

Statement on Education and Training

February 2009





Introduction to the NCC

The National Competitiveness Council was established in 1997 as a Social Partnership body, reporting to An Taoiseach on key competitiveness issues facing the Irish economy and offering recommendations on policy actions required to enhance Ireland's competitive position.

Each year the NCC publishes the two-volume Annual Competitiveness Report:

- Volume One, **Benchmarking Ireland's Performance**, is a collection of statistical indicators of Ireland's competitiveness performance in relation to 17 other economies and the OECD or EU-15/Eurozone average; and
- Volume Two, **Ireland's Competitiveness Challenge**, uses this information along with the latest research to outline the main challenges to Ireland's competitiveness and the policy responses required to meet them.

As part of its work, the NCC also publishes other papers on specific competitiveness issues.

Ireland's education system has been a key contributor to economic growth and improvements in living standards in recent years. The OECD defines human capital as the knowledge, skills, competencies and attributes that allow people to contribute to their personal and social well-being, as well as that of their countries¹. Human capital development is a broad and multifaceted concept encompassing many different types of investment in people's cognitive and non-cognitive abilities. The acquisition of these skills and knowledge can take place in the workplace, in formal and informal training or at home. This paper focuses on human capital development that arises from formal training.

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Chairman's Preface


We need to improve our competitiveness in order to achieve our ambitions for social and economic progress. This is even more essential at a time of great economic and financial difficulty and uncertainty. Education is at the centre of this policy imperative. The qualities, skills and capacities of our people in their roles in the workplace and in wider society are essential to underpinning our national capacity to achieve sustainable increases in employment, incomes and living standards. We need to ensure that all of the people leaving our schools and colleges do so with the highest education attainments consistent with their abilities and ambitions.

Education has been at the centre of our economic and social progress. Bold reforms and increases in education investment as far back as the 1960s, and more recently in third-level institutions, have enabled Ireland to take advantage of new business opportunities arising from globalisation. Continuing improvements in performance and outcomes are needed. Our policymakers and educators must be ambitious and continue to strive for the best outcomes for students. This applies even more strongly in an environment of very scarce public resources. This is the only way to ensure that our children, young people and adult learners are equipped with the knowledge, the skills and the personal and moral attributes that are necessary to support a socially inclusive society underpinned by economic development and high employment and living standards.

Ireland now faces harsh new fiscal realities. There has been an alarming deterioration in the public finances which is putting pressure on Government expenditure. Challenging budgetary choices lie ahead and corrective measures to reduce both current and capital Exchequer expenditure are now inescapable. The current downturn bolsters the case for a renewed emphasis on strengthening and reforming aspects of the education and training system within a broader effort to re-ignite economic growth. It is equally important that all stakeholders recognise the stark fiscal realities facing Government and respond with the necessary flexibility to ensure that our education system can continue to improve the quality of learning and skill levels of the population within a very difficult fiscal environment.

In Ireland, strong educational outcomes have consistently been achieved with relatively modest public financial resources. This demonstrates that the ways in which resources are used can be just as important as the absolute levels of funding. The commitment and skills of our educators and the support of parents, students and wider society have made these strong outcomes possible. While the Council recognises that the formal education system is only one factor which contributes to individuals' educational performance, it has never been more important to ensure that the significant resources invested in education are spent in a manner that achieves the best possible outcomes in the most cost effective way.

International experience demonstrates that reform in education is seldom (if ever) rapidly achieved. Reform is a slow, difficult process, requiring both focus and flexibility from all stakeholders. The current serious economic and fiscal difficulties intensify the case for reforms and change. Our



ability to take maximum advantage of the eventual upswing in the global economy will be considerably enhanced if we successfully tackle the complex challenges set forth in this review.

I would like to thank Council members and the advisors from the relevant government departments and our external expert reviewers for their work on this document, and to acknowledge the Forfás Secretariat for the work that they have done in preparing material for consideration by the Council. Our analysis and our diagnoses may not be complete and will certainly require the insights which we hope will come from a vigorous and informed debate around the contribution of education to our social and economic wellbeing.

Don Thornhill

Chairman, National Competitiveness Council

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Executive Summary


Every developed economy must rely on the quality of its people to achieve sustainable increases in living standards. The quality of our education system has been a critical foundation for our economic and social progress by equipping the Irish workforce with skills and qualities that supported growth in economic activity and employment. It is essential that our policymakers and educators are ambitious about the potential of our students and educators to build on current strengths and to ensure that a highly-skilled population is able to thrive in an increasingly competitive global environment. It is imperative that our education system continues to improve its performance – even in the face of very scarce public resources.

In Ireland, strong educational outcomes have been achieved with relatively modest public financial resources. Funding is important but excellent teachers, policies, processes and the support of families and society matter even more in achieving strong educational outcomes. The NCC believes that further potential exists to enhance the performance of Ireland's education and training system in terms of participation and high quality outcomes. At a time of great economic uncertainty it has never been more important that the significant resources invested in education are spent in a manner which achieves the best possible outcomes in the most cost effective way. While some areas of our education system require additional funding, many of the recommendations made in this paper are revenue-neutral and necessary reforms can be achieved with a focus on student performance and flexibility from all stakeholders.

In order to achieve the participation targets set in the *National Skills Strategy*, patterns of educational disadvantage in Irish schools must be tackled. Investments in tomorrow's labour force should begin as early in life as possible. To tackle disadvantage where it exists, and to support the working lives of parents, the NCC views the establishment of a system of pre-primary education as a key long-term priority, mirroring the bold steps Ireland has taken in recent decades in the development of primary, secondary, tertiary, and more recently fourth level education. The more focused use of existing resources (*Early Childcare Payment* and *National Childcare Investment Programme*) can drive quality in the sector and initiate progress in the right direction.

Positioning our economy towards knowledge-intensive high-technology sectors requires a supply of people with mathematics, science, engineering and technology skills of the highest calibre. Disincentives for students taking higher level Leaving Certificate mathematics should be addressed and professional development opportunities for second-level mathematics teachers should be enhanced. Implementation of the government's *Strategy for ICT in Schools* remains critical for future competitiveness and innovative solutions to the current funding impasse should be explored.

The NCC believes that schools have the potential to achieve excellent outcomes on a system-wide basis – given the incentives, supports and opportunities to do so. Curricula and assessment mechanisms should promote critical thinking, entrepreneurship and innovation. Teacher professional development should be frequent, continuing and progressive during a teacher's career and not limited to introduction of new syllabi. Equally, outstanding teachers need to be recognised



with merit based promotion. Greater autonomy for principals in setting and achieving goals and greater performance incentives related to funding would support quality in education and raise national outcomes. Additional support for principals, in their administrative and planning functions, would allow them to focus on providing the best possible learning environment within their schools.

The available evidence does not support a widely held view that lower class sizes automatically equate to better student outcomes. There is a need for greater balance between a focus on absolute levels of funding and the need for other reforms that have the potential to improve student performance. Reducing class sizes is expensive and an excessive focus on this area can deflect scarce resources from ensuring our teachers can avail of frequent professional development and providing students and teachers with suitable physical and technological infrastructure (e.g. school buildings, science labs, sports facilities, adequate computers and broadband access).

Irish third level education has performed well in expanding participation rapidly in recent years while maintaining quality. The significant levels of institutional autonomy given to Universities and Institutes of Technology through the funding framework managed by the Higher Education Authority (HEA) has been an important contributor to this outcome. However, autonomy needs to be balanced with institutional accountability for processes, programmes and outcomes, and continued developments in these areas will be important. Without continued and high levels of public confidence in the work of our higher education institutions, there is a risk that greater controls will be put in place at central levels that paradoxically will run the risk of reducing quality and responsiveness. Areas such as the unnecessary duplication of programmes between institutions need to be addressed through greater collaboration in planning and provision. Equally, cooperation and amalgamation is important for achieving critical mass in research; the considerable progress made in this area needs to be continuously strengthened.

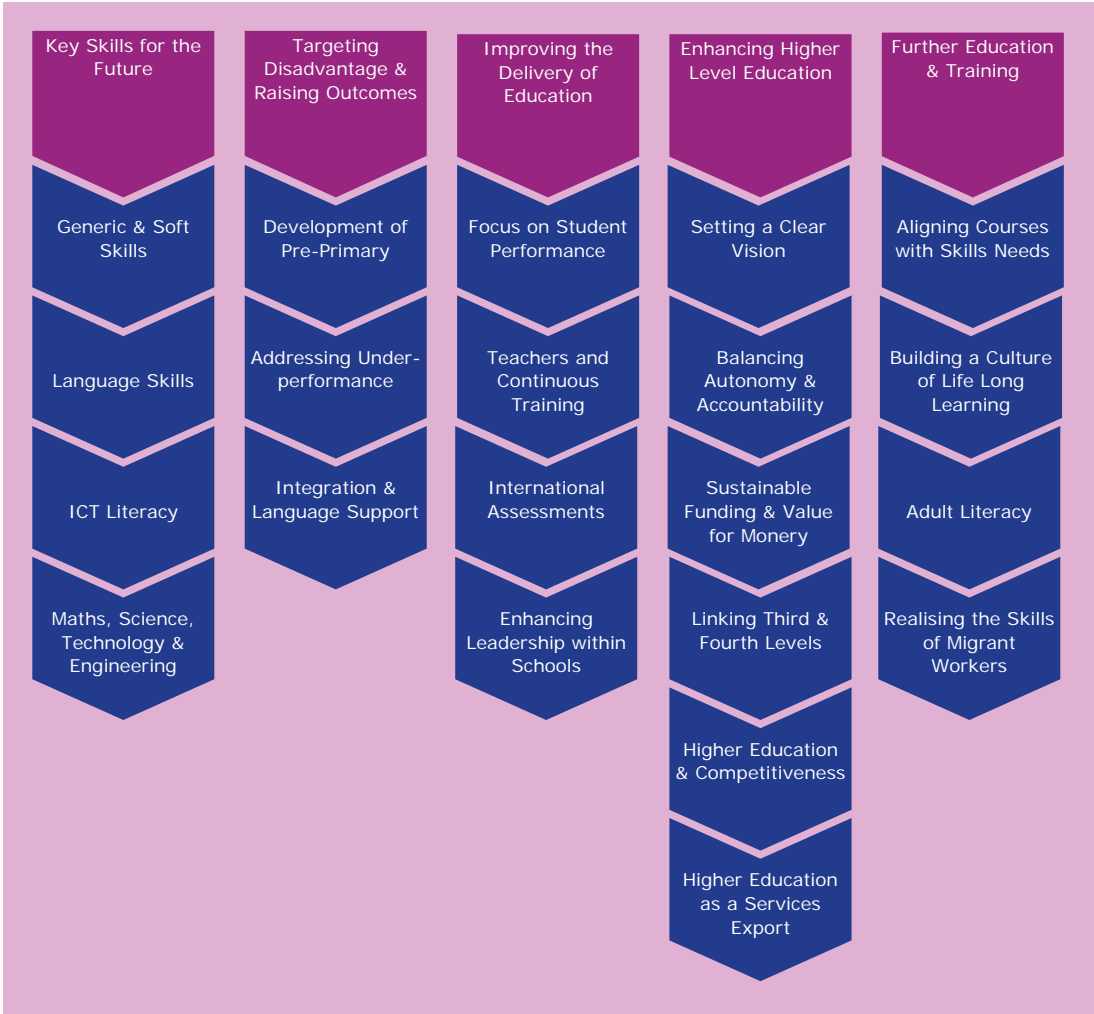
The current arrangements whereby undergraduate student fees are largely met by the Exchequer are no longer sufficient to meet the funding needs of higher education institutions on a sustainable long-term basis. The NCC believes it is appropriate and equitable that graduates, who will benefit significantly from higher education in terms of increased earnings over the course of their life, should contribute a portion of the cost of their education. Moving towards this does not necessarily require the introduction of upfront tuition fees; many other approaches involving income-contingent loans and graduate taxes have been adopted in other countries. Care should be taken that any measures to increase contributions from graduates or students, do not create new financial or psychological barriers to participation. A review of the structure and administration of the current inequitable and inadequate student maintenance grant system, where assets are excluded from the eligibility criteria and where income thresholds prove difficult to assess, is also required.

The NCC welcomes the Government's commitment to implement the *Strategy for Science, Technology and Innovation* by continuing to invest in developing a world class research system through the competitive funding mechanisms used for the Higher Education Authority's *Programme for Research in Third Level Institutions (PRTL)* and by *Science Foundation Ireland (SFI)*.

In the current downturn, building a culture of up-skilling is equally important for jobseekers and for the continuous development of skills among those already in employment. The provision of workplace-based training, fitted around working hours, needs to be actively promoted; and the inequitable treatment of part-time students in higher education also needs to be addressed. While investment in further education and training should be targeted in areas where potential exists for future employment growth, there is also a need for a pro-active up-skilling plan for the unemployed – particularly for those in construction who lack formal qualifications and those whose apprenticeships terminated mid-programme. Given the recent sharp rise in unemployment, it is important to strike an appropriate balance between devoting the necessary resources to retraining the newly unemployed to avail of opportunities in sectors with potential for employment growth and the longer-term objective of upskilling the entire workforce as set out in the *National Skills Strategy (NSS)*.

The paper examines these and related issues in greater detail, and sets out a range of policy options to ensure that our education and training system continues to support our competitiveness and is well placed to drive economic recovery. An overview of policy themes and recommendations covered in this paper is given in Figure A below.

Figure A: Overview of Policy Themes and Recommendations



1 Introduction and Overview

1.1 Background


The National Competitiveness Council (NCC) defines competitiveness as all those factors that influence the ability of firms in Ireland to compete in international markets in a way that provides Ireland's people with the opportunity to improve their standards of living and quality of life. Higher levels of education support both individual wellbeing and competitiveness. Ensuring better access to high quality education and training opportunities, especially among those from disadvantaged backgrounds, can raise both competitiveness and the wellbeing of society. To successfully compete on global markets, it is critical that Ireland has a highly skilled and well educated workforce. All other things being equal, higher skill levels boost labour participation rates, productivity and economic growth

The analysis and recommendations of the Council flow from a concern for economic performance and competitiveness. Nonetheless, education has an importance which transcends the economy and the Council has had regard to this in formulating its recommendations. The emphasis of this paper is on the role of the education system in contributing to national competitiveness. This focus should not be interpreted as implying that the NCC attaches a lesser importance to the social and cultural importance of education. The widely shared appreciation of the role that education and training plays in promoting economic and social development, and enhancing life chances, is one of Ireland's key strengths. This has benefits for individuals and society beyond the economic domain, where a rich educational experience makes a vital contribution to personal development. The NCC believes that its recommendations will contribute to achieving progress in all these wider and equally important areas of concern.

1.2 Importance of Education to Future Economic Success

Our education system has played a key role in our economic transformation over the last three decades by equipping the Irish workforce with skills and qualifications that supported the growth of our internationally trading manufacturing and services sectors. Bold reforms and increases in education investment as far back as the 1960s have provided a skilled pool of human resources and enabled Ireland to take advantage of the new business opportunities arising from increased globalisation. In 2008, 34 percent of the Irish labour force (aged 25-64) had completed some form of higher education, compared to four percent in the early 1970s. Similarly, the number of persons holding a primary education (or less) has fallen from circa 60 percent to 14 percent over the same period². Significantly, such strong educational outcomes have been produced with relatively modest public financial resources³.

Globalisation and technological advances are continuously changing the business environment and demand for skills in virtually all countries. As knowledge and creativity increasingly become the basis of competition, high skill levels are vitally important to economic performance and living standards. Without a world class education and training system Ireland will have great difficulty in



succeeding in the face of intensifying global competition and in protecting recent increases in our living standards.

The *National Skills Strategy (NSS)* sets out a vision of Ireland in 2020 in which a well-educated and highly skilled population contributes to a competitive, innovation-driven, knowledge-based, participative and inclusive economy. Specifically, the strategy concludes that if Ireland is to realise this vision of a new knowledge economy that can compete effectively in the global market place, it requires enhancing the skills of the resident population, increasing participation in the workforce, and continuing to attract highly skilled migrants. The strategy targets are summarised in Box 1.

The entry of China and India into the world's trading system has introduced a large and increasingly skilled supply of labour to the internationally-traded economy. The implications of this for low value-added sectors of the economy are already clear in terms of declining market share in parts of manufacturing, job losses and downward pressure on profits and wages. High performing and high income economies increasingly rely on a culture of innovation, continuous learning and activities that require critical thinking and complex communication. Occupations are becoming more knowledge-intensive, with a corresponding rise in the requirement for qualifications and technical skills. ICT and automation, through enhancing productivity, will continue to create new occupations and fresh demands for skills inevitably rendering other skills obsolete⁴. To compete individually and nationally, employees need to develop a range of generic and transferable skills including a breadth of knowledge and understanding of business and customer needs. The NCC believes these global shifts in the nature of skills pose a stark challenge for Ireland. We can meet this challenge through a shared ambition to make Ireland's education and training system one of the best in the world⁵.

Section two of this paper assesses the current performance of Ireland's education system, while section three outlines the changing skills needs of the economy. The remaining sections focus on maximising students' achievements through tackling disadvantage as early as possible in the educational lifecycle (chapter four); improving the delivery of education in the context of new fiscal constraints (chapter five); enhancing our system of third level education, achieving value for money in its operation and equipping it with sustainable sources for finance (chapter six); and finally enhancing our systems of further education and life-long learning to provide targeted retraining opportunities, along with expanding access and participation (chapter seven).

Box 1: National Skills Strategy

The Strategy proposes that by 2020:

- 48 percent of the labour force should have qualifications at National Framework of Qualifications (NFQ) Levels 6 to 10 (Third level certificate and above);
- 45 percent should have qualifications at NFQ levels 4 and 5 (Leaving Cert or equivalent); and
- The remaining seven percent should have qualifications at NFQ levels 1 to 3 (up to and including Junior Cert).

In order to achieve these objectives, it will require:

- An additional 500,000 individuals within the workforce to progress by at least one NFQ level;
- The proportion of the population aged 20-24 with Leaving Certificate or equivalent vocationally-oriented programmes should be increased to 94 percent. The retention rate at Leaving Certificate needs to increase from 82 percent in 2006 to 90 percent by 2020; and
- The progression rate to third level education will need to increase from 55 percent in 2004 to 72 percent by 2020.

2 Performance of the Irish Education System

Ireland's steady increase in educational attainment has been an important factor behind our recent success. A wide range of overseas investors and others have highlighted skill levels as a key strength of Ireland as a location for enterprise. Notwithstanding substantial progress, the NCC believes that further potential exists to enhance the performance of Ireland's education and training system. The OECD notes⁶ that Ireland is, "well below the OECD's best performers in terms of the quantity and quality of education. Its economic structure and its ambitious target for R&D both require a more skilled workforce than the average country". In this context, it is vital to realise the potential of our education and training system to advance further and for policy initiatives to be ambitious.

This section provides a summary assessment of the performance of Ireland's education system based on a life cycle approach of an individual as they move through the education and training system. Appendix 3 provides a more complete analysis.

Pre-primary education is considered the most important level of education in an individual's cognitive development, as educational progress is cumulative for most individuals.

- Participation rates in state-funded pre-primary are extremely low in Ireland by international standards. The percentage of Irish three year olds in state-funded education in 2005 was 1.7 percent compared to an EU-14 average of 82.2 percent (see Appendix 3, Fig. 4). Some reasons for this include; insufficient capacity in services with a high-quality educational component; low levels of female participation in the labour force historically; and predominance of unpaid care provided in the home by mothers, grandmothers and other relatives. Ireland has made very limited progress in realising the benefits of early childhood education.
- Pre-primary education in Ireland, where availed of, is predominately privately funded. The State supports a small number of pilot schemes, which are focused on disadvantaged groups.
- The current focus of Government policy is on the provision of additional childcare places, with only 20 percent of the 50,000 childcare places planned in the National Development Plan (2007-2013) allocated for pre-primary education.

Primary education consists of the first years of formal, structured education that occurs during childhood.

- Participation in primary education in Ireland is close to universal⁷.
- Spending per student has increased significantly in recent years, and both teacher/student ratios and class sizes have moved towards the OECD and EU averages.
- The number of teaching hours at primary level exceeds the OECD average, although the school year is shorter than average. This may not be the optimum balance.
- The amount of time spent on the key skills of mathematics, science and technology is among the lowest in the OECD.
- The quality of teaching candidates entering primary education is a key strength.
- In terms of outputs and results, limited Irish data are available on the performance of students at primary level as Ireland does not participate in some international assessments of

performance. Longitudinal data from various national assessments in English reading and mathematical achievement have shown no increase in scores during the period 1999 to 2004. Additionally, the relative performance of pupils in designated disadvantaged schools has shown no improvement over the same period⁸.

- Government policy has paid particular attention to meeting the ongoing challenge of providing schools in rapidly growing communities, reducing social exclusion, providing for special needs and revising curricula.

Second level education plays a key role in preparing students to progress to tertiary education, further education or the workplace.

