5.6)	0.0	(0.0)	33.3	(5.6)
Third Year	48.3	(1.0)	31.5	(2.6)	16.8	(2.8)
Transition Year	30.7	(1.8)	21.1	(2.7)	9.6	(3.3)
Fifth/Sixth Year	39.9	(2.2)	22.9	(3.1)	17.0	(3.8)
Lowest ESCS	36.4	(1.5)	18.4	(2.1)	18.0	(2.5)
Low-Medium ESCS	39.8	(1.6)	22.2	(2.1)	17.6	(2.6)
Medium-High ESCS	41.9	(1.4)	25.8	(2.4)	16.2	(2.8)
Highest ESCS	51.4	(1.7)	30.5	(2.8)	21.0	(3.2)
Native	42.9	(0.9)	24.3	(1.7)	18.7	(1.9)
Immigrant & Eng./Irish	40.0	(2.5)	21.9	(3.4)	18.2	(4.2)
Immigrant & other lang.	41.0	(2.6)	22.2	(3.0)	18.8	(4.0)
Girls' secondary	47.7	(2.2)	18.7	(3.3)	29.0	(4.0)
Boys' secondary	40.2	(1.9)	24.2	(3.1)	16.0	(3.6)
Community/ comprehensive	42.2	(1.8)	25.9	(3.9)	16.2	(4.3)
Mixed secondary	45.4	(2.1)	31.4	(4.1)	13.9	(4.7)
ETB vocational	38.0	(1.8)	21.8	(2.0)	16.3	(2.7)
Non-DEIS	44.3	(1.1)	24.8	(1.8)	19.5	(2.1)
DEIS	36.2	(1.4)	22.1	(2.5)	14.1	(2.9)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L9: Percentage of students who had been taught various online reading strategies since started school by student level variables, Spring and Autumn testing

<i>Online reading strategies...</i>	Spring								Autumn								Spring-Autumn							
	1.		2.		3.		4.		1.		2.		3.		4.		1.		2.		3.		4.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
Male	44.5	(1.3)	59.2	(1.2)	47.3	(1.1)	79.6	(0.9)	51.0	(2.0)	65.8	(2.4)	57.8	(2.3)	80.8	(2.1)	-6.5	(2.3)	-6.5*	(2.6)	-10.6	(2.5)	-1.2	(2.3)
Female	44.2	(1.3)	57.2	(1.2)	44.1	(1.1)	86.5	(0.9)	46.0	(1.4)	63.3	(2.6)	48.7	(2.0)	84.2	(1.3)	-1.8	(1.9)	-6.2*	(2.9)	-4.6*	(2.3)	2.2	(1.6)
First / Second Year	55.9	(5.2)	71.8	(5.1)	66.0	(4.9)	83.4	(4.0)	50.6	(17.1)	58.5	(16.5)	69.7	(12.2)	75.4	(12.8)	5.3	(17.8)	13.3	(17.2)	-3.8	(13.1)	7.9	(13.4)
Third Year	40.4	(1.0)	55.6	(1.2)	41.0	(1.0)	82.5	(0.9)	49.0	(3.2)	67.5	(2.5)	59.8	(3.4)	80.2	(2.4)	-8.6*	(3.4)	-11.9	(2.8)	-18.8	(3.5)	2.3	(2.5)
Transition Year	51.6	(1.5)	63.4	(1.6)	52.6	(1.4)	84.8	(1.0)	48.4	(1.4)	65.4	(2.3)	50.1	(2.2)	83.9	(1.7)	3.2	(2.0)	-2.0	(2.8)	2.5	(2.6)	0.9	(2.0)
Fifth/Sixth Year	46.3	(2.2)	56.4	(2.2)	51.8	(2.2)	81.3	(2.2)	48.0	(3.3)	58.8	(2.9)	52.3	(2.5)	82.3	(2.7)	-1.7	(3.9)	-2.4	(3.7)	-0.4	(3.4)	-0.9	(3.5)
Lowest ESCS	48.2	(1.4)	59.6	(1.5)	47.0	(1.6)	81.4	(1.2)	52.6	(2.2)	66.7	(1.8)	54.3	(1.8)	80.7	(2.0)	-4.5	(2.6)	-7.0	(2.3)	-7.3	(2.4)	0.6	(2.3)
Low-Medium ESCS	45.0	(1.5)	57.9	(1.6)	45.8	(1.5)	83.3	(1.2)	51.2	(2.1)	66.5	(3.4)	56.3	(2.7)	83.1	(2.2)	-6.2*	(2.6)	-8.6*	(3.8)	-10.5	(3.1)	0.2	(2.5)
Medium-High ESCS	41.6	(1.4)	57.0	(1.5)	43.4	(1.4)	83.5	(1.0)	46.3	(2.7)	65.0	(2.6)	53.2	(2.4)	82.2	(2.2)	-4.7	(3.0)	-8.1	(2.9)	-9.9	(2.8)	1.3	(2.4)
Highest ESCS	42.2	(1.8)	58.1	(1.7)	46.6	(1.4)	84.2	(1.2)	43.6	(2.0)	60.4	(2.5)	48.8	(2.3)	83.8	(2.9)	-1.4	(2.7)	-2.2	(3.0)	-2.2	(2.7)	0.4	(3.2)
Native	43.7	(0.9)	57.4	(1.0)	44.4	(0.8)	83.1	(0.8)	47.4	(1.5)	64.0	(2.1)	52.0	(1.8)	82.8	(1.4)	-3.7*	(1.8)	-6.6	(2.3)	-7.6	(2.0)	0.3	(1.6)
Immigrant & Eng./Irish	45.6	(2.4)	61.6	(2.5)	50.0	(2.2)	83.5	(1.7)	48.5	(4.0)	62.7	(3.9)	55.0	(4.1)	78.3	(3.6)	-2.8	(4.7)	-1.0	(4.6)	-5.0	(4.7)	5.2	(4.0)
Immigrant & other lang.	47.0	(2.4)	61.7	(3.1)	50.3	(2.5)	82.8	(1.9)	54.9	(3.4)	72.3	(3.3)	62.7	(4.1)	83.3	(2.4)	-7.9	(4.2)	-10.6*	(4.5)	-12.3*	(4.8)	-0.5	(3.1)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

1. How to use keywords when using a search engine; 2. How to decide whether to trust information from the internet; 3. How to compare different web pages and decide what information is more relevant for your schoolwork; 4. To understand the consequences of making information publicly available online.

School-level variables are not included in the table as the reference is across the entire school experience, students will have changed schools.

Condt. Table L9: Percentage of students who had been taught various online reading strategies since starting school by student level variables, Spring and Autumn testing

<i>Online reading strategies...</i>	Spring						Autumn						Spring-Autumn					
	5.		6.		7.		5.		6.		7.		5.		6.		7.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
Male	38.1	(0.9)	60.7	(1.3)	30.3	(1.1)	45.5	(1.9)	68.8	(2.3)	38.4	(1.9)	-7.4	(2.2)	-8.1	(2.6)	-8.2	(2.2)
Female	32.1	(1.1)	57.5	(1.1)	25.8	(1.2)	33.6	(1.7)	62.7	(2.0)	28.4	(1.9)	-1.5	(2.0)	-5.1*	(2.3)	-2.6	(2.2)
First / Second Year	51.3	(4.5)	67.0	(4.5)	42.8	(4.4)	55.9	(12.2)	70.8	(9.9)	37.2	(13.6)	-4.6	(13.0)	-3.7	(10.9)	5.5	(14.3)
Third Year	31.4	(0.9)	56.7	(1.0)	24.3	(0.9)	40.1	(2.1)	70.7	(2.7)	34.4	(2.3)	-8.7	(2.3)	-14.0	(2.9)	-10.1	(2.4)
Transition Year	40.8	(1.3)	63.6	(1.5)	33.9	(1.8)	38.4	(2.2)	65.8	(2.2)	34.5	(2.3)	2.4	(2.6)	-2.2	(2.7)	-0.6	(2.9)
Fifth/Sixth Year	39.1	(2.4)	59.8	(3.0)	32.5	(2.6)	41.3	(2.5)	58.9	(3.6)	29.1	(2.9)	-2.2	(3.5)	0.9	(4.7)	3.4	(3.9)
Lowest ESCS	38.2	(1.3)	55.6	(1.3)	29.2	(1.4)	43.9	(2.4)	63.0	(2.3)	34.9	(2.1)	-5.7*	(2.7)	-7.5	(2.6)	-5.7	(2.5)
Low-Medium ESCS	35.8	(1.6)	58.2	(1.5)	28.1	(1.4)	39.7	(2.5)	63.5	(2.4)	32.7	(2.7)	-4.0	(3.0)	-5.2	(2.9)	-4.6	(3.1)
Medium-High ESCS	32.6	(1.4)	59.9	(1.3)	27.1	(1.5)	37.9	(2.2)	69.3	(3.3)	34.9	(2.3)	-5.4*	(2.6)	-9.4	(3.5)	-7.8	(2.8)
Highest ESCS	34.0	(1.3)	62.4	(1.4)	27.5	(1.4)	36.3	(2.1)	66.9	(2.9)	31.3	(2.5)	-2.3	(2.4)	-4.5	(3.2)	-3.8	(2.9)
Native	34.1	(0.8)	59.5	(0.9)	27.9	(0.9)	38.4	(1.5)	67.3	(1.9)	33.1	(1.8)	-4.3*	(1.7)	-7.8	(2.1)	-5.2	(2.0)
Immigrant & Eng./Irish	38.1	(2.2)	59.6	(2.4)	28.4	(2.7)	42.7	(2.8)	61.8	(4.5)	31.7	(3.9)	-4.6	(3.6)	-2.2	(5.1)	-3.3	(4.7)
Immigrant & other lang.	37.8	(2.8)	55.7	(2.6)	28.9	(3.2)	43.6	(3.6)	57.5	(3.6)	36.4	(4.3)	-5.8	(4.6)	-1.8	(4.5)	-7.5	(5.4)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

5. How to use the short description below the links in the list of search results; 6. How to detect whether the information is subjective or biased; 7. How to detect phishing or spam emails.

Table L10: Mean scores on the index of ‘teacher stimulation’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
All students	0.06	(0.02)	0.05	(0.03)	0.02	(0.03)
Male	0.03	(0.03)	0.02	(0.04)	0.01	(0.04)
Female	0.10	(0.02)	0.07	(0.04)	0.03	(0.05)
First / Second Year	0.09	(0.11)	0.03	(0.27)	0.06	(0.29)
Third Year	0.09	(0.02)	0.08	(0.04)	0.01	(0.04)
Transition Year	-0.01	(0.03)	-0.02	(0.04)	0.01	(0.05)
Fifth/Sixth Year	0.11	(0.04)	0.18	(0.05)	-0.07	(0.06)
Lowest ESCS	-0.05	(0.03)	-0.02	(0.05)	-0.02	(0.06)
Low-Medium ESCS	0.10	(0.03)	0.06	(0.05)	0.05	(0.06)
Medium-High ESCS	0.04	(0.03)	0.10	(0.04)	-0.06	(0.05)
Highest ESCS	0.15	(0.04)	0.06	(0.04)	0.09	(0.06)
Native	0.05	(0.02)	0.03	(0.03)	0.02	(0.03)
Immigrant & Eng./Irish	0.17	(0.04)	0.13	(0.10)	0.04	(0.11)
Immigrant & other lang.	0.11	(0.05)	0.13	(0.09)	-0.02	(0.10)
Girls’ secondary	0.14	(0.04)	0.09	(0.05)	0.05	(0.07)
Boys’ secondary	-0.04	(0.05)	0.03	(0.07)	-0.07	(0.09)
Community/ comprehensive	0.05	(0.05)	0.08	(0.07)	-0.03	(0.09)
Mixed secondary	0.12	(0.04)	0.09	(0.07)	0.03	(0.08)
ETB vocational	0.04	(0.03)	-0.02	(0.06)	0.06	(0.07)
Non-DEIS	0.07	(0.02)	0.03	(0.04)	0.04	(0.04)
DEIS	0.04	(0.04)	0.09	(0.07)	-0.05	(0.08)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L11: Percentage of students reporting that in *all/most* classes the teacher stimulates the students in a number of ways in English class by background variables, Spring and Autumn testing

<i>All/most classes the teacher...</i>	Spring								Autumn								Spring - Autumn							
	Encourages students to express their opinion		Helps relate the stories they read to their lives		Shows how information builds on what they already know		Poses questions that motivate		Encourages students to express their opinion		Helps relate the stories they read to their lives		Shows how information builds on what they already know		Poses questions that motivate		Encourages students to express their opinion		Helps relate the stories they read to their lives		Shows how information builds on what they already know		Poses questions that motivate	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
All students	63.1	(0.8)	39.0	(0.8)	55.6	(0.8)	58.4	(0.8)	60.7	(1.7)	39.4	(1.2)	52.8	(1.2)	56.0	(1.6)	2.4	(1.8)	-0.4	(1.4)	2.8	(1.5)	2.4	(1.8)
Male	60.0	(1.2)	40.9	(1.1)	55.7	(0.9)	56.6	(1.2)	57.7	(2.3)	38.8	(1.8)	52.0	(1.6)	55.1	(2.3)	2.3	(2.6)	2.1	(2.1)	3.7*	(1.9)	1.5	(2.6)
Female	66.2	(1.0)	37.2	(1.1)	55.4	(1.1)	60.2	(1.1)	63.7	(2.0)	40.1	(1.5)	53.6	(1.6)	56.8	(2.0)	2.5	(2.2)	-2.8	(1.9)	1.8	(1.9)	3.3	(2.3)
First / Second Year	48.3	(4.6)	43.9	(4.6)	61.8	(4.8)	54.9	(4.7)	52.1	(14.8)	27.2	(15.8)	48.6	(14.8)	60.9	(12.9)	-3.8	(15.5)	16.7	(16.5)	13.2	(15.6)	-5.9	(13.7)
Third Year	64.3	(1.0)	38.5	(1.0)	57.6	(1.0)	59.1	(1.0)	58.8	(2.9)	37.7	(2.4)	58.0	(2.1)	57.6	(2.2)	5.5	(3.1)	0.8	(2.6)	-0.4	(2.3)	1.5	(2.4)
Transition Year	61.6	(1.6)	38.6	(1.4)	50.7	(1.5)	56.5	(1.5)	61.0	(2.3)	38.5	(1.7)	49.0	(1.8)	55.0	(2.2)	0.6	(2.8)	0.1	(2.2)	1.7	(2.3)	1.5	(2.6)
Fifth/Sixth Year	63.6	(2.3)	43.4	(2.5)	55.7	(2.2)	60.5	(2.2)	62.9	(2.3)	44.5	(2.3)	55.9	(2.0)	56.4	(2.8)	0.7	(3.2)	-1.1	(3.4)	-0.2	(3.0)	4.1	(3.5)
Lowest ESCS	56.8	(1.5)	35.5	(1.3)	50.4	(1.5)	53.9	(1.4)	52.8	(2.1)	39.2	(1.9)	50.3	(2.0)	52.0	(2.9)	4.0	(2.6)	-3.7	(2.3)	0.1	(2.5)	1.9	(3.2)
Low-Medium ESCS	64.0	(1.3)	40.3	(1.6)	58.3	(1.4)	60.1	(1.5)	62.3	(2.5)	38.1	(2.2)	54.8	(2.1)	58.2	(2.3)	1.8	(2.8)	2.3	(2.7)	3.5	(2.6)	1.9	(2.8)
Medium-High ESCS	63.4	(1.3)	37.9	(1.2)	55.0	(1.4)	56.8	(1.3)	63.7	(2.8)	42.6	(2.1)	55.7	(2.2)	57.3	(2.4)	-0.3	(3.1)	-4.7	(2.5)	-0.7	(2.6)	-0.5	(2.8)
Highest ESCS	68.0	(1.6)	42.1	(1.6)	58.4	(1.8)	62.5	(1.8)	64.9	(2.8)	37.8	(2.3)	50.6	(2.6)	56.4	(2.6)	3.2	(3.2)	4.2	(2.8)	7.8*	(3.1)	6.2*	(3.1)
Native	63.1	(0.9)	38.5	(0.8)	54.7	(0.8)	57.8	(0.9)	59.9	(1.7)	39.3	(1.3)	52.0	(1.4)	56.0	(1.8)	3.2	(1.9)	-0.8	(1.6)	2.7	(1.7)	1.8	(2.0)
Immigrant & Eng./Irish	64.0	(2.4)	41.2	(2.5)	61.5	(2.2)	63.5	(2.2)	71.2	(5.0)	45.0	(4.3)	55.7	(4.3)	53.9	(4.6)	-7.2	(5.5)	-3.9	(5.0)	5.8	(4.8)	9.6	(5.1)
Immigrant & other lang.	62.9	(2.0)	40.5	(1.9)	57.2	(2.3)	59.9	(2.1)	60.5	(5.3)	38.2	(3.5)	59.9	(3.7)	57.9	(3.7)	2.4	(5.7)	2.3	(4.0)	-2.7	(4.4)	2.0	(4.3)
Girls' secondary	68.2	(1.2)	39.1	(1.6)	55.0	(1.9)	61.7	(1.5)	64.3	(2.7)	39.6	(2.4)	55.7	(1.8)	54.8	(3.1)	3.9	(3.0)	-0.5	(2.8)	-0.7	(2.6)	6.9*	(3.4)
Boys' secondary	57.6	(2.5)	38.2	(2.2)	54.3	(1.5)	54.0	(2.3)	59.1	(4.7)	38.5	(3.3)	51.2	(2.7)	57.9	(5.1)	-1.6	(5.3)	-0.4	(3.9)	3.1	(3.1)	-3.9	(5.6)
Community/ comprehensive	63.0	(1.9)	38.7	(2.2)	56.6	(1.8)	56.6	(2.1)	64.2	(4.4)	39.1	(2.3)	52.7	(1.6)	58.5	(4.5)	-1.2	(4.8)	-0.4	(3.2)	3.8	(2.4)	-1.9	(4.9)
Mixed secondary	65.8	(1.9)	39.8	(1.8)	56.9	(2.2)	62.0	(2.2)	58.6	(2.4)	42.6	(3.5)	52.8	(3.7)	59.3	(3.3)	7.2*	(3.1)	-2.8	(3.9)	4.1	(4.3)	2.8	(4.0)
ETB vocational	60.7	(1.3)	39.1	(1.2)	55.2	(1.3)	57.2	(1.5)	58.4	(4.0)	37.8	(2.5)	51.8	(3.0)	51.9	(2.6)	2.3	(4.2)	1.3	(2.8)	3.5	(3.2)	5.2	(3.0)
Non-DEIS	63.8	(0.8)	39.1	(0.8)	55.6	(0.9)	58.8	(1.0)	61.9	(2.1)	38.4	(1.5)	51.6	(1.3)	56.1	(2.1)	1.9	(2.2)	0.7	(1.7)	3.9*	(1.6)	2.7	(2.3)
DEIS	61.0	(1.9)	38.8	(1.8)	55.6	(1.2)	57.0	(1.7)	57.3	(2.9)	42.4	(2.8)	56.4	(2.8)	55.5	(2.0)	3.7	(3.5)	-3.6	(3.3)	-0.8	(3.1)	1.5	(2.6)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L12: Mean scores on the index of ‘teacher feedback’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	(SE Diff)
All students	0.30	(0.02)	0.28	(0.04)	0.03	(0.04)
Male	0.36	(0.03)	0.31	(0.04)	0.04	(0.05)
Female	0.25	(0.02)	0.24	(0.05)	0.01	(0.05)
First / Second Year	0.31	(0.08)	0.12	(0.27)	0.19	(0.28)
Third Year	0.41	(0.02)	0.47	(0.05)	-0.06	(0.05)
Transition Year	0.08	(0.03)	0.14	(0.05)	-0.06	(0.06)
Fifth/Sixth Year	0.27	(0.05)	0.38	(0.05)	-0.11	(0.07)
Lowest ESCS	0.26	(0.03)	0.24	(0.05)	0.02	(0.06)
Low-Medium ESCS	0.34	(0.03)	0.26	(0.05)	0.08	(0.06)
Medium-High ESCS	0.30	(0.02)	0.32	(0.06)	-0.02	(0.06)
Highest ESCS	0.31	(0.03)	0.28	(0.05)	0.03	(0.06)
Native	0.29	(0.02)	0.27	(0.04)	0.02	(0.04)
Immigrant & Eng./Irish	0.35	(0.04)	0.34	(0.09)	0.01	(0.10)
Immigrant & other lang.	0.36	(0.05)	0.29	(0.06)	0.07	(0.08)
Girls’ secondary	0.23	(0.04)	0.18	(0.07)	0.05	(0.08)
Boys’ secondary	0.26	(0.05)	0.22	(0.10)	0.04	(0.11)
Community/ comprehensive	0.32	(0.03)	0.42	(0.08)	-0.09	(0.09)
Mixed secondary	0.39	(0.06)	0.30	(0.06)	0.09	(0.08)
ETB vocational	0.31	(0.03)	0.27	(0.08)	0.05	(0.08)
Non-DEIS	0.29	(0.02)	0.26	(0.04)	0.03	(0.05)
DEIS	0.34	(0.04)	0.33	(0.07)	0.01	(0.08)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L13: Percentage of students reporting that in *many/every/almost every* class the teacher provides feedback to the students in a number of ways in English class by background variables, Spring and Autumn testing

