A cost benefit analysis of adult literacy training

Research report

March 2009

NALA
National Adult Literacy Agency
Áisíneacht Náisiúnta Litearthachta do Aosaigh

Written by: James Dorgan, Dorgan Associates
Published by: The National Adult Literacy Agency 2009

The National Adult Literacy Agency (NALA) was established in 1980 and is an independent membership organisation, concerned with developing policy, advocacy, research and offering advisory services in adult literacy work in Ireland. NALA has campaigned for the recognition of, and response to, the adult literacy issue in Ireland.

Contact NALA at:

National Adult Literacy Agency
76 Lower Gardiner Street
Dublin 1

Tel: +353 1 8554332
Fax +353 1 8555475
Email: literacy@nala.ie

www.nala.ie

ISBN: 1-871737-99-0

Acknowledgements

The consultant would like to acknowledge the assistance of Dr Orla Doyle of the Geary Institute at University College Dublin for searching the literature, contributing the detailed explanation of the two crucial studies which underlie the methodology, for analyzing the Irish International Adults Literacy Survey data to produce estimates of the effect of literacy on chances of employment and for comments on the text.

The author would also like to acknowledge assistance received from personnel of NALA, the Department of Education and Science, County Dublin VEC and FÁS.

Abbreviations

ABE	Adult Basic Education
AEGI	Adult Education Guidance Initiative
ALCE	Adult Literacy and Community Education
ALO	Adult Literacy Organiser(s)
ALS	Adult Literacy Service
BCS70	British Cohort Study
CE	Community Employment
CTs	Controlled Trials
DES	Department of Education and Science
DETE	Department of Enterprise, Trade and Employment
GED	General Educational Development (US high school diploma)
IALS	International Adult Literacy Survey
ITABE	Intensive Tuition in Adult Basic Education
NALA	National Adult Literacy Agency
NCDS	National Child Development Study
NFQ	National Framework of Qualifications
NLT	National Literacy Trust
NPV	Net Present Value
NRDC	National Research and Development Centre
RCT	Randomised Control Trials
SCBA	Social Cost Benefit Analysis
SILC	Survey of Income and Living Conditions
VECs	Vocational Education Committees
VTOS	Vocational Training Opportunities Scheme

Table of contents

Executive summary

Introduction

1 The 1995 International Adult Literacy Survey (IALS) showed that a significant number of the Irish population have problems with basic tasks in literacy and numeracy. This prompted an expansion of adult literacy training budgets from just over €1 million in 1997 to a budget of around €30 million in 2007.

2 Although the prima facie case for literacy training is strong in a tight budgetary environment the effectiveness of these expendit ures needs to be carefully evaluated. The purpose of this assignment is to conduct a cost benefit analysis of literacy training in Ireland using data and research from Ireland and, where relevant, abroad.

Cost and Outcomes of Literacy Training

3 The first step is to estimate the costs of literacy training in relation to the results achieved. There seems to be little relevant international research on this subject. However, an evaluation of the Intensive Tuition in Adult Basic Education (ITABE) Programme carried out by County Dublin Vocational Education Committee in 2006 provides some useful information.

4 The ITABE Programme cost €1 million and provided tuition for 953 trainees over 14 weeks at the rate of 6 hours per week. Trainees were rated on a nine-point scale (or stages) before and after the Programme. These nine stages were equivalent to the National Frameworks of Qualifications (NFQ) levels 1 to 3.

5 Most trainees moved one or more stages (i.e. points on the nine-point scale) and the aggregate of all the moves or 'progressions' is taken as the overall outcome of the Programme. This was the equivalent of 246 moves in NFQ levels. The cost of moving literacy up one level on the NFQ is therefore about €4,065.

Economic Impacts from Literacy

6 The next step is to quantify the economic impact of gains in literacy. There is a good deal of international and some Irish research on this topic. There is some convergence on the conclusion that gains in income are around 30% for a movement of 100 points in the 5-level IALS. Irish data points to a 34% increase. Since the first two levels of the IALS are the equivalent of NFQ levels 1 to 3, this means a 28% increase in income per improvement in one NFQ level for those in work or getting work after training.

7 The estimated gain from improvements in literacy is sensitive to the level of income which is increased as a result of the training. There is no income data on literacy trainees, but the IALS showed that those with low literacy levels were in the bottom 40% of the income distribution. Using data from the Survey of Income and Living Conditions (SILC) it is possible to work out that the annual income gain per NFQ is €3,810 and the impact on the Exchequer, in terms of reduced social welfare transfers and increased tax payments, is €1,531 per annum.

8 Aggregated over the ITABE programme the income gains amount to €937,000 per annum, compared to the programme cost of €1 million, and is a very high rate of return. However, this only applies to literacy training for those at work: only 26% of participants in the ITABE were employed. The analysis addresses the question of whether the economic gains from training those in employment would be sufficient to remunerate the cost of training the typical literacy training class in which the majority is not working.

9 However, if the model is to apply to all trainees including those not working, then it is logical to factor in the effect of literacy training on employment. An analysis of the IALS data for Ireland shows that literacy training increases employment by about 12% per increase in NFQ level. Bearing in mind the aggregate number of NFQs in the ITABE sample, the gain in employment is about 3.8% of the number of trainees not in work during the training or 22 trainees in the ITABE example.

Since this gain in employment means moving from very low incomes from work, this implies a relatively significant gain in financial terms. Altogether, the income gains from the minority at work, plus those from those subsequently employed as a result of the training, amount to €498,000 per annum - also a very high rate of return on the cost of the Programme.

10 In summary, these figures indicate that expenditure on literacy training generates high economic returns. Assuming a twenty-year working life after training (i.e. trainees in their thirties or forties), the net present values (NPVs) of incomes exceed costs by a large margin even when only a minority is working. This is on the basis of a 5% discount factor and it holds even when it is assumed that the gains from literacy are phased in gradually over five years.

11 The pay back to the Exchequer in the form of tax increases from the increased incomes and reduced benefits due to reductions in eligibility and more people at work, is, of course, longer. Even so, in the case where all trainees are assumed to be working, the annual gains to the Exchequer are estimated at €377,000 per annum and in the more typical case where a minority is employed, the annual return is €172,000 per annum. In both cases, the NPVs are positive.

12. Excluded from costs are the trainees' real or imputed costs (e.g. value of time spent on training) on the grounds that data on these costs is unavailable. On the other hand, some estimates of the economic benefit of education include not only the income gains to employees, as in the preceding estimates for literacy training, but also the gains to employers from the extra productivity of the employees. Research in the UK suggests this could be as much again as the income increases of the employees, thus doubling the rates of return calculated above. However, there is no research on this point in Ireland and no further calculations are made here. Yet it is clear that the economic gains that have been estimated are conservative.