- Ireland has made significant progress over time and relative to other countries in terms of increasing second level school participation rates, and the Leaving Certificate completion rate currently stands at 82 percent⁹. Though still unacceptably high at 11.5 percent in 2007, the proportion of early school leavers compares favourably to 15 percent in 2000 and an EU-15 average of 16.9 percent in 2007¹⁰.
- As with primary level, expenditure at second level has increased significantly in recent years.
- The average number of hours of tuition received by 12-14 year olds is among the lowest in the OECD for science subjects.
- The availability of computers in Irish schools remains very low relative to leading countries and ICT is not effectively integrated into teaching practices.
- Government policy has focused on meeting the ongoing challenge of providing schools in rapidly growing communities, reducing social exclusion, providing for special needs and revising curricula. For example, a revised syllabus for second level mathematics, launched on a phased introduction from September 2008 is a promising development.

Further education includes education and training which occurs after second-level schooling but falls outside the third level system (e.g. post Leaving Certificate courses, apprenticeships). Further education courses are provided free of charge to participants.

- In 2006, 130,226 FETAC awards were made, with 51 percent of all recipients aged 30 or under¹¹.
- The current focus of Government policy is on increasing participation in this area and enabling participants in further education and training to enhance their skills and to progress towards a third level qualification.
- An additional 5,000 places in further education were provided over the period 2002-2007, including a 50 percent increase in the number of adult literacy places and an expansion in PLC places to 30,200.
- *Budget 2009* reduced capacity in the *Back to Education Initiative (BTEI)*, with a total of 9,000 BTEI places expected during 2009 - a reduction of 500 places.

Tertiary level encompasses the university sector, the institutes of technology, the colleges of education, private colleges and a number of other third level providers.

- Participation in Irish third level education has increased substantially in recent years.

- Ireland's younger population is considerably better qualified than older cohorts, with 41 percent of the 25-34 age group possessing a third-level qualification. This compares very favourably with the OECD average of 35 percent.
- Participation rates continue to grow; the participation rate among the school leaving cohort has risen from 44 percent in 1998 to 55 percent in 2004.
- Mature students comprise a significant and growing share of Ireland's third level student population (11.7 percent in 2007/8), reflecting adult education and access initiatives among universities and other providers¹².
- The number of mathematics, science and computing graduates as a percentage of total graduates in all fields is high in Ireland in comparison to other EU countries¹³.
- Expenditure per student on teaching and research has increased significantly in recent years, but as a percentage of GDP it remains behind that of the leading countries and institutions.
- Irish institutions have performed well in expanding student numbers rapidly. Notwithstanding their limitations, the available international rankings¹⁴ indicate that while improving, Irish institutions still have considerable progress to make before they reach the demanding standards set by leading institutions overseas.

Fourth level education comprises Masters, PhD and post-doctoral research (NFQ levels 9 and 10). Ireland is at an early stage in the development of our fourth level system. While the numbers in fourth level in Ireland remain proportionately below those in leading countries, significant funding has been allocated to this area.

- The *Strategy for Science, Technology and Innovation (SSTI)* is currently being implemented to increase the number of fourth level students.
- In 2006 Ireland produced more PhD graduates per 1,000 of population than the EU-15 average¹⁵.
- Despite a large increase in actual expenditure on R&D (1.5 percent of GNP in 2006), Ireland still has a considerable distance to reach the 2013 target of 2.5 percent of GNP, set in the *Strategy for Science, Technology and Innovation (SSTI)*. The OECD average for total expenditure on R&D is 2.34 percent of GDP.
- The number of researchers per 1,000 in employment has grown from five to six over the period 2000-06.
- Despite strong growth rates in expenditure, business R&D as a percentage of economic activity has remained relatively static over the past decade¹⁶.

Lifelong learning is defined as all learning activity undertaken throughout life with the aim of improving knowledge, skills and competencies. Participation rates remain relatively low in Ireland.

- Eurostat data indicates that in 2007, 7.6 percent of the Irish population aged between 25 and 64 were in receipt of education in the four weeks prior to a survey¹⁷, compared to an EU-15 average of 12 percent.
- There are a number of perceived barriers to lifelong learning, including questions over who should bear the financial and training leave costs.

3 Key Skills for the Future

The skills needs of the Irish economy are changing. The sectoral restructuring that we have seen in recent years, in common with most developed countries, is likely to accelerate despite the profound changes in the world economy triggered by the current economic downturn. In particular, the services sector is likely to increase in relative importance. At an occupational level, the greatest increases in employment are expected to occur in the professional, associate professional and personal and services groupings.

The current broad holistic nature of the Irish school system is conducive to fostering flexibility and adaptability among young people¹⁸. From a competitiveness perspective, this is a major strength. Notwithstanding this, significant improvements are required in outcomes and competencies in the fields of “soft” skills, languages, ICT literacy, science, mathematics and engineering.

3.1 Generic and Soft Skills

The greater prominence of high-tech manufacturing, internationally traded services and R&D activities in Ireland’s economy means that Irish people need high standards of generic skills to complement their academic or vocational ones. These skills include critical thinking as well as self-management and self-directed learning, communication and influencing skills and team working. It is important that curricula and assessment mechanisms promote the development of these skills and embed entrepreneurship and innovation at all levels. Rote learning towards final examinations contributes little to developing these skills and is an obstacle to innovative teaching practices.

3.2 Language Skills

The ability of people working in Irish-based enterprises to communicate effectively with other nationalities will have a huge bearing on how successful we are and how we interact with other cultures in a globalising world. Foreign language skills will play a crucial role and need to be developed throughout the education system and become more aligned with key trading partners and the emerging economies, such as China. Recent immigrants to Ireland speak a broad range of languages and this is a valuable resource.

3.3 ICT Skills

The use of information and communications technology is reshaping how we work and live. Ireland’s ability to maximise the benefits of ICT and to remain a leading provider of ICT goods and services is dependent on ICT literacy levels. Ireland’s future competitive advantages are likely to be in internationally trading sectors (e.g. software, high-technology manufacturing, financial services, and other business services) that depend on advanced telecommunications infrastructure and an ICT literate population. ICT has the potential to enliven learning in science, engineering and technology subjects, which underpin the skills on which future competitiveness will be based.

The availability of computers in Irish schools remains very low relative to leading countries and ICT is not effectively integrated into teaching practices. Between 2000 and 2005 the number of pupils per computer in schools fell from 16 to 11 and 9 to 7 at primary and second level respectively¹⁹. Progress in terms of how we teach ICT skills or how we use ICT in educational and training processes

has been limited²⁰. There is an urgent need to improve ICT infrastructure across a range of areas including broadband speed and access, technical support and school networking.

Notwithstanding dramatic changes in the public finances, the NDP commitment of €252 million for ICT development in schools is vital for the future competitiveness of the Irish economy. A number of innovative avenues of delivery remain to be explored, including the feasibility of acquiring low-cost competitively-procured (or leased) netbooks²¹ to second level students, degrees of cost sharing with parents, and exploiting the significant economies of free/open-source operating systems and applications²².


The success of the *Strategy for ICT in Schools* initiative depends on successfully integrating technology into school curricula. Localised pockets of excellent practice in ICT adoption demonstrate the potential of the strategy to improve teaching methods. Professional development and collaboration among teachers is essential to ensuring the system-wide adoption of ICT, encouraging innovative teaching methods and building skills and confidence.

3.3 Mathematics, Science, Technology and Engineering Skills

The success of Ireland's strategy to reposition industry towards knowledge intensive high-technology sectors will depend critically on the supply of people with mathematics, science, engineering and technology skills. Ireland is the leading EU country in terms of the proportion of mathematics, science and computing graduates per 1,000 of population aged 20-29 in (21.4 in 2006), compared with 13 per 1,000 of population for the EU as a whole, 10.3 per 1,000 of population for the US, and 14.4 per 1,000 of population for Japan. The number of mathematics, science and computing graduates as a percentage of total graduates in all fields is high in Ireland in comparison to other EU countries. However, the declining proportion of CAO acceptances in engineering, computing and science and falling entry points requirements in recent years are worrying.

In OECD PISA assessments, Ireland ranks 14th and 16th respectively out of 30 OECD countries in terms of scientific and mathematical literacy. OECD data shows that the time spent teaching science and mathematics in Irish primary and second level schools is noticeably lower than in other countries. In fact, the time devoted to science teaching at primary level is just half the OECD average (see Appendix Figure 13)²³. Low interest in mathematics and science at Leaving Certificate and tertiary level could be addressed by better subject marketing within schools and through a combination of formal career guidance and site visits to companies who value these skills.

Mathematics is particularly important because it underpins many other disciplines such as science, technology, engineering, business and finance. The *Expert Group on Future Skills Needs (EGFSN)*, among others, has raised concerns that our stock of mathematical capability has shown no improvement in recent years²⁴. The proportion of candidates taking higher level Leaving Certificate mathematics has dropped slightly from 18 percent of the overall cohort in 2001 to 17 percent in 2007 and continues to lag other subjects considerably²⁵. It is important to address longstanding concerns about the levels of take-up and attainment in Leaving Certificate mathematics. Modest



levels of attainment in mathematics at junior second level are feeding into poor performance and low levels of interest in higher level mathematics²⁶. The *Project Maths* initiative is a promising development. It will implement syllabus change focussed on problem-solving, understanding concepts, contexts and applications²⁷. It will provide accompanying professional training for teachers and incremental reform of examinations in second level schools. Further efforts should be explored to address the perceived disincentives to devoting time and effort to mathematics at higher level, ensuring a suitably equipped flow of entrants into undergraduate mathematics, science, technology and engineering courses. The Expert Group's recommendation to introduce bonus points for higher level Leaving Certificate mathematics should be given immediate consideration, and perhaps broadened to include closely related subjects (for example, applied mathematics, chemistry and physics).

The quality of teaching of mathematics at both primary and second level is essential to improving mathematics proficiency. Best performing countries focus on the continuous professional development of their teachers and innovations in teaching. The availability of teachers whose primary degree qualification is in mathematics is strongly related to the overall quality of the teaching and learning experience for students²⁸. A recent report from the Inspectorate of the Department of Education and Science stated that 28 percent of new primary teachers felt, "poorly prepared," to teach mathematics²⁹. The Royal Irish Academy estimates that as few as 20 percent of teachers of second-level mathematics studied it as a major subject beyond the first year of their primary degree³⁰. The EGFSN recommends that professional development opportunities for second-level mathematics teachers should be enhanced, including through a professional masters degree and a part-time higher diploma in mathematical education, and that consideration be given to the introduction of a four year honours degree in mathematical education. Implementation of these recommendations will contribute to improving national mathematical performance.

Key Recommendations on Skills for the Future

The skills needs of the economy are changing. It is important that Ireland's education and training system responds to the needs of the economy in terms of working to improve aptitudes and competencies in the fields of soft skills, languages, ICT literacy, science, mathematics and engineering.

- Curricula and assessment mechanisms should promote the development of critical thinking, self-directed learning, communication and influencing skills, team working and embed entrepreneurship and innovation at all levels. Rote learning towards final examinations contributes little to developing these skills.
- Foreign language skills need to become more aligned with key trading partners.
- Despite the harsh fiscal climate, implementation of the *Strategy for ICT in Schools* is vital. A number of avenues remain to be explored, including the feasibility of acquiring low-cost competitively-procured (or leased) netbooks to second level students, as well as exploiting the significant economies of open-source operating systems and applications. Success also depends on successfully integrating technology into school curricula.
- The recruitment of qualified mathematics teachers and their professional development is critical to improving mathematical proficiency, and the recommendations of the *Expert Group on Future Skills Needs* in this regard need to be implemented.
- Measures to increase the amount of time dedicated to studying science and mathematics in schools and to address the perceived disincentives to studying mathematics at higher level for the Leaving Certificate should also be considered and implemented.

4 Targeting Disadvantage and Raising Student Outcomes

Participation in education and training offers every person in Ireland the means to participate in the economy to their fullest potential – increasing employment opportunities, boosting productivity, income levels and national competitiveness. Education policies that support competitiveness also enhance social justice, through addressing inclusion and furthering individuals' life chances. Extensive research highlights that low skilled individuals are more likely to be unemployed, at risk of unemployment and that earnings are closely related to education levels. The current economic slowdown reinforces the importance of high skill levels within the labour force.

In the context of life-chances, equity and competitiveness, the Council is concerned that 11 percent of young people, aged 18 to 24, exit formal education without a Leaving Certificate or equivalent qualification. In economic terms they represent an underutilised resource in the economy and an obvious priority group for skills training and education³¹. Tackling educational disadvantage is a complex issue as it comprises a range of intertwining social, cultural and economic factors – many of which are outside the control of teachers, schools/colleges and Government. In order to achieve the *National Skills Strategy* targets of a 94 percent completion rate at second level with 72 percent progression to third level by 2020, Ireland will have to make further progress in breaking the cycle of educational disadvantage.

4.1 Long-Term Development of the Pre-Primary System is Critical

“Skill begets skill; motivation begets motivation. Early failure begets later failure.”

– James J. Heckman, Nobel Laureate

Pre-primary education is a key determinant of student performance at all levels of education as it leads to improvements in students' skills levels, motivation and the propensity to learn, which in turn raises the private and social returns from all future investments in their education^{32 & 33}. There is clear evidence that stronger pre-primary interventions could help to address educational disadvantage in Ireland, and in particular help to lower the drop-out rate from second level and raise enrolment at third level. Research indicates that there is a high return to early interventions and contrasting low return to remedial or compensatory interventions later in the life cycle³⁴. Pre-primary education also has important labour market benefits for parents of young children. Investing in pre-primary or early childhood education and care (ECEC) is a unique opportunity for public policy to promote social justice and productivity in the economy at the same time³⁵.

Provision of early childhood education and care services in Ireland is diverse and fragmented. Within the childcare sector, private child minders working from home form the major component of services. Many parents rely on informal provision by partners, family, friends and neighbours. Centre-based childcare in nurseries or crèches is mainly privately owned³⁶. Eurostat data show that only 1.7 percent of Irish three year olds were in education in 2005 compared to an EU-14 average of 82 percent. International evidence suggests that Ireland is under-investing in services for younger

children. Irish levels of investment in early education services for 0-6 year olds as a percentage of GDP were 0.45 percent in 2004, which considerably lags Denmark (2%), Sweden (1.7%), Norway (1.7%) and Finland (1.1%)³⁷. Ireland's pre-primary system is almost entirely privately funded, unlike the typical OECD system which is 80 percent funded by public expenditure³⁸.

The *Early Start* pilot project, which commenced in 1994, is the most significant publicly funded pre-school intervention scheme that currently exists in Ireland³⁹. However, childcare rather than pre-primary education is the key policy focus of the NDP which allocated €575 million for a *National Childcare Investment Sub-Programme (NCIP)*. €175million was spent on the *NCIP* in 2008. Notwithstanding year-on-year adjustments to capital spending in response to fiscal tightening, remaining expenditures should be linked to the rollout of national quality standards in early childhood care and education⁴⁰.

Due to the cumulative nature of education, the NCC believes that serious consideration should be given towards the long term development of a formal pre-primary education system in Ireland, mirroring the bold steps Ireland has taken in recent decades in the development of primary, secondary, tertiary, and more recently fourth level education. While this is a time of considerable difficulty in the public finances, the case for targeting expenditure where returns are greatest remains strong. Further work will be required to establish the full cost implications of establishing a pre-primary education system and to ensure a cost-effective approach to implementation. As a first step, the NCC encourages the extension and implementation of a comprehensive Government programme to support early childhood development, beginning with disadvantaged children.

Steps to Ensure a High Quality Service

Research indicates that the returns to public investment in pre-primary are lost unless young children receive a high quality service. Quality service implies lower child-to-staff ratios than other age-groups and well-trained providers. The OECD raised concerns about the general low-level of training and the ad-hoc development of training for childcare workers, which they linked with limited state involvement. It is estimated that 30 percent of childcare staff are without any qualifications in this field⁴¹. Qualifications range from teachers trained to international standards to child care providers with no formal training in child development. In Scandinavian countries professional tertiary-trained teachers are supported by childcare assistants which minimises the cost of providing a high quality service⁴². There is a clear need for a common quality accreditation system for centres and providers of early childhood care and education in Ireland.

Despite significant progress in expanding childcare services rapidly in the past decade through capital grants, the provision of early childhood education and care in Ireland remains patchy. The ongoing expansion of childcare places provides a good opportunity to move towards an integrated system that combines pre-primary education with centre-based day-care at the same location. In light of the pressures upon the public finances, the re-skilling and reorientation of the existing childcare sector is likely to be the most cost-effective way of expanding early childhood education. The State already spends considerable sums of money in this area: the Office of the Minister for Children spent €506 million on the *Early Childcare Payment* during 2008 alone and has budgeted a

further €322million for 2009. Replacing this poorly-targeted cash transfer with a targeted subsidy to accredited early childhood education and care providers would facilitate the adoption of national standards/curricula in the existing childcare sector – much of which has already received grant assistance for capital investment.

The cost of privately-funded early childhood education and care in Ireland is currently prohibitive, accounting for 30 percent of disposable income for dual-earners and 51 percent for lone-parents⁴³. A sharing of costs between private fees, targeted provider subsidies and tax efficient employer contributions would also address the financial handicap facing dual income families who allocate as much as 66 percent of their gross second income to childcare costs⁴⁴.

Box 4.1: New Zealand: Where Public Money Targets Quality

The expansion of early education services in New Zealand provides a model relevant to Ireland. Current public expenditure is targeted as a subsidy to service providers, ensuring a high quality service provided by well-trained professionals. Centre-based education and care providers are required to have 50 percent of their staff holding recognised early childhood teaching qualifications. This will increase to 80 percent in 2010 and to 100 percent in 2012, representing an ambitious up-skilling process across the entire sector. This initiative to enhance the quality of services is supported by growth in the numbers of graduates from early childhood teacher education courses at third level⁴⁵. Graduated subsidies for providers are tied to the proportion of registered teachers – providing a good example of a system where public money has led service quality improvements.

4.2 Intervening to Address Underperformance

While the nature of educational attainment is multi-faceted and schools alone cannot solve deep-rooted societal problems, there is a need to ensure that the programmes in place are as effective as possible. Concerns remain over the quality of education in disadvantaged areas. A study of primary schools in disadvantaged areas in 2004 identified pockets of low achievement⁴⁶. The report highlighted the fragmented school experience of many children, with an average of 36.5 percent of pupils in surveyed schools absent for more than twenty days in the school year. Many pupils leave primary schools with very low levels of reading ability and a poor grasp of basic mathematical concepts⁴⁷.

Underperformance at primary level means that significant numbers of Irish children enter second level schools at a disadvantage and with a limited range of skills. The 11.5 percent of Irish people aged 18-24 who have not completed the Leaving Certificate or equivalent remains too high. There are significant concentrations of under performance in certain locations. For example, in 2004 there was a wide variation in admission rates to higher education by Dublin postal district, ranging from 11.7 percent in Ballyfermot to 86 percent in Rathfarnham-Clonskeagh⁴⁸.

The NCC supports the introduction of more intensive and better targeted catch-up programmes at early stages, in order to ensure that young people leave school with the confidence and skills to lead full and productive lives. In this context, it is important that the Department of Education

appraises the effectiveness of the *Delivering Equality of Opportunity in Schools* (DEIS) programme. It is important to ensure that the selection criteria for targeting resources on schools which have a high concentration of pupils from disadvantaged backgrounds do not penalise schools for improving their performance, and equally that other pupils from disadvantaged backgrounds in non-designated schools are not overlooked.

4.3 Integration and Language Support

The future development of the education system needs to have regard to supporting a more diversified student population and workforce as part of the single European labour market, as over 200 million EU citizens are now entitled to live and work anywhere within the EU. Notwithstanding a likely outflow of some recent immigrants to Ireland, it is essential to ensure that recent immigrants are integrated into the formal education and training system at all levels and that their children make smooth and successful transitions into the primary and second level system and beyond. While the number of language assistants in schools has risen rapidly⁴⁹, there will be an ongoing need to protect the provision of language support for new children within the mainstream curriculum⁵⁰. The development of a formal pre-primary system would encourage the integration of the children of recent immigrants at an early stage, helping to ensure that their performance will not be constrained by language difficulties⁵¹.

Key Recommendations for Targeting Disadvantage and Maximising Outcomes

- The NCC supports the long term development of a formal pre-primary education system in Ireland, mirroring the bold steps Ireland has taken in recent decades in the development of primary, secondary, tertiary, and more recently fourth level education. Specifically:
 - 1 The seeds of educational disadvantage are sown early in a child's development. We need to ensure sufficient capacity to integrate under-privileged children into education at the earliest stage possible and to free their parents for work or work-related training;
 - 2 Ireland needs a common quality accreditation system for providers of early childhood care and education;
 - 3 Provision of early childhood education and care should be integrated, combining pre-primary education with centre-based day-care at the same location;
 - 4 Reorientation of the existing childcare sector is the most cost-effective way of expanding early childhood education; and
 - 5 The poorly-targeted *Early Childcare Payment* should be replaced with a targeted subsidy to accredited ECEC providers, which would also facilitate the adoption of national quality standards in ECEC.
- Notwithstanding forecasts of net outward migration for 2009, the provision of language support for the children of recent immigrants will continue to be important.

5 Improving the Delivery of Education in Irish Schools

Ireland's education and training system has responded well to the changes in the Irish economy and society in recent decades, particularly in terms of accommodating rapid increases in student participation in primary, secondary and more recently third level education. As globalisation, technology and other factors change the nature of skills required in the economy, we need to ensure that our education and training sector responds in terms of the range of services it provides and how it delivers these services. The education system must adapt to these changes and be open to reforms focussed on improving the quality of the learning experience that our students receive.