<i>Many classes or every class or almost every class the teacher...</i>	Spring						Autumn						Spring - Autumn					
	Gives me feedback on my strengths in this subject.		Tells me in which areas I can still improve.		Tells me how I can improve my performance.		Gives me feedback on my strengths in this subject.		Tells me in which areas I can still improve.		Tells me how I can improve my performance.		Gives me feedback on my strengths in this subject.		Tells me in which areas I can still improve.		Tells me how I can improve my performance.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	47.1	(0.9)	54.8	(0.9)	53.5	(0.9)	45.8	(1.8)	53.8	(1.7)	52.0	(1.6)	1.3	(2.0)	1.1	(1.9)	1.4	(1.8)
Male	48.7	(1.2)	57.4	(1.2)	57.2	(1.1)	47.9	(2.4)	54.8	(2.1)	55.1	(2.1)	0.8	(2.7)	2.6	(2.4)	2.1	(2.4)
Female	45.5	(1.2)	52.2	(1.2)	49.8	(1.2)	43.7	(2.4)	52.7	(2.1)	49.0	(2.1)	1.8	(2.6)	-0.5	(2.4)	0.9	(2.5)
First / Second Year	49.1	(4.6)	50.2	(4.9)	51.6	(5.1)	40.8	(16.1)	41.4	(18.4)	36.1	(15.7)	8.2	(16.8)	8.7	(19.0)	15.5	(16.5)
Third Year	51.5	(1.1)	59.4	(1.1)	57.4	(1.1)	52.9	(2.5)	62.0	(2.5)	59.6	(2.6)	-1.4	(2.7)	-2.6	(2.8)	-2.2	(2.8)
Transition Year	38.3	(1.5)	44.9	(1.3)	44.7	(1.3)	41.3	(2.6)	49.4	(2.1)	47.7	(1.8)	-3.0	(3.0)	-4.4	(2.5)	-3.0	(2.2)
Fifth/Sixth Year	43.6	(2.3)	55.2	(2.2)	54.0	(2.1)	48.4	(3.1)	54.7	(3.0)	53.8	(2.9)	-4.8	(3.8)	0.5	(3.7)	0.2	(3.6)
Lowest ESCS	44.1	(1.3)	52.9	(1.5)	51.2	(1.3)	42.4	(2.9)	54.2	(2.1)	51.0	(2.3)	1.6	(3.2)	-1.3	(2.6)	0.2	(2.6)
Low-Medium ESCS	47.5	(1.4)	57.2	(1.4)	55.3	(1.6)	46.7	(2.3)	53.3	(3.0)	52.4	(2.7)	0.8	(2.7)	3.9	(3.3)	2.9	(3.1)
Medium-High ESCS	47.4	(1.3)	54.6	(1.2)	53.5	(1.2)	48.4	(2.7)	56.0	(2.9)	54.6	(2.8)	-0.9	(3.0)	-1.4	(3.1)	-1.0	(3.0)
Highest ESCS	49.5	(1.7)	54.5	(1.6)	54.0	(1.5)	45.6	(2.7)	51.3	(2.2)	50.3	(2.1)	3.9	(3.1)	3.2	(2.7)	3.7	(2.6)
Native	46.7	(0.9)	54.2	(0.9)	52.7	(0.9)	45.7	(2.0)	54.1	(1.8)	52.5	(1.7)	1.0	(2.2)	0.1	(2.0)	0.3	(1.9)
Immigrant & Eng./Irish	46.1	(2.2)	58.1	(2.3)	58.1	(2.2)	47.9	(4.3)	52.0	(3.7)	49.2	(4.0)	-1.8	(4.9)	6.2	(4.4)	8.9	(4.5)
Immigrant & other lang.	51.8	(2.5)	57.2	(2.4)	55.3	(2.6)	45.7	(3.0)	55.3	(3.5)	50.4	(4.2)	6.1	(3.9)	2.0	(4.2)	4.9	(4.9)
Girls' secondary	46.6	(2.0)	51.9	(2.0)	47.9	(2.2)	39.5	(3.7)	51.5	(2.5)	47.1	(3.1)	7.1	(4.2)	0.4	(3.2)	0.8	(3.8)
Boys' secondary	43.5	(2.3)	53.9	(2.0)	52.9	(1.9)	46.1	(5.6)	51.1	(4.0)	51.8	(4.4)	-2.6	(6.1)	2.9	(4.5)	1.1	(4.8)
Community/ comprehensive	46.6	(1.5)	54.6	(1.4)	53.6	(1.6)	53.2	(5.3)	58.4	(4.6)	56.1	(4.6)	-6.6	(5.5)	-3.8	(4.8)	-2.4	(4.9)
Mixed secondary	49.6	(2.2)	58.7	(2.5)	57.6	(2.1)	42.9	(2.2)	53.7	(2.2)	54.5	(1.7)	6.7*	(3.1)	5.1	(3.3)	3.1	(2.7)
ETB vocational	48.1	(1.6)	55.2	(1.5)	55.3	(1.6)	47.4	(3.1)	54.0	(4.2)	51.4	(3.5)	0.7	(3.6)	1.2	(4.4)	3.9	(3.8)
Non-DEIS	46.9	(1.1)	54.5	(1.1)	52.8	(1.1)	45.4	(2.4)	53.5	(1.9)	50.8	(1.9)	1.5	(2.6)	1.0	(2.2)	2.0	(2.2)
DEIS	47.7	(1.6)	55.8	(1.6)	55.8	(1.6)	47.0	(2.5)	54.5	(3.9)	55.7	(3.2)	0.6	(3.0)	1.2	(4.2)	0.1	(3.5)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L14: Mean scores on the index of ‘teacher-directed instruction’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	(SE Diff)
All students	-0.20	(0.02)	-0.21	(0.04)	0.01	(0.04)
Male	-0.13	(0.03)	-0.17	(0.04)	0.03	(0.05)
Female	-0.27	(0.03)	-0.26	(0.04)	-0.01	(0.05)
First / Second Year	0.15	(0.09)	-0.27	(0.29)	0.41	(0.30)
Third Year	-0.19	(0.03)	-0.10	(0.05)	-0.09	(0.05)
Transition Year	-0.30	(0.03)	-0.33	(0.04)	0.04	(0.05)
Fifth/Sixth Year	-0.06	(0.06)	-0.05	(0.06)	-0.01	(0.08)
Lowest ESCS	-0.17	(0.03)	-0.11	(0.05)	-0.06	(0.06)
Low-Medium ESCS	-0.16	(0.03)	-0.18	(0.05)	0.02	(0.06)
Medium-High ESCS	-0.27	(0.03)	-0.25	(0.06)	-0.02	(0.06)
Highest ESCS	-0.22	(0.04)	-0.34	(0.05)	0.11	(0.06)
Native	-0.23	(0.02)	-0.24	(0.03)	0.00	(0.04)
Immigrant & Eng./Irish	-0.09	(0.04)	-0.17	(0.10)	0.08	(0.11)
Immigrant & other lang.	-0.05	(0.04)	-0.05	(0.09)	0.00	(0.10)
Girls’ secondary	-0.33	(0.04)	-0.31	(0.06)	-0.02	(0.07)
Boys’ secondary	-0.23	(0.05)	-0.25	(0.11)	0.02	(0.12)
Community/ comprehensive	-0.19	(0.05)	-0.09	(0.10)	-0.10	(0.11)
Mixed secondary	-0.17	(0.07)	-0.25	(0.08)	0.09	(0.11)
ETB vocational	-0.13	(0.04)	-0.18	(0.06)	0.05	(0.07)
Non-DEIS	-0.25	(0.03)	-0.27	(0.05)	0.02	(0.05)
DEIS	-0.05	(0.03)	-0.05	(0.06)	0.00	(0.07)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L15: Percentage of students reporting that in *every/most* classes the teacher provides teacher-directed instruction in English class by background variables, Spring and Autumn testing

<i>Every/most class the teacher...</i>	Spring								Autumn								Spring - Autumn							
	Sets clear goals for student learning.		Asks questions to check students understood		Presents a short summary of the previous lesson.		Tells what students have to learn.		Sets clear goals for student learning.		Asks questions to check students understood		Presents a short summary of the previous lesson.		Tells what students have to learn.		Sets clear goals for student learning.		Asks questions to check students understood		Presents a short summary of the previous lesson.		Tells what students have to learn.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	62.2	(1.0)	74.7	(0.8)	28.6	(0.8)	71.2	(0.8)	61.7	(1.7)	72.4	(1.5)	28.4	(1.0)	70.7	(1.3)	0.4	(2.0)	2.3	(1.7)	0.2	(1.3)	0.5	(1.5)
Male	65.8	(1.2)	76.4	(1.2)	29.4	(1.0)	75.5	(1.0)	64.4	(2.3)	73.1	(1.5)	29.0	(1.0)	74.8	(2.1)	1.4	(2.6)	3.3	(1.9)	0.4	(1.4)	0.6	(2.3)
Female	58.6	(1.2)	73.0	(1.1)	27.8	(1.0)	67.0	(1.1)	59.0	(2.2)	71.7	(2.1)	27.8	(1.8)	66.5	(1.6)	-0.4	(2.6)	1.3	(2.4)	-0.1	(2.1)	0.5	(1.9)
First / Second Year	75.5	(4.3)	83.8	(3.7)	38.9	(4.3)	80.0	(4.0)	48.6	(18.0)	53.7	(18.6)	34.9	(15.0)	83.9	(13.1)	26.9	(18.6)	30.1	(18.9)	4.0	(15.6)	-3.9	(13.7)
Third Year	63.5	(1.1)	75.9	(0.9)	26.8	(1.0)	72.1	(1.0)	63.9	(2.6)	73.7	(2.3)	33.5	(1.9)	76.2	(1.9)	-0.4	(2.8)	2.2	(2.5)	-6.7	(2.2)	-4.2	(2.2)
Transition Year	57.3	(1.5)	71.9	(1.4)	28.6	(1.3)	67.7	(1.4)	58.9	(2.2)	70.8	(1.9)	23.0	(1.3)	66.5	(2.0)	-1.6	(2.6)	1.1	(2.4)	5.6	(1.8)	1.2	(2.4)
Fifth/Sixth Year	65.4	(2.4)	72.5	(2.3)	39.3	(2.2)	74.6	(2.3)	66.6	(3.2)	75.3	(2.5)	35.6	(2.5)	73.7	(2.2)	-1.2	(4.0)	-2.8	(3.4)	3.7	(3.4)	1.0	(3.2)
Lowest ESCS	61.5	(1.5)	75.4	(1.2)	30.3	(1.2)	73.6	(1.3)	62.3	(2.5)	74.6	(2.4)	34.1	(2.2)	73.9	(1.6)	-0.8	(2.9)	0.8	(2.7)	-3.8	(2.5)	-0.2	(2.1)
Low-Medium ESCS	62.9	(1.5)	76.1	(1.1)	30.7	(1.2)	72.1	(1.5)	64.3	(2.4)	73.3	(2.3)	29.5	(2.6)	71.7	(2.1)	-1.4	(2.8)	2.9	(2.5)	1.2	(2.9)	0.4	(2.6)
Medium-High ESCS	62.0	(1.6)	72.6	(1.3)	26.4	(1.3)	69.8	(1.3)	59.3	(2.9)	72.1	(2.3)	25.7	(2.2)	71.9	(2.1)	2.7	(3.4)	0.5	(2.6)	0.7	(2.6)	-2.0	(2.5)
Highest ESCS	62.0	(1.5)	74.6	(1.7)	26.9	(1.5)	69.2	(1.4)	60.5	(3.1)	69.2	(2.1)	24.5	(2.0)	64.8	(2.6)	1.6	(3.5)	5.4*	(2.7)	2.4	(2.5)	4.4	(2.9)
Native	60.9	(1.0)	74.3	(0.9)	27.5	(0.9)	69.9	(0.9)	61.4	(1.7)	72.7	(1.4)	26.9	(1.0)	69.2	(1.4)	-0.5	(2.0)	1.6	(1.7)	0.6	(1.4)	0.7	(1.7)
Immigrant & Eng./Irish	65.0	(2.2)	76.8	(2.1)	32.1	(2.1)	77.4	(2.1)	62.1	(3.7)	75.8	(3.9)	32.9	(4.0)	74.0	(4.4)	2.9	(4.3)	1.1	(4.5)	-0.8	(4.5)	3.4	(4.9)
Immigrant & other lang.	70.1	(2.1)	75.4	(2.0)	34.1	(2.3)	77.2	(1.7)	66.4	(3.6)	70.2	(5.7)	38.5	(3.7)	80.1	(2.0)	3.7	(4.2)	5.2	(6.0)	-4.4	(4.4)	-2.9	(2.6)
Girls' secondary	56.3	(2.0)	71.6	(1.5)	26.2	(1.7)	65.8	(1.8)	55.3	(3.8)	71.8	(3.0)	29.1	(1.6)	67.9	(2.3)	1.0	(4.3)	-0.2	(3.3)	-3.0	(2.3)	-2.1	(2.9)
Boys' secondary	64.0	(2.2)	74.0	(2.0)	26.9	(1.7)	74.9	(1.9)	61.9	(5.8)	75.0	(3.4)	24.8	(1.8)	69.8	(5.6)	2.0	(6.2)	-1.0	(3.9)	2.2	(2.5)	5.1	(6.0)
Comm/comp	60.7	(1.6)	74.0	(1.7)	29.4	(2.0)	71.7	(1.8)	68.3	(5.6)	74.8	(2.9)	30.0	(2.3)	72.1	(2.5)	-7.6	(5.8)	-0.7	(3.3)	-0.6	(3.1)	-0.4	(3.1)
Mixed secondary	65.9	(2.6)	76.1	(2.9)	26.3	(2.1)	71.7	(2.5)	60.7	(2.6)	70.0	(3.7)	22.6	(3.4)	70.6	(3.1)	5.2	(3.7)	6.0	(4.7)	3.7	(4.0)	1.1	(4.0)
ETB vocational	64.2	(1.9)	76.7	(1.4)	32.1	(1.5)	72.7	(1.3)	62.7	(2.7)	71.4	(3.1)	33.0	(1.5)	72.2	(1.2)	1.5	(3.3)	5.3	(3.4)	-0.8	(2.2)	0.5	(1.7)
Non-DEIS	60.5	(1.1)	73.5	(1.0)	26.8	(0.8)	70.0	(0.9)	60.1	(2.3)	71.4	(1.7)	26.7	(1.3)	69.0	(1.8)	0.4	(2.6)	2.1	(2.0)	0.1	(1.5)	1.1	(2.0)
DEIS	67.6	(1.7)	78.4	(1.1)	34.5	(1.9)	74.9	(1.5)	66.6	(3.0)	75.3	(2.8)	33.7	(2.5)	75.6	(1.4)	0.9	(3.4)	3.1	(3.1)	0.9	(3.1)	-0.6	(2.1)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L16: Mean scores on the index of ‘adaptive instruction’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	(SE Diff)
All students	-0.01	(0.02)	-0.04	(0.03)	0.03	(0.04)
Male	0.01	(0.02)	-0.04	(0.03)	0.05	(0.04)
Female	-0.03	(0.02)	-0.04	(0.05)	0.01	(0.06)
First / Second Year	0.04	(0.08)	0.11	(0.23)	-0.07	(0.24)
Third Year	0.01	(0.02)	-0.02	(0.02)	0.02	(0.03)
Transition Year	-0.04	(0.03)	-0.08	(0.04)	0.04	(0.05)
Fifth/Sixth Year	-0.09	(0.04)	0.03	(0.06)	-0.12	(0.07)
Lowest ESCS	-0.06	(0.02)	-0.08	(0.05)	0.02	(0.06)
Low-Medium ESCS	0.01	(0.03)	-0.01	(0.06)	0.02	(0.07)
Medium-High ESCS	-0.05	(0.03)	-0.05	(0.05)	0.00	(0.05)
Highest ESCS	0.04	(0.03)	-0.04	(0.04)	0.08	(0.05)
Native	-0.02	(0.02)	-0.05	(0.03)	0.03	(0.04)
Immigrant & Eng./Irish	-0.04	(0.05)	-0.04	(0.08)	0.00	(0.10)
Immigrant & other lang.	0.07	(0.04)	0.02	(0.06)	0.05	(0.07)
Girls’ secondary	-0.04	(0.04)	-0.03	(0.09)	-0.01	(0.10)
Boys’ secondary	-0.04	(0.05)	-0.06	(0.08)	0.02	(0.10)
Community/ comprehensive	-0.01	(0.04)	-0.05	(0.02)	0.03	(0.04)
Mixed secondary	0.01	(0.04)	-0.04	(0.09)	0.06	(0.10)
ETB vocational	0.00	(0.03)	-0.04	(0.06)	0.04	(0.07)
Non-DEIS	-0.01	(0.02)	-0.06	(0.04)	0.05	(0.04)
DEIS	-0.02	(0.03)	0.03	(0.08)	-0.05	(0.08)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L17: Percentage of students reporting that in *many/every/almost every* class the teacher adapts the instruction in English class, by background variables, Spring and Autumn testing

<i>Many /every/almost every class the teacher...</i>	Spring						Autumn						Spring - Autumn					
	Adapts the lesson to my class's needs and knowledge.		Provides individual help when a student has difficulties		Changes the structure that most students find difficult to understand		Adapts the lesson to my class's needs and knowledge.		Provides individual help when a student has difficulties		Changes the structure that most students find difficult to understand		Adapts the lesson to my class's needs and knowledge.		Provides individual help when a student has difficulties		Changes the structure that most students find difficult to understand	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	54.2	(0.8)	54.6	(0.9)	38.6	(0.7)	51.3	(1.5)	53.3	(1.4)	37.4	(1.4)	2.8	(1.7)	1.3	(1.6)	1.2	(1.6)
Male	54.4	(1.1)	57.0	(1.1)	41.0	(1.0)	51.2	(2.3)	53.9	(1.8)	36.9	(1.4)	3.2	(2.5)	3.1	(2.1)	4.0*	(1.7)
Female	53.9	(1.1)	52.2	(1.3)	36.3	(1.0)	51.4	(1.8)	52.7	(1.9)	37.9	(2.2)	2.5	(2.1)	-0.5	(2.3)	-1.7	(2.4)
First / Second Year	52.5	(4.1)	57.1	(4.5)	34.8	(4.4)	57.5	(16.2)	65.9	(11.3)	25.3	(14.6)	-5.1	(16.7)	-8.8	(12.2)	9.5	(15.2)
Third Year	55.7	(1.0)	55.0	(1.2)	39.6	(0.9)	54.9	(2.0)	54.9	(2.1)	37.4	(2.3)	0.9	(2.2)	0.1	(2.4)	2.2	(2.5)
Transition Year	51.3	(1.5)	54.0	(1.5)	37.5	(1.2)	48.7	(1.9)	52.4	(1.8)	36.3	(1.8)	2.5	(2.4)	1.6	(2.3)	1.2	(2.2)
Fifth/Sixth Year	52.6	(2.4)	52.9	(2.0)	35.9	(2.0)	53.3	(2.8)	52.9	(2.9)	40.7	(2.5)	-0.7	(3.7)	-0.1	(3.5)	-4.7	(3.2)
Lowest ESCS	50.7	(1.2)	53.6	(1.3)	36.5	(1.4)	48.9	(2.2)	54.9	(2.4)	35.0	(3.0)	1.8	(2.5)	-1.3	(2.7)	1.5	(3.3)
Low-Medium ESCS	55.2	(1.5)	56.6	(1.4)	38.6	(1.4)	54.0	(2.6)	56.4	(2.8)	37.9	(2.9)	1.2	(3.0)	0.2	(3.1)	0.7	(3.2)
Medium-High ESCS	53.9	(1.3)	52.9	(1.6)	38.4	(1.5)	52.2	(2.9)	49.6	(2.7)	38.1	(2.3)	1.7	(3.2)	3.3	(3.2)	0.3	(2.7)
Highest ESCS	57.2	(1.7)	55.1	(1.7)	41.0	(1.6)	49.7	(2.2)	52.2	(2.1)	38.5	(2.5)	7.5	(2.8)	2.9	(2.7)	2.5	(2.9)
Native	54.5	(0.9)	54.1	(1.0)	38.8	(0.8)	51.3	(1.6)	52.1	(1.5)	36.8	(1.5)	3.2	(1.8)	2.0	(1.8)	2.0	(1.7)
Immigrant & Eng./Irish	49.6	(2.7)	52.1	(2.9)	37.1	(2.5)	51.5	(3.8)	53.0	(4.2)	40.2	(4.5)	-1.9	(4.6)	-0.9	(5.1)	-3.1	(5.2)
Immigrant & other lang.	56.1	(2.4)	61.6	(2.3)	37.9	(2.0)	51.8	(3.3)	64.0	(2.3)	40.2	(2.8)	4.3	(4.1)	-2.4	(3.2)	-2.3	(3.4)
Girls' secondary	53.8	(1.5)	50.6	(2.0)	35.9	(1.5)	50.2	(2.4)	54.2	(3.3)	36.5	(3.6)	3.6	(2.9)	-3.6	(3.8)	-0.6	(3.9)
Boys' secondary	52.9	(2.7)	55.1	(2.3)	39.1	(1.8)	51.4	(5.9)	52.9	(3.7)	36.0	(3.1)	1.5	(6.4)	2.2	(4.4)	3.1	(3.5)
Comm/ comp	54.8	(2.0)	54.5	(1.9)	39.7	(1.9)	48.8	(1.1)	51.9	(2.8)	35.0	(2.2)	6.0*	(2.3)	2.6	(3.4)	4.6	(2.9)
Mixed secondary	55.5	(1.6)	57.0	(2.7)	40.2	(1.7)	55.4	(3.9)	51.7	(3.5)	38.6	(4.4)	0.1	(4.2)	5.3	(4.4)	1.6	(4.7)
ETB vocational	53.9	(1.6)	55.9	(1.6)	38.8	(1.5)	51.0	(3.0)	54.8	(2.2)	39.7	(2.3)	3.0	(3.4)	1.1	(2.7)	-0.9	(2.7)
Non-DEIS	54.8	(1.0)	54.2	(1.1)	39.0	(0.9)	50.6	(1.7)	52.3	(1.8)	36.0	(1.7)	4.2*	(2.0)	1.9	(2.1)	3.0	(1.9)
DEIS	52.1	(1.5)	55.8	(1.8)	37.3	(1.3)	53.4	(3.5)	56.1	(2.8)	41.6	(2.2)	-1.3	(3.8)	-0.3	(3.3)	-4.3	(2.5)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L18: Mean scores on the index of ‘disciplinary climate’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	(SE Diff)
All students	0.04	(0.03)	0.05	(0.04)	-0.01	(0.05)
Male	-0.04	(0.04)	-0.05	(0.04)	0.01	(0.06)
Female	0.12	(0.04)	0.14	(0.04)	-0.03	(0.06)
First / Second Year	0.00	(0.11)	0.94	(0.21)	-0.94	(0.24)
Third Year	0.05	(0.04)	0.04	(0.08)	0.01	(0.09)
Transition Year	-0.02	(0.03)	-0.04	(0.05)	0.02	(0.06)
Fifth/Sixth Year	0.16	(0.08)	0.26	(0.06)	-0.10	(0.10)
Lowest ESCS	-0.05	(0.04)	-0.01	(0.06)	-0.04	(0.07)
Low-Medium ESCS	0.05	(0.03)	0.03	(0.06)	0.02	(0.07)
Medium-High ESCS	0.06	(0.04)	0.13	(0.05)	-0.08	(0.06)
Highest ESCS	0.11	(0.04)	0.05	(0.04)	0.06	(0.06)
Native	0.03	(0.03)	0.04	(0.04)	-0.01	(0.05)
Immigrant & Eng./Irish	0.12	(0.05)	0.10	(0.07)	0.03	(0.09)
Immigrant & other lang.	0.11	(0.07)	0.13	(0.10)	-0.02	(0.13)
Girls’ secondary	0.25	(0.07)	0.26	(0.06)	0.00	(0.09)
Boys’ secondary	-0.11	(0.08)	-0.15	(0.06)	0.05	(0.10)
Community/ comprehensive	-0.02	(0.05)	0.14	(0.08)	-0.16	(0.09)
Mixed secondary	0.04	(0.06)	0.06	(0.11)	-0.02	(0.13)
ETB vocational	0.00	(0.06)	-0.05	(0.07)	0.05	(0.09)
Non-DEIS	0.09	(0.03)	0.07	(0.04)	0.03	(0.05)
DEIS	-0.13	(0.05)	-0.01	(0.08)	-0.11	(0.09)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L19: Percentage of students reporting on a number of disciplinary issues in *every/most* English class(es) by background variables, Spring and Autumn

<i>In every/most class...</i>	Spring						Autumn						Spring – Autumn					
	Students don't listen to what the teacher says		There is noise and disorder		The teacher waits long for students to quiet down		Students don't listen to what the teacher says		There is noise and disorder		The teacher waits long for students to quiet down		Students don't listen to what the teacher says		There is noise and disorder		The teacher waits long for students to quiet down	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	33.0	(1.0)	34.8	(1.1)	25.6	(0.9)	32.6	(1.3)	34.5	(1.4)	24.3	(1.5)	0.4	(1.6)	0.3	(1.7)	1.3	(1.8)
Male	35.1	(1.3)	36.9	(1.5)	26.4	(1.2)	34.6	(1.7)	37.8	(1.9)	25.8	(2.1)	0.5	(2.1)	-0.9	(2.4)	0.5	(2.4)
Female	30.9	(1.3)	32.7	(1.3)	24.8	(1.2)	30.6	(1.6)	31.3	(1.5)	22.7	(1.7)	0.3	(2.0)	1.4	(2.0)	2.1	(2.1)
First / Second Year	34.7	(4.6)	33.9	(4.6)	34.9	(5.1)	5.0	(5.1)	11.3	(9.8)	0.0	(0.0)	29.6	(6.8)	22.6*	(10.8)	34.9	(5.1)
Third Year	33.4	(1.2)	35.0	(1.3)	25.9	(1.1)	34.2	(2.5)	36.0	(3.4)	25.4	(2.5)	-0.8	(2.7)	-1.0	(3.7)	0.5	(2.8)
Transition Year	33.0	(1.4)	36.2	(1.5)	25.6	(1.4)	33.8	(1.9)	36.7	(2.0)	24.9	(2.0)	-0.9	(2.3)	-0.5	(2.5)	0.7	(2.5)
Fifth/Sixth Year	29.8	(2.8)	28.7	(2.9)	21.2	(2.2)	28.1	(2.1)	27.8	(2.9)	21.9	(2.7)	1.7	(3.5)	0.9	(4.1)	-0.7	(3.4)
Lowest ESCS	35.7	(1.4)	38.0	(1.6)	28.7	(1.5)	35.8	(2.7)	36.9	(2.9)	28.7	(2.6)	-0.1	(3.0)	1.0	(3.3)	0.0	(3.0)
Low-Medium ESCS	32.8	(1.3)	34.5	(1.4)	24.8	(1.3)	32.1	(2.1)	35.7	(2.2)	23.5	(2.4)	0.6	(2.5)	-1.2	(2.6)	1.3	(2.8)
Medium-High ESCS	32.0	(1.5)	33.0	(1.7)	24.9	(1.2)	31.4	(2.1)	31.6	(2.0)	22.1	(2.4)	0.6	(2.6)	1.4	(2.6)	2.8	(2.7)
Highest ESCS	31.2	(1.8)	33.5	(1.6)	23.7	(1.4)	31.0	(1.8)	33.3	(2.4)	22.6	(2.4)	0.2	(2.5)	0.2	(2.9)	1.1	(2.8)
Native	33.5	(1.0)	35.2	(1.1)	25.1	(0.9)	32.7	(1.4)	34.4	(1.4)	23.9	(1.6)	0.8	(1.8)	0.8	(1.8)	1.2	(1.8)
Immigrant & Eng./Irish	26.4	(2.5)	32.3	(2.4)	26.7	(2.0)	30.6	(3.8)	32.7	(4.3)	23.0	(3.9)	-4.2	(4.6)	-0.4	(4.9)	3.7	(4.4)
Immigrant & other lang.	31.4	(2.7)	30.8	(2.8)	25.0	(2.5)	30.7	(4.4)	36.0	(3.5)	24.5	(3.0)	0.7	(5.2)	-5.2	(4.5)	0.5	(3.9)
Girls' secondary	26.7	(2.0)	28.5	(2.1)	22.3	(2.2)	28.2	(1.5)	27.6	(1.2)	17.9	(1.7)	-1.5	(2.5)	0.9	(2.4)	4.4	(2.8)
Boys' secondary	39.3	(3.3)	39.1	(3.3)	27.5	(2.6)	39.9	(3.3)	42.4	(3.9)	29.2	(4.0)	-0.6	(4.6)	-3.3	(5.1)	-1.7	(4.7)
Community/comprehensive	34.1	(1.9)	37.5	(2.1)	27.1	(2.0)	30.0	(2.6)	30.9	(2.3)	23.9	(3.6)	4.0	(3.2)	6.6*	(3.2)	3.2	(4.1)
Mixed secondary	31.2	(1.7)	32.8	(2.2)	24.9	(2.0)	33.6	(3.5)	33.1	(4.4)	24.0	(3.6)	-2.3	(3.9)	-0.3	(5.0)	0.9	(4.1)
ETB vocational	34.8	(2.0)	36.7	(2.2)	26.5	(1.6)	32.5	(2.5)	38.1	(2.4)	26.3	(3.4)	2.3	(3.2)	-1.4	(3.3)	0.2	(3.8)
Non-DEIS	31.3	(1.1)	33.1	(1.2)	30.1	(2.0)	31.8	(1.5)	33.7	(1.5)	28.1	(3.1)	-0.5	(1.9)	-0.6	(2.0)	2.0	(3.7)
DEIS	38.3	(1.9)	40.1	(2.0)	24.2	(1.0)	34.8	(3.1)	36.9	(2.6)	23.0	(1.6)	3.6	(3.7)	3.1	(3.3)	1.2	(1.9)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Condt. Table L19: Percentage of students reporting on a number of disciplinary issues in *every/most* English class(es) by background variables, Spring and Autumn testing