    Finally, it should be noted that the calculation of costs and benefits is heavily dependent on the data from the ITABE evaluation. This is the first, and so far the only, systematic evaluation of literacy training in Ireland. Further evaluations of literacy training will need to be undertaken to verify the accuracy of the ITABE results. But in the mean time, it is considered that they provide a reasonable basis for analysis. However, the results should not be taken to apply to other literacy training courses in Ireland.

Social Impact of Literacy Training

13 Improved literacy is also associated with a wide range of non-economic or social gains. The most interesting relate to:

- **Aspirations:** Career and educational aspirations are important for subsequent development of individuals and their children. There is empirical evidence that links literacy problems to low aspirations and onwards to poor career and educational choices.

- **Intergenerational effects:** There is strong evidence that low literacy amongst parents has knock on adverse effects on children's educational attainment leading to increased costs in the form of remedial teaching.

- **Civic and cultural engagement:** People with low literacy are less likely to become involved in their communities, to vote or volunteer. This is likely to have some adverse economic effects on community development, though no attempts have been made to estimate these.

- **Crime:** Studies in the US and the UK have linked low literacy with a tendency to delinquent behaviour. One UK study (KPMG 2006) attempted to quantify some of these costs resulting from low literacy amongst school children. Applied to Ireland they might be of the order of €15 to €30 million.

- **Health:** There are a large number of studies about the relationship between literacy and health with the evidence suggesting that individuals with low literacy have difficulty in identifying health problems, managing their care and understanding health professionals. It is clear that there is a relationship between literacy and health problems. The KPMG estimated costs for a small area of health care (obesity, substance abuse, teenage pregnancies and depression). In Irish terms, these costs would be around €18 million.

17 In summary, therefore it is clear that there are causal relationships between low literacy and certain types of social problems. While quantifying the effect is difficult there is enough evidence to suggest that the economic costs are, in the aggregate, likely to be significant, certainly by reference to the annual investment of about €30 million in literacy training.

Recommendations

18 The principal recommendation that emerges from this analysis is that since there is strong evidence that the economic gains from literacy are significant, literacy training should move further up the hierarchy of educational priorities. The example of other English speaking countries is instructive in this respect.

19 However, a major impediment to the development of policy is the absence of good up to date information on literacy levels in Ireland. The Irish authorities should undertake a national survey as soon as possible, preferably in conjunction with another IALS type international survey.

20 To deepen our understanding of factors involved in literacy and its long-term consequences, literacy questions should be included in the existing childhood longitudinal survey now under way under the auspices of the Department of Health and Children. Failing that, a literacy longitudinal study should be started and maintained. This could be an omnibus survey but it is important that the design incorporates a literacy dimension.

21 As the discussion has indicated, there is some information on the economic aspects of literacy yet very little on the social consequences of low literacy. Research into both needs to be undertaken, particularly to fill the void in terms of social outcomes.

22 There is a need for more information on the outcomes of literacy training. Data on outcomes is not abundant anywhere and in Ireland there appears to be only one such exercise. Without data on outcomes, the value of literacy training cannot be known. Outcome data could also help in determining optimum pedagogies.

I Introduction

The International Adult Literacy Survey

1.1 The 1995 OECD International Adult Literacy Survey (IALS) results for Ireland, published by the Department of Education / Educational Research Centre in 1997, showed that a significant number of the Irish population have problems with basic tasks in literacy and numeracy (DES ERC 1997). The survey classed about 25% of the population in Level 1 (the lowest in a five-part scale) in respect of document, prose and quantitative literacy. This was one of the highest percentages in this category in the 22-country sample.

1.2 The results of the IALS were a shock to policy makers and educationalists. This was reinforced by the consideration that the results came at a time when it was clear that changes in society are making increasingly complex demands on individuals. This is most evident in the work place where unskilled manual work is disappearing. Yet also outside the world of work, interaction with government services, financial institutions, professional advisers and information technology, requires an increasing competence in oral, written and quantitative expression. Participation in civil society, whether through social, cultural, sporting or political organizations, is also inhibited if individuals suffer from impediments in any of these aspects of literacy. Thus, without adequate attainment in these skills, individuals risk exclusion in the work and non-work spheres of life.

The Adult Literacy Service

1.3 The most tangible response to the results of the IALS was the expansion by the Department of Education and Science (DES) of adult literacy programmes within the adult education framework operated by the Vocational Education Committees (VECs). Increased funding was also provided to National Adult Literacy Agency (NALA), to enhance its role in coordination, training, innovation and research in the field of adult literacy. In the field of vocational training, a number of initiatives were also launched by the Department of Enterprise, Trade and Employment (DETE) aimed at improving basic skills of workers incorporating an enlarged and vocational concept of literacy.

1.4 These measures have now reached an appreciable size in financial terms. (See Table 1.1) The budget for the Adult Literacy Service (ALS) operated through the VECs, is currently running at €30 million and other measures in which literacy training is at least a component amount to another €3 million. However, in a difficult economic environment all budget allocations are liable to challenge. While the prima facie case for literacy may be persuasive, policy makers and administrators in the field have to substantiate their claims on the Exchequer with robust objective evidence of costs and benefits.

1.5 Other countries, some of which had unsatisfactory results in the IALS, reacted similarly to Ireland and the result was a widespread increase in emphasis on literacy training and also on research. The empirical element of this research followed techniques previously applied to quantifying the effects of education (usually measured as years in school). The results showed that literacy difficulties had significant adverse economic and non-economic effects for those affected and that individuals with higher levels of literacy benefitted from higher incomes and fewer social and personal difficulties.

Table 1.1: Expansion of the Adult Literacy Service

	1997	2000	2001	2002	2003	2004	2005	2006	2007
Budget €m	1.10	11.25	13.56	16.49	17.90	18.50	21.00	23.00	30.00
Students (000s)	5.00	17.15	22.73	28.36	31.58	33.87	35.55	40.68	45.81
Paid Tutors		800	1,200	1,279	1,504	1,375	1,314	1,424	1,492
Volunteer Tutors		3,400	4,000	4,130	4,215	3,973	3,775	3,662	3,599

Source: Department of Education and Science.