5.1 Focus on Student Performance

Education policy should be driven by a strong focus on student outcomes. To date, much of the debate on education is defined in terms of expenditure per student and pupil-teacher ratios rather than on educational systems, practices and student achievement. Discussions on funding levels are important; but excellent teachers, policies, strategies and processes are even more important for achieving strong outcomes. There is a lack of concrete evidence that lower teacher-pupil ratios enhance student outcomes.

Evidence indicates that while spending on educational institutions is a necessary prerequisite for the provision of high-quality education, spending alone is not sufficient to achieve high levels of outcomes⁵². Factors such as greater school autonomy and parental choice are important in stimulating better outcomes. Analysis of OECD PISA test scores undertaken by the Educational Research Centre suggests that while expenditure on education is related to performance, the strength of the relationship is weak⁵³. Overall, evidence on the effects of variations in class size upon student performance is very mixed⁵⁴. Most international studies highlight that policies based on quantifiable input measures such as class sizes will not yield significant improvements in student performance, except for very young pupils⁵⁵. Not least, an excessive focus on class size deflects scarce resources from other strategies such as:

- Formalising the professional development of our teachers;
- Modernising career structures and promotions;
- Attracting the best new entrants and training them to the highest standards; and
- Providing students and teachers with suitable physical (e.g. school buildings, science labs, sports facilities) and technological infrastructure (adequate computers and broadband access).

5.2 Importance of Teachers and Continuous Teacher Training

Teacher quality is fundamental to the success of the education and training system, and appears to affect student performance more than any other factor⁵⁶. Good teachers have the ability to stimulate and endow their students with a spirit of enquiry and a love of learning. Education is not just about delivering and memorising content; it is critical that education and learning promote the importance of reasoning, critical thinking and soft/generic skills important for maximising life

chances in the labour market and outside it. International evidence suggests that a number of conditions need to be met to ensure a quality teaching profession:

High Status and Rigorous Selection Processes

Teaching should be a prestigious profession with competitive salaries and conditions of service⁵⁷. It should attract candidates from among the most talented people in the population. This includes both school leavers as well as people with valuable experience and insights gained in other areas of work. It is also essential that teaching attracts both male and female candidates. The attraction and rigorous selection of talented individuals into teaching careers is a core aspect of some of the best-performing education systems such as Finland and Singapore⁵⁸. OECD data shows that the top performers in PISA rankings pay little more than average starting salaries, indicating that the status of the profession and rigorous selection standards are important in ensuring that bright and highly motivated students are attracted to a career in teaching.

Ireland continues to attract very good candidates into teaching; the profession is well paid and offers attractive working conditions⁵⁹. The minimum number of Leaving Certificate points required to enter primary education training courses in 2008 was 465 points – placing candidates for primary teacher training in the top 16 percent of their Leaving Certificate cohort. There is also a rigorous selection process for admission to the second level teaching profession via the H.Dip.Ed. entry route. High standards should be maintained for these and other entry routes.

Continuous Professional Development

In Ireland, limited mechanisms exist to share best practice and to participate in and benefit from research on effective teaching methodologies. Professional and in-service development should be frequent, continuing and progressive during a teacher's career and not limited to introduction of new syllabi. Teachers should have opportunities to develop their skills and to benefit from peer review and collaboration with colleagues, including during initial training^{60 & 61}. This is especially important in an age when new developments in information technology have increasing capacity to empower teaching and learning. Such mechanisms for developing the skills of teachers, and the quality of their teaching, represent the best path to improving student performance.

The NCC believes that policy initiatives should focus on the quality of instruction and interaction within the classroom. The Teaching Council⁶² could play a key role in setting out an ambitious framework for teacher professional development and actively safeguarding the high status of the profession – for example through linking registration to requirements for continuous training as is the case in some other professions. It is important that the review by the Teaching Council of necessary competencies develops into a coherent approach to teacher professional development, allowing teachers to enhance their skills and learn from best practice⁶³. Teacher training should involve considerable teaching practice under the supervision of experienced teachers. Periodic career breaks to other professions and industries can also be beneficial to teachers and students.

Identifying and Rewarding Excellence

Despite the importance of teaching quality to student outcomes, performance standards are not well defined or monitored at teacher level. Outstanding teachers are often not recognised for their excellence as might occur in other professions, particularly as seniority currently determines most promotional opportunities in most second level schools. The NCC welcomes the progress made in 2008 on broadening the criteria for promotion in second level schools to a merit based scheme which will replace the current system based on seniority on a phased basis from September 2009. Additionally, unlike other professions, teacher associations are primarily focused on industrial relations matters rather than being formal professional bodies focussed on training, standards and professional development.

5.3 Importance of International Assessments

Participation in international student assessments programmes is vital for measuring performance and identifying relative strengths and weaknesses vis-à-vis others countries. Ireland has not participated in either the *Trends in International Mathematics and Science Study* or the *Progress in International Reading Literacy Study* since 1995. Linking funding to outcome targets requires adequate information. Lack of data makes it more difficult to assess the performance, set targets and evaluate outcomes for Ireland's education system. It is important for Ireland to participate in future international assessments.

5.4 Enhancing Leadership within Schools

Effective leadership within schools is critical to the experience of students and their learning outcomes. The organisation of the Irish education system is highly centralised and governance structures in schools are complex. While schools in Ireland enjoy significant autonomy in terms of teacher selection and the organisation of teaching time, as a result of private ownership structures, schools nonetheless face considerable administrative requirements in complying with policy initiatives and new and existing legislation. The voluntary nature of school Boards of Management means that in practice this burden often falls disproportionately on principals.

A recent report highlighted that teachers are less willing to apply for the position of principal in second level schools than in the past⁶⁴. The workload involved in school administration often means that principals do not have the time to act as leaders of learning in schools. While principals should be accountable for their performance, there is concern that too much of their time is consumed with administrative returns. Accordingly, there would be value in reviewing the role and responsibilities of principals and the system of administration in Irish schools.

- The emergence of an effective management structure in schools, allowing principals and teachers to focus on learning outcomes, has been hindered by a promotions system built on seniority and a culture of entitlement. It will be important that the recent agreement on merit-based criteria for promotion translates into the ability for principals to distribute responsibility and tasks to those best qualified to assist in running the school effectively.
- Professional advice should be available to Boards of Management through the Department of Education and Science, in order to allow them fulfil their obligation to deal with legal issues,

and the logistics of meeting the investment needs of their schools. Additional administrative support on financial returns and budgeting would free up time for principals to focus on improving the quality of students' learning experience.

- Greater autonomy for schools and principals in deciding how to allocate funding in line with the particular socioeconomic or geographic needs of their school could enhance the efficacy of school funding. Initiatives identified by principals, addressing the specific needs of their pupils, should have clearly articulated aims and targets, should be embedded in the whole school plan and should be monitored on a regular basis. In addition to capitation based funding, incentive funding could be made available to schools where they meet or exceed agreed outcome targets.

Key Recommendations on Improving the Delivery of Education in Irish Schools

Education policy should be driven by a strong focus on student outcomes. To date, much of the debate on education is defined in terms of expenditure per student and pupil-teacher ratios rather than on educational systems, practices and student achievement.

- Initiatives should focus on the quality of instruction and interaction within the classroom. Curricular reform and investment in teachers' skills is the best means of improving student achievement.
- A coherent approach to teacher professional development is urgently required. The Teaching Council's review of necessary competencies should drive this forward as early as possible.
- Teacher education and training should be of a high quality and should involve considerable teaching practice under the supervision of experienced teachers.
- Professional and in-service development should be frequent, continuing and progressive during a teacher's career and not limited to introduction of new syllabi. Teachers should have opportunities to benefit from peer review and collaboration with colleagues.
- Outstanding teachers should be recognised for their excellence through the promotion system.
- The role and responsibilities of principals needs to be adequately defined and supported. An effective middle management structure in schools would enable principals and teachers to focus on the quality of students' learning experience.
- Greater autonomy for schools and principals in deciding how to allocate funding in line with the needs of their school could enhance the efficacy of school funding; while incentive-linked funds could enable schools and colleges to pursue excellence and achieve agreed outcome targets.

6 Enhancing Ireland's Higher Level Education System

The higher education sector is critical to developing an innovation intensive economy, particularly in those sectors where Ireland competes for international trade and investment. The development of the higher education sector in Ireland has been a major achievement, underpinning the increasing sophistication of the economy and the recent rise in living standards. Within the OECD, Korea, Ireland and Spain have achieved the greatest increases in third level participation in recent decades. In 2008, 34 percent of the Irish labour force (aged 25-64) had completed some form of higher education. The key challenge now is to continue improving the quality and relevance of the education that students receive while expanding access and participation ever further.

6.1 Setting a Clear Vision for Higher Education

The NCC supports the development of a national policy framework that would clearly identify the expected outcomes to be achieved by the sector over the next decade from a public policy perspective and which would provide the higher education sector with the autonomy and funding required to achieve these outcomes. The current environment is characterised by acute uncertainty and apprehension regarding the future status of institutions. In the context of rising deficits among a number of higher education institutions, the importance of setting an agreed vision for both performance and revenue generation within the sector is more pertinent than ever.

The NCC believes that diversity, inter-institutional cooperation and competition are critical to the future success of Ireland's higher education system. Despite significant recent improvements, the world ranking tables for higher education institutions (HEIs) do not include any Irish institutions among the top institutions worldwide. Thanks to significant increases in State funding, there has been an increase in research activity accompanied by greater inter-institutional cooperation and collaboration. In contrast, at the undergraduate teaching level there are high levels of similarity between the courses offered by many HEIs and little evidence of significant inter-institutional cooperation in programme delivery. The challenge for Ireland's higher education system is how to create a system that enables and supports Ireland's leading institutions and academics to compete with the best in the world. All institutions should build on their strengths and, where appropriate, differentiate their activities on the basis of national, regional and sectoral needs. The NCC believes:

- Greater specialisation, amalgamation of courses/programmes among Irish institutions and greater cooperation both locally and internationally will be required if Irish HEIs are to reach critical mass and attain a level of performance that is comparable with leading institutions overseas.
- The distinct role of the Institutes of Technology in the provision of higher education should be maintained and strengthened. The *National Skills Strategy* clearly highlights that the types of skills being produced by the institutes will continue to be critical for our future success. The institutes have a vital role in providing a broad range of qualifications, applied research and

ensuring the vitality of regional economies and small and medium-sized enterprises nationwide⁶⁵.

- The Government's recent publication, *Building Ireland's Smart Economy*, indicated that new organisation arrangements, including a potential rationalisation or reconfiguration of roles across the higher education system, would be necessary. The rationalisation agenda should be carefully examined as part of the *Higher Education Strategy Review* process.

6.2 Balancing Autonomy with Accountability

Ireland needs to create and maintain a system of diverse, sustainable and high-quality institutions with the freedom to respond to the demands of students and the labour market. It is critical that HEIs have the autonomy and flexibility which enables them to develop strategically and respond to changing conditions. In this respect, Irish universities enjoy high levels of legal autonomy compared with equivalent publically-funded counterparts in other OECD countries and this is a major strength. The recent transfer of funding responsibility for the Institutes of Technology to the HEA has the potential to significantly enhance the strategic autonomy of the institutions in this sector. The benefits of greater autonomy should be readily identifiable through improved outcomes such as access, completion rates, research achievements and contribution to innovation across teaching and research.

Tensions will always exist within HEIs and more widely. There needs in all institutions to be a clear identification of institutional priorities for teaching and learning, research, and other services. Internal governance systems need to be consistent with these strategic priorities and supported by professional management of human resources, investment and administrative procedures. The NCC welcomes the substantial internal reforms which have taken place within higher education institutes, and encourages further actions to overcome the remaining inefficiencies resulting from inappropriate fragmentation into faculties, departments, laboratories and administrative units. Without continued and high levels of public confidence in the work of our higher education institutions, there is a risk that greater controls will be put in place at central level which paradoxically will run the risk of reducing quality and responsiveness.

6.3 Funding and Value for Money

Adequate funding is essential to enable Irish higher education institutions equip students with the highest quality of education available. While scope exists for more efficient use of existing resources, Irish institutions remain under-funded relative to institutions internationally, despite increases over the past decade. Achievement of the ambitious targets set for third and fourth level education will require sustainable funding structures for Irish higher education institutions. Additional funding, if required, will have to come from either public or private sources and the full range of options should be explored, including tuition fees, philanthropy and collaboration with local and regional businesses.

Sustainable Sources of Funding

The current arrangement whereby undergraduate student fees are largely met by the Exchequer is no longer sufficient to meet the funding needs of higher education institutions on a sustainable long-term basis. The NCC believes it is appropriate and equitable that graduates, who will benefit significantly from higher education in terms of increased earnings over the course of their life, should contribute a portion of the cost of their education. Moving towards this does not necessarily require the introduction of upfront tuition fees; many other approaches involving income-contingent loans or graduate taxation⁶⁶ have been adopted in other countries. Care should be taken that any measures to increase contributions from graduates or students do not create new financial or psychological barriers to participation. In conjunction with a revised student maintenance grant, a universal student loan system, and targeted tuition waivers based on both income and assets, the reinstatement of higher education tuition fees can provide for sustainable funding and should not be considered prima facie unjust towards lower and lower-middle income families.

Ultimately, it is important that any additional private funding would supplement a sustainable level of capitation income for HEIs from the State. An adequate level of public funding will be necessary, not least to forestall fully cost-reflective private tuition fees with large variations between courses. In addition, a review of the structure and administration of the current inequitable and inadequate student maintenance grant system, where assets are excluded from the eligibility criteria and where income thresholds prove difficult to assess, is also required.

Fees are only one element in determining educational participation, and the seeds to educational success are sown far earlier⁶⁷. Retention rates at second level and completion of the Leaving Certificate are important determinants of progression to third level. As argued earlier, public funds targeted at socially disadvantaged communities could be more effectively employed at pre-primary level.

Value for Money

While the need for greater investment in higher level education in Ireland is widely advocated, significant productivity and efficiency improvements can be made in the current delivery of higher level education, including new approaches to performance management. Reducing duplication by rationalising courses, increasing specialisation and developing critical mass could enhance the efficiency of HEIs. The NCC supports the new funding model being implemented by the HEA which includes significant strategic and performance-related incentives. HEIs should be increasingly funded more for what they do rather than for what they are, by focusing funding on relevant outputs. The NCC welcomes greater use of competitive funding mechanisms, where institutions compete with one another for funding, as an effective method of targeting resources at particular policy objectives such as skills needs. The establishment of the seven year *Strategic Innovation Fund (SIF)*, comprising €510 million of exchequer and locally matched funding, is a positive step in this direction. In the context of the future resource-needs of the sector, it is important to ensure that current resources in the higher education sector are being deployed in a way that provides the best value for money.

At the undergraduate level, a greater focus on performance-led funding, and/or the re-introduction of a more substantial student contribution, could make higher education institutions more innovative in terms of course content and delivery at undergraduate level. Greater student contributions to the costs of their education may also encourage students to choose courses more strategically and to maximise the private and social returns to education.

At the graduate level, recent moves by the research councils⁶⁸ and the HEA⁶⁹ to incentivise the creation of collaborative graduate schools with the aim of grouping expertise for the benefit of training PhD students across partner institutions will yield not just economies of scale in graduate education but will also act to counter inefficiencies where duplication in basic graduate training exists. The clustering of graduate education around centres of excellence should serve an important quality control function while also ensuring that PhD students from smaller departments share in the same exposure to leading academics in their field.


The current system of recruitment into academic faculties does not offer a well-structured entry-route with clearly defined expectations and incentive structures for young Ph.D graduates. Neither does it offer departments the opportunity to critically review the contribution of new faculty within a defined evaluation period. A formal “tenure-track” system would incentivise early-stage research and ensure that faculties benefit from highly-motivated, productive researchers and educators in the long run. Under this system, a tenured appointment would be conditional on demonstrated and internationally-competitive excellence across research and teaching.

6.4 Linking the Third and Fourth Level Sectors

The *Strategy for Science, Technology and Innovation* represents a very significant commitment to invest in building research and innovation capacity across the economy and contains a number of important targets which will impact on the education system. The Strategy sets major challenges for higher education such as:

- doubling the number of PhD graduates in humanities and social science, and science, engineering and technology within a four year completion cycle;
- attaining the necessary intellectual critical mass in key strategic areas like ICT and the bio-sciences;
- advancing the quality of our post-graduate and PhD training; and,
- strengthening arrangements for industry collaboration to support knowledge transfer.

The NCC welcomes Government commitments to implement the *Strategy for Science, Technology and Innovation* (SSTI). Despite rapid increases in research funding in recent years, Ireland will need to maintain high levels of R&D spending in order to close the gap in terms of facilities available to researchers in this country and those available in leading knowledge economies such as the US, Switzerland and Sweden.



In the course of this significant ramp-up in the fourth level sector, it remains critical that adequate focus and resources are retained to support the continued development of the teaching role in our universities and institutes of technology. The quality of undergraduate teaching is an important determinant of the quality of researchers at fourth level and of skills in the labour force more generally. It is critical that the teaching and research roles of our higher education bodies are complementary and mutually reinforcing. As such, excellence in undergraduate teaching should remain a core objective of the third level sector. While the institutional and professional incentives driving research excellence are important, quality undergraduate teaching must continue to be given equal recognition and incentives.


6.5 Higher Education Institutes as Drivers of Regional Competitiveness

Significant potential exists for HEIs to become stronger drivers of national and regional competitiveness and to form a key part in the development of industry clusters and networks. HEIs need to respond better and faster to the demands of the market and to develop partnerships with businesses and others, which harness scientific and technological knowledge. Stronger partnerships with the business community (including small and medium enterprises) bring opportunities for educational institutions to enhance the prospects for graduates. Placements have the potential to increase the relevance of education and training programmes, and improve the career prospects of students by adding entrepreneurial skills to scientific expertise. For example, a number of commentators have highlighted the potential of professional masters programmes for science disciplines, which would equip graduates with both scientific knowledge and broader multidisciplinary skills required by industry employers⁷⁰. The NCC would also favour the inclusion of business-related modules in the coursework for Ph.D degrees to ensure that new Ph.D graduates, particularly in science and engineering, can make early contributions to the commercial sides of their new employment and play an active role in research commercialisation and technology transfer.

Potential also exists for further collaboration and commercialisation of research results, for example through on-campus start-ups or the creation of science parks. Links with business can bring additional funding, for example to expand research capacity or to provide retraining courses, and will enhance the impact of university-based research on SMEs and regional innovation. This will require significant organisational change and efforts to build up entrepreneurial attitudes and management skills.

6.6 Positioning Higher Education as a High Value-Added Services Export

Strategically managed, the attraction of overseas students to Ireland could have a range of educational, economic, social and cultural benefits. Ireland performs relatively poorly in terms of attracting overseas students and is a net exporter of students. In 2006, foreign tertiary students comprised 6.8 percent of the student population in Ireland versus 14.1 percent in the UK (See Appendix 4.3, Figure 15)⁷¹.



The internationalisation of education presents significant growth opportunities for Ireland in terms of services exports. In Ireland, total income of €372 million was generated by international students in the academic year 2006/07 according to the International Education Board Ireland⁷². Recent UK research has highlighted that the UK higher education sector is a significant export industry in its own right (£3.74 billion). In both Australia and New Zealand, the generation of foreign earnings from education have now become major contributors to the economy and to the resourcing of the education system. There are also growing markets for the online delivery of courses to students in other countries.

Demand in this rapidly growing services sector is mainly fuelled by demand for high-quality education delivered in English. Ireland has potential strengths in this area. We have an education system which is well regarded internationally. Our membership of the European Union and our strong links with the United States are also major potential attractions. While the number of foreign students enrolled in tertiary education in Ireland has increased by 72 percent since 2000⁷³, other countries have moved further ahead in terms of developing their education systems as an international service, in addition to meeting domestic needs.

Priority attention should be given to the creation of a proactive, consistent and supportive policy framework for promoting Irish institutions abroad and attracting international students. Foreign students can bolster Ireland's stock of human capital, improve the quality of our HEIs, foster new economic, financial and political links, and promote tourism and exports of Irish goods and services. While there has been considerable consideration given to this issue, delivery of a coherent policy framework remains an outstanding issue. There is a need to deepen engagement with emerging economies (such as Brazil, Russia, India and China) and to market Ireland as an attractive location to study.

Key Recommendations on Enhancing Ireland's Higher Level Education System

Higher education institutes play a vital role in providing the Irish workforce with the skills required to compete successfully in the global economy and in developing an innovation intensive economy. It is critical to continue to improve the quality and relevance of the education that students receive, while expanding access and participation further. The NCC recommends:

- Achievement of the ambitious targets set for third and fourth level education will require sustainable funding structures for higher education institutions (HEIs). Additional funding will have to come from either public or private sources and the full range of options should be explored, including tuition fees, philanthropy and collaboration with local and regional businesses.
- In conjunction with a revised student maintenance grant, a universal student loan system, and targeted tuition waivers based on both income and assets, the reinstatement of higher education tuition fees can provide for sustainable funding and should not be considered prima facie unjust towards lower and lower-middle income families.
- Greater specialisation and amalgamation of courses among Irish HEIs is required in order to develop critical mass.
- Greater use of competitive funding mechanisms would yield productivity and efficiency improvements in the delivery of higher level education.
- Implementation of the *Strategy for Science, Technology and Innovation* is important. High levels of R&D spending provided on a competitive basis will contribute to closing the gap between facilities available to researchers in this country and leading knowledge economies.
- Ireland needs a proactive and consistent policy framework to promote Irish institutions abroad and to attract international students.