<i>In every/most class...</i>	Spring				Autumn				Spring – Autumn			
	Students cannot work well		Students don't start working for a long time after the lesson begins		Students cannot work well		Students don't start working for a long time after the lesson begins		Students cannot work well		Students don't start working for a long time after the lesson begins	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	15.0	(0.6)	21.5	(0.8)	14.3	(1.4)	18.6	(1.3)	0.7	(1.5)	2.8	(1.5)
Male	16.8	(0.9)	23.1	(1.1)	17.6	(2.0)	20.6	(1.7)	-0.8	(2.2)	2.4	(2.0)
Female	13.2	(0.8)	19.9	(1.2)	11.0	(1.5)	16.6	(1.4)	2.2	(1.7)	3.3	(1.9)
First / Second Year	16.7	(3.4)	23.0	(3.6)	0.0	(0.0)	0.0	(0.0)	16.7	(3.4)	23.0	(3.6)
Third Year	15.0	(0.8)	20.7	(1.2)	17.4	(2.7)	16.8	(2.3)	-2.4	(2.8)	3.9	(2.6)
Transition Year	14.2	(1.0)	23.0	(1.3)	13.8	(1.6)	21.3	(1.8)	0.4	(1.9)	1.7	(2.2)
Fifth/Sixth Year	17.2	(2.2)	21.4	(2.0)	12.1	(2.2)	14.7	(1.9)	5.1	(3.1)	6.7*	(2.8)
Lowest ESCS	16.1	(1.0)	23.8	(1.3)	16.9	(2.8)	19.4	(1.9)	-0.8	(3.0)	4.4	(2.3)
Low-Medium ESCS	15.8	(1.1)	20.9	(1.3)	13.6	(1.9)	19.0	(2.0)	2.2	(2.2)	1.9	(2.4)
Medium-High ESCS	13.2	(0.9)	20.6	(1.3)	13.2	(1.9)	17.8	(2.6)	0.0	(2.1)	2.8	(2.9)
Highest ESCS	15.1	(1.1)	20.7	(1.3)	13.0	(1.2)	17.8	(1.6)	2.1	(1.7)	2.9	(2.1)
Native	15.2	(0.7)	21.8	(0.9)	13.7	(1.5)	18.6	(1.3)	1.5	(1.6)	3.2*	(1.6)
Immigrant & Eng./Irish	11.7	(1.4)	19.6	(2.2)	15.6	(2.6)	19.8	(3.3)	-3.9	(3.0)	-0.2	(4.0)
Immigrant & other lang.	15.2	(1.6)	18.7	(2.4)	15.9	(2.9)	16.0	(2.9)	-0.7	(3.4)	2.7	(3.8)
Girls' secondary	10.3	(1.3)	17.6	(2.3)	9.0	(2.4)	15.3	(1.9)	1.3	(2.7)	2.3	(3.0)
Boys' secondary	17.4	(1.6)	24.3	(2.5)	21.3	(5.1)	20.8	(1.8)	-3.9	(5.3)	3.5	(3.1)
Community/ comprehensive	15.8	(1.8)	22.2	(1.5)	13.6	(2.4)	16.0	(3.0)	2.2	(3.0)	6.2	(3.4)
Mixed secondary	14.0	(1.6)	21.2	(2.0)	14.0	(2.7)	19.7	(2.6)	0.0	(3.1)	1.5	(3.3)
ETB vocational	17.4	(1.1)	22.5	(1.4)	14.7	(2.1)	20.6	(3.2)	2.7	(2.4)	2.0	(3.5)
Non-DEIS	13.4	(0.7)	19.8	(1.0)	13.2	(1.4)	17.7	(1.3)	0.2	(1.6)	2.1	(1.6)
DEIS	20.3	(1.2)	26.8	(1.6)	17.5	(2.6)	21.3	(3.0)	2.7	(2.9)	5.5	(3.4)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L20: Percentages of students who skip *a whole day* by background variables, Spring and Autumn testing

<i>Students skip[ing] a whole day...</i>	Spring						Autumn						Spring - Autumn					
	None		1 or 2 whole days		3 or more whole days		None		1 or 2 whole days		3 or more whole days		None		1 or 2 whole days		3 or more whole days	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
Male	72.4	(1.0)	21.5	(0.9)	6.1	(0.5)	65.2	(1.8)	27.6	(1.8)	7.2	(1.0)	7.2	(2.1)	-6.1	(2.0)	-1.1	(1.1)
Female	67.9	(1.2)	26.7	(1.1)	5.3	(0.4)	65.6	(1.5)	29.4	(1.6)	5.1	(0.7)	2.3	(2.0)	-2.6	(2.0)	0.3	(0.8)
First / Second Year	69.0	(5.4)	21.2	(4.1)	9.8	(3.1)	57.3	(20.9)	42.7	(20.9)	0.0	(0.0)	11.7	(21.6)	-21.5	(21.3)	9.8	(3.1)
Third Year	74.6	(0.9)	21.2	(0.9)	4.3	(0.4)	71.5	(2.5)	25.6	(2.2)	2.9	(1.3)	3.1	(2.7)	-4.4	(2.4)	1.4	(1.3)
Transition Year	62.2	(1.7)	30.1	(1.5)	7.7	(0.8)	64.7	(1.8)	29.4	(1.8)	5.8	(0.7)	-2.5	(2.5)	0.7	(2.4)	1.8	(1.0)
Fifth/Sixth Year	66.2	(2.1)	25.5	(1.8)	8.3	(1.4)	59.8	(2.5)	29.2	(2.1)	11.0	(1.6)	6.4	(3.3)	-3.7	(2.8)	-2.7	(2.1)
Lowest ESCS	66.4	(1.4)	26.2	(1.3)	7.3	(0.7)	58.2	(2.4)	34.0	(2.5)	7.8	(1.7)	8.2	(2.7)	-7.8	(2.8)	-0.5	(1.8)
Low-Medium ESCS	68.1	(1.4)	25.7	(1.3)	6.2	(0.7)	62.6	(3.2)	30.9	(3.3)	6.5	(1.2)	5.5	(3.4)	-5.2	(3.5)	-0.4	(1.4)
Medium-High ESCS	71.2	(1.3)	23.4	(1.4)	5.4	(0.6)	68.6	(2.6)	26.7	(2.7)	4.7	(1.5)	2.6	(2.9)	-3.4	(3.1)	0.7	(1.6)
Highest ESCS	74.5	(1.5)	21.4	(1.2)	4.1	(0.7)	71.6	(3.0)	22.8	(2.7)	5.5	(1.1)	2.8	(3.4)	-1.4	(3.0)	-1.5	(1.3)
Native	70.8	(0.9)	23.7	(0.8)	5.5	(0.4)	65.6	(1.4)	29.0	(1.5)	5.4	(0.5)	5.2	(1.6)	-5.2	(1.6)	0.1	(0.7)
Immigrant & Eng./Irish	70.4	(2.4)	23.3	(2.1)	6.3	(1.2)	72.0	(4.4)	20.4	(3.6)	7.6	(2.4)	-1.6	(5.0)	2.8	(4.2)	-1.3	(2.7)
Immigrant & other lang.	64.9	(2.2)	27.5	(2.3)	7.6	(1.3)	64.2	(3.3)	28.1	(2.9)	7.7	(2.2)	0.6	(3.9)	-0.6	(3.7)	-0.1	(2.6)
Girls' secondary	67.6	(1.9)	26.5	(1.4)	5.9	(0.8)	67.6	(2.2)	28.0	(2.5)	4.5	(1.0)	0.0	(2.9)	-1.4	(2.9)	1.4	(1.3)
Boys' secondary	73.8	(2.0)	20.5	(1.8)	5.7	(1.0)	64.3	(3.2)	29.2	(3.2)	6.4	(1.1)	9.4*	(3.8)	-8.7*	(3.6)	-0.7	(1.5)
Community/comprehensive	68.6	(1.6)	24.7	(1.4)	6.6	(0.7)	67.2	(3.6)	25.7	(2.9)	7.2	(1.8)	1.5	(3.9)	-0.9	(3.3)	-0.6	(1.9)
Mixed secondary	73.6	(2.0)	22.0	(1.6)	4.4	(0.9)	64.8	(2.9)	28.7	(3.2)	6.5	(1.1)	8.8	(3.5)	-6.7	(3.6)	-2.1	(1.5)
ETB vocational	68.9	(1.4)	25.3	(1.4)	5.8	(0.5)	63.6	(2.6)	30.2	(3.1)	6.2	(1.0)	5.3	(2.9)	-4.9	(3.4)	-0.4	(1.2)
Non-DEIS	70.9	(1.0)	24.0	(0.9)	5.1	(0.4)	67.1	(1.7)	26.9	(1.6)	6.0	(0.5)	3.9*	(1.9)	-3.0	(1.8)	-0.9	(0.7)
DEIS	67.5	(1.5)	24.8	(1.3)	7.7	(0.7)	60.2	(2.4)	33.2	(3.0)	6.5	(1.2)	7.3*	(2.8)	-8.4*	(3.3)	1.2	(1.4)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L21: Percentages of students who *skip class* by background variables, Spring and Autumn testing

<i>Students skip[ing] class...</i>	Spring						Autumn						Spring - Autumn					
	None		1 or 2 days		3 or more days		None		1 or 2 days		3 or more days		None		1 or 2 days		3 or more days	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
Male	74.3	(1.0)	19.2	(1.0)	6.5	(0.5)	66.8	(2.5)	24.2	(1.9)	9.0	(1.7)	7.5	2.7	5.0*	2.2	-2.4	(1.7)
Female	70.4	(1.4)	21.9	(1.1)	7.7	(0.8)	69.6	(1.8)	22.9	(1.5)	7.5	(0.7)	0.8	2.3	-1.0	1.9	0.2	(1.1)
First / Second Year	75.0	(4.9)	19.8	(4.5)	5.2	(2.5)	81.5	(13.2)	18.5	(13.2)	0.0	(0.0)	-6.5	14.1	1.3	13.9	5.2	(2.5)
Third Year	78.8	(0.9)	17.3	(0.8)	3.9	(0.4)	74.0	(2.7)	21.4	(2.4)	4.6	(1.5)	4.8	2.9	-4.1	2.5	-0.7	(1.6)
Transition Year	58.9	(2.2)	27.4	(1.5)	13.7	(1.3)	65.8	(1.9)	24.6	(1.6)	9.5	(1.2)	-6.9*	2.9	2.8	2.2	4.2*	(1.7)
Fifth/Sixth Year	71.9	(2.2)	20.3	(2.2)	7.8	(1.4)	67.0	(2.7)	23.5	(2.5)	9.5	(1.7)	5.0	3.5	-3.2	3.3	1.7	(2.2)
Lowest ESCS	70.5	(1.5)	22.3	(1.4)	7.2	(0.8)	66.7	(3.2)	23.1	(2.8)	10.2	(1.9)	3.8	3.6	-0.8	3.2	-3.0	(2.1)
Low-Medium ESCS	71.9	(1.5)	21.1	(1.4)	6.9	(0.7)	68.1	(2.5)	24.4	(2.0)	7.5	(1.5)	3.9	2.9	-3.3	2.4	-0.6	(1.6)
Medium-High ESCS	73.7	(1.6)	19.8	(1.3)	6.5	(0.8)	69.8	(2.8)	23.5	(2.5)	6.7	(1.5)	3.9	3.2	-3.8	2.8	-0.1	(1.7)
Highest ESCS	72.9	(1.7)	19.2	(1.3)	8.0	(1.0)	67.6	(2.4)	23.7	(2.0)	8.7	(1.4)	5.2	2.9	-4.5	2.4	-0.7	(1.8)
Native	72.6	(1.1)	20.3	(0.8)	7.2	(0.5)	68.4	(1.6)	23.5	(1.3)	8.1	(1.1)	4.2*	2.0	3.2*	1.5	-1.0	(1.2)
Immigrant & Eng./Irish	74.5	(2.1)	19.6	(1.8)	5.8	(1.2)	72.2	(3.1)	20.6	(2.9)	7.2	(2.1)	2.3	3.8	-0.9	3.4	-1.4	(2.5)
Immigrant & other lang.	68.2	(2.7)	24.6	(2.1)	7.3	(1.5)	69.8	(3.7)	23.6	(4.2)	6.6	(2.5)	-1.7	4.6	1.0	4.7	0.7	(2.9)
Girls' secondary	71.6	(2.7)	21.2	(1.9)	7.2	(1.3)	76.3	(2.6)	20.2	(2.5)	3.5	(0.9)	-4.7	3.7	1.0	3.2	3.7*	(1.6)
Boys' secondary	73.1	(1.8)	20.7	(1.7)	6.2	(1.1)	71.4	(5.6)	20.0	(3.6)	8.6	(2.5)	1.7	5.9	0.7	4.0	-2.4	(2.7)
Community/comprehensive	70.5	(2.1)	21.7	(1.7)	7.8	(0.9)	65.7	(3.9)	25.5	(2.6)	8.8	(3.6)	4.8	4.5	-3.9	3.1	-0.9	(3.7)
Mixed secondary	73.4	(2.3)	19.6	(1.7)	7.0	(0.8)	62.8	(3.8)	25.5	(2.7)	11.6	(2.4)	10.6*	4.4	-6.0	3.2	-4.6	(2.5)
ETB vocational	72.9	(1.8)	20.0	(1.4)	7.1	(1.0)	65.6	(1.9)	25.5	(2.2)	8.9	(1.5)	7.3	2.6	5.5*	2.6	-1.8	(1.8)
Non-DEIS	72.6	(1.2)	20.6	(0.9)	6.7	(0.6)	68.0	(1.9)	24.0	(1.5)	8.0	(1.2)	4.6*	2.3	-3.4	1.7	-1.2	(1.3)
DEIS	71.4	(1.8)	20.3	(1.7)	8.4	(0.9)	69.0	(2.3)	22.1	(1.6)	8.9	(1.9)	2.3	(2.9)	-1.8	(2.4)	-0.5	(2.1)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L22: Percentages of students who arrive late by background variables, Spring and Autumn testing

<i>Student arrive[ing] late...</i>	Spring						Autumn						Spring - Autumn					
	None		1 or 2 days		3 or more days		None		1 or 2 days		3 or more days		None		1 or 2 days		3 or more days	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
Male	62.8	(1.3)	26.5	(1.1)	10.7	(0.6)	61.3	(2.3)	25.5	(1.8)	13.2	(1.3)	1.5	(2.7)	1.0	(2.1)	-2.5	(1.4)
Female	69.9	(1.1)	22.5	(1.0)	7.7	(0.6)	71.1	(2.5)	22.1	(1.9)	6.8	(1.3)	-1.2	(2.7)	0.4	(2.1)	0.9	(1.4)
First / Second Year	63.8	(5.7)	30.1	(5.0)	6.1	(2.5)	90.4	(10.4)	9.6	(10.4)	0.0	(0.0)	26.6*	(11.8)	20.5*	(11.5)	6.1	(2.5)
Third Year	68.2	(1.1)	24.0	(0.9)	7.8	(0.6)	68.0	(2.6)	23.3	(2.2)	8.6	(1.0)	0.2	(2.8)	0.7	(2.4)	-0.9	(1.2)
Transition Year	65.1	(1.6)	24.3	(1.3)	10.6	(0.8)	69.0	(2.1)	21.7	(1.5)	9.3	(1.3)	-3.9	(2.6)	2.6	(2.0)	1.3	(1.5)
Fifth/Sixth Year	58.6	(2.6)	26.8	(2.6)	14.6	(1.7)	56.6	(3.4)	30.1	(2.9)	13.4	(2.0)	2.0	(4.3)	-3.3	(3.9)	1.2	(2.6)
Lowest ESCS	61.7	(1.5)	27.3	(1.2)	11.0	(1.0)	60.6	(3.7)	26.4	(2.6)	13.0	(2.1)	1.0	(4.0)	1.0	(2.9)	-2.0	(2.3)
Low-Medium ESCS	66.9	(1.5)	23.9	(1.3)	9.3	(0.9)	70.1	(3.1)	22.3	(2.9)	7.5	(1.5)	-3.3	(3.5)	1.5	(3.2)	1.7	(1.7)
Medium-High ESCS	65.4	(1.5)	24.9	(1.3)	9.7	(0.9)	66.9	(2.8)	23.0	(2.5)	10.0	(1.5)	-1.6	(3.2)	1.9	(2.8)	-0.3	(1.7)
Highest ESCS	71.1	(1.5)	21.9	(1.4)	6.9	(0.7)	67.1	(3.2)	23.5	(2.5)	9.5	(1.4)	4.1	(3.5)	-1.5	(2.9)	-2.6	(1.6)
Native	66.4	(1.1)	24.3	(0.9)	9.2	(0.6)	67.1	(2.1)	23.6	(1.5)	9.2	(1.0)	-0.7	(2.3)	0.7	(1.8)	0.0	(1.2)
Immigrant & Eng./Irish	61.8	(2.6)	27.8	(2.7)	10.4	(1.5)	54.1	(4.6)	28.2	(3.9)	17.7	(3.6)	7.7	(5.3)	-0.3	(4.8)	-7.4	(3.9)
Immigrant & other lang.	71.1	(2.6)	23.0	(2.3)	5.9	(1.4)	71.0	(4.6)	21.6	(3.3)	7.4	(2.8)	0.1	(5.2)	1.4	(4.0)	-1.5	(3.1)
Girls' secondary	73.4	(1.5)	20.4	(1.5)	6.3	(0.8)	74.6	(3.7)	20.2	(2.9)	5.2	(1.4)	-1.3	(4.0)	0.2	(3.3)	1.1	(1.6)
Boys' secondary	62.6	(2.6)	26.8	(2.1)	10.6	(1.0)	58.8	(5.7)	27.7	(4.3)	13.5	(2.1)	3.7	(6.3)	-0.9	(4.8)	-2.8	(2.3)
Community/comprehensive	64.8	(2.1)	22.9	(1.8)	12.3	(1.4)	61.3	(2.8)	28.4	(2.7)	10.3	(1.9)	3.5	(3.5)	-5.5	(3.3)	2.0	(2.3)
Mixed secondary	67.3	(3.0)	25.1	(2.3)	7.6	(1.2)	69.2	(5.0)	19.7	(3.5)	11.1	(2.8)	-1.9	(5.8)	5.4	(4.1)	-3.5	(3.1)
ETB vocational	63.5	(2.0)	26.8	(1.6)	9.7	(1.0)	65.7	(2.9)	23.9	(1.8)	10.4	(2.1)	-2.1	(3.5)	2.8	(2.4)	-0.7	(2.3)
Non-DEIS	68.1	(1.1)	23.8	(1.0)	8.1	(0.5)	67.0	(1.8)	22.9	(1.2)	10.0	(1.1)	1.0	(2.1)	0.9	(1.6)	-2.0	(1.3)
DEIS	61.0	(1.9)	26.4	(1.4)	12.7	(1.2)	64.1	(4.1)	26.3	(3.3)	9.6	(1.9)	-3.1	(4.6)	0.1	(3.5)	3.1	(2.3)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L23: Percentages of students *strongly agreeing/agreeing* on statements about ‘sense of belonging’ by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing...</i>	Spring Testing						Autumn Testing						Spring - Autumn					
	Feel like an outsider		Make Friend easily		Belong		Feel like an outsider		Make Friend easily		Belong		Feel like an outsider		Make Friend easily		Belong	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	22.0	(0.7)	76.3	(0.6)	66.7	(0.8)	23.4	(1.0)	75.1	(0.7)	64.7	(1.0)	-1.4	(1.2)	1.2	(0.9)	2.0	(1.3)
Male	20.5	(0.9)	80.5	(0.8)	66.3	(1.1)	21.4	(1.6)	76.9	(1.2)	64.0	(1.7)	-0.9	(1.8)	3.6*	(1.4)	2.3	(2.0)
Female	23.4	(1.0)	72.1	(0.9)	67.1	(1.0)	25.2	(1.3)	73.4	(1.0)	65.3	(1.5)	-1.8	(1.6)	-1.3	(1.3)	1.8	(1.8)
First / Second Year	29.9	(4.7)	73.7	(3.8)	63.2	(4.4)	14.1	(9.9)	84.3	(13.4)	70.1	(10.3)	15.8	(11.0)	-10.6	(13.9)	-6.8	(11.2)
Third Year	21.6	(0.7)	75.3	(0.8)	66.9	(0.9)	21.7	(2.3)	73.7	(1.9)	59.7	(2.3)	-0.1	(2.4)	1.6	(2.1)	7.2	(2.5)
Transition Year	22.4	(1.2)	78.8	(1.0)	69.2	(1.3)	21.8	(1.5)	78.3	(1.4)	71.5	(1.2)	0.6	(2.0)	0.5	(1.7)	-2.3	(1.7)
Fifth/Sixth Year	21.8	(2.0)	75.1	(1.8)	57.5	(2.1)	29.9	(2.7)	68.3	(2.6)	53.1	(3.3)	-8.0*	(3.4)	6.8*	(3.2)	4.4	(3.9)
Lowest ESCS	22.8	(1.2)	75.5	(1.3)	63.0	(1.3)	23.4	(2.5)	73.1	(2.0)	58.3	(1.8)	-0.6	(2.8)	2.5	(2.4)	4.7*	-(2.3)
Low-Medium ESCS	23.4	(1.1)	76.3	(1.2)	65.9	(1.4)	24.9	(1.5)	74.3	(1.5)	61.4	(2.4)	-1.5	(1.8)	2.1	(1.9)	4.5	(2.7)
Medium-High ESCS	20.7	(1.2)	76.0	(1.2)	67.7	(1.2)	22.7	(2.1)	77.0	(1.8)	68.6	(2.2)	-1.9	(2.4)	-1.0	(2.2)	-0.8	(2.5)
Highest ESCS	21.2	(1.2)	77.2	(1.1)	70.3	(1.3)	22.3	(1.5)	76.1	(2.0)	70.8	(2.1)	-1.1	(2.0)	1.1	(2.3)	-0.5	(2.5)
Native	21.6	(0.7)	76.9	(0.6)	66.8	(0.9)	22.3	(1.1)	76.4	(0.9)	65.4	(1.1)	-0.6	(1.3)	0.5	(1.1)	1.3	(1.4)
Immigrant & Eng./Irish	22.6	(1.8)	75.3	(2.3)	67.1	(2.0)	29.3	(3.6)	75.3	(3.6)	68.5	(3.0)	-6.7	(4.1)	0.0	(4.2)	-1.4	(3.6)
Immigrant & other lang.	24.7	(2.2)	70.9	(2.2)	65.4	(2.1)	28.8	(3.5)	64.2	(3.4)	58.1	(3.5)	-4.1	(4.1)	6.7	(4.1)	7.3	(4.1)
Girls’ secondary	22.1	(1.1)	72.7	(1.1)	66.0	(1.3)	21.4	(2.0)	76.3	(1.7)	65.1	(1.7)	0.7	(2.3)	-3.6	(2.0)	1.0	(2.2)
Boys’ secondary	22.0	(1.4)	78.3	(1.4)	63.8	(1.9)	17.0	(2.0)	78.7	(2.3)	71.5	(3.0)	5.0*	(2.4)	-0.5	(2.7)	7.6*	(3.5)
Community/ comprehensive	19.9	(1.1)	79.2	(0.9)	66.9	(1.6)	26.6	(1.7)	70.1	(2.0)	61.5	(2.3)	-6.7	(2.1)	9.1	(2.2)	5.4	(2.8)
Mixed secondary	20.7	(2.1)	76.7	(1.5)	71.5	(2.2)	24.7	(3.2)	76.2	(1.7)	65.0	(2.2)	-4.0	(3.8)	0.5	(2.3)	6.5*	(3.1)
ETB vocational	23.9	(1.4)	75.9	(1.2)	65.7	(1.5)	25.5	(2.2)	74.6	(0.9)	62.2	(2.1)	-1.6	(2.6)	1.3	(1.5)	3.5	(2.5)
Non-DEIS	21.6	(0.8)	76.2	(0.6)	67.1	(0.9)	22.2	(1.2)	75.7	(1.0)	66.8	(0.9)	-0.7	(1.5)	0.5	(1.1)	0.3	(1.3)
DEIS	23.4	(1.4)	76.4	(1.4)	65.5	(1.7)	26.7	(1.9)	73.4	(1.1)	58.4	(2.0)	-3.3	(2.4)	3.0	(1.8)	7.1	(2.6)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Condt. Table L23: Percentages of students *strongly agreeing/agreeing* on statements on ‘sense of belonging’ by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing..</i>	Spring testing						Autumn testing						Spring - Autumn					
	I feel awkward and out of place in my school.		Others seem to like me		I feel lonely at school.		I feel awkward and out of place in my school.		Others seem to like me		I feel lonely at school.		I feel awkward and out of place in my school.		Others seem to like me		I feel lonely at school.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	21.8	(0.6)	89.0	(0.4)	13.7	(0.5)	22.3	(0.8)	88.1	(0.7)	14.9	(0.6)	-0.4	(1.0)	0.9	(0.8)	-1.1	(0.8)
Male	19.2	(0.7)	89.0	(0.6)	11.4	(0.6)	19.8	(1.4)	88.9	(1.0)	12.5	(0.8)	-0.7	(1.6)	0.2	(1.2)	-1.1	(1.0)
Female	24.5	(0.8)	88.9	(0.6)	16.1	(0.8)	24.7	(1.2)	87.3	(1.1)	17.2	(1.2)	-0.2	(1.5)	1.6	(1.2)	-1.1	(1.4)
First / Second Year	29.8	(4.9)	80.2	(3.9)	23.1	(3.9)	38.1	(17.8)	100.0	(0.0)	0.0	(0.0)	-8.3	(18.4)	-19.8	(3.9)	23.1	(3.9)
Third Year	22.0	(0.7)	88.5	(0.5)	13.4	(0.6)	19.7	(2.6)	87.3	(1.8)	13.8	(1.4)	2.3	(2.7)	1.2	(1.9)	-0.4	(1.5)
Transition Year	20.8	(1.2)	90.7	(0.8)	13.9	(1.0)	20.7	(1.3)	90.0	(1.1)	14.1	(1.3)	0.1	(1.8)	0.7	(1.3)	-0.1	(1.7)
Fifth/Sixth Year	22.3	(1.9)	88.4	(1.5)	13.5	(1.7)	29.2	(3.4)	83.8	(2.9)	18.8	(2.2)	-6.9	(3.9)	4.6	(3.2)	-5.3	(2.8)
Lowest ESCS	23.0	(0.9)	88.0	(0.9)	14.1	(0.9)	27.0	(1.7)	86.0	(1.8)	16.4	(1.8)	-4.0*	(1.9)	2.0	(2.1)	-2.2	(2.0)
Low-Medium ESCS	22.9	(1.2)	87.4	(0.8)	14.4	(1.0)	24.6	(1.3)	86.5	(1.1)	15.7	(1.3)	-1.7	(1.8)	0.9	(1.4)	-1.3	(1.6)
Medium-High ESCS	21.2	(1.1)	88.5	(0.9)	13.9	(1.0)	19.6	(2.0)	89.6	(1.5)	13.9	(1.5)	1.6	(2.3)	-1.1	(1.8)	0.0	(1.8)
Highest ESCS	20.5	(1.0)	91.8	(0.8)	12.5	(0.8)	18.3	(1.8)	89.9	(1.5)	13.8	(1.4)	2.1	(2.1)	1.9	(1.7)	-1.3	(1.6)
Native	21.6	(0.6)	89.4	(0.4)	13.5	(0.5)	20.5	(1.0)	89.0	(0.8)	14.6	(0.8)	1.1	(1.1)	0.4	(0.9)	-1.1	(1.0)
Immigrant & Eng./Irish	20.0	(1.8)	90.6	(1.5)	13.1	(1.7)	26.8	(2.8)	88.5	(1.8)	18.3	(3.0)	-6.8*	(3.4)	2.2	(2.4)	-5.2	(3.4)
Immigrant & other lang.	23.7	(2.3)	83.0	(1.5)	16.6	(1.9)	29.0	(3.9)	82.7	(3.0)	14.9	(2.6)	-5.3	(4.5)	0.3	(3.4)	1.7	(3.2)
Girls’ secondary	22.2	(1.4)	91.9	(0.9)	15.9	(1.2)	21.0	(2.3)	91.2	(1.5)	14.0	(1.7)	1.2	(2.7)	0.7	(1.8)	1.9	(2.1)
Boys’ secondary	18.5	(1.4)	87.4	(1.1)	12.8	(1.2)	14.3	(2.3)	90.6	(2.0)	9.4	(0.8)	4.2	(2.6)	-3.2	(2.3)	3.3*	(1.5)
Community/ comprehensive	21.9	(1.0)	88.6	(0.7)	13.1	(0.9)	26.8	(2.3)	87.6	(1.9)	14.4	(0.6)	-4.9	(2.5)	1.0	(2.0)	-1.3	(1.1)
Mixed secondary	22.2	(1.3)	88.8	(1.0)	12.3	(1.3)	24.3	(1.8)	86.6	(1.2)	18.7	(1.8)	-2.1	(2.3)	2.2	(1.5)	-6.4	(2.2)
ETB vocational	23.0	(1.1)	88.0	(0.7)	13.9	(1.0)	23.6	(1.2)	85.7	(1.2)	16.3	(1.3)	-0.6	(1.7)	2.2	(1.4)	-2.4	(1.6)
Non-DEIS	21.2	(0.6)	89.6	(0.5)	13.4	(0.5)	20.7	(1.2)	89.1	(0.8)	13.7	(0.8)	0.6	(1.4)	0.5	(0.9)	-0.3	(0.9)
DEIS	23.8	(1.3)	86.9	(0.9)	15.0	(1.4)	27.2	(2.1)	85.0	(1.4)	18.4	(1.6)	-3.4	(2.5)	1.9	(1.7)	-3.5	(2.1)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L24: Percentages of students reporting the extent of English teacher support by background variables, Spring and Autumn testing