Objective of the Analysis

1.6 The objective of the current exercise is therefore to identify empirical evidence on the impacts of literacy training, devise a methodology that can translate these results into quantified estimates of costs and benefits, and thus demonstrate the extent to which Exchequer support is justified. Since impacts of literacy attainment extend beyond the vocational domain, the evaluation should embrace non-economic - termed here 'social' impacts - to the extent permitted by the data.

Methodology

1.7 Ideally, Social Cost Benefit Analysis (SCBA) is the most appropriate method of evaluating the costs benefit ratio of a public sector programme. SCBA includes all the costs and benefits incurred by or accruing to public authorities, private enterprises and individuals whether participating directly in the programme or contributing or benefitting indirectly. It includes costs and benefits which are imputed, such as time saved, by for example a new road, as well as those incurred through the market, such as purchases or sales of goods and services. It includes social as well as economic costs and benefits.

1.8 As will be seen in the discussion that follows, while some of the economic costs and benefits of literacy training are measurable relatively easily, many - especially social impacts - are difficult to quantify. A comprehensive SCBA of literacy training would therefore require rather extensive research. A major empirical evaluation of outcomes of literacy training in Ireland and its socio economic impacts is beyond the resources currently available. Instead, this exercise is exclusively based on existing data sources. A further difficulty is that the Irish literacy training programme is fairly small and there is very limited research on its economic and social costs and benefits.

1.9 However, some useful work has been done in Ireland and this makes an important contribution to the analysis which follows. Domestic resources can be supplemented by work carried out in other countries. Chief amongst these is the US where a national effort to deal with adult literacy has dated since the 1966 Adult Education Act. The second most abundant source, and the most relevant to Ireland, is the UK, where the IALS results were also disturbing and which led to adult literacy becoming a major plank of educational policy. Other countries in which literacy has attracted priority attention include New Zealand and Australia. In these countries, development of services has been accompanied by comprehensive research programmes which include studies measuring the economic and social impacts of literacy standards.

1.10 Based on this research, in conjunction with Irish resources, it is possible to envisage a cost benefit analysis of literacy training in terms of quantification of:

- Costs of training in financial terms;
- Economic benefits of training in terms of income accruing to participants and increased tax revenue and reduced welfare costs to the Exchequer.

And some indicators, mainly based on foreign research of:

- Social benefits in the form of improved public health, reduced welfare dependency, more socially responsible behaviour (e.g. less crime) and better child development.

1.11 The work is organised into a two-step procedure. The first step quantifies the effect of training on literacy standards. For convenience, these effects are referred to as the outcome of training. The second step evaluates the economic impact of higher standards of literacy. A third section deals with the social impacts.

Concept of Literacy

1.12 The term literacy training is used throughout this report. Before proceeding further, it is necessary to clarify what is understood by the term and the provision that is made for literacy training in Ireland. The simplest understanding of literacy is proficiency in written and oral communications. However, difficulties with numeracy can be more closely associated with disadvantage than difficulties with literacy (NRDC, 2005). Therefore, in practice much literacy training incorporates numeracy training in addition. Training in computer skills and information communication technology is another component often included, as those skills are equally important basic tools for work and non-work activities. Furthermore, it is found that these types of training are best provided within thematic contexts related to work, the home or leisure. Thus, in the case of work, much literacy training has a vocational dimension. The result of these extensions of the understanding of the concept of literacy and of pedagogical practice is that now what is referred to as literacy training is better understood as adult basic education (ABE) and ABE incorporates a large element of literacy - as widely understood. In what follows, the term 'literacy training' should be understood to embrace ABE.

II Outcomes of literacy training

2.1 While it may seem obvious that literacy training improves literacy, evidence is required that it does so when applied on a large scale and that the amount of improvement (as well the resources employed) can be quantified. Following the approach outlined in Section I, the international literature is first reviewed before applying the available Irish experience to assess the extent to which this is true.

Literature Review

2.2 There have been a number of reviews of the literature on the outcomes of adult literacy training in Beder (1999) as reported in Comings, Sum and Uvin (2000), Johnston (2004) and Torgerson et al (2004) published by the National Research and Development Centre (NRDC) for adult literacy and numeracy of the UK. Beder refers exclusively to the US experience up to 1999 where adult literacy has been established as a major dimension of education. Johnston reviews a selection of studies of the employment and earnings outcomes of employment-related, workplace, and community and family literacy programmes. Torgerson conducted a systematic review of randomised control trials (RCTs) and controlled trials (CTs) The studies reviewed in Torgerson focus on those which test particular pedagogies whereas these were excluded from Johnston. The result is that there is relatively little overlap between the three reviews.

2.3 Although the studies reviewed address the question of outcomes, and some include the measurement of impact on employment and other benefits, very few attempt to quantify the relationship between the resources absorbed in literacy training and the resulting improvement (if any) in literacy standards. While the reviews remark on this lacuna in literacy research, and recommend that it be closed, little appears to have been done in the last four or five years. Fortunately, there is one study from Ireland that provides usable information on this subject and there is an earlier source available from the US which is helpful.

2.4 After eliminating studies where the methodology was unsound from the viewpoint of measuring impact, Johnston reviews twelve studies of which eleven are from the US and one from England and Wales. The US studies showed positive impacts on education, as measured by attainment of high school diplomas (the General Educational Development tests or 'GED'), and some impact on earnings. But strangely, the effects on literacy per se were ambiguous. The exception was the UK study (Brooks et al, 2001) which was strongly positive.

2.5 Torgerson et al trawled over 4,500 papers in the literacy training literature and identified 59 which were relevant. Applying stringent criteria as to methodology employed in the studies, the authors extracted papers covering 18 valid trials of which nine were RCTs and nine were CTs. All but two of these studies were from the US; these being from the UK and New Zealand. One of these eighteen studies, showed perverse results, eleven showed no results and 6 yielded positive results which was enough for the authors to conclude that the particular types of literacy and numeracy training in the studies do produce results.

2.6 Beder covered 115 studies of variable quality which claimed to measure impacts in terms of literacy, employment and participation in children's education. In terms of outcomes, the majority of these studies reported favourable results. Yet these relied heavily on self-assessment. From a sub-set of the more cogent exercises Beder concludes that students do indeed gain from literacy training though sometimes the gain is small, but the effects on employment and income are more marked.

2.7 Overall, however, Johnston's conclusion about the studies he reviewed seems applicable to the entire corpus. *'Taken as a whole, (the studies) provide good evidence that adult basic skills programmes can increase educational attainment as measured by a receipt of a GED; some evidence that programmes can lead to increases in earnings and provide little evidence that programmes can increase people's literacy skills.'*

2.8 However, there are exceptions to the last point, which is the concern of this Section. Brooks et al showed gains of 11 points on the 500-point range used for IALS after 20 weeks (approximately 60 hours) of training. Johnston notes that a possible explanation for the superior performance in this study as compared to the eleven US studies he reviewed, is that participation in the UK scheme was voluntary whereas in the US studies participation was mandatory under 'welfare to work' programmes, or through random assignment.