7 Further Education and Training

A wide range of providers, including FÁS, Vocational Education Committees, Fáilte Ireland (CERT), Teagasc, Bord Iascaigh Mhara, community education and training centres and workplace training schemes, deliver further education. There is a need for Government-wide coherence in the provision of further education and training courses. It is important that different arms of the State are operating from a shared view of the future skills needs of the economy and that policy, funding and resources are determined in a coherent fashion accordingly.

7.1 Aligning Courses and Skills Needs

The current challenge is to ensure that investments are targeted in areas where skills shortages exist or are forecast. Given the sharp increase in unemployment in 2008/09, driven by but by no means confined to the construction sector, it is critical that courses and in particular apprenticeships are reoriented to meet the needs of sectors with potential for future employment growth and to assist students to successfully transition from further education to higher education.


The construction sector provides particular challenges. The sector is declining from a cyclical peak and demand for labour within the sector will not return to previous levels. The NCC believes that:

- There is a need for a pro-active upskilling plan for the 20,000 workers in the construction sector who lack formal qualifications, those that have had their apprenticeship terminated mid-programme and the many relatively low-skilled workers who are now unemployed. New training opportunities at NFQ Level 6 and 7 may be required to enable workers to take advantage of opportunities in other sectors such as environment and energy-related goods and services and ICT. This will require a significant reorientation of the courses provided.
- Alternative progression routes are required for the 10-15 percent of the school leaving cohort that would traditionally have gone into apprenticeships in recent years. This traditional path is now effectively closed and FÁS, the Institutes of Technology and further education and training providers will need to develop viable alternatives courses for those school leavers previously attracted by the construction industry.

7.2 Building a Culture of Life Long Learning

While younger cohorts of the Irish population have benefited from the rapid increase in participation in tertiary education, older cohorts of the Irish workforce remain less qualified than the OECD average. A relatively large share of the working age population (34 percent in 2005) has no more than lower second level education (Junior Certificate)⁷⁴. In many cases, insufficient or incomplete formal education may hinder their ability to participate fully in society and place them at a greater risk of poverty. The current economic downturn underscores the need for all, particularly those with low skill levels and those in vulnerable firms, to upgrade their skills.

The increasing importance of knowledge-based economic activities has led to a continuing increase in the level of skills demanded by employers. In addition, as firms react to an ever changing market and shorter product cycles, career jobs are scarcer and individuals experience more frequent



changes in jobs over the working life. The consequence is that the shelf life of skills is shorter⁷⁵. Although sixty percent of the 2020 workforce is already employed, changes in technology and business processes will have rendered many of their skills obsolete by that time⁷⁶. These developments mean that the Irish education and training system must increasingly cater for the needs of those already in the workforce and facilitate lifelong learning in a meaningful sense.

Ireland performs relatively poorly in terms of the percentage of persons engaging in lifelong learning (7.6 percent of respondents aged 25 to 64 received education in the four weeks prior to the Eurostat survey in 2007⁷⁷). This remains below the Lisbon target of 12.5 percent, the EU-15 average of 12 percent and considerably behind the leading countries. In common with other countries, participation in lifelong learning is not uniform. Those with higher educational attainment access more training and critically those with little education receive the least training. The evidence also highlights that larger firms train more than smaller firms⁷⁸. The implication of this for facilitating and widening access to lifelong learning is that a greater focus should be placed on attracting into training those who need it most.

Ireland's favourable demographics have enabled a rapid and perhaps once off transformation of the skills and qualifications of the labour force. Notwithstanding the sharp rise in unemployment and the consequent need for retraining, upgrading the skills level of the workforce will be increasingly dependent on addressing the needs of those already in employment. However, the obstacles facing those who may wish to engage in up-skilling are considerable – time pressures, family commitments and financial barriers, together with an education system that was largely created and developed to meet the needs of young people leaving school⁷⁹.

The NCC believes that the implementation of the *National Skills Strategy* is critical. The strategy sets an ambitious target of up-skilling an additional 500,000 individuals within the workforce by at least one level by 2020 in the national framework of qualifications. This presents a challenge for Government, employers and employees in terms of how to create a culture and sense of shared responsibility for lifelong learning and decisions on appropriate investment levels and sharing of costs. Despite the current need for prioritisation of elements of the NDP, the NCC believes investment in human capital is critical if Ireland wants to maintain a healthy and viable economy in the future.

Ireland's targets for life long learning represent a significant challenge for the education and training system, particularly in terms of attracting those with lower skill levels (i.e. those with below Leaving Certificate or equivalent qualification). The NCC is concerned that a range of practical and workplace barriers may mitigate against employees re-engaging with education, not least that they may lack the confidence to do so. Equally, the value of training is often insufficiently recognised by both employers and employees themselves. A range of issues are outstanding for educational institutions:

- **Relevance of courses:** further work is required to ensure that publicly-funded education and training is appropriate for the needs of individuals and enterprise development. Greater collaboration is required between education and training providers, potential students and

employers who need these skills to compete. The focus of courses should be to deliver competencies required by the labour market.

- **Timing of courses:** many of our educational bodies are still primarily designed and structured to serve the needs of full time students. The provision of education and training courses necessitates more flexible and responsive provision. The provision of workplace based training, which is fitted around working hours, needs to be actively promoted. Similarly, trade unions can play an active role in encouraging and in some cases providing training.
- **Costs:** the cost of training should not act as a significant barrier for people eager to upskill. As outlined in the *National Skills Strategy*, it is important that the State should pay for the tuition of anybody seeking to reach levels 4 and 5 of the National Framework for Qualifications (the Leaving Certificate or equivalent). At third level, while full time students receive free fees, part time students are required to pay. Addressing this anomaly is an important part of broadening access to opportunities within life long learning.
- **Access to Information:** employees seeking to upskill need to be able to access a comprehensive source of information about courses and training programmes suitable to their desired employment outcomes in the form of adult career guidance.

7.3 Adult Literacy

Literacy is an essential skill and illiteracy is a major barrier to the development of other skills. Ireland has a legacy of poor performance in terms of adult literacy. Approximately 500,000 adults (25 percent of the 16-64 year old labour force) were found to have difficulties with simple literacy tasks in the *International Adult Literacy Survey* in 1995. This compares to a figure of seven percent in Sweden. Ireland's performance may have improved since 1995 given significant investment in adult literacy programmes. The challenge remains how best to improve the literacy skills of those who have already left the education system and ensure that the programmes in place are effective. Not least, this will impact positively on the attitude toward education and performance of children from these households at school.

Providers of basic adult education need more up to date statistics on the extent of the challenge in this area, in order to gauge the impact of adult literacy provision and investment since the publication of the *International Adult Literacy Survey*. It is important that Ireland takes part in future international assessments of adult literacy. In this context, the NCC welcomes Ireland's participation in the feasibility study for the OECD's *Programme for the International Assessment of Adult Competencies* (PIAAC).

7.4 Realising the Skills of Migrant Workers

ESRI research indicates that the educational attainment levels of immigrant workers in Ireland in recent years have exceeded those of the resident population. However, many migrants are operating in occupations below that which one would expect given their educational profile⁸⁰. Reasons for this include the lack of recognition of international qualifications and weak English

language skills. Progress has been made with the establishment of *Qualifications Recognition Ireland* to provide advice on the comparability of international qualifications and training.

Employment and the opportunity for career advancement are significant magnets for skilled migrant workers⁸¹. The NCC believes that barriers (institutional, professional, or otherwise) which prevent migrant workers from entering the labour market at a level commensurate with their skills and qualifications should be removed.

Key Recommendations on Further Education and Training

The shelf life of skills is becoming shorter. The Irish education and training system must increasingly cater for the needs of those already in the workforce and promote a culture of lifelong learning.

- Investment in further education and training courses should be targeted in areas where skills shortages are forecast and in sectors where potential exists for future employment growth. Equally, publicly-funded education and training must be appropriate for the needs of individuals and enterprise development. Implementation of the *National Skills Strategy* is critical in this regard.
- There is a need for a pro-active upskilling plan for workers in the construction sector who lack formal qualifications and those that have had their apprenticeship terminated mid-programme.
- A balance must now be struck between repositioning the skills of the newly unemployed, with the longer-term objective of upskilling the entire workforce as set out in the *NSS*.
- The provision of workplace based training, which is fitted around working hours, needs to be actively promoted.
- Addressing discrimination against part-time students could enable more workers to enhance their qualifications.
- Providers of basic adult education need up to date statistics on the extent of the adult literacy challenge.
- Institutional barriers which prevent migrant workers from entering the labour market at a level commensurate with their skills and qualifications should be addressed.



Appendices

Statistical Indicators on Ireland's Education and Training System



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Appendix 4 Horizontal Issues 66



Introduction

This paper focuses on human capital development that arises from formal training. This appendix forms the baseline analysis.

Ireland's education system is considered at seven levels: pre-primary, second level, further education, tertiary level, fourth level and lifelong learning. A number of horizontal issues are also examined including the internationalisation of education, the availability of mathematics, science and technology skills, the use of information and communications technology, and the availability of career guidance. For each issue, Ireland's performance is assessed based on available data, international developments are summarised and recent policy developments are outlined.

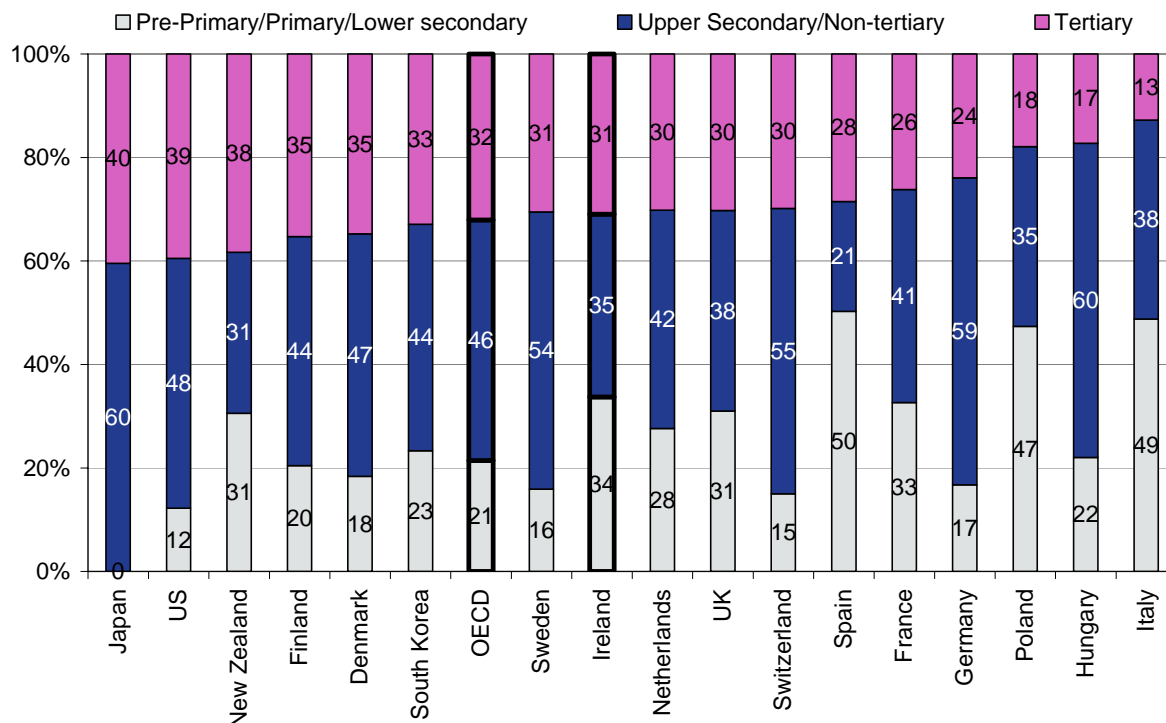
Appendix 1 assesses the current education levels of the Irish population. Appendix 2 provides an overview of investment in education. Appendix 3 assesses Ireland's performance in seven distinct levels or stages of the education system from pre-primary to life long learning. Appendix 4 assesses a number of horizontal issues.

Appendix 1 Education Level of the Irish Workforce

Overall Education Levels

Despite significant improvements in recent years, Ireland still has a large stock of people with low levels of qualifications. As can be seen from Figure 1, 34 percent of the overall working age population (aged 25-64) do not have an upper second level school qualification (Leaving Cert or equivalent).

Figure 1: Educational Attainment of Population Aged 25-64 by Highest Level of Education (percent), 2006



Source: OECD Education at a Glance, 2008

This compares unfavourably with the OECD-28 average of 21 percent. However, Ireland's performance is improving given relatively high graduation rates from younger cohorts. OECD data shows that there is a considerably higher number of 25-34 year olds than 55-64 year olds with at least third level education. In terms of this 25-34 age group, 42.2 percent of the Irish workforce has a third level qualification compared to an OECD average of 34.4 percent⁸².

Educational Attainment by Sector

There is significant variation in educational attainment across all sectors of employment in Ireland. Specifically⁸³ :

- Employment in agriculture is characterised by low educational attainment. Nine percent are educated to third level and 59 percent attain no more than lower second level education.
- In manufacturing, 40 percent have upper /post second level education with the remainder equally distributed between low and high attainment.
- In construction, Ireland has above average levels at either end of the attainment spectrum, with 38 percent at primary/lower second level.
- In the wholesale and retail sector, the educational profile is skewed towards lower levels of education, with 32 percent of employment at levels lower than upper second level education.
- In the hotel and restaurant sector, Ireland has a higher educational profile. At 22 percent, it has a significantly higher share of employment at tertiary level than the European average of 11 percent. This is partially due to the large number of non-nationals working in this sector (20 percent) of which over one third have tertiary education.
- In the transport sector, Ireland has higher shares at both ends of the educational distribution than the European average.
- In both the finance and business sectors, Ireland's share of tertiary graduates is greater than 50 percent, while the share of those not completing upper second level education is below the European average.
- In the education sector, 75 percent of the workforce has achieved higher education.
- In the public administration sector, Ireland's education profile is similar to the European average.
- In the health sector, Ireland has a higher share of skills at both ends of the skills spectrum.

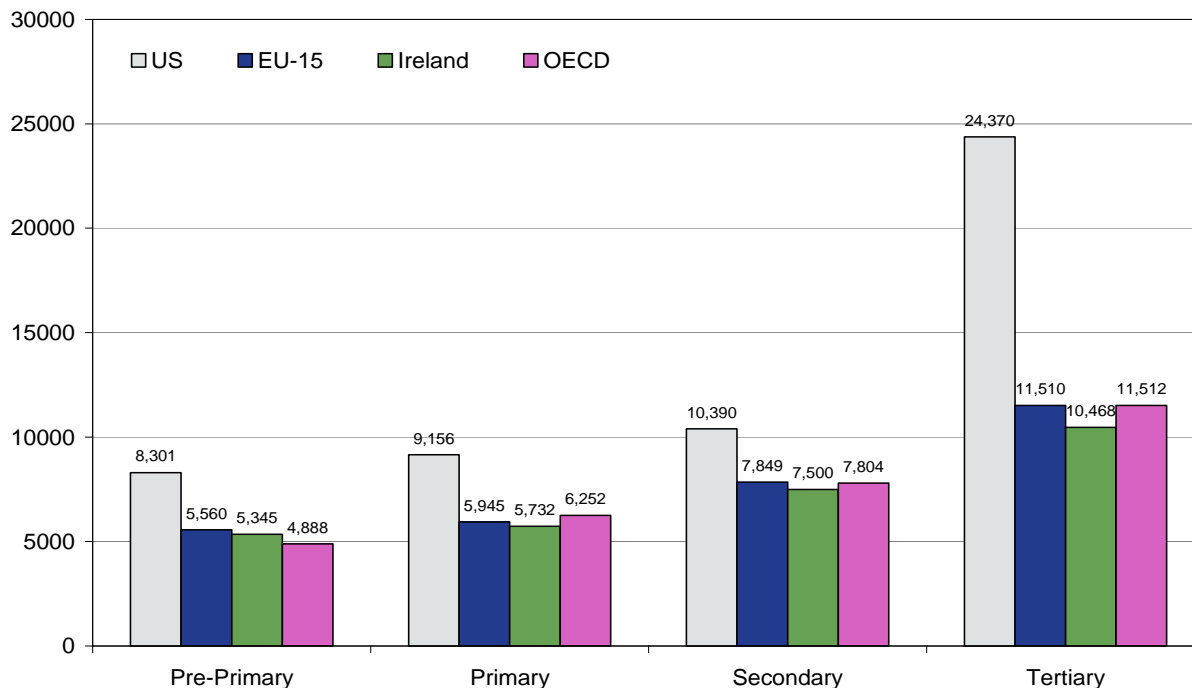
These figures demonstrate the need for a highly educated workforce to meet the demands of the changing occupational environment currently being experienced in Ireland. Those sectors characterised by low educational attainment such as agriculture are in decline; while sectors characterised by high educational attainment have assumed greater importance – primarily the business and finance sectors.

Literacy

Internationally, Ireland ranks poorly in terms of adult literacy. 500,000 adults (25 percent of the labour force 16-64 year olds) were found to have difficulties with simple literacy tasks in the *International Adult Literacy Survey* in 1995. This compares to a figure of seven percent for Sweden⁸⁴. Ireland has not participated in subsequent international studies of adult literacy.

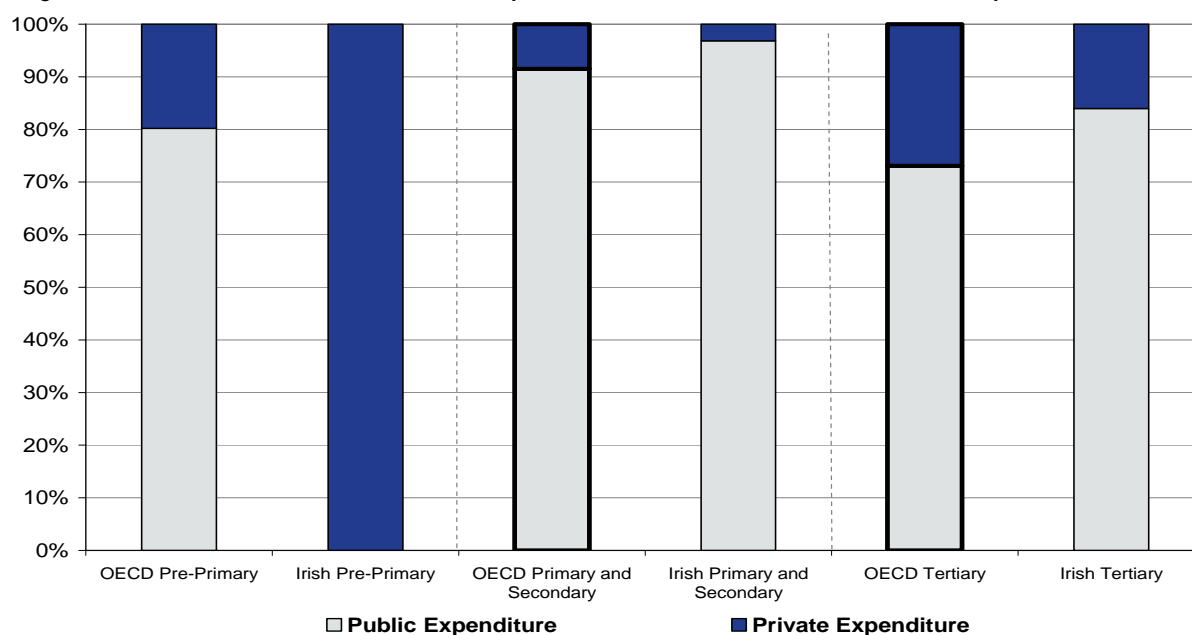
Appendix 2 Investment in Education

Figure 2: Total Annual Expenditure on Educational Institutions per Student (€'000s PPP) for all services by level of education, 2005




Source: OECD Education at a Glance, 2008

Figure 3: Relative Public and Private Expenditure on Educational Institutions (percent), 2005



Source: OECD Education at a Glance 2008



At all levels of education, Ireland invests less public and private resources per student than the EU-15 and OECD (with the exception of pre-primary) averages. The gap between the EU-15 and the US is considerable at all levels, particularly at third level.

Ireland's pre-primary system is almost entirely privately funded, unlike the typical OECD system. Public funding is relatively more important in Ireland at all other levels of the education system.

Appendix 3 Benchmarking Educational Competitiveness

This section benchmarks the competitiveness of Ireland's education system. A life cycle approach is adopted, starting with pre-primary and continuing to lifelong learning. Ireland's performance is assessed in terms of inputs (e.g. participation rates, expenditure) and outputs (e.g. performance levels). While some measures are not ideal, they represent the latest and best available data.