<i>Every/most class the teacher...</i>	Spring								Autumn								Spring - Autumn							
	Show an interest in every student's learning.		Give extra help when students need it.		Help students with their learning.		Continue teaching until the students understands.		Show an interest in every student's learning.		Give extra help when students need it.		Help students with their learning.		Continue teaching until the students understands.		Show an interest in every student's learning.		Give extra help when students need it.		Help students with their learning.		Continue teaching until the students understands.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
	Diff	Diff)	Diff	Diff)	Diff	Diff)	Diff	Diff)	Diff	Diff)	Diff	Diff)	Diff	Diff)	Diff	Diff)	Diff	Diff)	Diff	Diff)	Diff	Diff)	Diff	Diff)
All students	76.4	(0.7)	74.8	(0.8)	81.1	(0.6)	73.7	(0.8)	74.5	(1.5)	74.9	(1.3)	81.1	(1.1)	70.8	(1.6)	1.9	(1.7)	0.0	(1.5)	0.0	(1.3)	2.9	(1.8)
Male	78.6	(0.9)	76.9	(1.0)	83.3	(0.9)	74.1	(1.0)	76.5	(2.0)	76.5	(1.7)	82.7	(1.4)	71.2	(2.6)	2.1	(2.2)	0.4	(2.0)	0.6	(1.7)	3.0	(2.8)
Female	74.3	(0.9)	72.8	(1.0)	79.0	(0.8)	73.3	(1.0)	72.5	(2.1)	73.3	(1.7)	79.4	(1.6)	70.4	(1.4)	1.8	(2.3)	-0.5	(2.0)	-0.4	(1.8)	2.9	(1.8)
First / Second Year	80.4	(3.6)	74.5	(3.8)	81.6	(4.0)	77.8	(4.1)	95.0	(5.1)	83.9	(13.1)	94.6	(5.0)	89.3	(13.0)	-14.5*	(6.2)	-9.4	(13.7)	-13.0*	(6.4)	-11.5	(13.6)
Third Year	78.9	(0.9)	75.6	(1.0)	82.5	(0.8)	75.5	(0.9)	79.0	(2.0)	74.4	(2.0)	82.3	(1.7)	75.4	(1.9)	-0.1	(2.2)	1.2	(2.2)	0.2	(1.9)	0.1	(2.1)
Transition Year	71.8	(1.3)	73.7	(1.4)	79.3	(1.2)	70.3	(1.4)	70.4	(2.1)	73.9	(1.9)	79.7	(1.7)	67.6	(2.1)	1.4	(2.4)	-0.1	(2.3)	-0.4	(2.1)	2.8	(2.5)
Fifth/Sixth Year	73.2	(2.0)	72.9	(1.8)	77.5	(2.0)	70.9	(2.0)	78.7	(2.1)	77.9	(2.6)	82.8	(2.1)	72.6	(3.1)	-5.5	(2.9)	-5.0	(3.2)	-5.3	(2.9)	-1.7	(3.7)
Lowest ESCS	73.5	(1.2)	74.2	(1.3)	80.1	(1.1)	72.9	(1.3)	74.4	(2.1)	76.7	(1.9)	81.9	(1.9)	68.1	(2.8)	-0.9	(2.5)	-2.5	(2.3)	-1.7	(2.2)	4.8	(3.1)
Low-Medium ESCS	75.6	(1.4)	74.6	(1.4)	79.5	(1.2)	73.4	(1.3)	76.9	(2.4)	77.2	(2.1)	80.2	(2.0)	74.4	(2.0)	-1.4	(2.8)	-2.6	(2.5)	-0.7	(2.3)	-1.0	(2.4)
Medium-High ESCS	76.7	(1.1)	75.1	(1.4)	81.5	(1.1)	72.7	(1.2)	72.5	(2.6)	75.1	(2.4)	83.4	(1.8)	72.0	(3.1)	4.1	(2.8)	0.0	(2.8)	-1.9	(2.1)	0.6	(3.3)
Highest ESCS	79.8	(1.2)	75.3	(1.4)	83.4	(1.0)	75.9	(1.4)	74.1	(2.3)	70.5	(2.7)	78.9	(1.9)	68.6	(2.2)	5.6	(2.6)	4.9	(3.0)	4.5*	(2.2)	7.3	(2.6)
Native	76.5	(0.8)	74.3	(0.9)	80.8	(0.7)	73.8	(0.8)	74.3	(1.6)	74.5	(1.4)	81.1	(1.3)	71.8	(1.5)	2.2	(1.8)	-0.2	(1.6)	-0.2	(1.5)	2.0	(1.7)
Immigrant & Eng./Irish	76.6	(2.0)	76.6	(2.0)	84.7	(1.6)	74.4	(2.2)	72.2	(4.2)	72.7	(3.9)	78.2	(2.9)	65.3	(4.1)	4.4	(4.7)	3.9	(4.4)	6.5	(3.3)	9.1	(4.7)
Immigrant & other lang.	76.9	(1.8)	77.6	(2.3)	80.3	(1.9)	72.3	(2.3)	78.7	(2.9)	79.9	(3.6)	83.7	(2.4)	68.9	(4.8)	-1.8	(3.5)	-2.3	(4.3)	-3.5	(3.0)	3.4	(5.3)
Girls' secondary	73.4	(1.1)	71.1	(1.4)	77.2	(0.9)	72.8	(1.4)	69.6	(3.5)	72.1	(3.1)	74.2	(2.8)	69.0	(2.1)	3.8	(3.6)	-1.0	(3.4)	3.0	(2.9)	3.9	(2.5)
Boys' secondary	78.1	(1.8)	75.7	(2.3)	82.7	(1.8)	72.5	(2.1)	78.3	(4.1)	76.9	(3.9)	84.8	(2.0)	73.3	(5.9)	-0.2	(4.5)	-1.2	(4.5)	-2.1	(2.7)	-0.8	(6.3)
Com/ comp	76.0	(1.5)	75.5	(1.5)	81.8	(1.3)	73.4	(1.5)	76.7	(4.1)	71.9	(2.9)	79.6	(3.1)	69.6	(2.8)	-0.7	(4.4)	3.6	(3.3)	2.2	(3.4)	3.7	(3.2)
Mixed secondary	79.4	(1.9)	75.7	(2.6)	83.3	(2.0)	75.5	(2.5)	73.5	(3.0)	75.5	(1.6)	82.9	(1.4)	68.5	(3.6)	5.9	(3.6)	0.2	(3.0)	0.4	(2.4)	7.0	(4.4)
ETB vocational	76.3	(1.6)	76.2	(1.4)	81.6	(1.1)	74.1	(1.4)	75.1	(2.7)	77.1	(2.6)	83.5	(2.5)	72.9	(3.4)	1.1	(3.1)	-0.9	(3.0)	-2.0	(2.7)	1.2	(3.7)
Non-DEIS	76.5	(0.8)	74.3	(1.0)	81.3	(0.7)	73.3	(0.9)	73.3	(1.8)	73.1	(1.6)	80.0	(1.5)	69.4	(1.8)	3.2	(2.0)	1.2	(1.8)	1.3	(1.7)	3.9	(2.0)
DEIS	76.2	(1.2)	76.6	(1.4)	80.6	(1.1)	75.0	(1.2)	78.1	(3.0)	80.2	(1.9)	84.3	(1.1)	75.1	(3.3)	-1.9	(3.2)	-3.7	(2.4)	-3.7*	(1.6)	0.0	(3.5)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L25: Mean scores on the index for ‘understanding and memorising’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	(SE Diff)
All students	0.05	(0.02)	0.04	(0.03)	0.01	(0.03)
Male	-0.04	(0.02)	-0.06	(0.04)	0.02	(0.04)
Female	0.15	(0.02)	0.14	(0.03)	0.01	(0.04)
First / Second Year	-0.25	(0.11)	-0.31	(0.32)	0.06	(0.34)
Third Year	0.10	(0.02)	0.04	(0.04)	0.06	(0.05)
Transition Year	0.02	(0.03)	0.07	(0.03)	-0.05	(0.04)
Fifth/Sixth Year	-0.07	(0.06)	-0.04	(0.04)	-0.03	(0.07)
Lowest ESCS	-0.07	(0.03)	-0.07	(0.05)	0.00	(0.06)
Low-Medium ESCS	0.02	(0.03)	0.04	(0.05)	-0.02	(0.06)
Medium-High ESCS	0.09	(0.03)	0.11	(0.04)	-0.02	(0.05)
Highest ESCS	0.18	(0.03)	0.10	(0.04)	0.08	(0.05)
Native	0.05	(0.02)	0.05	(0.03)	0.00	(0.03)
Immigrant & Eng./Irish	0.08	(0.04)	-0.02	(0.09)	0.10	(0.10)
Immigrant & other lang.	0.08	(0.04)	0.03	(0.07)	0.04	(0.09)
Girls’ secondary	0.19	(0.03)	0.18	(0.05)	0.01	(0.06)
Boys’ secondary	-0.01	(0.05)	-0.04	(0.09)	0.03	(0.10)
Community/ comprehensive	0.01	(0.03)	0.05	(0.07)	-0.05	(0.08)
Mixed secondary	0.10	(0.03)	0.02	(0.06)	0.08	(0.06)
ETB vocational	-0.01	(0.03)	-0.01	(0.04)	-0.01	(0.05)
Non-DEIS	0.12	(0.02)	0.07	(0.03)	0.04	(0.04)
DEIS	-0.15	(0.03)	-0.06	(0.04)	-0.09	(0.05)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L26: Percentages of students reporting the usefulness for understanding and memorising text by background variables, Spring and Autumn testing

<i>Students who reported strategies as 'very useful'...</i>	Spring						Autumn						Spring - Autumn					
	I concentrate on the parts of the text that are easy to understand.		I quickly read through the text twice.		After reading the text, I discuss its content with other people.		I concentrate on the parts of the text that are easy to understand.		I quickly read through the text twice.		After reading the text, I discuss its content with other people.		I concentrate on the parts of the text that are easy to understand.		I quickly read through the text twice.		After reading the text, I discuss its content with other people.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	24.4	(0.6)	22.8	(0.7)	28.1	(0.6)	24.7	(0.9)	22.3	(1.1)	30.9	(1.3)	-0.4	(1.1)	0.6	(1.2)	-2.7	(1.4)
Male	22.4	(0.9)	23.2	(1.0)	24.4	(1.0)	22.1	(1.0)	21.1	(1.4)	26.0	(1.2)	0.3	(1.3)	2.1	(1.7)	-1.6	(1.6)
Female	26.3	(0.9)	22.5	(0.9)	31.7	(0.8)	27.3	(1.4)	23.5	(1.6)	35.6	(1.4)	-1.0	(1.6)	-0.9	(1.9)	-3.8*	(1.6)
First / Second Year	30.6	(4.4)	31.1	(4.9)	24.7	(4.2)	43.6	(15.4)	9.9	(10.1)	30.5	(15.2)	-13.0	(16.1)	21.3	(11.2)	-5.8	(15.8)
Third Year	23.9	(0.9)	21.8	(0.7)	28.0	(0.8)	27.0	(1.9)	20.4	(1.7)	28.8	(2.2)	-3.1	(2.1)	1.3	(1.9)	-0.7	(2.3)
Transition Year	24.5	(1.1)	23.7	(1.1)	28.1	(1.5)	21.8	(1.2)	23.1	(1.3)	33.6	(1.9)	2.6	(1.6)	0.7	(1.7)	-5.5*	(2.4)
Fifth/Sixth Year	26.2	(2.2)	25.8	(2.3)	29.6	(2.3)	29.0	(1.8)	23.0	(2.1)	26.5	(2.2)	-2.8	(2.8)	2.8	(3.1)	3.0	(3.2)
Lowest ESCS	23.5	(1.2)	21.4	(1.2)	24.0	(1.3)	24.4	(1.8)	22.0	(2.0)	28.2	(2.9)	-0.9	(2.2)	-0.6	(2.4)	-4.2	(3.2)
Low-Medium ESCS	26.0	(1.5)	24.8	(1.3)	26.3	(1.3)	27.1	(2.0)	23.1	(2.3)	31.8	(3.2)	-1.1	(2.5)	1.7	(2.6)	-5.4	(3.4)
Medium-High ESCS	24.0	(1.1)	20.5	(1.1)	28.7	(1.3)	25.6	(1.8)	21.1	(1.7)	31.5	(1.9)	-1.6	(2.1)	-0.5	(2.0)	-2.8	(2.3)
Highest ESCS	23.6	(1.4)	24.4	(1.6)	33.4	(1.4)	22.0	(1.7)	22.8	(2.0)	32.7	(2.8)	1.6	(2.2)	1.6	(2.6)	0.7	(3.1)
Native	23.8	(0.7)	21.9	(0.7)	28.0	(0.7)	23.3	(0.9)	21.7	(1.2)	30.5	(1.6)	0.4	(1.1)	0.2	(1.4)	-2.5	(1.8)
Immigrant & Eng./Irish	26.8	(2.2)	26.1	(1.8)	29.3	(2.1)	31.4	(3.5)	24.1	(3.7)	34.1	(4.3)	-4.6	(4.1)	2.0	(4.1)	-4.9	(4.7)
Immigrant & other lang.	26.9	(2.1)	27.9	(2.0)	28.9	(2.2)	31.6	(3.2)	23.1	(3.5)	31.6	(2.6)	-4.7	(3.8)	4.7	(4.1)	-2.6	(3.4)
Girls' secondary	26.3	(1.1)	21.8	(1.5)	35.4	(1.0)	29.3	(1.9)	24.1	(3.2)	39.0	(1.6)	-3.1	(2.2)	-2.3	(3.5)	-3.6	(1.9)
Boys' secondary	23.6	(1.8)	25.0	(2.3)	24.6	(1.5)	23.8	(2.2)	23.5	(3.0)	23.0	(1.6)	-0.2	(2.9)	1.5	(3.8)	1.6	(2.2)
Comm/ Comp	26.2	(1.8)	22.1	(1.2)	26.3	(1.5)	26.9	(0.9)	22.1	(1.6)	29.4	(2.5)	-0.8	(2.0)	0.0	(2.0)	-3.2	(2.9)
Mixed secondary	23.3	(1.4)	25.3	(1.3)	29.9	(1.6)	19.8	(1.4)	22.0	(2.1)	28.8	(3.1)	3.4	(2.0)	3.3	(2.5)	1.2	(3.5)
ETB vocational	23.0	(1.2)	21.5	(1.2)	24.5	(1.3)	24.0	(2.0)	20.6	(1.8)	31.7	(3.3)	-1.0	(2.3)	0.9	(2.1)	-7.3*	(3.5)
Non-DEIS	23.9	(0.8)	22.8	(0.7)	29.8	(0.7)	25.2	(0.9)	22.2	(1.2)	32.0	(1.5)	-1.3	(1.2)	0.6	(1.4)	-2.2	(1.6)
DEIS	26.0	(1.4)	22.9	(1.5)	22.5	(1.5)	23.4	(2.8)	22.6	(2.1)	27.3	(2.8)	2.6	(3.1)	0.4	(2.6)	-4.8	(3.2)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Note: 'Very useful' is defined here as 5/6 on the 6-point Likert-type scale, where 1 is not useful at all.

Condt. Table L26: Percentages of students reporting the usefulness for understanding and memorising text by background variables, Spring and Autumn testing

<i>Students who reported strategies as 'very useful'...</i>	Spring						Autumn						Spring - Autumn					
	I underline important parts of the text.		I summarise the text in my own words.		I read the text aloud to another person.		I underline important parts of the text.		I summarise the text in my own words.		I read the text aloud to another person.		I underline important parts of the text.		I summarise the text in my own words.		I read the text aloud to another person.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	53.0	(0.7)	49.3	(0.8)	20.0	(0.6)	54.8	(1.5)	49.7	(1.2)	21.3	(0.9)	-1.8	(1.6)	-0.4	(1.5)	-1.2	(1.0)
Male	43.6	(1.0)	44.1	(1.0)	15.0	(0.7)	43.2	(1.6)	43.2	(1.7)	16.5	(1.1)	0.3	(1.9)	0.9	(2.0)	-1.4	(1.3)
Female	62.2	(1.0)	54.4	(1.2)	25.0	(0.8)	66.1	(1.7)	56.1	(1.8)	26.0	(1.4)	-3.9	(2.0)	-1.7	(2.1)	-1.0	(1.6)
First / Second Year	47.8	(4.7)	52.4	(6.1)	22.3	(4.0)	51.7	(18.0)	34.4	(14.6)	12.0	(12.1)	-3.9	(18.6)	18.0	(15.8)	10.3	(12.7)
Third Year	55.1	(0.8)	50.6	(0.9)	20.6	(0.7)	56.0	(2.5)	51.9	(2.7)	22.3	(1.8)	-0.9	(2.6)	-1.3	(2.9)	-1.7	(1.9)
Transition Year	49.2	(1.3)	48.4	(1.5)	19.5	(1.3)	54.1	(1.7)	49.1	(1.7)	22.1	(1.3)	-4.9*	(2.2)	-0.7	(2.2)	-2.6	(1.8)
Fifth/Sixth Year	51.0	(2.6)	42.0	(2.5)	17.3	(1.8)	55.3	(3.4)	48.9	(2.3)	18.1	(1.9)	-4.2	(4.3)	-6.8*	(3.4)	-0.8	(2.7)
Lowest ESCS	49.2	(1.3)	42.6	(1.4)	17.8	(1.0)	50.5	(3.1)	42.7	(2.4)	18.2	(1.6)	-1.4	(3.3)	-0.1	(2.7)	-0.4	(1.9)
Low-Medium ESCS	53.4	(1.3)	47.3	(1.4)	19.0	(1.0)	53.6	(2.9)	47.6	(3.2)	19.8	(1.5)	-0.2	(3.2)	-0.4	(3.5)	-0.9	(1.8)
Medium-High ESCS	52.8	(1.5)	52.1	(1.4)	21.7	(1.0)	58.1	(2.5)	54.5	(2.2)	23.1	(2.2)	-5.3	(2.9)	-2.4	(2.6)	-1.4	(2.5)
Highest ESCS	56.5	(1.5)	55.0	(1.4)	21.5	(1.0)	57.4	(2.2)	54.4	(2.8)	24.4	(1.7)	-0.8	(2.6)	0.5	(3.1)	-2.9	(2.0)
Native	52.3	(0.8)	48.1	(0.9)	20.0	(0.7)	53.8	(1.5)	49.8	(1.4)	21.3	(1.0)	-1.5	(1.7)	-1.7	(1.6)	-1.3	(1.2)
Immigrant & Eng./Irish	56.7	(2.5)	55.0	(2.6)	22.0	(2.0)	62.8	(4.7)	48.8	(4.7)	25.7	(4.2)	-6.1	(5.3)	6.2	(5.4)	-3.7	(4.6)
Immigrant & other lang.	54.8	(2.5)	55.3	(2.3)	18.8	(1.8)	57.2	(3.7)	48.8	(4.0)	19.2	(2.6)	-2.5	(4.5)	6.5	(4.6)	-0.5	(3.1)
Girls' secondary	65.4	(1.6)	57.9	(1.9)	27.3	(1.4)	69.3	(3.2)	56.8	(3.5)	27.5	(3.2)	-3.9	(3.6)	1.1	(4.0)	-0.2	(3.5)
Boys' secondary	48.0	(1.5)	46.8	(1.5)	14.4	(1.5)	46.7	(2.9)	45.2	(3.0)	15.6	(1.3)	1.4	(3.2)	1.6	(3.4)	-1.2	(2.0)
Com/comp	51.2	(1.4)	48.7	(1.4)	18.7	(1.7)	53.7	(2.9)	51.3	(1.9)	20.9	(2.5)	-2.5	(3.2)	-2.7	(2.4)	-2.2	(3.0)
Mixed secondary	52.2	(2.0)	48.2	(1.5)	20.0	(1.3)	51.0	(3.7)	49.4	(3.6)	22.4	(1.6)	1.2	(4.2)	-1.2	(3.9)	-2.4	(2.1)
ETB vocational	47.8	(1.1)	45.3	(1.8)	18.5	(0.9)	52.3	(2.7)	46.4	(2.4)	19.6	(1.2)	-4.5	(2.9)	-1.1	(3.0)	-1.2	(1.5)
Non-DEIS	55.3	(0.9)	51.1	(0.9)	20.9	(0.7)	56.5	(1.5)	50.1	(1.6)	22.0	(1.1)	-1.2	(1.8)	1.0	(1.8)	-1.2	(1.3)
DEIS	45.3	(1.2)	43.5	(1.7)	17.4	(1.2)	49.7	(3.4)	48.4	(3.2)	19.0	(0.9)	-4.3	(3.6)	-4.9	(3.6)	-1.6	(1.5)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

'Very useful' is defined here as 5/6 on the 6-point Likert-type scale, where 1 is not useful at all.