2.9 Another important exception is a report in Comings, et al (2000) on one of his own studies. In a detailed examination of almost 20,000 students in an adult literacy programme in Massachusetts during 1997/99, Comings concluded that students gain from literacy training, and that the more training they get, the more they improve. Furthermore, he was able to produce a frequency distribution of the gains, in terms of grades, in relation to hours of training. The rate of progress per hour varied inversely with the hours of training But elsewhere (Comings 2003) concluded that: *'Several studies have identified approximately 100 hours of instruction as the minimum adults need to achieve an increase of one grade-level equivalent on a standardised test of reading comprehension (Sticht, 1982; Dakenwald 1986; Perin &Greenberg, 1993).'*

Irish Experience: Intensive Tuition in Adult Basic Education

2.10 A shortcoming with the standard training provided by the VECs is that there is no systematic pre- and post-completion evaluation of the progress of the trainees. An exception is the intensive training programme started by the VECs with DES support in 2006. This was the Intensive Tuition in Adult Basic Education (ITABE) programme. It was designed to provide tuition at the rate of 6 hours per week instead of the standard 2 hours, and to test the effectiveness of the intervention. The post completion evaluation was carried out by Mr. Terry McCann of the County Dublin VEC on behalf of the ITABE National Advisory Group (McCann, 2006). To date this appears to be the only evaluation of literacy training in Ireland in which estimates are made of the outcomes of literacy training which can be compared to the resources employed.

2.11 A total of 953 individuals participated in the Programme the majority of who were graded at the start. Of the total, 18%, (171) dropped out and 606 of the 782 remaining (77.5%) were assessed at the end of the Programme under three domains of literacy: 'listening and speaking', 'reading' and 'writing'. Numeracy training was also provided but not all students participated in this domain. The report records that 520 were subject to numeracy post assessment. Applying the same drop out and response rates to numeracy students as to literacy students suggests 821 of the 953 trainees started numeracy and literacy training.

2.12 According to the report, assessments were 'negotiated' between the trainers and the trainees. This means that upward bias is likely. On the other hand, the methodology is also subject to downward biases, as the following paragraphs make clear.

2.13 The assessment divided the participants into the National Framework of Qualifications (NFQ) levels 1 to 3 which were further subdivided into three to make a total of nine 'stages' denoted as 1.1, 2.2, 3.1 and so on to make a total of nine 'stages'. The report records the numbers in each stage with respect to each of the three literacy and the numeracy domains both before and after the Programme. The report also provides a distribution of the number of participants recording progressions according to the number of stages progressed. These are shown in Table 2.1 below. This is an aggregate of 'progressions' of students at all stages to subsequent stages.

2.14 The key issue is how to translate the data in Table 2.1 into a usable measure of outcome of the Programme as a whole. The number of students who progress is the basis for one possible measure. As can be seen the number of students recording an improvement in one or more stages ranges from 316 (Listening and Speaking) to 383 (Writing) or from about 52% to 65% of the students across the four domains. The average of the four domains is 351 or 60%.

2.15 However this figure would be an underestimate of outcome since it gives no weighting to those who progressed by more than one stage. In fact, about one third of the total who did progress in any of the four domains did so by more than one stage. This suggests that the aggregate outcome of the Programme should be the number of trainees who progress weighted by the amount of progress they make (i.e. number of trainees x stages progressed).

Table 2.1 Outcomes of the Intensive Tuition in Basic Education

Number of Stages Progressed	Numeracy	Listening Speaking	Reading	Writing	Average
	No of Trainees				
0	181	290	239	223	233.25
1	236	200	259	251	236.50
2	48	52	43	54	49.25
3	41	32	38	51	40.50
4	9	21	21	18	17.25
5	4	7	5	6	5.50
6	1	0	0	2	0.75
7	0	1	0	1	0.50
8	0	3	1	0	1.00
Total trainees	821	953	953	953	920.00
Number who completed (82%)	673	781	781	781	754.40
Number of trainees assessed	520	606	606	606	584.50
Number progressing	339	316	367	383	351.25
Number progressing more than one stage	103	116	108	132	114.75
Progressing as % assessed	65.19	52.15	60.56	63.20	60.27
Assessed as % completed	77.24	77.55	77.55	77.55	77.48

Table 2.2 Aggregate Progressions (Grossed up to allow for trainees who were not tested)

	Numeracy	Listening Speaking	Reading	Writing	Average
1	306	258	334	324	306
2	124	134	111	139	127
3	159	124	147	197	157
4	47	108	108	93	89
5	26	45	32	39	36
6	8	0		15	8
7	0	9		9	6
8	0	31	10	0	10
					738

2.16 In Table 2.2, the same distribution in Table 2.1 is shown with two changes. First, the numbers of students at each level are grossed up to allow for the non-responses and so represent the total numbers who completed. This grossing up implies that the distribution of progressions applies equally to those who were not assessed as to those who were. This may be a strong assumption. But to discard them altogether, and assume nil success among those who were not assessed, seems even more extreme. Second, the columns are weighted progressions such that the number of trainees who progressed is multiplied by the number of stages they progressed. The average across all four domains is 738 progressions. It is proposed that these 738 progressions, defined as 'stage progressions' for clarity, rather than the simple number of trainees who progress, should be the measure of the outcome of the Programme. As three stages represent one NFQ level, the measure of output can also be expressed as 246 NFQs gains.

2.17 There are a number of important assumptions implied by this procedure. The first is that students who do not progress a stage do not benefit from the training. This is asserted to the contrary in the report. Indeed the literature reviewed above includes studies that show that attending literacy training results in an improvement in educational attainment and employability even if impact on literacy per se is hard to detect (see the Johnston citation in paragraph 2.7 above). It also assumes that those who dropped out of the Programme did not benefit. In fact, some may have dropped out as they achieved their objectives, which may have included one or more progressions. However, in the absence of adequate measures, intra-stage progression and possible progression of dropouts is ignored.