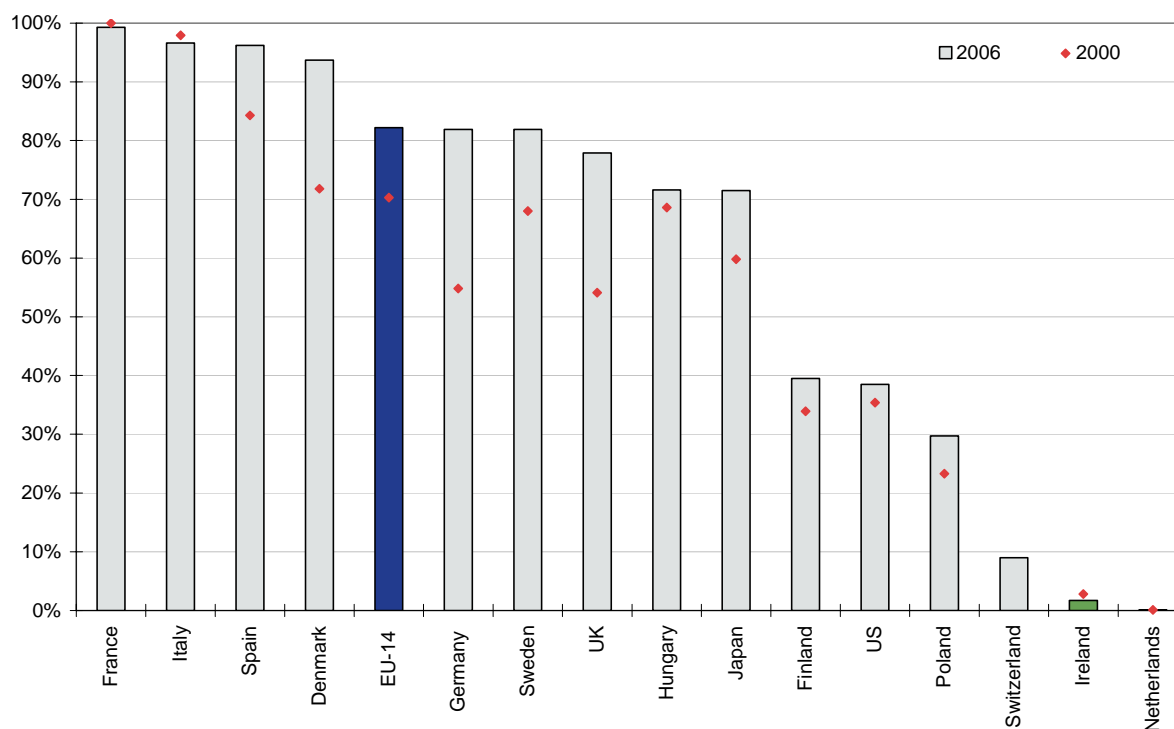
Appendix 3.1 Pre-Primary Education

Pre-primary and childcare are often referred to as early childhood care and education reflecting the dual nature of services at this level. However, pre-primary is differentiated by higher and standardised educational content, which acts as a bridge between home or childcare and primary school.

Participation in Pre-Primary Education

Pre-primary education includes programmes, which are designed for children at least three years old and not older than six years. The percentage of Irish three year olds in education in 2005 was 1.7 percent compared to an EU-14 average of 82.2 percent (see Figure 4)⁸⁵. It should be noted that in the wider context of early childhood education and care this figure may underestimate a certain amount of childcare based educational provision (e.g. playgroups) due to measurement difficulties.

Figure 4: Participants at ISCED⁸⁶ level 0 aged 3 years, as a percent of population aged 3, 2006



Source: Eurostat, *Population and Social Conditions*

As can be seen from the above figure, France, Spain and Italy have close to universal provision at pre-primary level.

Performance in Pre-Primary Education

In 2005, the annual expenditure on pre-primary institutions per student in Ireland was €5,345, compared to an OECD average of €4,888 and an EU-15 average of €5,560. Pre-primary education is predominantly privately funded in Ireland. Pre-primary institutions across the OECD are predominantly public funded (80 percent) compared to the privately driven Irish pre-primary sector⁸⁷.

Recent Developments in Pre-Primary Education

The *Centre for Early Childhood Development and Education (CECDE)* was established by the Department of Education and Science in October 2002 with a brief to co-ordinate and develop early childhood care and education in Ireland in pursuance of the objectives of the *White Paper on Early Childhood Education, Ready to Learn (1999)*. The CECDE was abolished in 2008; however some of its functions and key staff members have been transferred into the Office of the Minister for Children. It covers children from birth to six years of age in a wide variety of settings, including pre-schools. Its main objectives were to:

- Develop a quality framework for early childhood education;
- Develop targeted interventions on a pilot basis for children who are educationally disadvantaged and children with special needs; and
- Prepare the groundwork for the establishment of an Early Childhood Education Agency (to date this agency has not been established).

Since 2002, the *CECDE* has completed *Síolta*, the National Quality Framework for Early Childhood Education⁸⁸. At present, over 2,000 children are involved in piloting early intervention pre-school schemes in Ireland⁸⁹. These include a number of state sponsored pre-primary interventions such as the Rutland Street Project, the Early Start Programme (1,680 students) and the Pre-Schools for Traveller Children (500 students).

In recent years, the Government has made childcare rather than pre-primary a key policy focus. The National Development Plan (2007-2013) allocates €575 million for a *National Childcare Investment Sub-Programme*. This will involve the creation of 50,000 extra new childcare places by 2010, as set out in the National Childcare Strategy (2006-2010), of which 10,000 will be pre-school places. It is envisaged that approximately 44 percent of all proposed places will be in the private sector and the remainder in the community and voluntary sector⁹⁰.

Reasons for the underdevelopment of early childhood care and education in Ireland can be correlated to the historically low female participation levels. Low participation levels were due to a number of factors including the ban on married women working in the civil service, the trade unions and the banks. Female participation has risen from 30 percent in 1985 to 55.3 percent in 2007 Quarter 3⁹¹. The resulting influence has been a demand for pre-primary education and care, as those who previously provided this care informally are now in the workforce.

Appendix 3.2 Primary Education

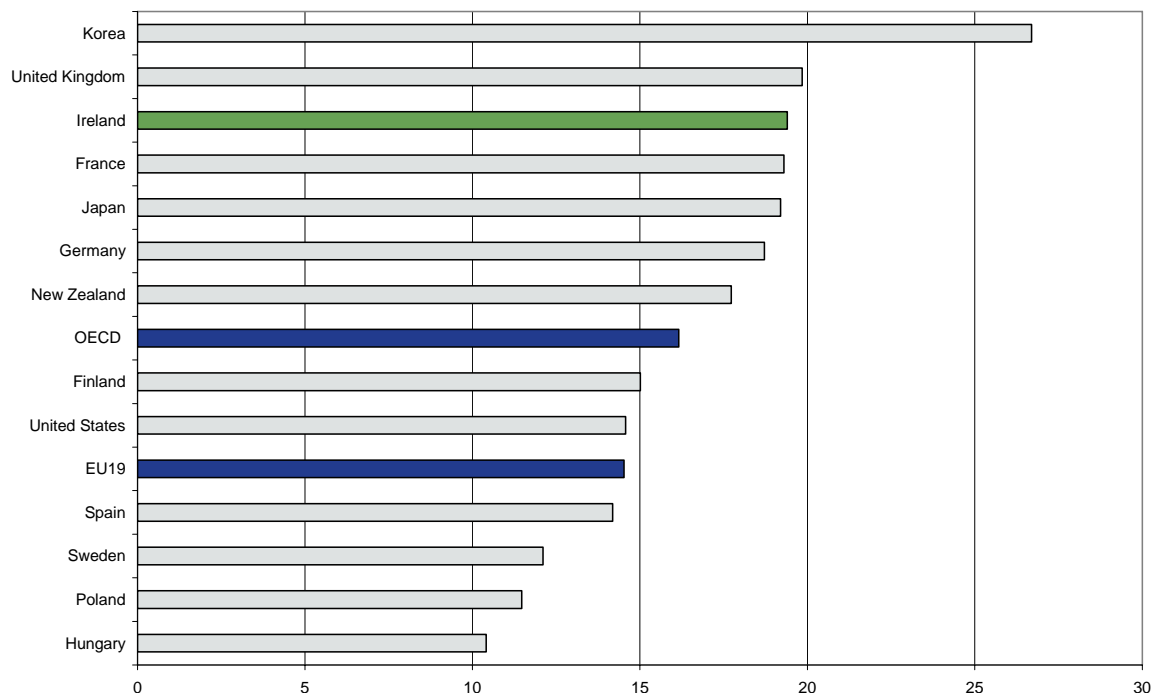
Primary education consists of the first years of formal, structured education that occur during childhood. Attendance at primary school in Ireland is not compulsory by law until the age of six, however primary level schools generally accept children on or after their fourth birthday. Participation in primary education in Ireland is close to universal⁹².

Performance in Primary Education

Performance can be assessed in terms of inputs and outputs from the primary education system. Inputs include average class sizes, student-teacher ratios, teaching hours per year, and state expenditure per student.

- **Primary level class size:** Ireland ranks above the OECD average (21.5) and the EU-19⁹³ average (20.3) with 24.5 students per class⁹⁴.
- **Student-teacher ratio:** At 19.4, Ireland has the third highest reported student-teacher ratio in the OECD-28. The average student-teacher ratio for primary schools in the OECD was 16.2 percent⁹⁵.
- **Teaching hours per year:** In 2006, Ireland was above average in relation to the number of compulsory teaching hours per year in public primary schools for students aged 9-11 with 941 hours. The OECD average is 810 hours.⁹⁶
- **Expenditure per pupil:** Annual expenditure on educational institutions per students for all services at primary level in 2005 amounted to €5,732 compared to an OECD average of €6,252⁹⁷. Using a different measure, Department of Education figures indicate that current expenditure per primary pupil (at constant 2007 prices) more than doubled between 1997 and 2007, increasing from €2,950 to €6,161⁹⁸.

Figure 5: Ratio of Students to Teaching Staff in Primary Education, 2006



Source: OECD Education at a Glance, 2008. Based on whole-time equivalents.

Limited Output Metrics

In terms of outputs, limited data is available on the performance of students at primary level. At a national level, the *National Assessment of Mathematics Achievement (NAMA)* is the fifth in a series of national assessments of mathematics achievement undertaken at fourth class level in 2004. The report showed:

- No increase in mean scores between 1999 and 2004.
- Pupils performed best on “Understanding & Recalling” but least well on “Applying & Problem Solving”.
- 12 percent achieved level 5 (advanced) proficiency.
- 15 percent recorded level 1 (lowest) proficiency.
- Boys outperform girls in the upper percentiles of achievement.
- Members of the Travelling Community have lower mean achievement scores.
- Ability was positively correlated with: school attendance; parent’s socioeconomic status; parental educational attainment; home access to calculator, the internet and a place to study; participation in out-of-school activities (sport, reading, music, dance or language classes); rural school location.
- Designated schools from disadvantaged areas had lower mean ability scores.
- Based on teacher rated performance, approximately 75 percent of fourth class pupils performed at fourth class level or above. Six percent performed at second class level. The remaining 19 percent perform between the two⁹⁹. The teacher rated performance results emphasise the size of the gap between students at this early stage of education.

The corresponding *National Assessment of English Reading*¹⁰⁰, also conducted in 2004, noted the following:

- No significant difference on mean reading scores between 1999 and 2004; with a marginal improvement among high achieving pupils.
- Girls outperformed boys in both years; this ratio remained constant between both years.
- In both years, reading test scores were significantly lower in designated disadvantaged schools.
- There had been no improvement in readings skills among pupils in designated schools.
- Reading test scores are correlated with a school’s attendance rate.

A report by the Department of Education and Science suggests that much of the underperformance in literacy and numeracy is concentrated in disadvantaged areas. It indicates that 43 percent of pupils profiled in disadvantaged areas had scores at or below the 20th percentile in a standardised literacy test. Sixty-four percent of pupils profiled had scores at or below the 20th percentile in mathematics on standardised tests (compared to 20 percent nationally) and that performance declined as pupils progressed through the school¹⁰¹.

At an international level, the *Trends in International Mathematics and Science Study (TIMSS)* is designed to help countries improve student learning in mathematics and science. It collects educational achievement data at ages ten and 14 to provide information about trends in

performance over time together with extensive background information to address concerns about the quantity, quality, and content of instruction. The 1995 report showed that:

- In Ireland, those aged 14 were found to perform around the international average in mathematics.
- Ireland performed above the international average for those aged ten in science but at the international average at age 14¹⁰².

Ireland participated in the 1995 study, but has not partaken in the three studies since. Progress in *International Reading Literacy Study (PIRLS)* is part of a five-year cycle of assessments that measures trends in children's reading literacy achievement, and policy and practices related to literacy. Ireland has not participated in either of its studies undertaken in 2001 and 2006. Both of these international assessments are valuable due to the large volume of countries participating in them (over 60 in the TIMSS including US and UK and 40 in *PIRLS*) and complement the *PISA* study undertaken every three years.

International Experience in Primary Education

The *International Review of Curriculum and Assessment Frameworks (INCA)* is an ongoing compilation of information on education structure and policy in 18 countries¹⁰³. The review shows that there is a tendency towards increasing reviews of curricula to reflect changing needs, and most countries have undertaken major reforms of the primary curriculum within the past 15 years. There is an increasing tendency to reform curriculum to include generic skills. There has been a trend towards external assessment – both statutory and voluntary¹⁰⁴.

In Australia, England, the Netherlands, New Zealand, Wales and some parts of Canada, curricula are now formulated in terms of learning outcomes or attainment targets. In Australia, England and Ontario, numeracy and literacy strategies are closely linked to target setting initiatives for the performance of children in specific school years¹⁰⁵.

Compulsory assessment of primary achievement in literacy and numeracy exists in 12 countries of the 18 in INCA, with science and social studies assessed in fewer countries. Of these, Japan, Korea, New Zealand, Spain and the USA assess a sample of children and/or schools to provide an indication of trends. It is generally accepted that the introduction of "high stakes" assessment leads to a degree of "teaching to the test". Consequently, in Sweden tests are broad and multi-faceted to counteract any narrowing of the curriculum. In England, there is specific funding provided to raise test performance by way of revision classes for children who are judged to be at risk of not achieving the expected level in the test¹⁰⁶. In Northern Ireland, the current debate is on how to replace the Eleven Plus exams which were due to be abolished after 2008.

Recent Developments in Primary Education

Government policy at primary school level since 2000 has focused on social inclusion. A number of initiatives have been put in place to tackle educational disadvantage at primary level. These include *Breaking the Cycle*, *Giving Children an Even Break* and *Delivering Equality of Opportunity in Schools (DEIS)*.

A curriculum review during the 2003/2004 school year gathered information on experiences with the curriculum in English, visual arts and mathematics. The second phase of this curriculum review during the 2006/2007 school year gathered information on experiences with the curriculum in Irish, science and social, personal and health education¹⁰⁷. In 2003 science was introduced into all primary schools as a subject.

Building on the *NCCA's* advice in 2005, all Irish primary schools are required to administer standardised test in English and mathematics at two stages in the primary cycle: at the end of first class or at the beginning of second class and at the end of fourth class or at the beginning of fifth class¹⁰⁸. These tests have begun, and over time should provide valuable longitudinal data on the performance of Irish primary students.

In relation to capital investment commitments, €4.49 billion is being allocated to primary and second level schools under the NDP *Schools Infrastructure Programme* to 2013. This figure is not disaggregated between primary and second level. This investment aims to provide new schools in rapidly developing areas and upgrade existing facilities. A second programme in the NDP will see €318 million invested to promote curriculum reform and professional development.

Appendix 3.3 Second Level Education

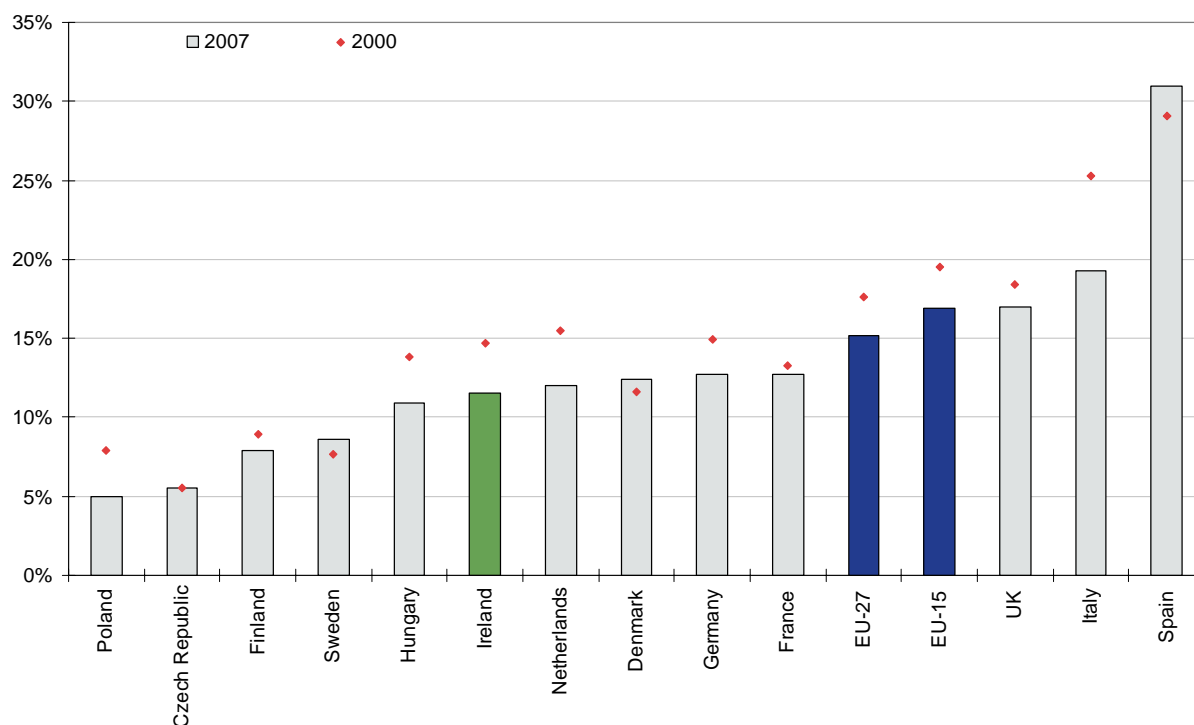
Second level education immediately follows primary education and plays the crucial role in preparing students to graduate to tertiary education, further education or the workplace. For registration in Irish second level schools, students must be aged 12 on 1st January in the first year of attendance. Second level education is compulsory up until the age of 16 or until three years of lower second level education has been completed.

Completion Rates

Ireland (85.4 percent) has exceeded the Lisbon target of 85 percent completion rate of upper second-level (those who sit the leaving certificate plus completion of courses of an equivalent level on the National Framework of Qualifications) in 2006¹⁰⁹. The 2006 School Leavers' Survey found no improvement in levels of second-level completion, which continue to remain at levels found in the early 1990s. In 2006 the Leaving Certificate completion rate (those who have sat the leaving certificate examination only) stood at 82 percent. 14 percent of school leavers completed the Junior Certificate, while 4 percent left with no formal qualification¹¹⁰.

Early school leavers represented 11.5 percent of the 18-24 age group in Ireland in 2007, the EU-27 average was 15.2 percent¹¹¹. While this performance is better than the EU average, this still has significant short and long run costs for the individuals involved, the economy and broader society. For example, the unemployment rate for this age group of early school leavers is 23.4 percent compared to 8.4 percent for the entire 18-24 age cohort¹¹².

Figure 6: Early School Leavers in EU Member States, 2007



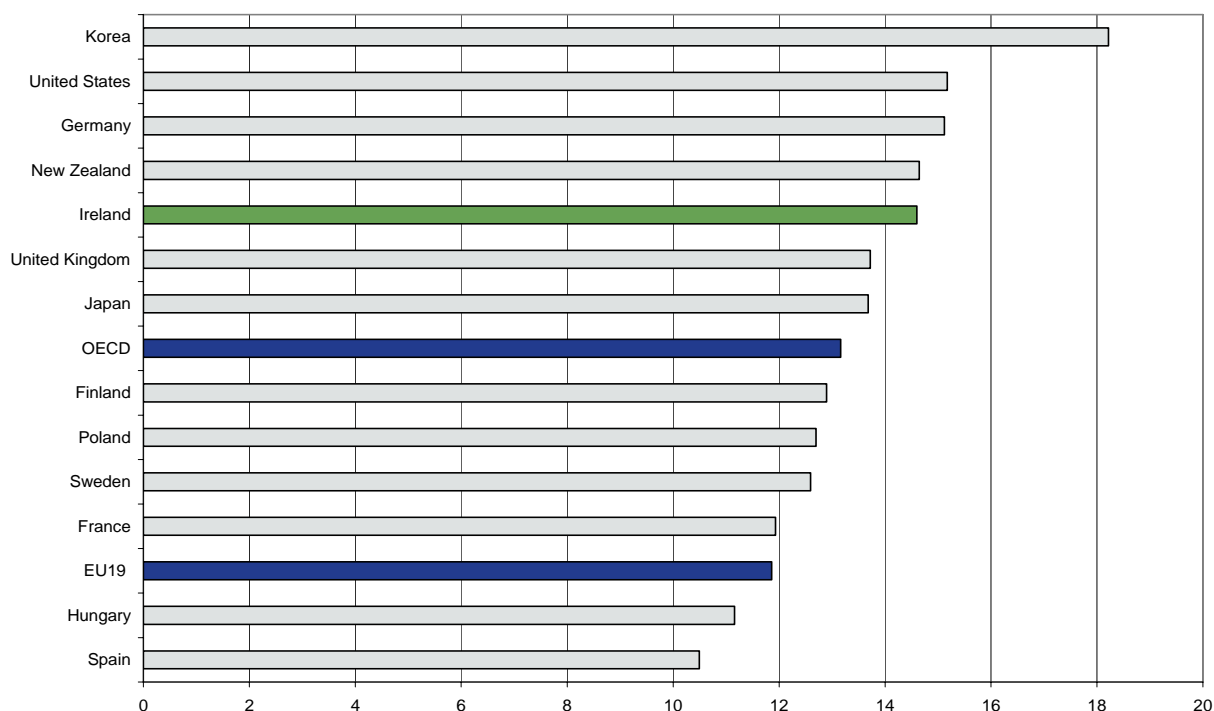
Source: Eurostat, Structural Indicators

Performance in Second Level Education

Performance is assessed in terms of inputs and outputs from the second level education system. In terms of inputs, state expenditure, class sizes, and the number of hours teaching are used. PISA scores of student ability are used to measure performance in terms of outcomes.