Table L27: Mean scores on the index for ‘summarising’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	(SE Diff)
All students	0.10	(0.02)	0.10	(0.03)	0.00	(0.03)
Male	-0.07	(0.02)	-0.05	(0.03)	-0.02	(0.04)
Female	0.28	(0.02)	0.25	(0.04)	0.03	(0.04)
First / Second Year	-0.19	(0.10)	-0.08	(0.40)	-0.11	(0.41)
Third Year	0.11	(0.02)	0.05	(0.06)	0.07	(0.06)
Transition Year	0.14	(0.03)	0.18	(0.03)	-0.03	(0.04)
Fifth/Sixth Year	-0.03	(0.05)	-0.03	(0.04)	0.00	(0.07)
Lowest ESCS	-0.10	(0.03)	-0.06	(0.06)	-0.05	(0.06)
Low-Medium ESCS	0.09	(0.02)	0.09	(0.04)	0.00	(0.05)
Medium-High ESCS	0.16	(0.02)	0.16	(0.05)	0.00	(0.05)
Highest ESCS	0.27	(0.02)	0.22	(0.04)	0.05	(0.04)
Native	0.10	(0.02)	0.09	(0.03)	0.02	(0.03)
Immigrant & Eng./Irish	0.16	(0.04)	0.19	(0.07)	-0.03	(0.08)
Immigrant & other lang.	0.13	(0.04)	0.16	(0.07)	-0.03	(0.08)
Girls’ secondary	0.34	(0.03)	0.29	(0.07)	0.05	(0.07)
Boys’ secondary	-0.01	(0.05)	-0.01	(0.06)	0.00	(0.08)
Community/ comprehensive	0.06	(0.03)	0.12	(0.09)	-0.06	(0.10)
Mixed secondary	0.13	(0.04)	0.09	(0.04)	0.04	(0.06)
ETB vocational	0.00	(0.02)	0.02	(0.05)	-0.02	(0.05)
Non-DEIS	0.19	(0.02)	0.15	(0.03)	0.04	(0.04)
DEIS	-0.16	(0.04)	-0.05	(0.05)	-0.12	(0.06)

Note. Bold indicates statistical significant difference at the .01 level; *indicates statistical significant difference at the .05 level.

Table L28: Percentages of students reporting the usefulness of specified strategies for summarising text by background variables, Spring and Autumn testing

<i>Students who reported strategies as 'very useful'...</i>	Spring						Autumn						Spring - Autumn					
	^A		B		C		A		B		C		A		B		C	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	26.2	(0.7)	13.0	(0.5)	28.7	(0.7)	26.1	(1.0)	12.5	(0.8)	27.2	(0.8)	0.1	(1.3)	0.5	(0.9)	1.5	(1.0)
Male	25.1	(1.0)	12.8	(0.6)	23.9	(0.8)	23.5	(1.6)	11.9	(1.1)	23.5	(0.8)	1.6	(1.9)	0.9	(1.3)	0.4	(1.1)
Female	27.2	(1.1)	13.3	(0.7)	33.4	(1.1)	28.5	(1.2)	13.0	(1.0)	30.8	(1.3)	-1.3	(1.6)	0.3	(1.3)	2.7	(1.7)
First / Second Year	35.8	(4.0)	20.2	(4.3)	32.9	(4.6)	18.9	(14.0)	15.9	(10.5)	6.0	(5.4)	16.9	(14.6)	4.3	(11.4)	26.8	(7.1)
Third Year	27.2	(0.9)	13.3	(0.6)	29.5	(0.8)	30.2	(1.7)	16.9	(1.9)	26.3	(1.7)	-3.0	(1.9)	-3.6	(2.0)	3.2	(1.9)
Transition Year	23.8	(1.0)	10.6	(0.8)	26.6	(1.3)	24.8	(1.3)	10.2	(1.1)	28.1	(1.5)	-0.9	(1.7)	0.4	(1.3)	-1.5	(2.0)
Fifth/Sixth Year	24.3	(2.3)	17.1	(1.7)	29.0	(2.6)	24.2	(2.1)	12.5	(1.8)	26.6	(2.0)	0.1	(3.1)	4.7	(2.5)	2.5	(3.3)
Lowest ESCS	22.1	(1.2)	14.4	(1.0)	26.3	(1.3)	21.2	(1.9)	13.9	(1.6)	23.8	(2.2)	1.0	(2.2)	0.5	(1.9)	2.5	(2.5)
Low-Medium ESCS	24.9	(1.1)	13.4	(0.9)	27.7	(1.2)	25.7	(2.5)	11.2	(1.6)	29.1	(2.7)	-0.8	(2.8)	2.2	(1.8)	-1.4	(2.9)
Medium-High ESCS	28.4	(1.2)	11.7	(0.7)	30.6	(1.4)	28.4	(2.0)	12.3	(1.4)	28.4	(1.9)	0.0	(2.4)	-0.5	(1.5)	2.2	(2.3)
Highest ESCS	29.0	(1.5)	12.2	(1.0)	30.1	(1.4)	28.5	(2.9)	12.3	(1.7)	28.0	(1.9)	0.4	(3.3)	-0.1	(2.0)	2.1	(2.4)
Native	25.6	(0.8)	12.6	(0.6)	27.8	(0.7)	25.3	(1.1)	12.5	(0.9)	27.2	(0.8)	0.2	(1.3)	0.1	(1.0)	0.7	(1.0)
Immigrant & Eng./Irish	28.8	(2.3)	15.6	(1.7)	32.3	(2.4)	28.0	(3.1)	14.1	(3.0)	34.3	(3.0)	0.8	(3.8)	1.5	(3.4)	-2.0	(3.8)
Immigrant & other lang.	28.8	(2.3)	13.2	(1.7)	32.1	(2.5)	31.1	(3.4)	9.8	(2.7)	22.9	(3.7)	-2.3	(4.1)	3.4	(3.2)	9.3*	(4.4)
Girls' secondary	28.8	(1.9)	12.5	(1.1)	33.6	(1.7)	29.9	(2.1)	13.6	(1.6)	33.2	(2.6)	-1.2	(2.9)	-1.0	(2.0)	0.4	(3.1)
Boys' secondary	27.4	(1.0)	15.0	(1.2)	25.2	(1.8)	22.3	(2.6)	14.5	(2.2)	29.1	(1.0)	5.1	(2.8)	0.6	(2.5)	-3.9	(2.0)
Community/ comprehensive	27.0	(1.4)	12.7	(1.1)	28.3	(1.5)	25.7	(2.3)	9.5	(1.7)	24.3	(1.1)	1.3	(2.7)	3.2	(2.0)	4.0	(1.8)
Mixed secondary	26.2	(1.1)	13.0	(1.3)	30.9	(1.6)	25.7	(3.6)	11.7	(1.9)	23.0	(1.9)	0.5	(3.7)	1.3	(2.3)	7.9	(2.5)
ETB vocational	23.1	(1.7)	12.5	(1.0)	25.8	(1.3)	25.9	(1.9)	12.9	(1.5)	26.5	(1.4)	-2.8	(2.5)	-0.4	(1.8)	-0.6	(1.9)
Non-DEIS	27.7	(0.8)	12.4	(0.6)	29.7	(0.8)	26.9	(1.2)	12.3	(0.7)	27.9	(0.8)	0.8	(1.4)	0.1	(0.9)	1.8	(1.2)
DEIS	21.4	(1.5)	15.0	(1.0)	25.6	(1.2)	23.6	(2.5)	12.9	(1.8)	25.0	(2.5)	-2.2	(2.9)	2.0	(2.1)	0.5	(2.8)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

^Details on next page

Condt. Table L28: Percentages of students reporting the usefulness of specified strategies for summarising text by background variables, Spring and Autumn testing

<i>Students who reported strategies as 'very useful'...</i>	Spring				Autumn				Spring - Autumn			
	D		E		D		E		D		E	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	58.7	(0.8)	57.2	(0.7)	59.0	(1.6)	58.1	(1.5)	-0.3	(1.8)	-0.9	(1.7)
Male	50.7	(1.1)	47.4	(0.9)	52.3	(1.9)	48.1	(1.8)	-1.6	(2.2)	-0.7	(2.0)
Female	66.6	(1.0)	66.9	(1.1)	65.5	(2.2)	67.9	(2.0)	1.1	(2.4)	-1.0	(2.3)
First / Second Year	58.8	(4.8)	52.5	(4.8)	48.6	(16.5)	60.5	(15.4)	10.2	(17.2)	-8.0	(16.1)
Third Year	60.3	(0.9)	58.5	(0.9)	57.7	(2.3)	59.9	(2.5)	2.6	(2.5)	-1.4	(2.7)
Transition Year	57.0	(1.4)	56.6	(1.3)	61.8	(2.0)	59.3	(2.0)	-4.8	(2.4)	-2.7	(2.4)
Fifth/Sixth Year	52.8	(2.9)	51.3	(2.7)	53.6	(3.6)	52.7	(2.5)	-0.8	(4.7)	-1.4	(3.7)
Lowest ESCS	49.3	(1.5)	48.2	(1.4)	53.7	(3.1)	52.0	(2.4)	-4.5	(3.4)	-3.9	(2.8)
Low-Medium ESCS	56.9	(1.2)	56.8	(1.2)	55.3	(2.8)	57.7	(2.8)	1.6	(3.1)	-1.0	(3.1)
Medium-High ESCS	61.2	(1.1)	60.0	(1.3)	62.0	(2.7)	62.6	(3.2)	-0.8	(3.0)	-2.6	(3.5)
Highest ESCS	67.3	(1.5)	63.6	(1.6)	65.0	(2.3)	60.9	(1.9)	2.4	(2.7)	2.7	(2.5)
Native	57.6	(0.9)	57.2	(0.8)	57.6	(1.7)	57.1	(1.6)	0.0	(1.9)	0.0	(1.8)
Immigrant & Eng./Irish	66.9	(2.5)	58.4	(2.4)	67.5	(3.5)	65.4	(4.3)	-0.6	(4.3)	-7.0	(4.9)
Immigrant & other lang.	62.6	(2.7)	57.7	(2.5)	62.3	(2.9)	60.9	(3.3)	0.3	(4.0)	-3.2	(4.1)
Girls' secondary	69.7	(1.6)	70.3	(1.8)	70.6	(4.0)	70.7	(3.1)	-1.0	(4.3)	-0.5	(3.6)
Boys' secondary	55.5	(1.6)	50.1	(1.5)	55.5	(4.1)	49.1	(2.9)	0.0	(4.3)	1.0	(3.3)
Comm/ comp	56.8	(1.9)	56.2	(1.5)	55.7	(3.0)	57.5	(3.3)	1.1	(3.5)	-1.3	(3.7)
Mixed secondary	61.9	(1.8)	57.4	(1.5)	55.5	(4.6)	58.5	(4.7)	6.4	(4.9)	-1.2	(5.0)
ETB vocational	51.5	(1.6)	51.8	(1.3)	57.1	(2.4)	54.3	(2.4)	-5.6	(2.9)	-2.5	(2.7)
Non-DEIS	61.9	(0.9)	60.5	(0.8)	61.0	(1.8)	59.5	(1.6)	0.9	(2.0)	0.9	(1.8)
DEIS	48.3	(1.8)	46.8	(1.3)	52.9	(3.2)	53.9	(3.0)	-4.5	(3.7)	-7.1*	(3.3)

Note. Bold indicates statistical significant difference at the .01 level; *indicates statistical significant difference at the .05 level.

^A. I write a summary. Then I check that each paragraph is covered in the summary, because the content of each paragraph should be included.

B. I try to copy out accurately as many sentences as possible.

C. Before writing the summary, I read the text as many times as possible.

D. I carefully check whether the most important facts in the text are represented in the summary.

E. I read through the text, underlining the most important sentences. Then I write them in my own words as a summary.

'Very useful' is defined here as 5/6 on the 6-point Likert-type scale, where 1 is not useful at all.

Table L29: Percentages of students reporting the appropriateness of selected strategies for assessing credibility of emails, by background variables, Spring and Autumn testing

<i>Students who reported strategies as 'very appropriate'...</i>	Spring						Autumn						Spring - Autumn					
	Answer the email and ask for more information about the smartphone		Check the sender's email address		Click on the link to fill out the form as soon as possible		Answer the email and ask for more information about the smartphone		Check the sender's email address		Click on the link to fill out the form as soon as possible		Answer the email and ask for more information about the smartphone		Check the sender's email address		Click on the link to fill out the form as soon as possible	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	21.7	(0.6)	58.1	(0.8)	10.5	(0.4)	23.0	(1.0)	58.2	(1.3)	11.8	(0.7)	-1.2	(1.2)	-0.1	(1.5)	-1.3	(0.8)
Male	21.0	(0.9)	53.2	(1.2)	10.0	(0.6)	21.8	(1.2)	51.4	(1.9)	10.0	(0.9)	-0.7	(1.5)	1.8	(2.3)	0.0	(1.0)
Female	22.4	(0.9)	62.9	(0.9)	11.1	(0.5)	24.1	(1.4)	64.8	(1.6)	13.6	(1.1)	-1.7	(1.7)	-1.8	(1.8)	-2.5*	(1.2)
First / Second Year	31.0	(4.0)	43.4	(4.2)	17.2	(3.7)	8.5	(8.8)	39.4	(14.3)	18.3	(13.1)	22.6*	(9.7)	4.0	(14.9)	-1.1	(13.6)
Third Year	21.8	(0.8)	59.1	(0.9)	10.6	(0.5)	21.1	(2.4)	53.3	(1.9)	10.9	(1.9)	0.7	(2.5)	5.7	(2.2)	-0.3	(2.0)
Transition Year	20.5	(1.2)	58.5	(1.3)	9.3	(0.8)	23.0	(1.2)	62.6	(2.1)	12.8	(0.9)	-2.6	(1.7)	-4.2	(2.5)	-3.5	(1.2)
Fifth/Sixth Year	22.7	(2.0)	53.1	(2.6)	13.3	(1.6)	25.5	(2.8)	53.3	(3.1)	10.4	(1.2)	-2.8	(3.5)	-0.2	(4.1)	3.0	(2.0)
Lowest ESCS	20.8	(1.1)	49.1	(1.5)	10.4	(0.9)	25.2	(2.1)	48.5	(3.2)	14.8	(1.7)	-4.4	(2.4)	0.6	(3.6)	-4.4*	(1.9)
Low-Medium ESCS	22.5	(1.1)	55.3	(1.5)	11.6	(0.8)	20.6	(2.0)	52.3	(2.0)	10.0	(1.3)	2.0	(2.3)	3.0	(2.5)	1.7	(1.5)
Medium-High ESCS	21.9	(1.1)	61.0	(1.3)	10.3	(0.9)	23.1	(2.4)	65.6	(2.4)	11.5	(1.7)	-1.2	(2.7)	-4.6	(2.8)	-1.2	(1.9)
Highest ESCS	21.2	(1.2)	66.9	(1.5)	9.5	(0.8)	22.8	(2.2)	66.7	(2.0)	11.2	(1.2)	-1.7	(2.5)	0.3	(2.4)	-1.8	(1.4)
Native	20.5	(0.7)	58.0	(1.0)	9.6	(0.4)	22.0	(1.0)	58.6	(1.3)	12.0	(0.9)	-1.5	(1.2)	-0.7	(1.6)	-2.4*	(1.0)
Immigrant & Eng./Irish	26.6	(1.9)	60.9	(2.2)	14.8	(1.7)	25.6	(4.1)	60.4	(4.3)	13.6	(2.2)	1.0	(4.6)	0.4	(4.8)	1.2	(2.8)
Immigrant & other lang.	25.9	(2.0)	56.8	(2.4)	12.2	(1.7)	29.5	(5.5)	54.2	(5.2)	10.4	(2.3)	-3.6	(5.8)	2.7	(5.7)	1.8	(2.8)
Girls' secondary	22.5	(1.4)	65.0	(1.2)	10.5	(0.5)	24.5	(1.6)	72.1	(2.1)	15.9	(1.7)	-2.0	(2.2)	-7.1	(2.4)	-5.5	(1.8)
Boys' secondary	23.5	(1.8)	55.8	(1.8)	9.1	(0.7)	21.1	(0.7)	56.0	(2.2)	9.2	(1.5)	2.4	(1.9)	-0.1	(2.8)	-0.1	(1.6)
Comm./comp.	21.8	(1.6)	54.7	(2.5)	11.2	(0.7)	20.4	(3.5)	58.3	(2.5)	9.7	(1.2)	1.4	(3.9)	-3.6	(3.5)	1.6	(1.4)
Mixed secondary	22.2	(1.2)	62.1	(1.7)	9.5	(1.2)	25.8	(1.8)	54.5	(3.4)	12.8	(2.0)	-3.6	(2.2)	7.6	(3.8)	-3.2	(2.3)
ETB vocational	19.8	(1.1)	53.7	(1.6)	11.6	(0.9)	22.6	(2.5)	51.8	(2.6)	11.0	(1.2)	-2.8	(2.7)	1.9	(3.0)	0.6	(1.5)
Non-DEIS	21.8	(0.8)	60.9	(0.9)	10.2	(0.4)	22.1	(0.9)	61.1	(1.4)	11.8	(0.8)	-0.3	(1.2)	-0.3	(1.7)	-1.7	(0.9)
DEIS	21.4	(1.0)	49.0	(1.8)	11.8	(0.9)	25.4	(2.8)	49.2	(3.0)	11.7	(1.6)	-4.1	(3.0)	-0.1	(3.5)	0.1	(1.9)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

'Very appropriate ' is defined here as 5/6 on the 6-point Likert-type scale, where 1 is not appropriate at all.

Condt. Table L29: Percentages of students reporting the appropriateness of selected strategies for assessing credibility of emails, by background variables, Spring and Autumn testing

<i>Students who reported strategies as 'very appropriate'...</i>	Spring				Autumn				Spring - Autumn			
	Delete the email without clicking on the link		Check the website of the mobile phone operator to see whether		Delete the email without clicking on the link		Check the website of the mobile phone operator to see whether		Delete the email without clicking on the link		Check the website of the mobile phone operator to see whether	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	33.7	(0.8)	56.1	(0.8)	30.4	(1.3)	54.9	(1.1)	3.3*	(1.5)	1.2	(1.3)
Male	31.4	(1.0)	52.9	(1.1)	27.7	(1.6)	50.4	(1.7)	3.7	(1.9)	2.5	(2.0)
Female	35.8	(0.9)	59.2	(1.1)	33.0	(1.4)	59.2	(1.2)	2.8	(1.7)	0.1	(1.7)
First / Second Year	34.1	(4.7)	44.6	(5.3)	17.7	(12.4)	5.6	(5.5)	16.5	(13.2)	39.0	(7.7)
Third Year	33.2	(0.9)	57.4	(1.0)	29.8	(2.4)	48.4	(1.9)	3.4	(2.6)	9.0	(2.2)
Transition Year	36.3	(1.4)	55.2	(1.3)	33.1	(1.6)	58.9	(1.7)	3.1	(2.1)	-3.7	(2.2)
Fifth/Sixth Year	27.9	(2.6)	52.1	(2.6)	24.2	(1.6)	54.0	(2.7)	3.7	(3.0)	-1.9	(3.7)
Lowest ESCS	29.9	(1.3)	47.3	(1.7)	22.4	(2.1)	48.2	(2.8)	7.4	(2.4)	-0.9	(3.3)
Low-Medium ESCS	31.7	(1.2)	53.8	(1.3)	30.1	(2.5)	50.2	(1.6)	1.6	(2.8)	3.6	(2.1)
Medium-High ESCS	34.1	(1.5)	58.6	(1.5)	34.3	(2.8)	60.3	(2.9)	-0.2	(3.2)	-1.7	(3.2)
Highest ESCS	39.1	(1.4)	64.6	(1.6)	35.0	(2.5)	61.1	(2.3)	4.2	(2.8)	3.5	(2.8)
Native	35.1	(0.8)	56.4	(1.0)	32.6	(1.6)	55.9	(1.2)	2.5	(1.8)	0.5	(1.5)
Immigrant & Eng./Irish	29.1	(2.2)	58.1	(2.5)	17.5	(3.0)	54.5	(5.3)	11.5	(3.8)	3.6	(5.9)
Immigrant & other lang.	26.3	(2.5)	52.1	(2.2)	25.4	(2.3)	46.8	(3.2)	0.9	(3.4)	5.2	(3.9)
Girls' secondary	40.0	(1.3)	62.6	(1.9)	36.2	(2.6)	62.6	(2.0)	3.7	(2.9)	0.0	(2.8)
Boys' secondary	32.4	(2.0)	55.4	(1.5)	31.5	(2.3)	52.8	(2.1)	0.9	(3.0)	2.6	(2.6)
Comm./comp.	30.5	(2.0)	51.3	(1.9)	27.3	(4.5)	53.8	(2.8)	3.2	(4.9)	-2.5	(3.3)
Mixed secondary	35.9	(2.3)	62.1	(2.0)	29.5	(1.3)	54.0	(3.5)	6.4*	(2.7)	8.2*	(4.0)
ETB vocational	30.1	(1.3)	50.9	(1.6)	28.1	(2.9)	51.7	(1.8)	2.0	(3.1)	-0.8	(2.4)
Non-DEIS	35.6	(0.9)	58.9	(1.0)	31.8	(1.6)	57.1	(1.3)	3.8*	(1.8)	1.7	(1.7)
DEIS	27.3	(1.1)	47.2	(1.6)	26.1	(2.5)	48.0	(2.9)	1.2	(2.7)	-0.8	(3.3)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

'Very appropriate' is defined here as 5/6 on the 6-point Likert-type scale, where 1 is not appropriate at all.