2.18 The other assumption which is applied in what follows is that of homogeneity: a progression is of equal educational value in whatever domain it arises and at whatever stage it occurs and that it absorbs the same quantum of resources to produce it. Thus to move a beginner from stage 1 to stage 2 takes as much time and training, and is of the same value to the learner, i.e. is a fair measure of 'outcome', as moving someone from 8 to 9. Likewise, it is assumed that to move a trainee four stages in one domain is of equal value in literacy improvement as moving one stage in each of the four domains. (In fact, trainees who progress tend to move at the same speed across all domains with the exception of numeracy where there can be divergencies with progress in the literacy domains).

Programme Costs

2.19 An allocation of €1 million was made by the DES to the ITABE Programme in 2006. This included provision for overheads as well as tuition fees. It is assumed that the provision for overheads adequately remunerated the cost of management time and materials absorbed by the Programme. However, in addition to paid tutors, students in the ALS have access to one to one tutoring from voluntary tutors. The evaluation report notes that the voluntary tutors also assisted participants in the ITABE. There is no indication from the evaluation of how large this involvement might have been. The opinion of NALA, which was involved in the organization of ITABE, is that it was not significant. The DES also pays separately for assistance to literacy learners under the Adult Education Guidance Initiative (AEGI). The services of these counsellors were available to the participants in ITABE. It is assumed that the margin for overheads referred to above was enough to cover this also.

2.20 The cost per stage progression is therefore estimated to be €1,355. (Table2.3). Table 2.3 also shows that the cost of moving one NFQ level (i.e. three stage progressions) is €4,065 and that the cost of moving from the lowest to beyond NFQ 3 (i.e. more than stage 9) is €12,195. (It is assumed that moving from 9 upwards and out of NFQ 3 is the same as one progression).

2.21 One other calculation is of interest: the number of hours of participation that a trainee needs to progress by a stage (or an NFQ level). The total number of hours of participation of all those trainees who persisted works out at about 66,000 hours. Dividing that by the aggregate number of stages progressed (738) yields 89 hours as the hours of training needed to progress one stage (or 267 hours to advance the equivalent of one NFQ level). There are 11 school years in the nine stages of NFQ levels 1 to 3, so 1.2 school years is the equivalent of one stage. This means that it takes about 73 hours of literacy training (89 / 1.22) to produce the equivalent of one year of school. This compares with Comings figure of 'about 100' hours per grade cited in paragraph 2.9 above. Considering the differences in methodology and data, the two figures are not too far apart.

Table 2.3 ITABE Progression Costs

	€
Total Cost of ITABE	1,000,000
Number of Stage Progressions	738
Cost Per Stage Progression	1,355
Cost per NFQ level (three progressions)	4,065
From Bottom (i.e. 1) to over NFQ level 3 (i.e. more than stage 9)	12,195

2.22 The foregoing analysis and conclusion about outcomes of literacy training is based on the ITABE evaluation, which is the first systematic evaluation of literacy training outcomes in Ireland. Further evaluation work on training should be undertaken in the future and this will improve the reliability of the data on outcomes. In the meantime, the fact that it seems to yield results broadly similar to those in the US provides support for the use of the ITABE results in this study. But it should be emphasized that the results of the ITABE should not be taken to apply to other literacy training programmes.

III Economic impact of literacy training

3.1 The preceding section looked at the outcome of literacy training by focusing first on the literature on the international experience and then on Irish research. The same procedure is followed here with respect to impact. By comparison with the volume of material on outcomes, the literature on economic and non-economic impacts is quite substantial. It is also much more positive in its conclusions about the impact of literacy.

International Literature

3.2 There have been two approaches to quantifying the impact of literacy on the economy: macroeconomic and microeconomic. Macroeconomic growth studies are mainly aimed at quantifying the impact on rates of economic growth of measures of countrywide labour, technology, physical investment and investment in human capital. In most of these studies, human capital means education. However, in many of these studies, education did not seem to be a reliable indicator of economic success, possibly because of the difficulty in measuring education. However, a study by Coulombe et al (2004) used literacy scores derived from the IALS as their measure of human capital. They found a strong positive association between high literacy scores and economic growth such that a country with a literacy rate 1% higher than the average will have a 2.5 % higher than average GDP per capita.

3.3 The other microeconomic approach uses samples of the population in which some measure of income or employment of the individuals in the sample is related to their individual literacy attainments. To isolate the effect of literacy from other possible influences on earnings, measures of education, ethnicity, occupation, and so on, are also included as possible explanatory factors. Most of these studies use the cross section data of the IALS or other surveys. Longitudinal data being more difficult to obtain, there are a small minority of studies based on following samples over time. Two important longitudinal data sets are the National Child Development Survey (NCDS) in the UK, which is based on a sample of people born in 1958, and the British Cohort Study (BCS70) based on people born in 1970.

3.4 Reviewing a total of 29 studies of the macro and sample types, Johnston (2004) concludes that they *'…show that literacy has a persistent, positive and statistically significant association with people's earnings per hour or per week. People with greater literacy skills are paid more, on average, than people with weaker literacy skills even after taking account of other observed factors.'*

3.5 Furthermore, *'While they vary across studies, countries and times, the results of the different studies are still fairly consistent. Across the studies, a 10-point increase in literacy, on the 500-point scale used in cross sectional literacy surveys, results in an increase in earnings of around 1% to 5%. A 3% earnings return to a 10 point increase is a reasonable, middle of the road assumption to make.'*

3.6 One of the problems with the IALS is that it did not collect data on 'innate' ability, childhood environment and 'soft' skills (e.g. sociability). These may also be related to future earnings and failure to control for them may lead to an exaggeration of the statistical significance of literacy in the IALS-based studies. Johnston reviews one UK study based on the NCDS (Mackintosh and Vignoles, 2001) which endeavours to control for these items using the extensive range of variables gathered in the NCDS. The net effect is to reduce the apparent significance of literacy. Yet this finding is not confirmed by a second study reported by Johnston on a longitudinal data set collected in Dunedin, New Zealand (Caspi et al, 1998). Nor is it confirmed by a more recent study, not available to Johnston (De Coulon et al, 2007) based on the BCS70 which concludes:

'Literacy and numeracy have a strong and similar association with individual's earnings. Specifically, even in models that control for an individual's ability and family background, an additional standard deviation in literacy results in approximately 14 per cent higher earnings, whilst an additional standard deviation in numeracy results in 12 per cent higher earnings.'