- **Expenditure per second level pupil:** Annual expenditure on educational institutions per student for all services amounted to €7,500 in Ireland in 2005, compared to an OECD average of €7,804¹¹³. Using a different measure, Department of Education figures indicate that expenditure (at constant 2007 prices) almost doubled between 1997 and 2007, increasing from €4.557 per pupil to €8,864 per pupil¹¹⁴.
- **Class Sizes:** Ireland (20.1) performed better than the OECD average of 23.8 in terms of lower second level school class sizes in public institutions.
- **Ratio of students to teaching staff:** The ratio for second level schools as a whole is 14.6 compared to an OECD average of 13.2¹¹⁵.
- **Teaching Hours per year:** In 2006, Ireland was below average in relation to the number of compulsory teaching hours per year in public second level schools with 848 hours for students aged 12-14. The OECD average for pupils aged 12-14 was 896 hours. For students aged 15, Irish pupils received 802 hours instruction compared to the OECD average of 910 hours¹¹⁶.
- The number of teaching hours on mathematics, science and technology is small as a proportion of total teaching hours.

Figure 7: Ratio of Students to Teaching Staff in Second Level Education Institutions, 2006



Source: OECD Education at a Glance, 2008

OECD PISA Assessments

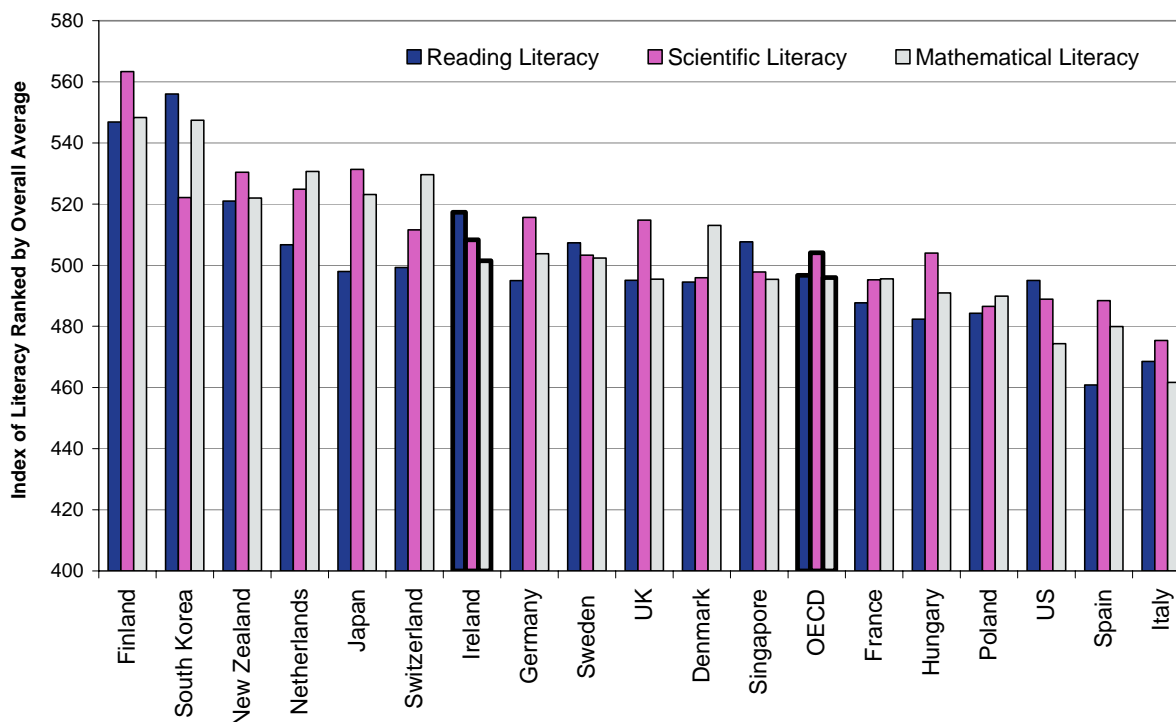
PISA aims to assess students' preparedness for the reading, mathematical and scientific demands of future education and adult life. Each year, one of these areas is assessed in depth, while the other two are assessed more broadly. In 2006, science was the focus of the assessment.

In terms of the PISA assessments (2006):

- Irish students' best performance was on reading literacy, where the Irish mean score of 517.3 was well above the OECD mean of 491.8. This performance placed Ireland 5th among the thirty OECD countries¹¹⁷.
- Performance on science (the major domain) was also slightly above the OECD average (508.3, compared to the OECD mean of 500.0). Ireland ranks 14th amongst OECD countries on the science assessment.
- For mathematics, Ireland's mean score of 501.5 does not differ significantly from the OECD mean of 497.7, placing Ireland 16th in the OECD.
- On average, females outperformed males on reading literacy, males outperformed females on mathematics, and there were no gender differences in overall scientific literacy.
- It is also notable that the gap between the strongest and weakest students¹¹⁸ in Ireland is less than that in many other countries for mathematics, reading and science¹¹⁹.

In sum, Ireland's students performed very well on the reading assessment, reasonably well on science, and about average on mathematics. This pattern was also evident in both previous PISA studies, and is in contrast to countries such as Finland, Hong Kong and Canada, where performance is well above average on all three domains.

Figure 8: Scientific, Mathematical and Reading Literacy of 15 Year Olds, 2006



Source: OECD (2006) PISA Database

Recent Developments in Second Level Education

The National Skills Strategy set a target of a 90 percent completion rate by 2020 at Leaving Certificate level. In addition to this target the Strategy has also set the goal of 94 percent of the population aged 20-24 achieving NFQ levels 4 or 5 through completion of the Leaving Certificate or through equivalent, more vocationally oriented programmes, such as the Leaving Certificate Applied and the Leaving Certificate Vocational Programme.

Tackling early school leavers has been a priority in recent years. The National Educational Welfare Board (NEWB) is responsible for supporting parents, guardians and children experiencing difficulty with school attendance or educational welfare. The NEWB is also responsible for some curricular reforms in the Leaving Certificate Applied, the School Completion Programme and the Home-School Community Liaison Scheme¹²⁰.

The National Council for Curriculum and Assessment (NCCA) undertakes a review of the junior cycle curriculum on a continuous basis. To enable students to reach and undertake the Junior Certificate Examination, students from educationally disadvantaged backgrounds, and those viewed as at risk of leaving school early, may follow the Junior Certificate School Programme¹²¹. Senior cycle education underwent significant change during the 1990s and is currently the subject of a major review by the NCCA aimed at planning for its future development. The NCCA has been asked to prioritise the reconfiguration of subjects within the Leaving Certificate in order to embed key skills and to provide for a second assessment component, such as practical, project and portfolio work. Mathematics, science and languages have been prioritised in the first phase of development.

In terms of capital investment, as mentioned in the previous section, the NDP (2007-2013) allocated €4.49 billion to primary and second level schools under the Schools Infrastructure Programme.

Appendix 3.4 Further education and training

Further education includes education and training which occurs after second-level schooling but is not part of the third level system¹²². A wide range of providers, including FÁS, Vocational Education Committees, Fáilte Ireland (CERT), Teagasc, Bord Iascaigh Mhara, community education and training centres and workplace training schemes, deliver further education and training. Awards are made by the Further Education and Training Awards Council (FETAC) at levels one to six on the National Framework of Qualifications. This section only deals with formal further education and training.

Participation in Further education and training

In 2005, there were 1,417 further education and training centres registered with FETAC. Total enrolments¹²³ for 2003/04 amounted to 184,559. This can be disaggregated between FÁS (45 percent), further education centres (41 percent), Teagasc (seven percent), Fáilte Ireland (six percent) and Bord Iascaigh Mhara (under one percent)¹²⁴.

A total of 111,099 candidates received 130,226 awards from FETAC in 2006 across levels 3-6 on the National Framework of Qualifications. 24,500 candidates received certificates (major awards). Component (minor) awards totalled 65,521 and almost 25,000 received special purpose awards.


Approximately 51% of all award recipients were aged 30 or younger. Of the major awards, approximately 24% were in the fields of Education, health and welfare related courses. These relate primarily to childcare and healthcare support courses at level 5. At level 6, the highest number of awards was in the fields of Engineering/Manufacturing (2,635) and Construction & Built Environment (1,970)¹²⁵.

The majority of those participating in PLC courses (72 percent) are female, while the majority of those participating in apprenticeships (99 percent) are male¹²⁶. This is a particular worry in relation to the slowdown in the construction sector.

Performance in Further education and training

In 2005, €542 million was provided in public funding for further education and training programmes. FÁS received 47 percent, further education and training centres 46 percent, Teagasc received four percent, Fáilte Ireland two percent, with the remainder allocated to Bord Iascaigh Mhara¹²⁷.

A study undertaken in 2006 of first time undergraduate entrants identified 554 students progressing into honours bachelor degree courses from further education and similar backgrounds in 2004/05. This amounts to four percent of first time entrants¹²⁸. The study related only to the University sector and did not include the Institute's of Technology, the latter of which take substantial numbers of students from PLC courses. The study was undertaken in the midst of rapid



developments in the mechanisms permitting progression into universities and it is likely that the numbers progressing would be significantly greater in future years.

Recent Developments in Further education and training

A Higher Education Links Programme, set up a decade ago, allows for progression to higher education on receipt of a full FETAC award. In 2006, FETAC confirmed that sixteen higher education institutions are now participating in the Higher Education Links scheme¹²⁹. The importance of this scheme can be seen from the increasing number of awards being made at Leaving Certificate equivalent level.

Under the National Development Plan (2007-2013), the *Further Education Sub-Programme* was allocated €2.2 billion in funding. A number of initiatives aimed at people of working age are to receive support through the Department of Education and Science.

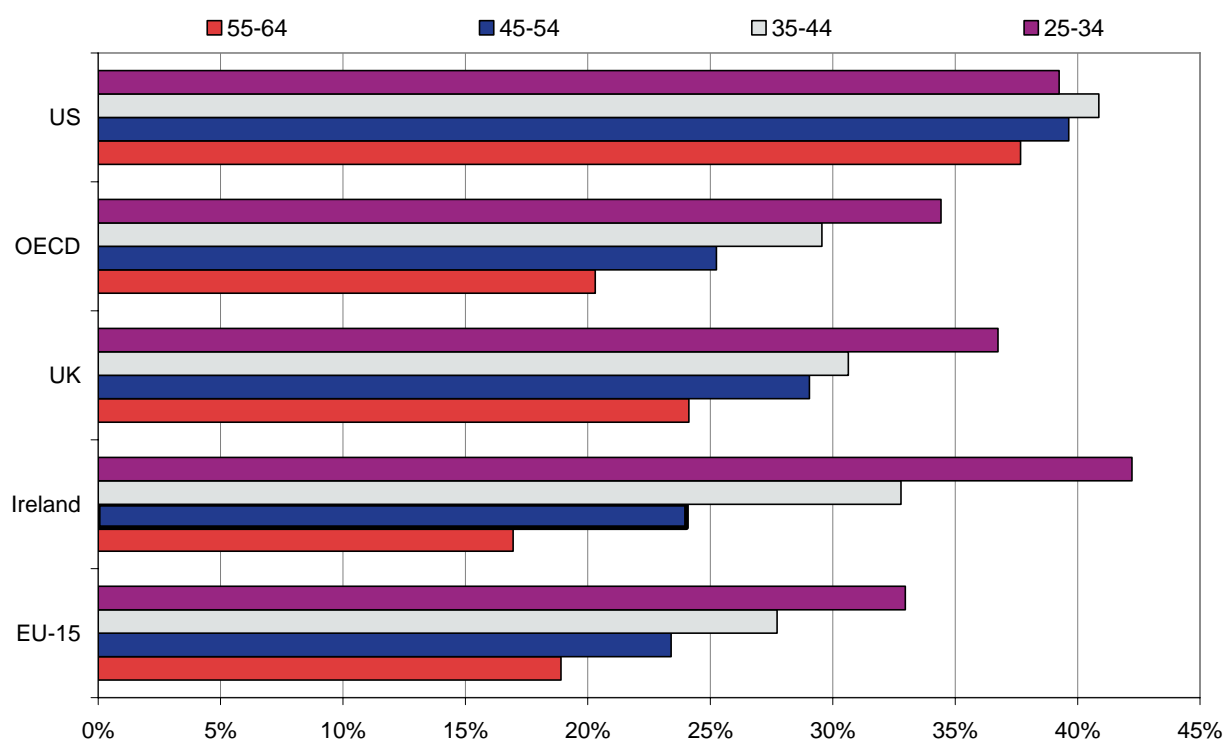
Appendix 3.5 Tertiary Education

The third level education system in Ireland encompasses the university sector, the institutes of technology, the colleges of education, private colleges and a number of other third level providers.

Participation in Tertiary Education

Ireland's third level education attainment rates vary much more by age than other countries as can be seen in Figure 8. This is due to the more recent mainstreaming of third level education into the life-cycle of the average school leaver. 42.2 percent of the population aged 25-34 have a third level education (fourth highest in the EU) compared to 33 percent for the EU-15 average. It is notable that the EU 15 average lags the OECD average lags the performance of the US.

Figure 9: Population by Age Cohort that has at Least Third Level Education, 2006



Source: OECD Education at a Glance, 2008

This can be broken down into 47.7 percent of females in the 25-34 cohort with third level education and 35.1 percent of males, reflecting the growing tendency for females to remain in education longer¹³⁰.

As participation rates have increased in Ireland, enrolments at honours bachelor degree and postgraduate level are increasing but remain below the OECD-28 average¹³¹. As of 2004, Ireland ranked 3rd out of 21 countries for graduation levels at higher certificate/ordinary degree. However, at 10th out of 24 for honours degrees and 18th out of 29 for advanced research degree level, we are significantly behind leading countries.

Thirty-three percent of the age cohort of students from lower socio-economic groups entered higher education in 2004 compared to 23 percent of the same group in 1998¹³².

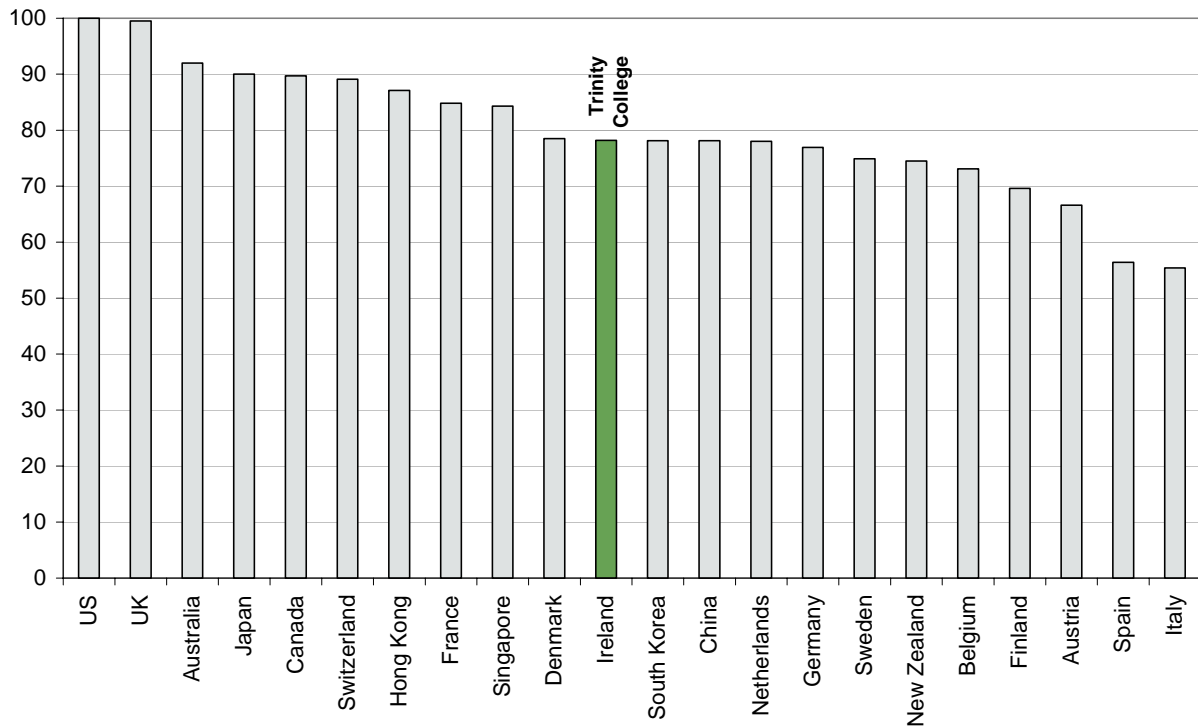
A 2005 survey by the *Association for Higher Education Access and Disability (AHEAD)* showed that 2.4 percent of undergraduates are students with a disability. HEA statistics show that entry by mature students has increased substantially since 2000 from 4 percent to 11.7 percent in 2007/8¹³³. The HEA has recently set a target that mature students should make up 20 per cent of full-time entrants to higher education by 2013.

Performance in Tertiary Education

As in other levels of education, limited data exists to measure the performance of the tertiary system. Performance is assessed in terms of inputs and outputs from the tertiary education system. In terms of inputs at third level, annual expenditure on educational institutions per student for all services in 2005 was €10,468 compared to an OECD average of €11,512¹³⁴. This is broken down between public and private expenditure of 84 and 16 percent respectively, compared to an OECD average of 73 and 27 percent¹³⁵. Using a different measure, Department of Education figures indicate that expenditure per student increased from €9,498 to €10,901 (constant 2007 prices) between 1997 and 2007¹³⁶.

In terms of outputs, a number of indicators are available that rank higher education institutions such as the *Times Higher Educational Supplement*, the *Financial Times* and *US Times*. All of these indicators have their respective strengths and weaknesses. Such assessments focus attention on academic achievement and influence policymakers. Many of these assessments favour the larger institutions in the US and UK in terms of citations counted etc. For this report we have taken the results of the *Times Higher World University* ranking. The performance of Irish third level institutions, though improving, still ranks behind the leading institutions overseas. *Times Higher University* scores are based on peer review assessments, the amount of cited research produced, the ratio of faculty to student numbers and a university's success in attracting foreign students and internationally renowned academics. Two Irish colleges are ranked in the top 200 institutions. These are Trinity College Dublin, which is ranked 49th in 2008, up four places from 2007 and University College Dublin which is ranked 108th in 2007, up 69 places since 2007¹³⁷. Cross-country comparison of figures for 2008 can be seen in Figure 9¹³⁸.

Figure 10: Performance of the Third Level Sector by Leading Institution (Scale 0-100), 2008



Source: *The Times Higher Education Supplement, 2008*

The Expert Group on Future Skills Needs and the Higher Education Authority jointly undertook a survey of multinational employers in Ireland in 2007 to benchmark Irish graduates from the higher education system against graduates from other countries. The main findings of this research indicate, that overall, employers perceive very little difference in quality between Irish and other graduates. Irish graduates appear to compare favourably in 'soft/generic skills' while foreign graduates are considered slightly more eager in the work environment. Recommendations of this report include the introduction of more placements to third level courses, the need for Irish students to have better management and business knowledge and more continuous assessment in third and fourth level courses with particular focus on building team skills and confidence¹³⁹.

International Experience in Tertiary Education

The quality of third level education is seen as increasingly important as countries compete for highly skilled graduates in modern high-technology sectors of manufacturing and services. Competition is growing in both developed and developing economies. For example, in the nine years to 2004, the number of students attending university in China and Malaysia more than doubled, while in Thailand and India, the numbers expanded by 83 percent and 51 percent respectively¹⁴⁰. Even if graduation rates in China and India still remain well below the OECD average, the mere size of the populations at tertiary level in these countries translates into a vast graduate output in absolute terms. In 2005, China already produced 4.4 million tertiary graduates compared to 2.5 million in the EU¹⁴¹. Given rapidly expanding participation rates in third level education around the world, concerns exist in many countries over the quality of graduates produced.

Recent Developments in Tertiary Education

Under the NDP (2007-2013) €13 billion was committed to investment in the *Higher Education Programme*. €1,975 million was allocated to a *Higher Education Infrastructure* sub-programme; €10.5 billion was allocated to a *Higher Education Development* sub-programme and €510 million on the *Strategic Innovation Fund* sub-programme. The *Student Support and Third Level Access* sub-programme of the *Working Age Education Programme* of the *National Development Plan (2007-2013)* was allocated two billion euro.

The Irish Universities Quality Board was established in 2002 and incorporated in 2006 to increase the level of inter-university co-operation in developing quality assurance procedures and processes and to facilitate the conduct of statutory reviews of the effectiveness of quality assurance procedures and their outcomes. Funding for this Board has been made available under the National Development Plan (2007-2013)¹⁴².