Table L30: Percentages of students strongly agreeing/agreeing on statements on general self-efficacy (resilience) by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing...</i>	Spring						Autumn						Spring - Autumn					
	I usually manage one way or another		I feel proud that I have accomplished things		I feel that I can handle many things at a time		I usually manage one way or another		I feel proud that I have accomplished things		I feel that I can handle many things at a time		I usually manage one way or another		I feel proud that I have accomplished things		I feel that I can handle many things at a time	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	93.7	(0.3)	90.1	(0.5)	72.2	(0.6)	92.3	(0.6)	90.0	(0.6)	71.2	(1.0)	1.4*	(0.7)	0.1	(0.8)	1.0	(1.2)
Male	93.7	(0.4)	90.3	(0.5)	74.3	(0.9)	91.9	(1.0)	90.2	(1.1)	74.8	(1.5)	1.8	(1.1)	0.1	(1.2)	-0.5	(1.8)
Female	93.7	(0.4)	89.9	(0.7)	70.2	(0.8)	92.7	(0.8)	89.7	(0.8)	67.7	(1.1)	1.0	(0.9)	0.2	(1.0)	2.5	(1.3)
First / Second Year	93.5	(2.2)	92.1	(2.4)	76.7	(3.3)	100.0	(0.0)	90.2	(9.8)	54.5	(15.9)	-6.5	(2.2)	1.9	(10.1)	22.2	(16.3)
Third Year	93.5	(0.4)	89.9	(0.6)	70.7	(0.6)	91.5	(1.2)	90.2	(1.4)	71.6	(2.5)	2.0	(1.3)	-0.3	(1.5)	-0.9	(2.6)
Transition Year	94.2	(0.6)	90.1	(0.8)	75.8	(1.2)	93.0	(0.8)	90.4	(1.0)	70.7	(1.4)	1.2	(1.0)	-0.4	(1.3)	5.1	(1.8)
Fifth/Sixth Year	93.4	(1.1)	91.1	(1.5)	70.1	(2.4)	91.4	(2.0)	88.6	(1.7)	72.5	(2.4)	2.0	(2.3)	2.6	(2.2)	-2.4	(3.4)
Lowest ESCS	93.1	(0.6)	88.7	(0.9)	68.2	(1.2)	91.0	(1.4)	89.1	(1.1)	69.2	(2.2)	2.1	(1.5)	-0.4	(1.4)	-1.0	(2.5)
Low-Medium ESCS	93.4	(0.7)	90.6	(0.8)	70.0	(1.2)	92.2	(1.1)	89.9	(1.5)	63.6	(2.2)	1.2	(1.3)	0.7	(1.7)	6.4*	(2.5)
Medium-High ESCS	93.9	(0.6)	90.5	(0.8)	74.1	(1.1)	93.6	(1.0)	90.2	(1.4)	74.0	(1.9)	0.3	(1.2)	0.2	(1.6)	0.1	(2.2)
Highest ESCS	94.3	(0.6)	90.5	(0.8)	76.6	(1.1)	92.2	(1.5)	91.2	(1.3)	77.7	(2.1)	2.1	(1.6)	-0.6	(1.5)	-1.1	(2.3)
Native	93.8	(0.3)	89.7	(0.5)	71.7	(0.7)	92.2	(0.6)	90.6	(0.7)	71.0	(1.3)	1.6*	(0.7)	-0.9	(0.9)	0.8	(1.5)
Immigrant & Eng./Irish	92.9	(1.0)	92.6	(1.4)	72.0	(2.3)	94.9	(2.0)	92.2	(2.1)	75.7	(2.9)	-2.0	(2.3)	0.3	(2.5)	-3.8	(3.7)
Immigrant & other lang.	94.1	(1.4)	92.1	(1.4)	77.9	(1.9)	93.2	(1.5)	84.0	(2.3)	72.0	(3.1)	0.9	(2.1)	8.1	(2.7)	5.9	(3.6)
Girls' secondary	93.6	(0.6)	89.4	(1.2)	70.9	(1.1)	95.2	(1.3)	91.2	(1.3)	63.9	(1.5)	-1.6	(1.4)	-1.7	(1.7)	7.1	(1.9)
Boys' secondary	93.3	(0.9)	90.1	(0.7)	73.1	(1.8)	90.9	(1.3)	88.4	(2.0)	78.8	(2.0)	2.3	(1.6)	1.7	(2.2)	-5.7*	(2.7)
Comm./comp.	94.0	(0.5)	90.5	(1.0)	72.7	(1.6)	91.4	(1.6)	88.6	(1.5)	74.0	(2.8)	2.6	(1.6)	1.8	(1.8)	-1.3	(3.2)
Mixed secondary	94.4	(0.9)	90.4	(0.8)	72.9	(0.9)	90.9	(1.6)	91.8	(1.0)	71.6	(2.3)	3.5	(1.8)	-1.4	(1.3)	1.3	(2.4)
ETB vocational	93.4	(0.5)	90.1	(1.0)	72.1	(1.2)	92.5	(1.0)	89.6	(1.0)	70.2	(2.9)	0.9	(1.1)	0.5	(1.4)	1.9	(3.2)
Non-DEIS	93.7	(0.3)	90.1	(0.5)	72.5	(0.7)	92.8	(0.7)	90.6	(0.7)	71.4	(1.2)	0.9	(0.8)	-0.5	(0.9)	1.1	(1.4)
DEIS	93.7	(0.6)	90.0	(0.9)	71.5	(1.4)	90.7	(1.3)	88.1	(1.0)	70.8	(2.4)	3.0*	(1.5)	1.9	(1.4)	0.7	(2.7)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Condt. Table L30: Percentages of students *strongly agreeing/agreeing* on statements on general self-efficacy (resilience) by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing...</i>	Spring				Autumn				Spring - Autumn			
	My belief in myself gets me through hard times		When I'm in a difficult situation, I can usually find my way out of it		My belief in myself gets me through hard times		When I'm in a difficult situation, I can usually find my way out of it		My belief in myself gets me through hard times		When I'm in a difficult situation, I can usually find my way out of it	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	66.1	(0.7)	85.5	(0.4)	65.9	(1.4)	85.0	(0.7)	0.2	(1.6)	0.5	(0.9)
Male	73.2	(1.0)	89.7	(0.6)	71.9	(1.4)	89.4	(1.2)	1.3	(1.7)	0.3	(1.3)
Female	59.2	(1.0)	81.3	(0.6)	60.1	(2.5)	80.8	(1.2)	-0.9	(2.7)	0.6	(1.4)
First / Second Year	75.5	(3.9)	84.6	(3.6)	60.2	(17.1)	60.4	(14.6)	15.3	(17.5)	24.1	(15.0)
Third Year	65.6	(0.9)	85.1	(0.6)	67.8	(2.4)	82.5	(1.7)	-2.3	(2.6)	2.6	(1.8)
Transition Year	65.7	(1.2)	86.2	(1.0)	64.3	(2.0)	85.2	(1.1)	1.4	(2.3)	1.0	(1.4)
Fifth/Sixth Year	69.8	(2.3)	85.9	(1.8)	67.9	(3.1)	88.2	(1.6)	1.9	(3.9)	-2.2	(2.4)
Lowest ESCS	66.6	(1.4)	82.2	(1.0)	65.0	(2.5)	83.9	(1.9)	1.6	(2.9)	-1.8	(2.1)
Low-Medium ESCS	65.7	(1.4)	86.1	(1.0)	60.8	(2.3)	81.1	(1.6)	4.9	(2.7)	5.0	(1.9)
Medium-High ESCS	67.3	(1.5)	86.4	(0.8)	69.3	(1.8)	88.2	(1.5)	-2.0	(2.3)	-1.8	(1.7)
Highest ESCS	64.9	(1.2)	87.1	(0.9)	68.7	(2.1)	86.5	(2.1)	-3.8	(2.4)	0.6	(2.3)
Native	64.6	(0.7)	85.5	(0.5)	65.5	(1.4)	85.7	(0.8)	-0.8	(1.6)	-0.2	(0.9)
Immigrant & Eng./Irish	72.4	(2.1)	85.0	(1.5)	69.9	(3.5)	81.6	(3.0)	2.6	(4.1)	3.4	(3.4)
Immigrant & other lang.	71.9	(2.2)	86.4	(1.6)	67.3	(3.6)	82.8	(2.3)	4.6	(4.3)	3.6	(2.8)
Girls' secondary	59.8	(1.3)	80.0	(1.0)	61.7	(5.0)	82.1	(1.6)	-1.9	(5.1)	-2.1	(1.9)
Boys' secondary	72.1	(2.0)	88.2	(1.2)	71.7	(1.5)	88.9	(2.6)	0.4	(2.5)	-0.7	(2.9)
Community/ comprehensive	69.8	(1.9)	85.0	(0.9)	63.9	(3.2)	85.6	(2.1)	6.0	(3.7)	-0.7	(2.3)
Mixed secondary	63.9	(1.0)	88.4	(1.0)	69.2	(2.1)	84.8	(2.1)	-5.3*	(2.3)	3.7	(2.3)
ETB vocational	66.9	(1.2)	86.6	(0.7)	64.8	(2.9)	84.6	(1.3)	2.2	(3.1)	2.0	(1.5)
Non-DEIS	64.9	(0.8)	85.2	(0.5)	66.3	(1.8)	86.1	(0.9)	-1.4	(1.9)	-0.8	(1.1)
DEIS	70.1	(1.3)	86.2	(0.8)	65.0	(2.9)	81.8	(2.0)	5.2	(3.2)	4.4*	(2.2)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L31: Percentage of students *strongly agreeing/agreeing* on statements on perceived competence in reading, by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing...</i>	Spring						Autumn						Spring - Autumn					
	I am a good reader		I am able to understand difficult texts		I read fluently		I am a good reader		I am able to understand difficult texts		I read fluently		I am a good reader		I am able to understand difficult texts		I read fluently	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	79.6	(0.5)	72.7	(0.6)	74.1	(0.6)	78.0	(1.5)	70.3	(1.4)	73.3	(1.6)	1.6	(1.6)	2.4	(1.5)	0.7	(1.7)
Male	77.7	(0.7)	75.4	(0.8)	74.4	(0.8)	77.5	(1.9)	73.2	(1.7)	75.4	(1.5)	0.2	(2.0)	2.1	(1.9)	-0.9	(1.7)
Female	81.5	(0.8)	70.0	(0.9)	73.7	(0.8)	78.4	(1.9)	67.3	(2.1)	71.3	(2.3)	3.1	(2.1)	2.7	(2.2)	2.4	(2.5)
First / Second Year	74.1	(4.4)	63.1	(4.8)	62.6	(4.2)	56.6	(12.3)	45.6	(17.8)	61.3	(12.6)	17.5	(13.1)	17.5	(18.4)	1.2	(13.3)
Third Year	79.8	(0.6)	73.0	(0.8)	74.2	(0.8)	76.8	(2.2)	68.2	(2.4)	70.7	(2.4)	3.0	(2.3)	4.8	(2.5)	3.5	(2.5)
Transition Year	79.7	(1.1)	73.1	(1.2)	75.8	(1.0)	79.2	(2.0)	72.2	(1.6)	73.9	(2.1)	0.5	(2.2)	0.9	(2.0)	1.9	(2.3)
Fifth/Sixth Year	78.8	(2.0)	70.9	(1.9)	70.4	(2.7)	76.9	(2.6)	68.7	(3.1)	75.6	(2.3)	1.9	(3.3)	2.2	(3.7)	-5.2	(3.6)
Lowest ESCS	73.4	(1.3)	65.3	(1.3)	64.0	(1.2)	69.9	(2.9)	59.6	(3.2)	63.1	(2.9)	3.5	(3.2)	5.8	(3.5)	0.9	(3.2)
Low-Medium ESCS	78.5	(1.0)	70.8	(1.3)	71.2	(1.0)	78.3	(2.3)	66.8	(2.5)	68.8	(2.9)	0.2	(2.5)	4.0	(2.8)	2.4	(3.1)
Medium-High ESCS	80.9	(1.1)	73.3	(1.3)	77.0	(1.1)	80.8	(1.7)	75.6	(1.5)	78.7	(2.2)	0.1	(2.1)	-2.3	(2.0)	-1.7	(2.4)
Highest ESCS	85.5	(1.0)	81.3	(1.1)	84.6	(1.1)	82.5	(2.0)	78.5	(1.9)	82.7	(1.4)	3.0	(2.2)	2.8	(2.2)	1.9	(1.8)
Native	79.0	(0.6)	72.6	(0.7)	73.5	(0.6)	77.0	(1.6)	70.2	(1.4)	72.2	(1.7)	2.0	(1.7)	2.4	(1.6)	1.3	(1.8)
Immigrant & Eng./Irish	86.3	(1.6)	79.8	(2.0)	80.2	(2.1)	82.2	(4.1)	72.4	(3.2)	81.9	(4.3)	4.1	(4.4)	7.4	(3.8)	-1.7	(4.8)
Immigrant & other lang.	81.1	(1.7)	68.2	(2.5)	75.6	(1.8)	80.8	(3.1)	69.5	(3.8)	74.7	(3.5)	0.3	(3.5)	-1.4	(4.5)	1.0	(4.0)
Girls' secondary	81.7	(1.2)	70.9	(1.4)	76.4	(0.9)	77.4	(4.2)	67.9	(4.8)	72.4	(4.4)	4.3	(4.4)	3.0	(5.0)	3.9	(4.5)
Boys' secondary	78.9	(1.7)	76.7	(1.5)	76.3	(1.6)	77.6	(3.8)	70.9	(3.2)	78.3	(2.4)	1.3	(4.1)	5.9	(3.5)	-2.1	(2.8)
Community/ comprehensive	79.0	(1.5)	71.0	(1.6)	70.4	(1.3)	82.2	(2.7)	74.7	(1.5)	77.9	(3.6)	-3.2	(3.1)	-3.8	(2.2)	-7.6	(3.9)
Mixed secondary	80.5	(1.3)	74.4	(1.6)	79.2	(1.4)	76.5	(4.5)	69.1	(2.9)	69.5	(3.9)	4.0	(4.7)	5.3	(3.3)	9.7*	(4.1)
ETB vocational	78.2	(0.8)	71.8	(1.2)	70.4	(1.2)	76.9	(2.0)	69.5	(2.3)	70.8	(2.8)	1.3	(2.2)	2.3	(2.6)	-0.4	(3.1)
Non-DEIS	80.5	(0.7)	73.3	(0.8)	76.2	(0.6)	79.4	(1.6)	70.5	(1.6)	75.7	(1.6)	1.1	(1.7)	2.8	(1.8)	0.5	(1.8)
DEIS	76.7	(0.8)	70.8	(1.3)	67.1	(1.2)	73.6	(3.1)	69.6	(2.8)	66.2	(3.5)	3.1	(3.2)	1.2	(3.0)	0.9	(3.7)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L32: Mean scores on the index of ‘perceived difficulty in reading’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	(SE Diff)
All students	0.00	(0.01)	0.04	(0.03)	-0.03	(0.04)
Male	-0.07	(0.02)	-0.03	(0.04)	-0.04	(0.05)
Female	0.07	(0.02)	0.10	(0.05)	-0.02	(0.05)
First / Second Year	0.35	(0.10)	0.58	(0.13)	-0.23	(0.16)
Third Year	-0.03	(0.02)	0.01	(0.05)	-0.04	(0.06)
Transition Year	0.03	(0.03)	0.03	(0.04)	-0.01	(0.05)
Fifth/Sixth Year	0.11	(0.05)	0.06	(0.06)	0.05	(0.08)
Lowest ESCS	0.16	(0.03)	0.29	(0.07)	-0.13	(0.08)
Low-Medium ESCS	0.05	(0.02)	0.08	(0.05)	-0.04	(0.06)
Medium-High ESCS	-0.01	(0.03)	-0.14	(0.04)	0.13*	(0.05)
Highest ESCS	-0.18	(0.02)	-0.08	(0.06)	-0.10	(0.06)
Native	0.00	(0.02)	0.06	(0.04)	-0.05	(0.04)
Immigrant & Eng./Irish	-0.11	(0.04)	-0.06	(0.09)	-0.05	(0.10)
Immigrant & other lang.	0.06	(0.04)	0.01	(0.07)	0.05	(0.09)
Girls’ secondary	0.05	(0.02)	0.13	(0.11)	-0.07	(0.11)
Boys’ secondary	-0.10	(0.03)	-0.06	(0.08)	-0.04	(0.08)
Community/ comprehensive	0.02	(0.03)	-0.02	(0.03)	0.04	(0.04)
Mixed secondary	-0.05	(0.03)	0.10	(0.11)	-0.14	(0.11)
ETB vocational	0.04	(0.03)	0.02	(0.05)	0.02	(0.06)
Non-DEIS	-0.02	(0.01)	0.01	(0.04)	-0.03	(0.04)
DEIS	0.09	(0.04)	0.11	(0.07)	-0.02	(0.08)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L33: Percentage of students *strongly agreeing/agreeing* on statements of perceived difficulty in reading, by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing...</i>	Spring						Autumn						Spring - Autumn					
	I have always had difficulty with reading		I have to read a text several times before completely understanding it		I find it difficult to answer questions about a text		I have always had difficulty with reading		I have to read a text several times before completely understanding it		I find it difficult to answer questions about a text		I have always had difficulty with reading		I have to read a text several times before completely understanding it		I find it difficult to answer questions about a text	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	18.4	(0.5)	41.1	(0.7)	25.0	(0.7)	20.0	(1.4)	40.8	(1.4)	25.6	(1.5)	-1.7	(1.5)	0.3	(1.6)	-0.6	(1.6)
Male	18.0	(0.8)	37.1	(0.8)	23.4	(0.9)	19.4	(2.1)	37.1	(2.2)	24.8	(1.9)	-1.4	(2.3)	0.0	(2.4)	-1.4	(2.1)
Female	18.7	(0.7)	45.0	(1.1)	26.6	(0.9)	20.6	(1.4)	44.5	(1.8)	26.4	(2.1)	-2.0	(1.6)	0.6	(2.1)	0.2	(2.3)
First / Second Year	27.5	(3.9)	49.9	(5.7)	36.3	(4.8)	49.1	(14.9)	50.6	(15.2)	39.9	(12.4)	-21.6	(15.4)	-0.7	(16.3)	-3.6	(13.3)
Third Year	17.9	(0.7)	40.4	(0.9)	24.0	(0.9)	20.3	(1.9)	38.6	(2.4)	24.3	(2.0)	-2.4	(2.0)	1.8	(2.6)	-0.3	(2.2)
Transition Year	18.0	(1.0)	41.7	(1.2)	25.0	(1.3)	19.5	(1.9)	40.1	(1.6)	25.4	(2.0)	-1.5	(2.1)	1.6	(2.0)	-0.4	(2.4)
Fifth/Sixth Year	20.6	(1.9)	42.0	(2.7)	30.1	(2.3)	20.2	(2.7)	45.2	(2.9)	27.5	(2.5)	0.4	(3.3)	-3.2	(4.0)	2.6	(3.4)
Lowest ESCS	23.9	(1.2)	45.7	(1.5)	30.9	(1.3)	27.5	(2.9)	47.1	(2.7)	34.0	(2.9)	-3.6	(3.1)	-1.3	(3.1)	-3.2	(3.2)
Low-Medium ESCS	19.4	(1.1)	43.6	(1.3)	25.0	(1.0)	20.1	(2.1)	43.9	(2.5)	27.5	(2.7)	-0.7	(2.4)	-0.3	(2.8)	-2.6	(2.9)
Medium-High ESCS	16.8	(1.0)	40.5	(1.5)	23.9	(1.2)	15.2	(1.7)	35.0	(2.2)	21.1	(2.2)	1.6	(2.0)	5.5*	(2.6)	2.8	(2.5)
Highest ESCS	13.2	(0.7)	34.2	(1.3)	20.2	(1.0)	17.5	(2.1)	37.5	(2.3)	20.4	(1.8)	-4.3	(2.2)	-3.3	(2.6)	-0.1	(2.1)
Native	19.1	(0.7)	40.9	(0.8)	25.3	(0.8)	20.7	(1.7)	41.3	(1.6)	26.2	(1.7)	-1.6	(1.8)	-0.4	(1.8)	-0.9	(1.8)
Immigrant & Eng./Irish	11.9	(1.6)	37.9	(1.9)	20.7	(1.8)	15.3	(2.7)	40.5	(4.4)	24.8	(3.2)	-3.4	(3.1)	-2.7	(4.8)	-4.1	(3.7)
Immigrant & other lang.	15.7	(1.7)	44.5	(2.9)	24.6	(2.0)	19.7	(2.4)	39.6	(3.3)	23.0	(2.7)	-4.0	(2.9)	4.9	(4.4)	1.6	(3.3)
Girls' secondary	17.2	(0.9)	43.3	(1.6)	26.2	(1.2)	19.5	(3.0)	46.2	(3.7)	26.5	(4.7)	-2.3	(3.1)	-2.9	(4.0)	-0.3	(4.8)
Boys' secondary	18.7	(1.6)	36.6	(1.0)	21.7	(1.2)	17.5	(2.8)	37.8	(4.3)	22.2	(3.5)	1.1	(3.2)	-1.2	(4.4)	-0.5	(3.7)
Comm/comp	19.4	(1.6)	41.1	(1.3)	25.0	(1.9)	17.5	(2.2)	35.2	(3.0)	24.2	(1.9)	2.0	(2.7)	5.9	(3.3)	0.8	(2.7)
Mixed secondary	16.4	(1.2)	40.1	(1.4)	24.2	(1.2)	22.8	(4.7)	42.4	(2.7)	30.5	(4.4)	-6.4	(4.9)	-2.2	(3.1)	-6.3	(4.6)
ETB vocational	19.6	(1.0)	42.3	(1.7)	26.4	(1.5)	21.6	(2.3)	41.2	(2.2)	24.5	(1.4)	-2.0	(2.5)	1.2	(2.8)	1.9	(2.1)
Non-DEIS	16.9	(0.6)	40.0	(0.7)	24.4	(0.7)	18.0	(1.2)	39.4	(1.6)	24.0	(1.6)	-1.1	(1.3)	0.6	(1.8)	0.4	(1.7)
DEIS	22.9	(1.3)	44.5	(1.8)	26.9	(1.6)	26.1	(3.3)	44.9	(2.0)	30.3	(3.0)	-3.1	(3.6)	-0.4	(2.7)	-3.5	(3.4)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L34: Percentages of students *strongly agreeing/agreeing* on statements on enjoyment of reading by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing...</i>	Spring						Autumn						Spring - Autumn					
	I read only if I have to.		Reading is one of my favourite hobbies.		I like talking about books with other people.		I read only if I have to.		Reading is one of my favourite hobbies.		I like talking about books with other people.		I read only if I have to.		Reading is one of my favourite hobbies.		I like talking about books with other people.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)
All students	51.5	(0.9)	30.8	(0.6)	33.5	(0.7)	54.8	(1.5)	29.4	(1.3)	31.6	(1.5)	-3.3	(1.8)	1.4	(1.5)	1.8	(1.6)
Male	59.0	(1.2)	22.1	(0.8)	23.0	(0.8)	61.2	(1.8)	22.9	(1.8)	23.8	(2.3)	-2.2	(2.2)	-0.8	(2.0)	-0.9	(2.5)
Female	44.1	(1.1)	39.3	(0.9)	43.8	(1.0)	48.4	(2.0)	35.8	(2.3)	39.4	(1.7)	-4.2	(2.3)	3.5	(2.4)	4.4*	(2.0)
First / Second Year	64.8	(4.2)	26.6	(4.1)	25.8	(4.3)	57.2	(14.3)	32.1	(15.5)	28.6	(16.3)	7.6	(14.9)	-5.5	(16.1)	-2.8	(16.8)
Third Year	51.2	(1.0)	30.5	(0.9)	33.7	(0.9)	54.9	(2.2)	30.3	(1.6)	30.6	(1.8)	-3.8	(2.4)	0.2	(1.8)	3.1	(2.0)
Transition Year	50.5	(1.4)	32.0	(1.2)	34.7	(1.4)	53.6	(2.0)	30.2	(2.0)	34.2	(2.1)	-3.1	(2.4)	1.8	(2.3)	0.5	(2.5)
Fifth/Sixth Year	54.2	(2.6)	29.3	(2.1)	29.3	(2.6)	57.6	(2.6)	26.0	(2.6)	26.5	(3.0)	-3.3	(3.7)	3.3	(3.4)	2.8	(4.0)
Lowest ESCS	62.3	(1.5)	24.8	(1.3)	22.8	(1.2)	64.0	(2.6)	22.8	(2.4)	25.8	(2.3)	-1.7	(3.0)	2.0	(2.7)	-3.0	(2.6)
Low-Medium ESCS	54.9	(1.5)	28.0	(1.2)	29.7	(1.2)	58.3	(2.6)	26.5	(2.0)	27.7	(1.8)	-3.4	(3.0)	1.5	(2.3)	2.0	(2.1)
Medium-High ESCS	50.1	(1.4)	30.0	(1.1)	34.5	(1.4)	52.9	(2.2)	32.9	(1.9)	31.9	(2.5)	-2.8	(2.6)	-2.9	(2.2)	2.7	(2.8)
Highest ESCS	38.3	(1.6)	40.2	(1.4)	46.9	(1.5)	43.9	(2.4)	36.1	(2.6)	42.0	(2.5)	-5.6	(2.9)	4.1	(2.9)	5.0	(3.0)
Native	52.4	(1.0)	28.8	(0.7)	31.8	(0.8)	55.6	(1.8)	28.1	(1.4)	30.9	(1.5)	-3.2	(2.1)	0.7	(1.5)	0.9	(1.7)
Immigrant & Eng./Irish	44.8	(2.4)	42.1	(2.3)	43.4	(2.3)	50.3	(3.2)	34.3	(3.6)	32.4	(3.5)	-5.4	(4.0)	7.8	(4.3)	11.1*	(4.2)
Immigrant & other lang.	46.2	(2.3)	38.4	(2.0)	40.7	(2.4)	49.8	(2.5)	38.7	(4.0)	40.0	(4.2)	-3.6	(3.4)	-0.3	(4.5)	0.8	(4.9)
Girls' secondary	42.9	(1.3)	40.2	(1.1)	46.7	(1.7)	51.6	(3.7)	33.4	(3.8)	37.4	(3.6)	-8.7*	(4.0)	6.8	(4.0)	9.3*	(4.0)
Boys' secondary	58.8	(2.4)	20.4	(1.4)	23.9	(1.4)	61.4	(2.2)	22.4	(3.7)	24.3	(5.1)	-2.6	(3.2)	-2.1	(3.9)	-0.4	(5.3)
Community/ comprehensive	55.5	(2.0)	28.6	(1.9)	29.3	(1.4)	49.6	(3.2)	31.7	(2.4)	36.4	(4.0)	5.9	(3.8)	-3.1	(3.1)	-7.1	(4.2)
Mixed secondary	45.3	(3.0)	35.5	(1.8)	38.5	(2.4)	55.4	(5.1)	28.7	(4.0)	31.4	(2.2)	-10.1	(5.9)	6.8	(4.4)	7.0*	(3.3)
ETB vocational	55.5	(1.8)	27.6	(1.1)	28.1	(1.0)	56.0	(2.8)	29.4	(1.6)	29.0	(2.2)	-0.6	(3.3)	-1.8	(2.0)	-0.9	(2.4)
Non-DEIS	48.3	(0.9)	32.6	(0.7)	35.8	(0.9)	53.4	(1.7)	29.5	(1.6)	31.6	(1.7)	-5.1*	(2.0)	3.1	(1.8)	4.2*	(1.9)
DEIS	61.8	(1.7)	24.9	(1.2)	25.9	(1.1)	58.8	(3.0)	29.0	(2.1)	31.9	(3.1)	3.0	(3.5)	-4.1	(2.4)	-6.0	(3.3)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Condt. Table L34: Percentages of students *strongly agreeing/agreeing* on statements on enjoyment of reading by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing...</i>	Spring				Autumn				Spring - Autumn			
	For me, reading is a waste of time		I read only to get information that I need		For me, reading is a waste of time		I read only to get information that I need		For me, reading is a waste of time		I read only to get information that I need	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	26.8	(0.8)	52.0	(0.9)	29.4	(1.2)	54.5	(1.3)	-2.6	(1.4)	-2.5	(1.6)
Male	32.4	(1.1)	60.9	(1.2)	33.3	(1.4)	61.9	(1.9)	-1.0	(1.8)	-1.1	(2.3)
Female	21.3	(1.0)	43.2	(1.2)	25.5	(1.7)	47.1	(1.6)	-4.2*	(1.9)	-3.8	(2.0)
First / Second Year	27.3	(5.3)	63.7	(4.2)	19.2	(10.3)	57.2	(14.3)	8.1	(11.6)	6.5	(14.9)
Third Year	26.2	(0.8)	51.5	(1.0)	25.8	(2.3)	56.5	(1.8)	0.3	(2.4)	-5.0*	(2.1)
Transition Year	27.4	(1.3)	50.4	(1.5)	28.3	(1.6)	50.8	(1.9)	-0.9	(2.0)	-0.3	(2.4)
Fifth/Sixth Year	29.4	(2.4)	58.1	(2.4)	37.0	(3.3)	61.4	(2.7)	-7.7	(4.1)	-3.3	(3.6)
Lowest ESCS	36.1	(1.4)	63.8	(1.4)	39.0	(2.9)	66.2	(2.8)	-3.0	(3.3)	-2.4	(3.1)
Low-Medium ESCS	29.1	(1.1)	55.9	(1.5)	30.2	(1.9)	56.1	(2.0)	-1.1	(2.2)	-0.1	(2.5)
Medium-High ESCS	26.5	(1.3)	51.3	(1.5)	26.2	(1.8)	51.3	(1.8)	0.3	(2.3)	0.0	(2.3)
Highest ESCS	15.7	(1.0)	36.6	(1.4)	22.1	(2.1)	44.1	(2.8)	-6.4*	(2.3)	-7.4*	(3.2)
Native	27.8	(0.9)	52.3	(1.0)	30.3	(1.3)	54.1	(1.6)	-2.4	(1.5)	-1.8	(1.9)
Immigrant & Eng./Irish	19.2	(2.3)	49.3	(2.9)	23.6	(3.5)	56.2	(4.2)	-4.4	(4.2)	-6.9	(5.1)
Immigrant & other lang.	22.9	(2.0)	48.1	(2.4)	25.6	(4.4)	54.6	(3.5)	-2.7	(4.8)	-6.5	(4.2)
Girls' secondary	19.1	(1.5)	41.2	(2.1)	27.4	(3.1)	46.6	(2.4)	-8.3*	(3.5)	-5.5	(3.2)
Boys' secondary	31.1	(2.1)	59.8	(2.6)	32.0	(1.7)	58.3	(1.8)	-1.0	(2.7)	1.5	(3.2)
Community/comprehensive	29.9	(2.3)	57.2	(1.8)	26.4	(1.9)	54.4	(2.2)	3.5	(3.0)	2.8	(2.9)
Mixed secondary	22.7	(2.0)	45.1	(2.7)	31.6	(3.0)	55.5	(4.4)	-9.0*	(3.6)	-10.4*	(5.2)
ETB vocational	30.9	(1.5)	57.0	(1.5)	29.6	(2.6)	57.1	(2.9)	1.2	(3.0)	-0.2	(3.2)
Non-DEIS	23.8	(0.8)	48.8	(1.0)	27.9	(1.1)	52.4	(1.2)	-4.1	(1.4)	-3.6*	(1.6)
DEIS	36.3	(1.8)	62.2	(1.5)	33.7	(3.4)	60.6	(3.1)	2.6	(3.8)	1.6	(3.5)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L35: Percentages of students *strongly agreeing/agreeing* on statements of motivation to master tasks by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing...</i>	Spring				Autumn				Spring - Autumn			
	I find satisfaction in working as hard as I can.		Once I start a task, I persist until it is finished.		I find satisfaction in working as hard as I can.		Once I start a task, I persist until it is finished.		I find satisfaction in working as hard as I can.		Once I start a task, I persist until it is finished.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	80.8	(0.6)	70.2	(0.6)	79.4	(0.9)	69.6	(1.1)	1.4	(1.0)	0.6	(1.2)
Male	77.1	(0.9)	70.8	(1.0)	74.0	(1.2)	70.9	(1.6)	3.1*	(1.5)	-0.1	(1.9)
Female	84.4	(0.7)	69.6	(0.8)	84.6	(1.1)	68.4	(1.4)	-0.2	(1.3)	1.2	(1.6)
First / Second Year	75.5	(4.7)	82.9	(3.2)	84.2	(10.8)	72.1	(14.0)	-8.7	(11.8)	10.8	(14.4)
Third Year	79.9	(0.7)	69.0	(0.8)	76.5	(1.9)	67.3	(2.1)	3.5	(2.1)	1.7	(2.3)
Transition Year	83.3	(1.0)	71.8	(1.2)	81.3	(1.4)	69.6	(1.5)	2.0	(1.7)	2.3	(1.9)
Fifth/Sixth Year	79.9	(1.7)	70.6	(2.2)	78.0	(2.7)	72.6	(2.9)	1.9	(3.1)	-2.0	(3.7)
Lowest ESCS	75.1	(1.4)	67.2	(1.2)	71.4	(2.0)	66.0	(1.6)	3.7	(2.4)	1.2	(2.0)
Low-Medium ESCS	82.0	(1.2)	72.2	(1.2)	81.4	(2.0)	69.7	(2.2)	0.6	(2.3)	2.4	(2.5)
Medium-High ESCS	81.3	(1.0)	70.4	(1.4)	80.3	(1.6)	69.3	(2.1)	1.0	(1.8)	1.1	(2.5)
Highest ESCS	84.9	(0.8)	71.2	(1.3)	84.7	(2.2)	73.2	(1.6)	0.3	(2.3)	-2.0	(2.1)
Native	80.6	(0.6)	70.2	(0.7)	79.5	(1.0)	69.4	(1.4)	1.1	(1.1)	0.8	(1.6)
Immigrant & Eng./Irish	82.7	(1.7)	66.3	(1.9)	81.8	(3.7)	72.3	(3.5)	0.9	(4.1)	-5.9	(4.0)
Immigrant & other lang.	82.1	(1.8)	74.6	(2.0)	79.7	(2.6)	68.8	(3.0)	2.4	(3.2)	5.8	(3.6)
Girls' secondary	85.6	(0.9)	67.6	(1.1)	83.8	(2.5)	68.1	(3.2)	1.9	(2.7)	-0.5	(3.4)
Boys' secondary	77.2	(2.0)	70.8	(1.4)	78.1	(1.5)	70.1	(2.9)	-0.9	(2.5)	0.7	(3.2)
Community/comprehensive	80.8	(1.2)	70.0	(1.8)	78.0	(2.2)	70.7	(1.2)	2.8	(2.5)	-0.7	(2.2)
Mixed secondary	82.4	(1.1)	71.8	(1.4)	80.1	(2.8)	71.0	(2.2)	2.3	(3.0)	0.8	(2.6)
ETB vocational	78.1	(1.1)	70.9	(1.1)	77.4	(1.2)	68.8	(2.3)	0.7	(1.6)	2.1	(2.5)
Non-DEIS	81.8	(0.6)	69.4	(0.6)	80.4	(1.1)	68.4	(1.3)	1.4	(1.3)	1.0	(1.4)
DEIS	77.6	(1.5)	72.7	(1.4)	76.2	(1.8)	73.2	(1.8)	1.4	(2.4)	-0.4	(2.3)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Condt. Table L35: Percentages of students *strongly agreeing/agreeing* on statements of motivation to master tasks by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing...</i>	Spring				Autumn				Spring - Autumn			
	Improving on how well I did in the past is part of the enjoyment when I do things.		If I am not good at something, I would rather keep struggling to master it than move on to something I may be good at.		Improving on how well I did in the past is part of the enjoyment when I do things.		If I am not good at something, I would rather keep struggling to master it than move on to something I may be good at.		Improving on how well I did in the past is part of the enjoyment when I do things.		If I am not good at something, I would rather keep struggling to master it than move on to something I may be good at.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	80.3	(0.6)	56.7	(0.6)	79.0	(1.2)	53.7	(0.9)	1.3	(1.3)	3.0	(1.1)
Male	79.1	(0.9)	61.5	(1.0)	77.9	(1.4)	57.6	(1.7)	1.2	(1.7)	3.9	(2.0)
Female	81.5	(0.8)	52.0	(0.9)	80.1	(1.2)	50.0	(1.3)	1.4	(1.5)	2.0	(1.6)
First / Second Year	79.3	(3.5)	66.0	(4.6)	70.0	(17.0)	26.4	(13.4)	9.4	(17.3)	39.6	(14.2)
Third Year	79.5	(0.7)	56.8	(0.8)	73.0	(1.9)	56.1	(1.9)	6.5	(2.0)	0.8	(2.0)
Transition Year	83.1	(1.2)	54.9	(1.2)	81.9	(1.6)	50.9	(1.7)	1.2	(2.0)	3.9	(2.1)
Fifth/Sixth Year	76.8	(1.8)	60.2	(2.7)	79.6	(2.3)	58.7	(3.2)	-2.8	(2.9)	1.5	(4.2)
Lowest ESCS	76.3	(1.1)	57.1	(1.5)	75.0	(2.4)	54.9	(2.3)	1.3	(2.6)	2.2	(2.7)
Low-Medium ESCS	79.8	(1.4)	57.5	(1.3)	77.7	(2.1)	52.5	(1.4)	2.1	(2.5)	5.0*	(1.9)
Medium-High ESCS	80.6	(1.1)	56.0	(1.3)	79.2	(1.9)	51.5	(2.1)	1.4	(2.1)	4.5	(2.5)
Highest ESCS	84.5	(1.1)	56.1	(1.2)	84.3	(2.3)	56.3	(2.3)	0.2	(2.6)	-0.1	(2.6)
Native	79.9	(0.7)	55.7	(0.7)	78.6	(1.3)	52.3	(1.1)	1.3	(1.5)	3.5	(1.3)
Immigrant & Eng./Irish	82.1	(2.0)	61.5	(2.3)	83.7	(2.9)	57.1	(3.8)	-1.5	(3.5)	4.4	(4.5)
Immigrant & other lang.	83.3	(1.7)	60.6	(2.5)	78.1	(2.4)	63.0	(3.3)	5.2	(3.0)	-2.4	(4.1)
Girls' secondary	81.1	(1.6)	51.5	(1.5)	79.9	(1.8)	46.6	(2.2)	1.2	(2.4)	4.9	(2.6)
Boys' secondary	77.5	(2.3)	62.8	(2.0)	79.5	(1.6)	58.6	(2.0)	-2.0	(2.7)	4.2	(2.9)
Community/comprehensive	81.2	(1.4)	58.4	(1.5)	78.6	(2.5)	55.9	(1.6)	2.6	(2.8)	2.5	(2.3)
Mixed secondary	80.4	(1.1)	55.7	(1.5)	79.7	(2.7)	53.7	(2.9)	0.7	(3.0)	1.9	(3.3)
ETB vocational	80.5	(1.0)	57.1	(1.2)	77.8	(3.4)	54.8	(1.5)	2.7	(3.5)	2.3	(1.9)
Non-DEIS	80.5	(0.7)	55.6	(0.7)	78.9	(1.3)	51.6	(1.2)	1.6	(1.5)	3.9	(1.4)
DEIS	79.5	(1.2)	60.5	(1.3)	79.3	(2.5)	60.1	(1.8)	0.2	(2.8)	0.4	(2.2)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L36: Mean scores on the index of ‘attitudes towards competition’ by background variables, Spring and Autumn testing.