Analysis of IALS Data for Ireland

3.7 Two studies based on the IALS data report results specifically for Ireland: Denny et al (2000) and Denny et al (2003). Both address the question of the relative importance of schooling and literacy in determining earnings but the second is the more ambitious exercise and embraces results from 21 countries participating in the IALS. Returns to schooling in Ireland are found to be about 7.9%, which is average among the 21 countries. But including literacy as an explanatory variable reduces the recorded return to schooling and highlights literacy as an important explanatory variable. In fact, the impact of literacy is relatively high in Ireland and in other English speaking countries compared to non-English speaking countries where, on the other hand, schooling is relatively more significant. For Ireland Denny et al (2003) shows that a move of one standard deviation in IALS scores produces a 17% increase in earnings. This is the equivalent of a move of 52 points in the 500-point IALS scale. An increase in literacy from zero to IALS level 2 would require five standard deviations and theoretically would yield an 85% increase in income. Since IALS level 2 is about the same as NFQ level 3, this would suggest that moving one NFQ would produce an increase in earnings of one third of this or about 28%. (See Annex I for summary of the work of Denny).

Table 3.1: Descriptive Statistics of Irish Sample of IALS

	Mean	Sample
Age	37.8	2369
Years of Schooling	10.3	2403
Document Literacy	257.7	2423
Quantitative Literacy	262.8	2423
Prose Literacy	264.5	2423

Table 3.2: Economic Status of the Irish Sample of the IALS

	Number	Percent Sample
Employed	1,189	49.15
Retired	61	2.52
Unemployed	229	9.47
Student	242	10.00
Homemaker	596	24.64
Other and not stated	102	4.22
All Non Employed	1,230	50.85
Total	2,419	100.00

3.8 It would be useful to find support for Denny et al's conclusion from other studies. Given that there are no other sources in Ireland, the next best is to review the English experience where the De Coulon et al (2007) is the most relevant work. Making full use of a very wide range of variables generated from the BCS70, De Coulon et al tested the impact of literacy on earnings before and after taking account of a wide range of variables representing innate ability, parental attitudes and individual characteristics. Before taking account of these variables the returns to literacy were similar to those reported by Denny et al for Ireland: an improvement in scores of one standard deviation in literacy (numeracy) yielded an increase in earnings of 20% (17%). After including the family background variables, the returns decline to 16% (11%) but are still high and statistically significant (See Annex I).

3.9 Denny et al (2003) did not address another potential economic benefit of improved literacy, namely employment. However, Dr Orla Doyle of the Geary Institute at UCD prepared an analysis of the relationship between literacy and employment using the IALS data set for Ireland. Since the effect of improved literacy is visualized as increasing employability, it is desirable to examine the impact on all those who are not at work - not just the formally unemployed. Her work is summarized in Annex II. The impact on employment is seen to vary between men and women. The conclusion is that a move of one standard deviation (measured in this case as 55 points on the IALS scale) increases employment by 8%. Translated into NFQ levels that implies that a move of one NFQ level should produce a gain in employment of about 12%.

3.10 Employment impacts are also evaluated in De Coulon et al. As in the Irish IALS data, the results vary depending on whether the sample is male or female and whether it is literacy or numeracy that is the explanatory variable. However, their analysis is on the increased employability of those who are unemployed. As a generalization, the models show that an improvement in literacy of one standard deviation produces an increase in employment of between 2% and 4% among the unemployed. From Dr Doyle's work on the IALS, the comparable figure for Ireland from the IALS is 6%, which is reasonably in line with the UK figure, given differences in methodology and data.

Quantifying Economic Impacts of Literacy

3.11 In order to translate the Denny and Doyle findings about increased incomes and increased employment into aggregate economic benefits, assumptions have to be made (or data obtained) about the incomes and employment rates of potential participants in literacy training. As there are no income data for literacy trainees, it is necessary to make some assumptions. Table 3.3 shows IALS scores by income quintile as compiled by the IALS. About two thirds of the two lowest quintiles (i.e. the lowest 40%) have IALS scores at IALS 1 or 2. Literacy trainees are likely to be drawn from persons in these income levels i.e. the lowest 40% in terms of income.

3.12 This data can be brought up to date using the Survey of Incomes and Living Conditions (SILC) which is conducted each year by the CSO. This provides details of incomes and expenditure by households classed in deciles, (i.e. each category representing 10% of the population) ranged from lowest to highest in terms of income. A summary of the results for 2007 is shown in Table 3.4. Applying the percentages from the IALS in Table 3.3 it seems that literacy trainees are most likely to be found in the lowest four deciles. Household income in the fourth decile is €550 per week, which is about half the national average household income.

Average household employment in the fourth decile is 78% of one person indicating that there is a high rate of employment in that decile. It is proposed to use this decile to calculate the income gains from literacy training for a trainee who is working.

Table 3.3. Percentage (%) in each IALS category by Income Quintiles (Ireland)

	IALS 1	IALS 2	IALS 3	IALS 4	IALS 5
Income £1-5200: lowest earner quintile	31.47	32.87	26.92	8.04	0.70
Income £5201-8580: next to lowest earner quintile	29.19	34.39	31.79	4.05	0.58
Income £8581-14040: mid level earner quintile	16.78	33.81	38.77	9.93	0.71
Income £14041-22360: next to highest earner quintile	7.89	25.94	45.49	19.17	1.50
Income £22361+: highest earner quintile	6.17	16.05	45.68	26.54	5.56

3.13 To calculate the economic gains from increased employment due to literacy training, a decile has to be chosen in which, on average, a large proportion of the adults are unemployed. The third decile has a high level of unemployment and at the same time a number of child dependents, indicating that, though unemployed, the adults are of working age. (This is in contrast to the first decile, which also has high unemployment, but has few child dependents suggesting this decile is dominated by retired persons.) Therefore, the third decile is chosen as the base for calculating the increase in income resulting from increased employment.

3.14 Movements in income trigger complex tax and benefit changes. These can be evaluated through making assumptions about the family size, participation in education, employment of other members of the household and so on of individual literacy trainees. However, a more empirical procedure is used here. The SILC presents data on taxes paid and social welfare benefits ('transfers') received by households distributed by income decile. The effects on taxes and benefits of successive increases in income can be derived from movement up the deciles in the SILC, the movement being taken to correspond to increases in income. Although literacy trainees are individuals rather than households, the main driver of income and tax-benefit changes through the deciles is the level of household income. Therefore, this procedure seems a reasonable means of estimating the average effect on tax payments and transfer receipts resulting from changes in incomes.