Under *Towards 2016*, a targeted fund will be put in place to alleviate the fees in public institutions for part-time courses at third level by those at work who have not previously pursued a third level qualification.

The *National Office for Equity of Access to Higher Education* was established within the Higher Education Authority in August 2003. The office addresses access issues for those school leavers from socio-economically disadvantaged backgrounds, mature students, disabled students, members of the travelling community and refugees.

Appendix 3.6 Fourth Level

Fourth level education in the form of PhD level research is critical to the development of research capabilities in the Irish economy and high value-added skills among the Irish workforce.

Participation in Fourth Level

PhD graduates are central to the delivery of Ireland's *Strategy for Science, Technology and Innovation*. In 2006, Ireland produced 0.24 PhD graduates per 1,000 of population compared to an EU-13 average of 0.19¹⁴³. In 2006, 54 percent of PhD graduates in Ireland were males and 46 percent were female. This gender gap is not as large as that in other EU countries. The number of researchers in Ireland is growing. The number of researchers per 1,000 in total employment has grown from 5 per 1,000 in 2000 to 6 per 1,000 in 2006¹⁴⁴.

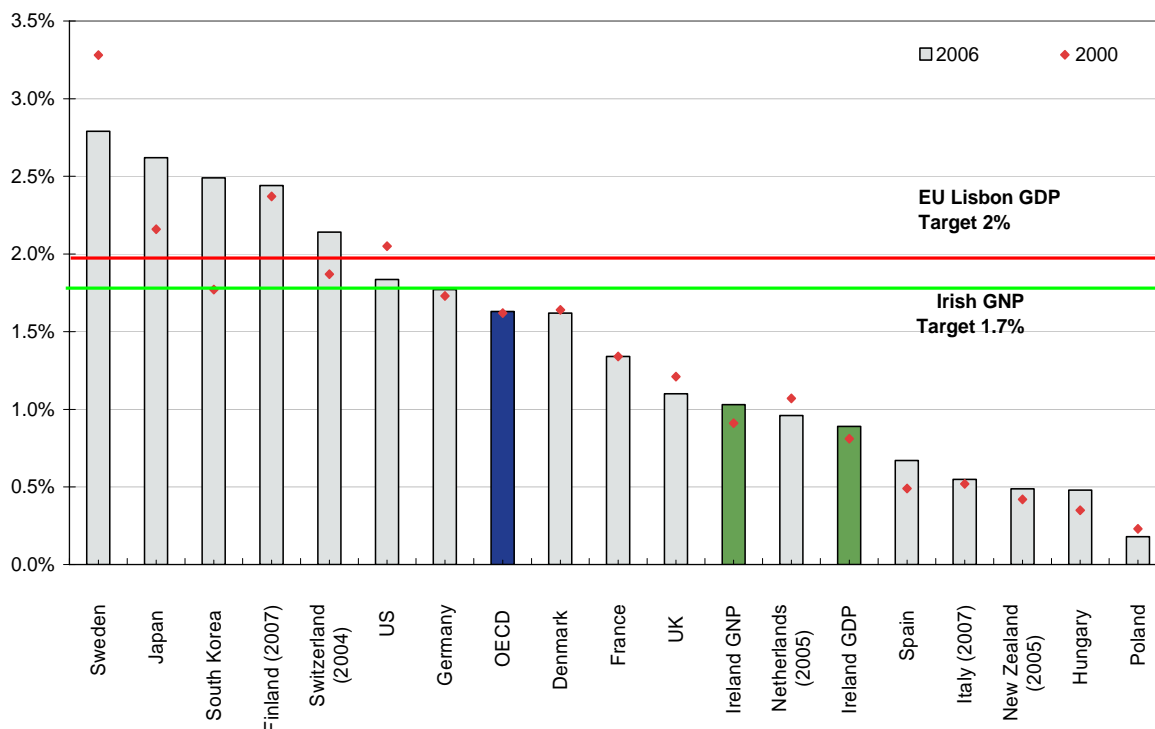
For NFQ level 9/10 courses, over 24,500 people enrolled in 2005, an increase of 23 percent for postgraduate diplomas/certificates, 60 percent for masters and 61 percent for doctorates when compared to 2000. Approximately 11,600 persons graduated with a level 9/10 award from universities in 2005, an increase of 9 percent for postgraduate diplomas/certificates, 59 percent for masters and 38 percent for doctorates when compared to 2000. With enrolments increasing, it is expected that graduate output will continue to increase in the coming years.

Performance in Fourth Level

Higher education expenditure on research and development has more than doubled over the last eight years rising from €238 million in 2000 to €600 million in 2006, supported by direct government funding. As a percentage of GNP, Ireland has converged with the OECD average, but remains far behind the leading countries. Irish higher education research and development (HERD) was 0.4 percent of GNP in 2006¹⁴⁵. Sweden allocates 0.76 percent of GDP to higher education research and development, while Finland and Switzerland allocate 0.64 and 0.66 percent of GDP to HERD.

It is notable that linkages between the private sector and third-level education, as measured by industry-financed higher education R&D, remain poor¹⁴⁶. Despite strong growth rates in expenditure, business R&D as a percentage of economic activity has remained relatively static over the past decade. Figure 10 shows that business expenditure on R&D in Ireland (1.06 percent of GNP) lags the OECD average (1.61 percent) considerably. In leading countries such as Sweden (2.86 percent), Japan (2.54 percent) and Finland (2.45 percent) business spends considerably more on R&D. IBEC have expressed their disappointment in relation to the lack of progress in increasing the representation of the enterprise sector on governing bodies of higher education institutions and related bodies¹⁴⁷. The *Strategy for Science, Technology and Innovation* has set a target of €3 billion for business expenditure on R&D by 2013. In 2006, business expenditure on R&D in Ireland stood at €1,560 million. Most business expenditure on R&D in Ireland is undertaken by foreign-owned companies. Triadic patents granted per million of population in Ireland remain well below the OECD average¹⁴⁸.

Figure 11: Business Expenditure on R&D (BERD) as a % of GDP, 2006



Source: OECD, *Main Science and Technology Indicators, 2007/ Issue 2*; NCC, 2009, *Benchmarking Ireland's Performance 2008*.

Recent Developments in Fourth Level

In the context of the Lisbon Strategy, the European Council set a target that R&D expenditure would equate to 3 percent of EU GDP by 2010. This three percent is divided between business and higher education R&D, with two thirds of this spend to come from the private sector.

The *Strategy for Science, Technology and Innovation* envisages Ireland reaching 2.5 per cent of GNP expenditure on R&D by 2013 with two thirds of the increase in overall expenditure to come from the private sector. The Strategy provides for the continued development of a quality world-class research system with the capacity to cater for a rapidly changing environment. It plans to almost double innovation performance of enterprise and the number of PhD graduates over its lifespan. Top level researchers will be drawn from home-grown talent and from overseas. It will also implement curriculum and teacher training improvements focused on ensuring that science stimulates and enthruses students, from school entry right through to career choice. In addition the SSTI proposed the establishment of Competence Centres. The objective of the Competence Centre initiative is to achieve competitive advantage for industry in Ireland by accessing the innovative capacity of the research community.¹⁴⁹ The R&D Action Plan for Promoting Investment in R&D has set a target of 9.3 researchers per 1,000 of total employment by 2010. Some progress has been made, with the number of researchers growing from 5 per 1000 total employment in 2000 to 6 in 2006¹⁵⁰.

The *Strategic Innovation Fund* is aimed at enhancing collaboration between higher education institutions, improving teaching and learning, supporting institutional reform, promoting access and lifelong learning and supporting the development of fourth level education. An overview of the projects co-funded under both cycles of SIF is given in tables 1 & 2 below. Of the 31 projects approved for funding in Cycle II, 30 are collaborative and 13 involve alliances between institutes of technology and the universities.

In 2005, Enterprise Ireland initiated a pilot programme to encourage the development of industry research networks in biotechnology, ICT, industrial technologies and functional foods. New approaches to developing and strengthening such networks are being implemented as part of the Strategy for Science Technology and Innovation. The Government's recent publication Building Ireland's Smart Economy reaffirmed the commitment to the roll-out of industry-led Competence Centre Programme sectors such as Applied Nanotechnology, Advanced Manufacturing Productivity, Energy, and BioEnergy¹⁵¹.

Table 1: SIF Cycle I

Project Type	Value (€m)
Institutional Restructuring	12.7
Improving Access & Lifelong Learning	10.2
Enabling Fourth Level	9.9
Enhancing Teaching & Learning	9.3
<i>Total*</i>	42.0

Source: Higher Education Authority.

*Total may include other projects not categorised above.

Table 2: SIF Cycle II

Project Type	Value (€m)
Enhancing Teaching & Learning	35.9
Research Capacity/SSTI Implementation	20.7
Institutional Restructuring	13.0
Access Initiatives for Under-Represented Groups	11.8
Lifelong Learning & Upskilling	10.2
<i>Total*</i>	97.0

Source: Higher Education Authority.

*Total may include other projects not categorised above.

Appendix 3.7 Lifelong Learning

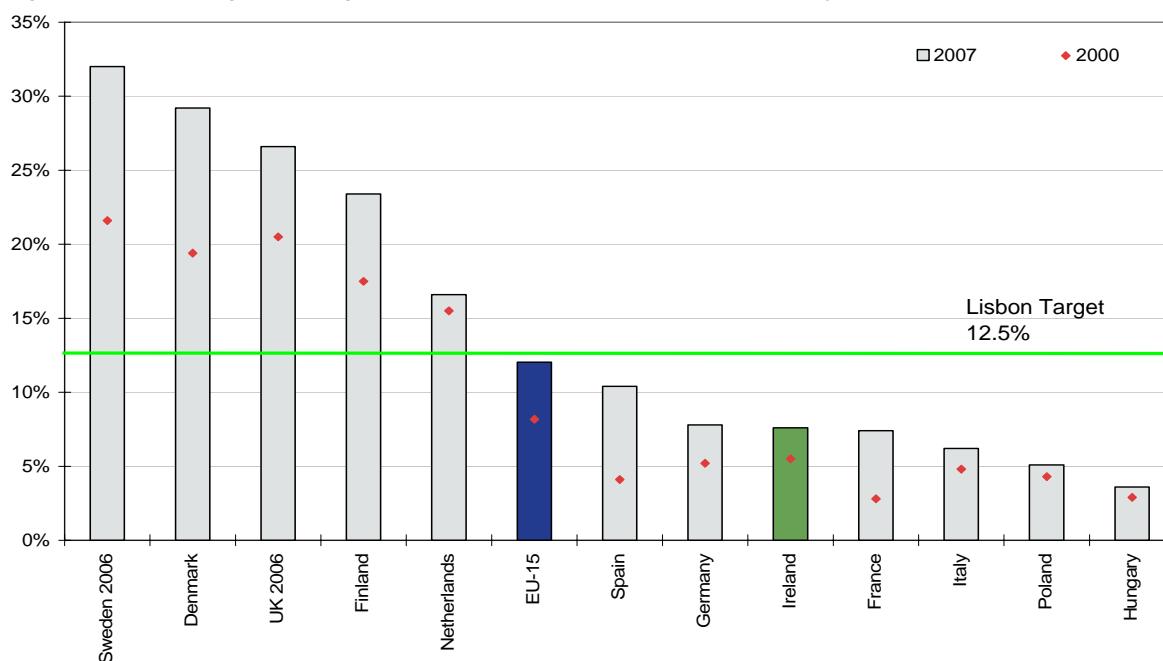
Lifelong learning is defined as all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competencies. The OECD states that 80 percent of the workforce of 2015 is already at work but that changes in technology and business processes will have rendered many of their skills obsolete by that time¹⁵². As firms react to an ever changing market and shorter product cycles, career jobs are scarcer and individuals experience more frequent changes in jobs over the working life. The consequence is that the shelf life of skills is shorter¹⁵³.

Participation in Lifelong Learning

Figure 11 measures the percentage of persons aged 25 to 64 in receipt of education in the four weeks prior to the Eurostat survey and includes both formal and non-formal education¹⁵⁴. Ireland performs poorly with 7.6 percent of respondents receiving education in the previous four weeks. This remains below the Lisbon target of 12.5 percent, the EU-15 average of 12 percent and considerably behind the leading countries such as Sweden. The provision of lifelong learning has certain characteristics across most countries:

- Those with higher educational attainment get most training: conversely those with little education receive the least training.
- The employed receive more training than the unemployed.
- The unemployed, in turn, receive more training than those who are not economically active.
- Larger firms train more than smaller firms¹⁵⁵.

Figure 12: Lifelong Learning in EU Member States (Percent 25-64 year olds), 2007



Source: Eurostat, Structural Indicators

International Experience in Lifelong Learning

A number of countries in the EU have set out rules governing learning leave, including Sweden and Denmark, two of the top performers in lifelong learning. This consists of allowing workers a number of hours learning leave based on the length of time currently in the workforce. Ireland does not currently have a formal universal policy on learning such as these.¹⁵⁶

Progress to Date in Lifelong Learning

There have been numerous reports and studies aimed at promoting life long learning in Ireland. These include the *Report of the Commission on the Points System* (1999), the *White Paper on Adult Education* (2000), the *Task Force on Lifelong Learning* (2002) and the more recent *One Step Up Initiative* proposed by the *Enterprise Strategy Group* (2004). The follow-up to these reports has been mixed.¹⁵⁷


The *National Training Fund (NTF)* was established in 2000 and supports a range of training schemes operated by FÁS, Enterprise Ireland, IDA, Shannon Development, HEA, Institute of Engineers in Ireland and Skillnets.

The *National Development Plan (2007-2013)* provides the framework for publicly funded lifelong learning, with a total of €7.7 billion allocated under the *Training and Skills Development Programme*. This is divided between the sub-programme for *Up-skilling the Workforce* and the Sub-programme for the *Activation and Participation of Groups outside the Workforce*. The main aims of the two sub programmes are as follows:

- **Workforce Sub-programme:** To improve training for people in employment, help up-skill those affected or likely to be affected by industrial restructuring, improve and enlarge the apprenticeship system and provide progression opportunities for school-leavers. This sub-programme has an allocation of €2.8 billion.
- **Sub-programme for Activation and Participation of Groups outside the Workforce:** To provide targeted training and services to groups outside the workforce such as the unemployed, people with disabilities, lone parents, travellers, prisoners as well as encouraging the increased participation of women, older workers, part-time workers and migrants in the workforce. This sub-programme has an allocation of €4.9 billion.

IBEC have reiterated the importance of the Workplace Innovation Fund as recommended in the National Workplace Strategy.¹⁵⁸

ICTU have pointed to the need for employers to invest in up-skilling and management training. It has recommended the introduction of paid learning leave, development of support networks for adult learners; equal treatment for fees purposes of full and part time learners; an increase of the National Training Fund by deducting 0.5 percent from employee's existing PRSI, currently deductions are only made from employers PRSI; provision of distance learning through one institution representing all IoTs and universities and rebalancing of budgetary priorities¹⁵⁹.



Towards 2016 sets out a programme for training in the workforce. The Government, IBEC/CIF and ICTU have agreed on a number of areas for action including:

- the development of a targeted guidance, learning and training programme;
- the introduction of measures for the promotion of take up of apprenticeships by older workers;
- the mainstreaming of the *Knowledge Economy Skills Passport (KESP)*, focusing on computer literacy, science and technology fundamentals, basic business skills and innovation and entrepreneurship;
- expansion of the *Skillnets* programme;
- increased financial support for the existing pilot trade union-led learning network under the FÁS *One-Step-Up* programme;
- increasing the allocation for the Workplace Basic Education Fund; and,
- a targeted fund will be put in place to alleviate the fees in public institutions for part-time courses at third level by those at work who have not previously pursued a third level qualification.¹⁶⁰

Appendix 4 Horizontal Issues

Section four reviewed the contribution of Ireland's education system to competitiveness based on the educational life cycle. A number of other issues are important across many levels of education. These include:

- The Availability of Mathematics, Science and Technology Skills
- The use of Information and Communications Technology in the education system
- The Internationalisation of Education
- The availability of Career Guidance

Appendix 4.1 Mathematics, Science and Technology

Skills in mathematics, science and technology are essential to underpin the competitiveness of the Irish labour force in the years ahead.

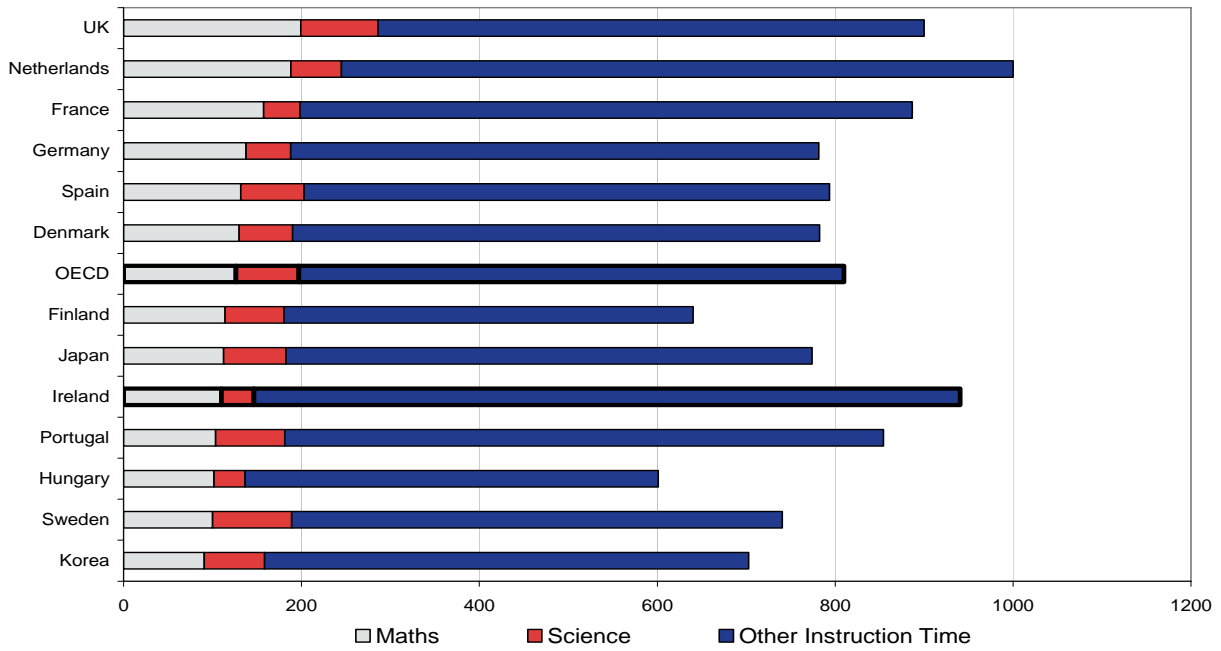
Ireland's Performance

The average number of tertiary graduates in mathematics, science and technology (MST) per 1000 of population aged 20-29 in the EU was 13 in 2006. Ireland is the best performing EU country in this regard with 21.4 MST graduates per 1000 of population in this age group¹⁶¹. However, the number of science graduates is decreasing while the demand for science graduates is increasing¹⁶². This is however an international trend affecting many leading developed countries.

In assessing the performance of the primary and second level education system, it is notable that:

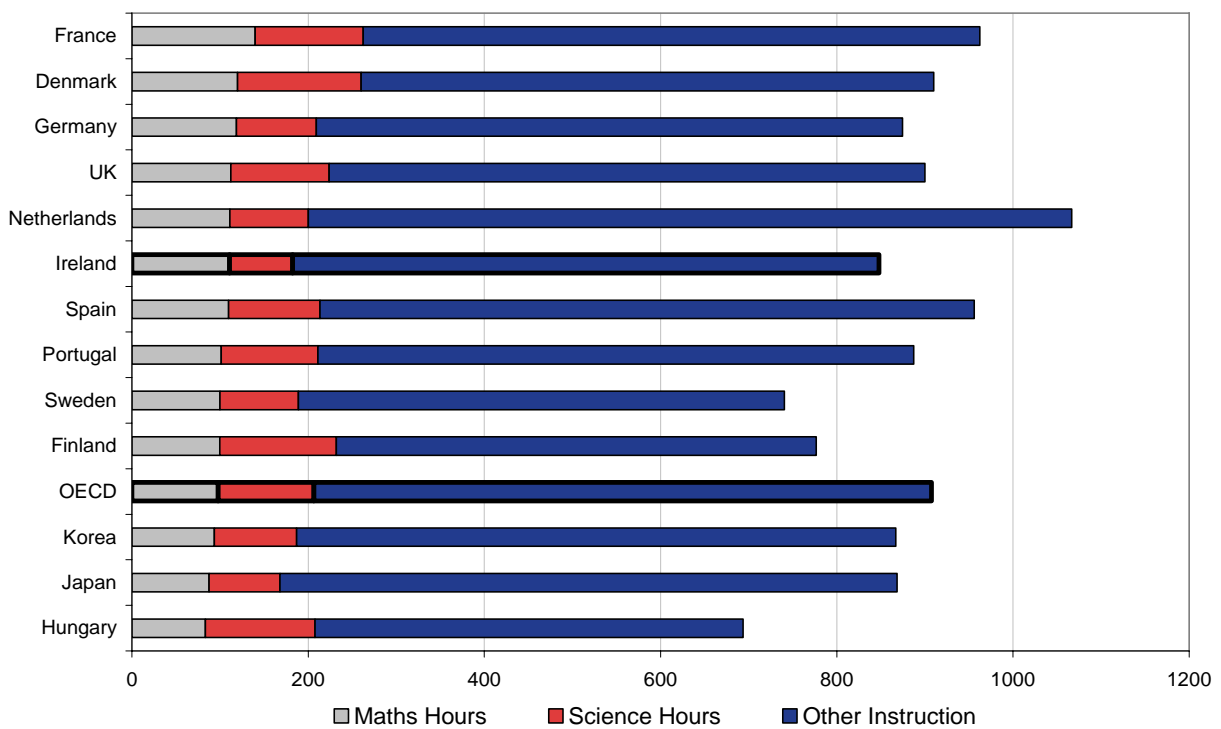
- In the 2006 OECD PISA assessments performance on science was slightly above the OECD average (508.3, compared to the OECD mean of 500.0). Ireland ranks 14th amongst OECD countries on the science assessment.
- For mathematics, Ireland's mean score of 501.5 does not differ significantly from the OECD mean of 497.7, placing Ireland 16th in the OECD.
- In Ireland, less time is spent on mathematics and science as a proportion of all teaching hours than in other OECD countries.
- At primary level, 9 to 11 year old students in Ireland receive more hours of overall tuition per year than in most other OECD countries. However, Ireland ranks 14th out of 21 OECD countries in terms of time spent on mathematics and 18th out of 21 on time spent on science¹⁶³. See figure 13.
- At second level, 12 to 14 year old students in Ireland receive less hours of overall tuition per year than in most other OECD countries. Ireland is close to the OECD average in terms of time spent on mathematics at second level. However, Ireland ranks 20th out of 22 OECD countries on time spent on science at second level.