	Spring		Autumn		Spring-Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	SE Diff
All Students	0.16	(0.01)	0.16	(0.02)	0.00	(0.03)
Male	0.34	(0.02)	0.34	(0.04)	0.00	(0.05)
Female	-0.02	(0.02)	-0.03	(0.04)	0.01	(0.04)
First / Second Year	0.05	(0.10)	-0.14	(0.33)	0.18	(0.35)
Third Year	0.19	(0.02)	0.15	(0.05)	0.04	(0.05)
Transition Year	0.14	(0.02)	0.17	(0.03)	-0.03	(0.04)
Fifth/Sixth Year	0.06	(0.05)	0.15	(0.06)	-0.09	(0.07)
Lowest ESCS	0.05	(0.03)	0.02	(0.04)	0.04	(0.05)
Low-Medium ESCS	0.13	(0.03)	0.05	(0.04)	0.08	(0.05)
Medium-High ESCS	0.20	(0.03)	0.22	(0.05)	-0.01	(0.06)
Highest ESCS	0.25	(0.03)	0.34	(0.06)	-0.09	(0.06)
Native	0.15	(0.02)	0.14	(0.02)	0.02	(0.03)
Immigrant & Eng./Irish	0.25	(0.04)	0.22	(0.11)	0.04	(0.11)
Immigrant & other lang.	0.15	(0.04)	0.25	(0.08)	-0.11	(0.09)
Girls’ secondary	-0.01	(0.03)	-0.05	(0.07)	0.04	(0.08)
Boys’ secondary	0.41	(0.05)	0.34	(0.04)	0.07	(0.06)
Community/ comprehensive	0.20	(0.02)	0.19	(0.08)	0.00	(0.08)
Mixed secondary	0.21	(0.04)	0.20	(0.07)	0.01	(0.08)
ETB vocational	0.11	(0.02)	0.15	(0.03)	-0.04	(0.04)
Non-DEIS	0.17	(0.02)	0.15	(0.03)	0.02	(0.03)
DEIS	0.13	(0.03)	0.16	(0.04)	-0.03	(0.05)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L37: Percentages of students *strongly agreeing/agreeing* on statements on attitudes towards competition by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing...</i>	Spring						Autumn						Spring - Autumn					
	I enjoy working in situations involving competition with others.		It is important for me to perform better than other people on a task.		I try harder when I'm in competition with other people.		I enjoy working in situations involving competition with others.		It is important for me to perform better than other people on a task.		I try harder when I'm in competition with other people.		I enjoy working in situations involving competition with others.		It is important for me to perform better than other people on a task.		I try harder when I'm in competition with other people.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	75.6	(0.6)	57.8	(0.8)	81.4	(0.6)	73.8	(1.2)	56.1	(1.3)	81.3	(0.8)	1.8	(1.3)	1.7	(1.5)	0.2	(1.0)
Male	82.3	(0.8)	66.6	(1.1)	84.9	(0.8)	80.3	(2.0)	66.1	(1.7)	86.1	(0.9)	2.0	(2.2)	0.5	(2.1)	-1.3	(1.2)
Female	69.0	(0.8)	48.9	(1.0)	78.1	(0.9)	67.5	(1.7)	46.2	(1.9)	76.5	(1.4)	1.6	(1.9)	2.7	(2.1)	1.5	(1.7)
First / Second Year	73.2	(4.3)	59.8	(4.0)	74.7	(4.6)	67.1	(12.8)	61.4	(15.3)	67.1	(12.8)	6.1	(13.5)	-1.6	(15.8)	7.7	(13.6)
Third Year	76.2	(0.6)	58.3	(0.9)	82.7	(0.7)	76.0	(1.9)	55.0	(2.3)	80.7	(1.8)	0.2	(2.0)	3.3	(2.5)	2.0	(1.9)
Transition Year	75.3	(1.1)	57.1	(1.3)	81.2	(1.1)	74.7	(1.4)	55.3	(1.7)	82.8	(1.1)	0.6	(1.8)	1.8	(2.1)	-1.6	(1.5)
Fifth/Sixth Year	72.7	(1.8)	55.5	(2.5)	74.9	(2.0)	68.9	(2.4)	59.2	(2.8)	78.7	(2.4)	3.8	(3.0)	-3.8	(3.8)	-3.7	(3.1)
Lowest ESCS	72.5	(1.0)	54.3	(1.5)	78.4	(1.2)	67.5	(2.1)	49.6	(2.8)	77.1	(1.9)	4.9*	(2.4)	4.7	(3.2)	1.3	(2.3)
Low-Medium ESCS	74.9	(1.2)	55.9	(1.3)	79.5	(1.2)	73.5	(2.1)	54.8	(2.0)	78.3	(2.5)	1.4	(2.4)	1.1	(2.4)	1.3	(2.8)
Medium-High ESCS	76.2	(1.1)	58.9	(1.5)	82.9	(1.1)	74.4	(2.6)	59.5	(2.2)	84.7	(1.8)	1.8	(2.9)	-0.7	(2.7)	-1.8	(2.1)
Highest ESCS	79.0	(0.9)	61.7	(1.6)	85.2	(1.1)	79.7	(2.4)	60.2	(2.3)	85.5	(1.5)	-0.7	(2.6)	1.5	(2.8)	-0.3	(1.8)
Native	75.7	(0.7)	56.9	(0.9)	81.1	(0.7)	73.9	(1.3)	54.4	(1.4)	81.4	(0.9)	1.8	(1.5)	2.6	(1.7)	-0.3	(1.2)
Immigrant & Eng./Irish	77.0	(2.0)	62.2	(2.2)	87.5	(1.6)	71.5	(4.2)	64.0	(3.6)	77.9	(3.4)	5.4	(4.7)	-1.9	(4.2)	9.5*	(3.8)
Immigrant & other lang.	74.6	(1.6)	60.3	(2.2)	79.9	(1.7)	75.7	(3.1)	64.2	(4.7)	85.3	(3.2)	-1.1	(3.5)	-3.8	(5.2)	-5.4	(3.6)
Girls' secondary	68.7	(1.1)	48.4	(1.3)	78.3	(1.6)	67.1	(3.0)	41.7	(2.9)	76.4	(2.5)	1.7	(3.2)	6.7*	(3.2)	1.9	(2.9)
Boys' secondary	83.2	(1.6)	70.1	(2.0)	84.7	(1.5)	81.1	(4.1)	67.2	(1.8)	87.7	(0.6)	2.1	(4.4)	2.9	(2.7)	-3.0	(1.6)
Community/ comprehensive	77.9	(1.2)	60.8	(1.3)	81.3	(1.5)	73.9	(2.7)	57.9	(3.0)	82.7	(1.9)	4.0	(3.0)	2.9	(3.3)	-1.4	(2.4)
Mixed secondary	76.2	(1.3)	59.4	(2.6)	83.0	(1.5)	74.9	(2.7)	59.5	(2.9)	82.0	(2.0)	1.3	(3.0)	-0.1	(3.9)	1.0	(2.5)
ETB vocational	75.0	(1.1)	55.4	(1.4)	81.2	(1.1)	73.7	(1.5)	56.6	(2.5)	79.7	(1.2)	1.4	(1.9)	-1.1	(2.9)	1.4	(1.7)
Non-DEIS	75.5	(0.6)	57.6	(0.9)	81.9	(0.8)	73.4	(1.5)	55.6	(1.5)	82.0	(0.9)	2.0	(1.6)	2.0	(1.7)	-0.2	(1.2)
DEIS	76.1	(1.1)	58.3	(1.8)	80.1	(1.3)	75.0	(1.9)	57.7	(2.5)	79.1	(1.8)	1.1	(2.2)	0.6	(3.1)	1.0	(2.2)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L38: Percentages of students *strongly agreeing/agreeing* on statements of fear of failure by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing...</i>	Spring						Autumn						Spring - Autumn					
	When I am failing, I worry about what others think of me.		When I am failing, I am afraid that I might not have enough talent.		When I am failing, this makes me doubt my plans for the future.		When I am failing, I worry about what others think of me.		When I am failing, I am afraid that I might not have enough talent.		When I am failing, this makes me doubt my plans for the future.		When I am failing, I worry about what others think of me.		When I am failing, I am afraid that I might not have enough talent.		When I am failing, this makes me doubt my plans for the future.	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	63.7	(0.7)	62.6	(0.7)	64.9	(0.6)	63.7	(1.1)	63.8	(1.2)	64.6	(1.3)	-0.1	(1.3)	-1.2	(1.4)	0.3	(1.4)
Male	56.7	(1.0)	53.6	(1.2)	54.5	(0.9)	55.3	(1.4)	55.0	(1.8)	54.6	(1.7)	1.4	(1.7)	-1.4	(2.1)	-0.2	(1.9)
Female	70.5	(0.9)	71.5	(0.8)	75.2	(0.7)	72.0	(2.0)	72.5	(1.6)	74.4	(1.7)	-1.5	(2.2)	-1.0	(1.7)	0.9	(1.9)
First / Second Year	61.8	(4.9)	57.6	(5.1)	55.9	(5.2)	79.3	(11.1)	60.1	(17.9)	75.4	(12.9)	-17.5	(12.1)	-2.5	(18.6)	-19.5	(13.9)
Third Year	64.0	(0.9)	62.5	(0.9)	64.2	(0.6)	59.6	(2.2)	57.2	(2.3)	60.4	(2.2)	4.5	(2.4)	5.4*	(2.4)	3.8	(2.2)
Transition Year	63.8	(1.2)	64.2	(1.3)	67.2	(1.3)	66.9	(2.2)	68.4	(1.7)	66.3	(1.8)	-3.1	(2.5)	-4.2	(2.2)	0.9	(2.2)
Fifth/Sixth Year	61.1	(2.4)	59.4	(2.4)	64.6	(2.2)	60.4	(2.1)	60.7	(2.8)	65.3	(3.9)	0.7	(3.2)	-1.3	(3.7)	-0.6	(4.4)
Lowest ESCS	61.4	(1.3)	60.3	(1.4)	63.7	(1.3)	61.1	(2.1)	60.3	(2.8)	63.0	(2.7)	0.4	(2.5)	0.1	(3.2)	0.7	(3.0)
Low-Medium ESCS	63.2	(1.3)	61.9	(1.5)	64.9	(1.2)	63.8	(2.2)	64.5	(2.3)	67.2	(2.3)	-0.6	(2.5)	-2.6	(2.7)	-2.3	(2.6)
Medium-High ESCS	63.3	(1.5)	61.9	(1.3)	64.0	(1.3)	64.3	(2.5)	64.1	(2.1)	60.9	(2.4)	-1.0	(2.9)	-2.2	(2.5)	3.1	(2.7)
Highest ESCS	67.0	(1.5)	66.4	(1.3)	67.2	(1.3)	66.9	(2.7)	66.9	(2.5)	67.8	(2.5)	0.0	(3.0)	-0.5	(2.8)	-0.6	(2.8)
Native	64.7	(0.8)	63.1	(0.8)	64.9	(0.6)	63.9	(1.3)	64.2	(1.3)	64.1	(1.4)	0.8	(1.6)	-1.0	(1.6)	0.8	(1.5)
Immigrant & Eng./Irish	60.7	(2.4)	62.9	(1.9)	68.1	(2.0)	60.9	(3.4)	63.9	(4.1)	61.3	(4.3)	-0.3	(4.2)	-1.0	(4.6)	6.9	(4.7)
Immigrant & other lang.	57.9	(2.7)	58.4	(2.9)	61.6	(2.6)	64.8	(3.2)	61.3	(4.5)	69.9	(3.9)	-6.9	(4.1)	-3.0	(5.4)	-8.3	(4.6)
Girls' secondary	70.3	(1.6)	73.4	(1.1)	76.3	(1.1)	68.2	(3.7)	70.0	(1.8)	72.5	(2.5)	2.1	(4.0)	3.4	(2.1)	3.8	(2.7)
Boys' secondary	59.5	(1.8)	57.5	(2.0)	57.6	(1.3)	51.3	(1.8)	51.1	(4.4)	49.7	(4.1)	8.3	(2.6)	6.3	(4.9)	7.9	(4.3)
Comm./comp.	62.2	(1.9)	60.2	(1.4)	64.7	(0.9)	63.9	(1.7)	64.3	(1.2)	68.3	(3.0)	-1.7	(2.6)	-4.1*	(1.8)	-3.6	(3.1)
Mixed secondary	64.3	(2.4)	60.1	(2.2)	62.7	(2.0)	67.8	(2.3)	67.0	(2.8)	66.4	(2.6)	-3.5	(3.3)	-7.0	(3.6)	-3.8	(3.3)
ETB vocational	61.4	(0.8)	60.4	(1.2)	61.9	(1.0)	64.7	(2.5)	64.1	(2.8)	63.9	(2.4)	-3.3	(2.6)	-3.6	(3.1)	-2.0	(2.6)
Non-DEIS	64.7	(0.9)	64.0	(0.8)	66.1	(0.7)	63.3	(1.4)	63.5	(1.5)	65.1	(1.5)	1.4	(1.7)	0.4	(1.7)	1.0	(1.7)
DEIS	60.2	(1.1)	58.4	(1.6)	61.2	(1.1)	65.0	(2.4)	64.6	(3.4)	63.0	(4.0)	-4.7	(2.6)	-6.3	(3.8)	-1.8	(4.1)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L39: Percentages of students reporting *always* on three positive affects of subjective wellbeing by background variables, Spring and Autumn testing