Table 3.4: SILC 2007 Household by Household Income Deciles

	1	2	3	4	5	6	7	8	9	10	State
Household											
Persons	1.19	1.81	2.30	2.70	2.86	3.12	3.37	3.47	3.57	3.91	2.83
Adults	1.14	1.41	1.91	2.00	2.15	2.35	2.49	2.68	2.80	3.03	2.19
Working	0.11	0.32	0.44	0.78	1.06	1.28	1.55	1.88	2.08	2.25	1.17
					€ per week						
Income from Work	17	71	118	269	483	737	1015	1356	1839	3235	913
Transfers	179	247	322	315	272	232	213	177	144	236	234
Total Income	193	312	429	550	678	969	1228	1533	1983	3471	1146
Tax	3	5	11	34	78	141	210	320	490	980	227

Source: CSO, 2007

Income Gains: Working Trainees

3.15 The procedure followed to establish the income gains from literacy training are shown in the attached Tables 3.5 and 3.6. The calculations are based on the outcome of the ITABE study detailed in Section II. The 738 'stage progressions' noted in that section are the equivalent of 246 NFQ level. The income gain per NFQ level is 28% and the base income from work (Fourth Decile Table 5.4) is €269 per week. The gain works out at €3,810 per annum per NFQ or a total of €937,465 when aggregated for the 246 NFQs. This can be compared with the €1 million cost of the literacy training . This constitutes a strong case for the vocational dimension of literacy training.

3.16 It should be noted that increases in incomes are additions to GDP. Taxes and transfers constitute the effects on the Exchequer examined in this report. They are not additions to GDP. Taxes are a use of incomes. On the other hand, social welfare benefits are regarded as transfers from the Government unrelated to production of goods and services by the recipients, and therefore are not counted as part of GDP.

Exchequer Gains: Working Trainees

3.17 Gains to the Exchequer may also be quantified from the SILC data. It is assumed that the movement in income from the fourth towards the fifth decile is accompanied by proportionate movements in tax payments and reductions in transfer receipts. On that basis, the increase in tax works out at €15 per week and the decline in transfers is (coincidentally) also €15 resulting in a total annual gain to the Exchequer of €1,531 per NFQ level. In total, the annual gain to the Exchequer is €376,738.

Gains: Working and Non-Working Trainees

3.18 However, not all literacy trainees are working. It is worth considering if the economic gains from providing literacy training could cover the cost of all trainees, including those not at work. The ITABE returns for 2007 show that 26% of participants areemployed and 41% unemployed with the balance of 33% reported as not in the labour force. On that basis, the gains worked out in the preceding paragraphs need to be reduced by 74%. In this case, therefore, the gain in incomes from work is €243,741. Likewise, the gain to the Exchequer is €97,952.

3.19 However, if account is taken of those not at work, then the impact of literacy training on employment should be factored in. The gain in employment is estimated at about 12% in the unemployed population per NFQ level. Since the average NFQ per the unemployed in the ITABE sample is 0.31, or about one third of one NFQ, the gain in employment is 3.8% of those not working or the equivalent of 22 persons. Using the third decile as a profile of unemployed trainee, we can see that weekly income will rise from €118 to €269 per week to reach the fourth decile and another €73 to reach the same level as literacy trainees in employment. This is a gain of €224 in income from work per week or €11,663 per annum or €254,129 in the aggregate.

3.20 Applying the same procedure as before yields a total gain to the Exchequer from reduced transfers and increased tax of €74,195.

Table 3.5 Calculation of Gains from Literacy Training Based on Model of ITABE 2006: Working Trainees Only

Number of Progressions	738
Number of NFQ Equivalents	246
Increase in Income per NFQ	28%
Increase in Income (Working Trainees Only)	
Base Income (fourth quintile, weekly income from work	€269
Income Increase per week	€73
Income Increase per annum	€3,810
Aggregate Annual Increase in Income	**€937,465**
Gains to the Exchequer (Working Trainees Only)	
Increases in Tax per week	€15
Reductions in Transfers per week	€15
Annual Gains to the Exchequer	€1,531
Aggregate Annual Gains to the Exchequer	**€376,738**

Table 3.6 Calculation of Gains from Literacy Training Based on Model of ITABE 2006: 26% of Trainees Working

Gains in Income and Exchequer (26% Already Working Trainees)	
Aggregate Income Increase	**€243,741**
Aggregate Annual Gains to the Exchequer	**€97.952**
Gains from Increased Employment	
Income Increase per Week	€224
Annual Income Increase	€11,663
Aggregate Annual Income Increase	**€254,128**
Increase in Tax per week	€38
Reductions in Transfers per week	€22
Annual Gains to the Exchequer	€3,091
Aggregate Annual Gains to the Exchequer	**€74,195**

Conclusion

3.21 The results are summarised in Table 3.7 below. If the focus is purely on the vocational dimension of literacy training, then the annual income gains, representing also gains to the economy as a whole, are €937,000 per €1 million (see Column1, Row 1 in Table 3.7) with the Exchequer gaining €377,000 annually (Column 1, Row 4) from increased taxes and reduced transfers.

3.22 If the cost of literacy training has to be justified economically on the basis of a typical intake of participants, and not just those working, then, especially if a low level of employment is assumed among trainees, the case becomes a bit more difficult yet still remains convincing. The gain from improved incomes of those at work, and from those who gain employment as a result of the training is €498,000 per annum (Column 2, Row 3 in Table 3.7) while the gain to the Exchequer is €172,000 per annum (Column 2, Row 4).

Table 3.7 Summary of Returns to Literacy (€000s)

Row		1	2
Column		100% Trainees Working	26% Trainees Working
1	Gain from Increased Incomes	937	244
2	Gain from Increased Employment	0	254
3	Total Gains	937	498
4	Exchequer Gain	377	172

3.23 The results can also be expressed in terms of the net present value (NPV) of costs (in the first year) and income and Exchequer gains thereafter being discounted to allow for the time value of money (the discount rate being 5%). Table 3.8 below summarises these results. It is assumed that the trainees are in mid-working life and that the flows continue for 20 years after completion of training. The table also calculates NPVs on the assumption that it takes 5 years for gains to build up after training is completed acompared with immediate increases in incomes and Exchequer benefits. Under all possibilities, the income gains to trainees, also equivalent to the contribution to GDP, yield positive net values. This is so even when, with costs unchanged, only the benefits to Exchequer in the form of tax and reduced welfare payments are taken into consideration.