Figure 12: Tuition hours spent on mathematics, science and all other tuition for 9-11 year olds, 2006



Source: OECD Education at a Glance, 2008

Figure 13: Tuition hours spent on mathematics, science and all other tuition for 12-14 year olds, 2006



Source: OECD Education at a Glance, 2008

IBEC have highlighted the need to address the subjects of mathematics and science at the early stages of education¹⁶⁴. A report published in 2006 showed that provision of learning support for mathematics was lowest in junior and senior infant classes and highest in senior classes (third to sixth class), suggesting that stronger early intervention is needed¹⁶⁵.

Progress to Date

A *Task Force on the Physical Sciences* reported to Government in March 2002 setting out a range of recommendations aimed at addressing the declining level of participation in the physical sciences at school level and in higher education and at ensuring the provision of a well developed skills base in this area.

As outlined earlier, curriculum reform is also underway. A revised syllabus for junior cycle science, with an increased emphasis on science process skills, hands-on student practical work and an investigative approach to teaching and learning, was introduced in schools in 2003. The National Council for Curriculum and Assessment (NCCA) is currently developing revised syllabuses in the three main senior cycle science subjects to bring them into line with the approach at junior cycle.

Project Maths, a major initiative in Mathematics in second level schools began in September 2008 in 24 project schools. Mainstreaming in all schools will begin in September 2010, prefaced by a national programme of professional development for teachers in 2009/10

Established in 2003, the *Discover Science and Engineering* programme, as part of its activities is supporting the new national science curriculum at primary school level.

Recognition of the importance of developing a scientifically literate society has led to the establishment of the *Centre for the Advancement of Learning of Mathematics, Science and Technology (CALMAST)* at Waterford Institute of Technology. Since its inception in 2002, it has worked to promote, advance and support the teaching of science, mathematics and technology¹⁶⁶. The University of Limerick (Shannon Consortium) has recently been designated as a *National Centre for Excellence in Mathematics and Science Teaching and Learning*, established under Cycle II of the *Strategic Investment Fund (SIF)*. The Centre is targeting the professional development of the teaching of science and mathematics at all levels with the ultimate objective of raising national achievement in these subjects from primary, through secondary and third level. The Centre will design and deliver nationally recognized evidence-based continuous professional development.

Appendix 4.2 Information and Communications Technology

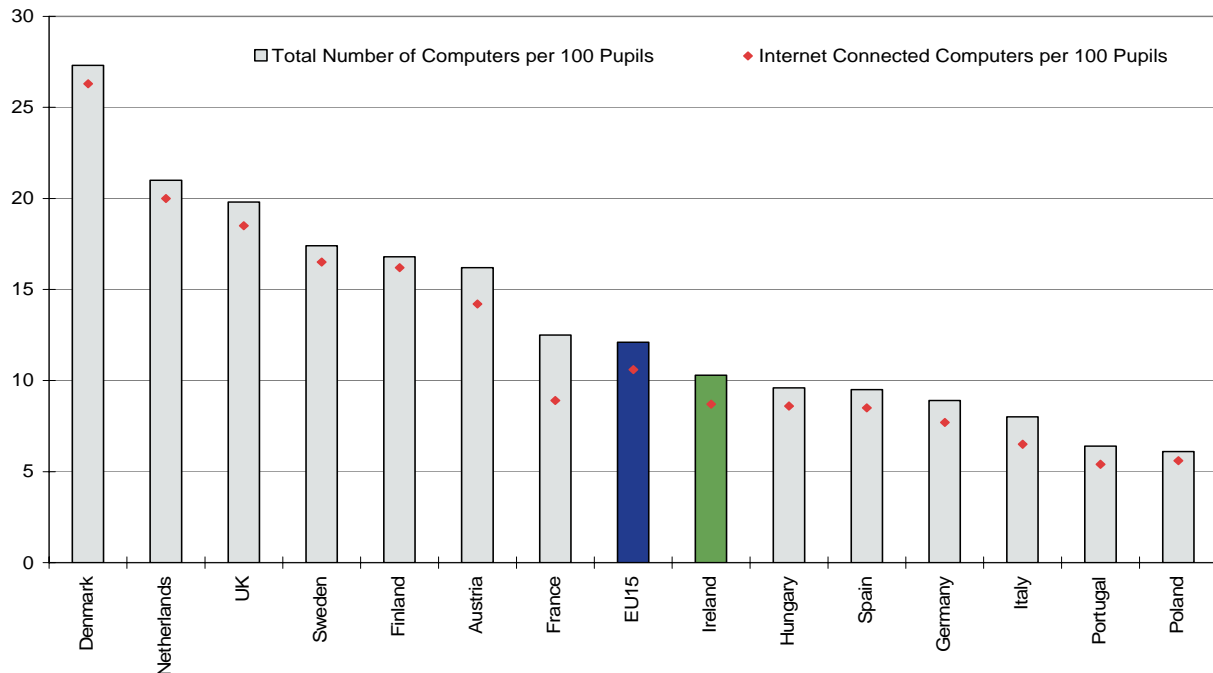
Information and communications technology has in recent years revolutionised business practices, facilitated globalisation and improved productivity of firms across the globe. ICT skills have become an essential skill. There are three principle benefits to integrating ICT into the education system. The computer literacy of those entering the workforce is higher, if managed properly it can improve the delivery of education, and it facilitates quality out of classroom learning for part-time students.

Evidence also exists that academically weaker students in particular can benefit from the introduction of ICT into schools¹⁶⁷.

Ireland's Performance

At present, the availability of computers in Irish schools remains relatively low. See figure 14. Ireland does not perform well in comparison to the EU-15. Ireland has fewer computers per student than the EU-15 average.

Figure 14: Computers per 100 Pupils, 2006



Source: *Benchmarking Access and Use of ICT in European Schools, 2006*

Progress to Date

The *ICT in Schools* Sub-Programme of the NDP 2007-2013 allocates €252 million for ICT in schools. Objectives mentioned in the NDP include developing an e-Learning culture in schools that will ensure that ICT usage is embedded in teaching and learning across the curriculum; teacher professional development; the maintenance of a national broadband network for schools; the upgrading and renewal of hardware; and the provision of software and digital content for learning. The funding allocated equates to an annual expenditure of €45 per pupil¹⁶⁸.

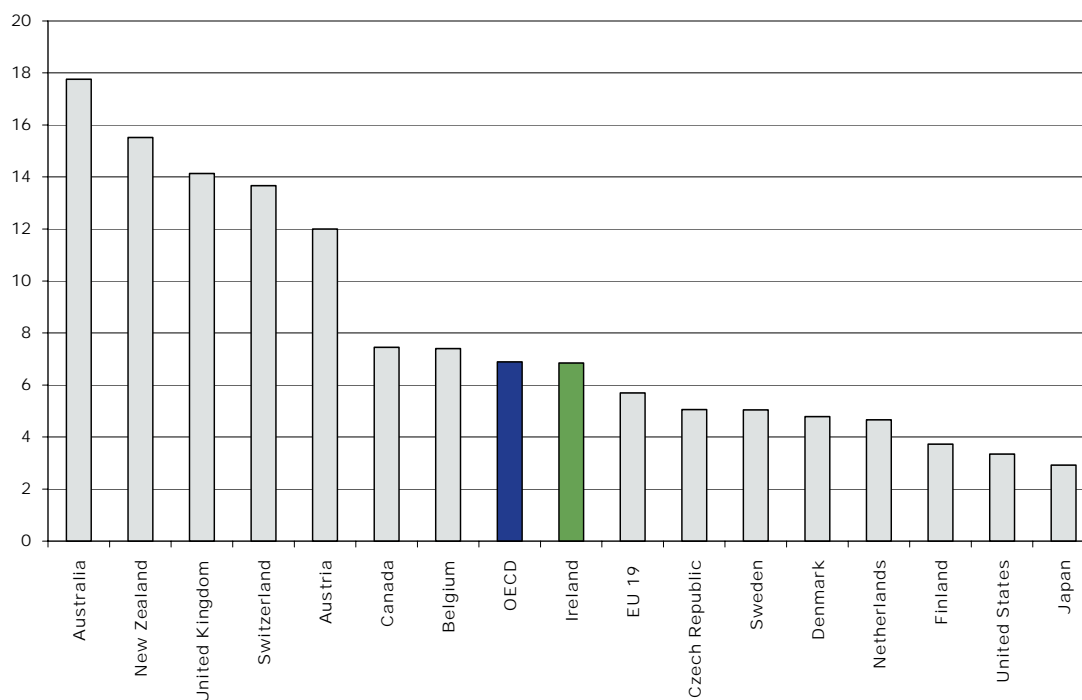
Appendix 4.3 Internationalisation of Education

Properly managed, the attraction of overseas students to Ireland could have a range of economic, social and cultural benefits. Attracting and integrating high quality overseas students into Ireland's education system is important to the future quality of Ireland's labour force. The international education market represents a means of building up networks and contacts, which can underpin the development of future economic, financial and political cooperation. It also has the potential to promote tourism and Irish exports of goods and services.

Ireland's Performance

While Ireland's performance in attracting international students is average compared to the OECD as a whole, Irish HEIs are not as successful as their counterparts in other English-speaking countries such as Australia (17.8%), New Zealand (15.5%), UK (14.1%) and Canada (7.4%) The evidence suggests that Ireland is not taking advantage of our significant potential to attract international students.

Figure 15: International Students as a Percentage of all Tertiary Enrolment, 2006



Source: OECD, *Education at a Glance 2008*.

A total income of €335 million was generated by international students in the academic year 2005/06. Of this €335 million, just under €154 million was generated by the Higher Education Institutions in tuition fees from international students, with the remaining €181 million generated through expenditure on accommodation and living expenses. This equates to an average spend per year of €9,715 per student on living expenses¹⁶⁹. The biggest sector in the internationalisation of education is English as a foreign language¹⁷⁰.

Appendix 4.4 Career Guidance

In order to become a leading knowledge-based economy, Ireland's workforce must be able to adapt its skills to the changing business environment. Consequently, career information and guidance is needed to assist individuals in reaching decisions about the steps they might take at different junctures in their working lives, to raise their skills and adapt to change.

Developments in Ireland

There is no formal guidance or career learning inputs at primary school level. A pilot of a Canadian primary level method of career guidance, the 'Be Real Game', is however underway. Formal methods of career guidance are available at second level, post Leaving Certificate level, third level institutions and FÁS training centres. More recently adult guidance has been made available to adults engaged in literacy, VTOS and community education programmes. Examples of some of the resources available include, the *National Centre for Guidance in Education (NCGE)*, which operates under the Department of Education and Science and provides training and information for those connected to education facilities, while the *National Resource Centre for Vocational Guidance* works with FÁS.

Despite career guidance being available at all levels of education in some shape or form, it is not utilised fully due to lack of awareness of its availability. A recent study by the *Expert Group on Future Skills Needs* shows that between 38 and 72 percent¹⁷¹ of respondents had never heard of four of the major Irish careers databases¹⁷². Current provision of labour market information is presently inaccessible outside policy and academic audiences due to its style of presentation. The *Expert Group on Future Skills Needs* in their report *Careers and Labour Market Information in Ireland* (2006) recommend the development of a central careers portal and a strengthening of career guidance for both adults and students, including the use of better on-line skills assessment tools.

In terms of funding under the current *National Development Plan*, while guidance and counselling are mentioned under the *Training and Skills Development* programme and the *Working Age Education* programme under the *Vocational Training Opportunities Scheme and Adult Guidance*, no specific allocations have been outlined.

Endnotes

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- 2 CSO, 2008, *Quarterly National Household Survey*, Module on Educational Attainment, December; CSO, 2008, *Measuring Ireland's Progress 2007*.
- 3 At all levels of education (with the exception of pre-primary which is primarily privately funded), total expenditure per student is lower than the EU-15 and OECD averages. See: OECD, 2008, *Education at a Glance*, Paris (Annex, figure 3).
- 4 Levy & Murnane point to the importance of education as a defence against a decline in economic activity due to computerisation and international competition in the form of outsourcing. They argue that there is a continued likelihood of job losses, predominantly in low and moderately skilled areas and that routine cognitive/manual tasks can be substituted by computers or competitors in lower cost economies. Source: Levy, F. & Murnane, R. (2007) "How Computerized Work and Globalization Shape Human Skill Demands," in M.M. Suárez-Orozco (ed.) *Learning in the Global Era: International Perspectives on Globalization and Education*, University of Chicago Press.
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- 8 Educational Research Centre, 2004, *National Assessment of English Reading (Primary) 2004*, Dublin.
- 9 Defined as those who sit the Leaving Certificate examination only.
- 10 Eurostat, Structural Indicators. Early school leavers are defined as persons aged 18 to 24 whose highest level of education attained is lower secondary or below and have not received education (either formal or non-formal) in the four weeks prior to the survey. See also CSO, 2008, Quarterly National Household Survey, Educational Attainment, December.
- 11 Expert Group on Future Skills Needs, 2008, *Annual Report 2007*, Dublin: Forfás.
- 12 Higher Education Authority, 2007/08, *Annual Statistics*, available at www.heai.ie. This figure refers to first-time (new) entrants to full-time undergraduate courses at universities and institutes of technology (NFQ levels 6 to 8).
- 13 National Competitiveness Council, 2008, *Benchmarking Ireland's Performance*, Dublin: Forfás.
- 14 Such as *The Times Higher Education Index*. Scores are based on peer review assessments, the amount of cited research produced, the ratio of faculty to student numbers and a university's success in attracting foreign students and internationally renowned academics. Two Irish colleges are ranked in the top 200 institutions. These are Trinity College Dublin, which is ranked 49th in 2007, up 4 places from 2007 and University College Dublin which is ranked 108th in 2007, up 69 places since 2007.
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- 16 National Competitiveness Council, 2008, *Benchmarking Ireland's Performance*, Dublin: Forfás.
- 17 Eurostat, *Structural Indicators*, available at <http://ec.europa.eu/eurostat>.
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- 19 PUII, 2004, *The Competencies for Next Generation Employability*, University Limerick.
- 20 Department of Education & Science, 2007, *Annual Report 2006*, Dublin.
- 20 A recent DES Inspectorate report found that teachers are positively disposed to using ICT but are impeded by the lack of access to equipment, broadband and technical support. It identified a need for greater clarity and understanding in using ICT effectively in teaching and learning and for greater support and guidance on ICT planning in schools. Department of Education and Science, 2008, *ICT in Schools Inspectorate Evaluation Studies*.
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- 22 Internationally, a number of governments, local authorities and educational authorities have adopted variety of Linux-based operating systems (Ubuntu/Edubuntu, Mandriva, OpenSUSE etc.) supplemented with free or open-source applications including OpenOffice.
- 23 Instruction time on science for students aged 9-11 as a percentage of all tuition was 4 percent compared to the OECD average of 7.9 percent in 2006. Time spent teaching mathematics is 12 percent compared to the OECD average of 16 percent. For students aged 12-14 science accounts for 8 percent of total tuition time compared to the OECD average of 11 percent. Time spent teaching mathematics is 13 percent - equal to the OECD average. OECD, 2008, *Education at a Glance 2008*. See Appendix Fig. 12
- 24 Expert Group on Future Skills Needs, 2008, *Statement on Raising National Mathematical Achievement*, November, Dublin: Forfás. Failure rates over recent years have remained stubbornly high, limiting the educational and employment prospects of a significant number of young people.
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- 26 PISA scores indicate that fewer students in Ireland (10 percent) achieved the highest mathematics proficiency levels compared to the OECD average of 13 percent. South Korea, Finland, Switzerland, Belgium and the Netherlands all had more than 20 percent of students at these top levels.

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- 27 National Council for Curriculum and Assessment, 2008, *Project Maths: Information for Schools*, Dublin.
 - 28 National Mathematics Advisory Panel, 2008, *Final Report of the National Mathematics Advisory Panel*, Department of Education, Washington DC, page xxi.
 - 29 Department of Education and Science, 2005, *Beginning to Teach*.
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 - 33 Robert J. Barro, 2001, "Human Capital and Growth," in *American Economic Review*, 91(2), pp. 12-17.
 - 34 Summarised in Hayes, N., 2008, *The Role of Early Childhood Care and Education: An Anti-Poverty Perspective*, Commissioned Paper, Combat Poverty Agency. OECD, 2006, *Starting Strong II: Early Childhood Education and Care*, Paris, Annex D.
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 - 43 29.2 percent of net income for dual-income family earning 167 percent of the average production wage jointly. Source: OECD, 2007, *Babies and Bosses: A Synthesis Report*, Paris.
 - 44 89.9 percent of gross earnings from the new job; net of income tax, social contributions, changes in benefits and childcare fees. This significant barrier to spousal employment is the highest of all OECD countries Source: OECD, 2007, *Babies and Bosses: A Synthesis Report*, Paris.
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 - 53 Achievement tends to increase with spending, but the relationship is not particularly strong, and spending per student explains only 19% of the variation in mean performance between the countries shown. The relationship between expenditure and PISA results varies by country. For example, Finland invests roughly the same amount per student as Australia and the UK, yet has a much higher level of achievement. Source: Education Research Centre, 2007, *Ready for Tomorrows World? The competencies of Irish 15-year-olds in PISA 2006*, prepared for Dept of Education & Science, ERC, Dublin.
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- 55 Of 112 studies which examined the impact of the reduction of class size on student outcomes, only nine found a positive relationship while 103 found no significant relationship or a negative one. Hanushek, E.A., 2003, "The Evidence on Class Size," in *International Library of Critical Writings in Economics*, 159(2), pp. 119-156. McKinsey, 2007, *How the Best-Performing School Systems Come Out on Top*, available at www.mckinsey.com/client/service/socialsector/resources/pdf/Worlds_School_Systems_Final.pdf.
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- 59 OECD, 2008, *Education at a Glance 2008*, Paris.
- 60 For example: In Japan and Finland, groups of teachers plan lessons jointly, and observe each others classes in order to hone best practice. In Singapore all teachers are entitled to 100 hours fully-paid professional development training per annum and senior teachers oversee professional development in each school.
- 61 Initiatives already in receipt of SIF Cycle II funding, including a *National Centre for Excellence in Mathematics and Science Teaching* (University of Limerick/Shannon Consortium) are relevant in this regard, as are proposals to disseminate academic research to practitioners (via staff-rooms) and to launch a dedicated web portal for teachers.
- 62 The Teaching Council is an independent, statutory agency with the remit to regulate the teaching profession and to maintain and enhance teaching standards. It was formally established in March 2006 and is self-funding, deriving its income primarily from teacher's registration fees.
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- 66 The hypothecation of (ring-fencing) of revenues raised from graduate taxation may not always be guaranteed. Not least, graduate taxes may only be levied on the cohorts who remain in Ireland for subsequent employment (90 percent of undergraduates; 80 percent of PhD graduates. Source: Higher Education Authority, 2008, *What Do Graduates Do?*).
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- 77 Eurostat, *Population and Social Conditions*.
- 78 O'Connell, P.J., 2004, "Who Generally Trains? The Effects of Personal and Workplace Characteristics on Training at Work," *ESRI Seminar Paper*, 13th May, ESRI, Dublin.
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- 95 OECD, 2008, *Education at a Glance*, Paris. Pupil-teacher ratio is calculated by dividing the number of full-time equivalent pupils at a given level of education by the number of full-time equivalent teachers teaching at that level.
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- 122 Further education and training includes programmes such as Post Leaving Certificate courses, the Vocational Training Opportunities Scheme (second chance education for the unemployed), programmes in Youthreach and Senior Traveller Training Centres for early school leavers, adult literacy and basic education, and self-funded evening adult programmes in second level schools.
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