<i>Students reporting always...</i>	Spring						Autumn						Spring - Autumn					
	Joyful		Cheerful		Happy		Joyful		Cheerful		Happy		Joyful		Cheerful		Happy	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	27.3	(0.7)	32.0	(0.8)	45.3	(0.8)	25.7	(1.3)	28.6	(1.2)	41.2	(1.2)	1.6	(1.4)	3.3*	(1.4)	4.0	(1.4)
Male	27.6	(0.9)	31.2	(1.0)	45.4	(1.1)	27.0	(1.5)	29.3	(1.7)	42.6	(1.6)	0.7	(1.7)	2.0	(2.0)	2.9	(1.9)
Female	26.9	(0.9)	32.7	(1.0)	45.1	(1.0)	24.4	(1.9)	28.0	(1.8)	39.9	(1.9)	2.5	(2.1)	4.7*	(2.0)	5.2*	(2.1)
First / Second Year	39.8	(4.3)	36.3	(4.3)	44.1	(4.6)	35.3	(11.7)	35.3	(11.7)	51.0	(13.0)	4.4	(12.5)	1.0	(12.5)	-6.9	(13.8)
Third Year	26.7	(0.9)	32.2	(0.8)	45.1	(0.9)	26.2	(2.2)	27.9	(1.7)	42.2	(1.9)	0.5	(2.3)	4.3*	(1.8)	3.0	(2.1)
Transition Year	27.9	(1.4)	31.3	(1.5)	46.5	(1.6)	25.2	(1.8)	29.5	(1.9)	41.5	(1.6)	2.6	(2.2)	1.8	(2.4)	5.0*	(2.2)
Fifth/Sixth Year	26.6	(2.1)	31.2	(1.9)	42.3	(2.4)	25.8	(2.2)	27.0	(1.6)	39.0	(3.8)	0.7	(3.0)	4.2	(2.5)	3.3	(4.5)
Lowest ESCS	26.8	(1.2)	31.5	(1.4)	42.2	(1.5)	24.4	(2.1)	28.4	(2.6)	39.9	(2.6)	2.4	(2.4)	3.0	(3.0)	2.4	(3.0)
Low-Medium ESCS	28.6	(1.2)	31.9	(1.3)	44.5	(1.3)	24.5	(1.9)	27.5	(2.3)	38.9	(2.5)	4.1	(2.3)	4.4	(2.6)	5.6	(2.8)
Medium-High ESCS	26.1	(1.2)	31.8	(1.3)	45.4	(1.4)	27.0	(2.4)	30.8	(2.4)	44.1	(2.6)	-1.0	(2.7)	1.1	(2.8)	1.4	(3.0)
Highest ESCS	27.5	(1.3)	32.6	(1.4)	48.8	(1.6)	26.5	(2.5)	27.5	(2.5)	41.7	(2.9)	0.9	(2.8)	5.1	(2.9)	7.1*	(3.3)
Native	26.5	(0.7)	31.6	(0.8)	45.7	(0.8)	26.5	(1.5)	29.2	(1.5)	42.4	(1.4)	0.0	(1.6)	2.5	(1.7)	3.3*	(1.6)
Immigrant & Eng./Irish	30.3	(2.4)	34.1	(2.4)	41.0	(2.7)	24.5	(2.9)	29.3	(3.9)	37.0	(3.3)	5.8	(3.8)	4.8	(4.6)	4.0	(4.2)
Immigrant & other lang.	31.1	(3.4)	31.8	(3.1)	45.3	(2.5)	21.0	(3.1)	24.9	(4.0)	38.7	(4.7)	10.1*	(4.6)	7.0	(5.1)	6.5	(5.3)
Girls' secondary	26.4	(1.5)	32.8	(1.6)	44.8	(1.5)	24.1	(3.8)	27.8	(4.1)	42.1	(3.0)	2.4	(4.1)	4.9	(4.4)	2.7	(3.3)
Boys' secondary	27.1	(2.1)	31.1	(2.1)	45.2	(2.0)	29.1	(2.4)	33.1	(2.0)	46.2	(2.9)	-2.1	(3.2)	-2.0	(2.9)	-1.0	(3.5)
Community/ comprehensive	26.9	(1.3)	30.4	(1.9)	44.6	(1.7)	23.6	(2.6)	24.9	(1.6)	41.3	(1.3)	3.3	(2.9)	5.5*	(2.5)	3.3	(2.1)
Mixed secondary	26.1	(1.4)	30.8	(1.7)	45.5	(2.0)	25.9	(2.9)	27.9	(2.1)	41.2	(2.4)	0.2	(3.3)	2.9	(2.7)	4.2	(3.1)
ETB vocational	28.8	(1.3)	33.4	(1.4)	45.9	(1.6)	25.9	(2.0)	29.4	(2.6)	37.8	(2.5)	2.9	(2.4)	4.0	(2.9)	8.1	(3.0)
Non-DEIS	26.5	(0.8)	31.7	(0.9)	45.3	(0.9)	25.5	(1.4)	28.8	(1.4)	42.1	(1.3)	1.0	(1.6)	2.9	(1.7)	3.2*	(1.6)
DEIS	29.5	(1.3)	32.7	(1.2)	45.1	(1.7)	26.1	(2.0)	27.9	(2.2)	38.7	(2.5)	3.4	(2.4)	4.8	(2.5)	6.4*	(3.0)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L40: Mean score on the index of ‘attitude to school/learning activities’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	(SE Diff)
All students	0.12	(0.02)	0.00	(0.03)	0.11	(0.03)
Male	0.01	(0.02)	-0.12	(0.04)	0.13	(0.04)
Female	0.22	(0.02)	0.13	(0.04)	0.09*	(0.05)
First / Second Year	0.11	(0.11)	-0.43	(0.31)	0.53	(0.33)
Third Year	0.13	(0.02)	0.04	(0.04)	0.09*	(0.05)
Transition Year	0.12	(0.03)	0.03	(0.05)	0.09	(0.05)
Fifth/Sixth Year	0.01	(0.05)	-0.09	(0.08)	0.09	(0.09)
Lowest ESCS	-0.04	(0.03)	-0.09	(0.05)	0.05	(0.06)
Low-Medium ESCS	0.10	(0.03)	-0.03	(0.06)	0.13*	(0.07)
Medium-High ESCS	0.10	(0.03)	0.00	(0.05)	0.09	(0.06)
Highest ESCS	0.30	(0.02)	0.14	(0.05)	0.16	(0.06)
Native	0.10	(0.02)	0.01	(0.03)	0.09*	(0.04)
Immigrant & Eng./Irish	0.23	(0.04)	0.07	(0.08)	0.16	(0.09)
Immigrant & other lang.	0.16	(0.05)	-0.02	(0.08)	0.18	(0.10)
Girls’ secondary	0.27	(0.04)	0.21	(0.03)	0.06	(0.04)
Boys’ secondary	-0.02	(0.03)	-0.06	(0.05)	0.04	(0.06)
Community/ comprehensive	0.14	(0.03)	0.00	(0.09)	0.14	(0.09)
Mixed secondary	0.14	(0.04)	-0.12	(0.10)	0.26*	(0.11)
ETB vocational	0.04	(0.03)	-0.02	(0.03)	0.06	(0.05)
Non-DEIS	0.14	(0.02)	0.03	(0.04)	0.11	(0.04)
DEIS	0.04	(0.03)	-0.07	(0.04)	0.11*	(0.05)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L41: Percentages of students *strongly agreeing/agreeing* about statements on their attitude towards school/learning activities by background variables, Spring and Autumn testing

<i>Students strongly agreeing/agreeing...</i>	Spring						Autumn						Spring - Autumn					
	Trying hard at school will help me get a good job		Trying hard at school will help me get into a good college		Trying hard at school is important		Trying hard at school will help me get a good job		Trying hard at school will help me get into a good college		Trying hard at school is important		Trying hard at school will help me get a good job		Trying hard at school will help me get into a good college		Trying hard at school is important	
	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	%	(SE)	% Diff	(SE Diff)	% Diff	(SE Diff)	% Diff	(SE Diff)
All students	89.0	(0.4)	94.1	(0.4)	89.9	(0.4)	85.2	(1.1)	93.4	(0.8)	86.7	(0.8)	3.8	(1.2)	0.7	(0.8)	3.1	(0.9)
Male	86.8	(0.6)	93.2	(0.5)	87.4	(0.6)	82.5	(1.5)	92.7	(0.9)	83.1	(1.0)	4.3	(1.6)	0.6	(1.0)	4.3	(1.1)
Female	91.1	(0.6)	95.0	(0.5)	92.3	(0.6)	87.9	(1.2)	94.2	(0.8)	90.4	(1.1)	3.2*	(1.4)	0.8	(0.9)	1.9	(1.3)
First / Second Year	86.3	(3.6)	92.8	(2.5)	87.6	(3.8)	76.7	(11.0)	82.4	(12.5)	76.7	(14.5)	9.7	(11.6)	10.4	(12.8)	10.9	(15.0)
Third Year	89.5	(0.5)	94.1	(0.5)	90.2	(0.6)	85.9	(1.7)	94.2	(1.0)	87.9	(1.4)	3.6*	(1.8)	-0.1	(1.1)	2.3	(1.5)
Transition Year	88.2	(0.7)	94.5	(0.7)	89.7	(0.8)	86.1	(1.5)	93.4	(1.0)	87.8	(1.4)	2.1	(1.7)	1.1	(1.2)	1.9	(1.6)
Fifth/Sixth Year	88.1	(1.3)	93.3	(1.1)	88.3	(1.5)	82.2	(2.9)	92.8	(1.5)	82.8	(2.0)	5.9	(3.2)	0.5	(1.9)	5.5*	(2.5)
Lowest ESCS	86.7	(0.9)	91.5	(0.7)	86.5	(0.8)	83.6	(1.5)	90.7	(1.3)	81.5	(2.2)	3.0	(1.8)	0.8	(1.5)	5.0*	(2.3)
Low-Medium ESCS	88.7	(1.0)	94.0	(0.7)	89.0	(1.0)	83.9	(2.3)	94.0	(1.3)	87.8	(1.8)	4.7	(2.5)	-0.1	(1.5)	1.2	(2.1)
Medium-High ESCS	88.9	(0.7)	94.4	(0.7)	89.7	(0.8)	87.3	(1.2)	95.1	(1.1)	88.2	(1.8)	1.6	(1.4)	-0.8	(1.3)	1.4	(2.0)
Highest ESCS	91.6	(0.6)	96.5	(0.5)	94.2	(0.6)	86.0	(2.4)	94.1	(1.0)	89.7	(1.6)	5.6*	(2.5)	2.5*	(1.1)	4.5*	(1.8)
Native	88.7	(0.5)	93.9	(0.4)	89.9	(0.5)	86.3	(1.2)	93.9	(0.9)	87.3	(1.0)	2.4	(1.3)	-0.1	(1.0)	2.6*	(1.1)
Immigrant & Eng./Irish	88.4	(1.4)	94.0	(1.1)	89.8	(1.4)	84.2	(2.7)	94.3	(1.7)	89.4	(2.4)	4.2	(3.0)	-0.3	(2.0)	0.4	(2.8)
Immigrant & other lang.	91.7	(1.2)	96.9	(0.8)	89.6	(1.5)	82.0	(2.9)	91.2	(2.1)	82.4	(1.9)	9.7	(3.2)	5.7*	(2.2)	7.2	(2.4)
Girls' secondary	92.7	(0.7)	96.4	(0.5)	93.3	(0.6)	90.5	(1.2)	95.8	(0.7)	94.2	(1.0)	2.2	(1.4)	0.6	(0.9)	-0.9	(1.2)
Boys' secondary	88.4	(0.9)	94.0	(1.0)	87.8	(1.0)	84.9	(2.4)	93.5	(1.2)	83.0	(1.2)	3.5	(2.5)	0.6	(1.5)	4.8	(1.6)
Community/ comprehensive	89.8	(0.8)	94.1	(0.5)	92.2	(0.5)	85.3	(2.8)	93.8	(1.3)	85.8	(1.0)	4.4	(2.9)	0.3	(1.4)	6.5	(1.1)
Mixed secondary	88.6	(1.3)	94.4	(0.8)	89.5	(1.1)	81.8	(3.7)	90.2	(3.5)	83.6	(3.0)	6.7	(4.0)	4.2	(3.6)	6.0	(3.2)
ETB vocational	86.3	(1.0)	92.3	(0.9)	87.2	(1.1)	83.7	(1.9)	93.6	(1.0)	86.4	(1.4)	2.6	(2.1)	-1.3	(1.4)	0.9	(1.8)
Non-DEIS	89.2	(0.5)	94.7	(0.4)	90.7	(0.5)	86.2	(1.3)	93.9	(1.0)	86.8	(1.0)	3.0*	(1.4)	0.76	(1.1)	3.8	(1.1)
DEIS	88.3	(0.9)	92.3	(0.8)	87.3	(0.9)	82.3	(2.2)	92.0	(1.4)	86.5	(1.4)	6.0*	(2.4)	0.36	(1.6)	0.8	(1.6)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L42: Mean score on the index of ‘perception of competition in the school’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	(SE Diff)
All students	0.20	(0.02)	0.23	(0.03)	-0.03	(0.04)
Male	0.25	(0.02)	0.25	(0.06)	0.00	(0.06)
Female	0.16	(0.03)	0.21	(0.04)	-0.06	(0.05)
First / Second Year	0.09	(0.12)	-0.04	(0.42)	0.13	(0.44)
Third Year	0.23	(0.02)	0.24	(0.06)	-0.01	(0.06)
Transition Year	0.23	(0.03)	0.22	(0.04)	0.01	(0.05)
Fifth/Sixth Year	-0.02	(0.05)	0.25	(0.05)	-0.28	(0.07)
Lowest ESCS	0.10	(0.03)	0.17	(0.06)	-0.07	(0.06)
Low-Medium ESCS	0.18	(0.03)	0.15	(0.04)	0.04	(0.05)
Medium-High ESCS	0.22	(0.03)	0.24	(0.06)	-0.02	(0.07)
Highest ESCS	0.30	(0.03)	0.37	(0.06)	-0.07	(0.06)
Native	0.22	(0.02)	0.25	(0.04)	-0.03	(0.04)
Immigrant & Eng./Irish	0.17	(0.05)	0.24	(0.12)	-0.07	(0.13)
Immigrant & other lang.	0.02	(0.05)	0.15	(0.10)	-0.12	(0.12)
Girls’ secondary	0.18	(0.05)	0.10	(0.07)	0.08	(0.08)
Boys’ secondary	0.31	(0.05)	0.29	(0.11)	0.02	(0.12)
Community/ comprehensive	0.25	(0.04)	0.26	(0.06)	-0.02	(0.08)
Mixed secondary	0.23	(0.03)	0.27	(0.09)	-0.04	(0.09)
ETB vocational	0.13	(0.03)	0.25	(0.07)	-0.13	(0.07)
Non-DEIS	0.22	(0.02)	0.21	(0.04)	0.02	(0.04)
DEIS	0.14	(0.03)	0.31	(0.07)	-0.17*	(0.08)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L43: Mean score on the index of ‘perception of cooperation in the school’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	(SE Diff)
All students	-0.17	(0.02)	-0.16	(0.03)	-0.01	(0.03)
Male	-0.23	(0.02)	-0.17	(0.04)	-0.06	(0.04)
Female	-0.12	(0.02)	-0.16	(0.05)	0.04	(0.05)
First / Second Year	-0.25	(0.13)	0.41	(0.31)	-0.66	(0.34)
Third Year	-0.17	(0.02)	-0.17	(0.04)	0.00	(0.05)
Transition Year	-0.12	(0.03)	-0.12	(0.05)	0.00	(0.06)
Fifth/Sixth Year	-0.32	(0.05)	-0.29	(0.07)	-0.03	(0.08)
Lowest ESCS	-0.24	(0.02)	-0.29	(0.05)	0.06	(0.05)
Low-Medium ESCS	-0.19	(0.03)	-0.15	(0.04)	-0.04	(0.05)
Medium-High ESCS	-0.16	(0.02)	-0.09	(0.07)	-0.07	(0.07)
Highest ESCS	-0.11	(0.03)	-0.13	(0.05)	0.02	(0.06)
Native	-0.18	(0.02)	-0.16	(0.04)	-0.02	(0.04)
Immigrant & Eng./Irish	-0.13	(0.05)	-0.22	(0.09)	0.09	(0.10)
Immigrant & other lang.	-0.13	(0.06)	-0.06	(0.08)	-0.07	(0.10)
Girls’ secondary	-0.03	(0.03)	-0.04	(0.09)	0.01	(0.09)
Boys’ secondary	-0.29	(0.03)	-0.16	(0.07)	-0.13	(0.07)
Community/ comprehensive	-0.21	(0.04)	-0.14	(0.04)	-0.07	(0.06)
Mixed secondary	-0.16	(0.04)	-0.31	(0.02)	0.15	(0.05)
ETB vocational	-0.20	(0.04)	-0.18	(0.08)	-0.02	(0.09)
Non-DEIS	-0.16	(0.02)	-0.15	(0.04)	-0.01	(0.04)
DEIS	-0.21	(0.03)	-0.22	(0.07)	0.01	(0.07)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L44: Mean score on the index ‘being bullied’ by background variables, Spring and Autumn testing

	Spring		Autumn		Spring - Autumn	
	Mean	(SE)	Mean	(SE)	Mean Diff	(SE Diff)
All students	0.13	(0.02)	0.13	(0.03)	0.00	(0.03)
Male	0.21	(0.02)	0.21	(0.04)	0.00	(0.05)
Female	0.06	(0.02)	0.07	(0.05)	-0.01	(0.05)
First / Second Year	0.28	(0.11)	-0.56	(0.23)	0.84	(0.25)
Third Year	0.15	(0.02)	0.15	(0.06)	0.01	(0.06)
Transition Year	0.08	(0.03)	0.12	(0.04)	-0.03	(0.05)
Fifth/Sixth Year	0.14	(0.05)	0.19	(0.07)	-0.05	(0.09)
Lowest ESCS	0.11	(0.03)	0.04	(0.05)	0.07	(0.06)
Low-Medium ESCS	0.17	(0.03)	0.19	(0.05)	-0.02	(0.06)
Medium-High ESCS	0.11	(0.03)	0.10	(0.05)	0.01	(0.06)
Highest ESCS	0.15	(0.03)	0.20	(0.04)	-0.05	(0.05)
Native	0.12	(0.02)	0.13	(0.04)	-0.02	(0.04)
Immigrant & Eng./Irish	0.20	(0.05)	0.08	(0.08)	0.12	(0.10)
Immigrant & other lang.	0.21	(0.05)	0.13	(0.09)	0.08	(0.10)
Girls’ secondary	-0.03	(0.03)	-0.15	(0.08)	0.11	(0.09)
Boys’ secondary	0.24	(0.03)	0.26	(0.07)	-0.02	(0.08)
Community/ comprehensive	0.14	(0.04)	0.18	(0.04)	-0.04	(0.05)
Mixed secondary	0.17	(0.05)	0.27	(0.09)	-0.10	(0.10)
ETB vocational	0.17	(0.03)	0.17	(0.03)	0.01	(0.04)
Non-DEIS	0.13	(0.02)	0.10	(0.04)	0.02	(0.04)
DEIS	0.16	(0.03)	0.23	(0.03)	-0.08	(0.04)

Note. Bold indicates statistical significant difference at .01 level; *indicates statistical significant difference at .05 level.

Table L45: Coefficients for the interaction between 'session' and 'other level 1 learning outcome variables' on final model presented in Table 5.41

<i>Session*...</i>	Reading			Mathematics			Science		
	Coefficient	SE	<i>p</i> -value	Coefficient	SE	<i>p</i> -value	Coefficient	SE	<i>p</i> -value
Text 101	5.24	4.52	0.246	a	a	a	a	a	a
Text100	7.67	5.83	0.188	a	a	a	a	a	a
Write a summary of the book/ chapter (Ref=No)	-3.40	4.95	0.492	a	a	a	a	a	a
Compare the content of the book or the chapter with your own experience (Ref=No)	2.89	4.32	0.503	a	a	a	a	a	a
Select a passage you liked or disliked and explain why (Ref=No)	3.53	4.13	0.393	a	a	a	a	a	a
How to use keywords when using a search engine (Ref=No)	2.19	4.72	0.644	a	a	a	a	a	a
To understand the consequences of making information publicly available online (Ref=No)	4.30	6.03	0.476	a	a	a	a	a	a
How to use the short description below the links in the list of search results (Ref=No)	7.30	4.49	0.104	a	a	a	a	a	a
How to detect whether the information is subjective or biased (Ref=No)	8.09	4.28	0.059	a	a	a	a	a	a
Teachers' stimulation of reading engagement	-1.20	2.23	0.591	a	a	a	a	a	a
Teacher-directed instruction	0.59	1.98	0.767	a	a	a	a	a	a
<i>Skipped a whole day in 2 weeks before PISA testing (Ref=No whole days skipped)^</i>									
1-2 whole days skipped	a	a	a	-0.12	5.66	0.983	3.76	6.64	0.572
3 or more whole days skipped	a	a	a	-17.25	10.62	0.104	-21.54	10.77	0.046
<i>Arrived late to school in 2 weeks before PISA testing (Ref=No days late)^</i>									
1-2 late days	1.93	5.34	0.718	-8.06	5.31	0.129	-7.64	5.84	0.190
3 or more late days	-9.67	8.18	0.237	4.21	9.03	0.641	0.23	10.82	0.983

Note: ^a not included in the final model. [^]Missing indicator included to retain data.

Condt. Table L45: Coefficients for the interaction between 'session' and 'other level 1 learning outcome' variables on final model presented in Table 5.41

Session*...	Reading			Mathematics			Science		
	Coefficient	SE	p-value	Coefficient	SE	p-value	Coefficient	SE	p-value
Understanding and remembering	-4.27	2.23	0.056	a	a	a	a	a	a
Summarising strategies	-1.58	2.15	0.460	a	a	a	a	a	a
Assessing credibility	0.29	1.94	0.880	a	a	a	a	a	a
Perceived competence in reading	1.43	1.98	0.471	a	a	a	a	a	a
Perceived difficulty in reading	-4.54	2.27	0.046	a	a	a	a	a	a
Enjoyment of reading	-0.39	1.99	0.845	a	a	a	a	a	a
General self-efficacy (resilience)	a	a	a	0.06	2.93	0.985	-4.11	3.29	0.213
Attitudes towards competition	a	a	a	3.16	2.44	0.196	-0.41	2.74	0.880
Motivation to master tasks	a	a	a	1.13	2.76	0.682	-3.22	2.92	0.270
Life satisfaction	-1.37	0.93	0.141	a	a	a	-0.65	1.20	0.589
Eudemonia: meaning in life	-1.45	2.34	0.536	-0.82	2.53	0.748	-4.16	2.69	0.122
Subjective wellbeing: positive affect	-0.63	2.21	0.774	1.46	2.82	0.606	-0.26	2.81	0.927
Attitude towards school/learning activities	a	a	a	1.01	2.56	0.694	-3.38	2.87	0.240

Note: ^a not included in the final model. [^]Missing indicator included to retain data.