Table 3.8 Summary of Net Present Value of Income and Exchequer Gains Discounted at 5% Under Alternative Assumptions (€000s)
Programme Cost = €1 million

	Income Gain		Exchequer Gain	
	All Working	26% Working	All Working	26% Working
Immediate Gain	10,169	4,958	3,522	1,089
Phased Gain	8,548	4,097	2,870	792

3.24 These estimates of the income gains are only returns to employees. The Leitch Review on skills in the UK (Leitch 2006) emphasized that the impact of education and training is an increase in productivity some of which takes the form of increased wages. The proportion of productivity gains which are paid out in the form of wages, and which therefore figure as dependent variables in studies of the sort reviewed here, depends on a variety of things including relative bargaining strengths of employers and workers. However, Leitch cites several studies which suggest that wage increases represent only half the economic value of improved education and training, the other half accruing to the employers. The studies cited by Leitch are not specifically focused on literacy training per se and there are no studies of the total gains from education in Ireland. In the absence of research, there is no basis for any specific figure for Ireland. But this research suggests that the economic returns calculated on the basis of incomes alone are likely to be conservative.

IV Social impact of literacy training

4.1 The economic aspects of literacy have been widely explored in the literature, as the preceding section indicates. In addition, researchers have studied the relationship between literacy and the social dimensions of community, family and individual life. As for education generally, correlations have been found between literacy and measures of health, criminality, welfare dependency, children's performance in school, civic participation (e.g. voting, volunteering) and cultural values. As explained at the outset, although these are termed here as 'social' impacts - meaning not related to employment and earnings - the economic costs of some of these can be estimated, in principle at least.

Data and Methodological Problems

4.2 Unfortunately, little work has been done in Ireland in relation to these aspects of low literacy, though there are studies of the wider consequences of disabilities in early childhood and poor educational attainment. Therefore, to the extent that it is possible to make inferences about the costs of literacy in the non-economic sphere, reliance would have to be made on research findings from other countries, applying these as appropriately as possible to the Irish situation.

4.3 To the lack of local data must be added two methodological difficulties with the international literature. While many studies demonstrate correlations between low levels of literacy and difficulties in the social spheres of life, causal relationships, of the sort provided in the economic area, and discussed in Section III, are not very common. A simple correlation between two variables does not exclude the influence of other contributory factors. Such correlations therefore only establish an outer bound to the possible impact of low literacy.

4.4 The other problem, in relation to adult literacy, is that several of the studies on the social effects of low literacy are longitudinal studies based on childhood measures of literacy and are aimed at evaluating the cost effectiveness of improved literacy training in school-going children. Obviously, there must be caution in applying these studies to the evaluation of the cost and benefits of adult literacy training. Literacy training intervening in adult life, when patterns of behaviour may be difficult to change, is likely to be less effective than interventions in early life. Any benefits that may be generated are also for a shorter period.

4.5 With these caveats in mind, we briefly review the results of some of the research that has been carried out in other countries.

Social Costs and Benefits

4.6 A recent report by the UK National Literary Trust (Dugdale and Clark, 2008) reviews a number of possible social impacts of literacy mainly using studies of the UK by Bynner and Parsons (Bynner and Parsons, 1997, 2002, 2005, 2006, 2007, 2008, Bynner 1998). These include aspirations, family life and civic and cultural engagement - dimensions of literacy that are not amenable to economic analysis. Also covering a broad field is a report from KPMG (2006) which attempts to conduct a cost benefit analysis of literacy training in the UK. From the viewpoint of the present study, the KPMG report suffers in that it is focused on literacy training among school children. However, many of the costs are those which arise in adulthood and are relevant to an evaluation of adult literacy training.

Extract from National Literacy Trust Report 2008

Profile of a person with poor literacy	Profile of a person with improved literacy
More likely to live in a non-working household 22% of men and 30% of women with literacy below entry level 2 live in nonworking households.	Becomes less likely to be on state benefits Men who improve their literacy rates see their likelihood of being on state benefits reduced from 19% to 6%.
Less likely to have children Individuals with low levels of literacy are more likely to lead solitary lives without any children.	Becomes more likely to own their own home A modest rise in literacy level sees the likelihood of a man owning their own house rise from 40% to 78%.
More likely to live in overcrowded housing Individuals with low literacy levels are more likely to live in overcrowded housing with reduced access to technology.	Becomes more likely to use a PC at work Increased literacy rates improve the chances of using a PC at work from 48% to 65%.
Less likely to vote Men and women with the poorest literacy or numeracy skills were the least likely to have voted in the 1987 and 1997 general elections.	Becomes more involved in democratic processes 16% of men who improved their literacy between the ages of 21 and 34 had contact with government, compared to 0% of those whose literacy remained poor.

Aspirations

4.7 The National Literacy Trust (NLT) reports surveys which show that men with low literacy skills (meaning at the equivalent of Irish NFQ 1 and 2) were twice as likely to have low career aspirations when at school as those at NFQ 3 and above. Women at the same level of literacy were three times less likely to have career aspirations as those at higher literacy levels. In terms of aspirations for children, Scottish data show that adults with NFQ 1 or 2 levels of literacy were three times more likely to have had parents who expected them to leave school as early as possible. Children at these levels of literacy are also revealed to be keen to leave school early. Not surprisingly, the NLT report asserts that low aspirations such as these have been shown to have important effects on individuals' performance at school, on career choices and on subsequent earnings.

Intergenerational Effects

4.8 Aspirations also have intergenerational effects: parents with low aspirations have adverse influences on their children's attainments in schools. This intergenerational effect leads to high costs of schooling (remedial teaching and supports) and to missed economic opportunities in later life. The effect has been studied in other countries. Although there are no studies of aspirations and intergenerational effects in Ireland, there is an estimate of the costs and benefits of early childhood education. (Chevalier et al 2006). This shows that early childhood education yields a benefit to cost ratio of between 4.6 to 1 and 7 to 1. The relevance of the study is that it highlights the value of offsetting the effects on children of low parental aspirations and limited capacity by early (i.e. pre-school) educational intervention. The focus of the study was education rather than literacy per se but it is plausible to assume that interventions aimed at literacy could generate a proportion of these estimated benefits.

4.9 The KPMG (2006) report on the costs and benefits of low literacy summarise the evidence on intergenerational effects as follows: *'Children whose parents have very low literacy levels (at or below Entry Level 2 of the adult national qualification framework) tend to have exceptionally low child test scores in reading (Vorhaus 2006). For adults, being at or below Entry Level 2 strongly predicts their children's test performance, whereas above this level the prediction tends to be weaker and at the highest qualification levels it largely disappears. The fact that this second result stands even when parents' qualifications are taken into account is particularly important.'*

4.10 This conclusion is backed up in the UK by the findings of a recent study by De Coulon et al (2008) published by the National Research Development Centre. This was based on the longitudinal BCS70 database which, as noted in paragraph 3.8, embraces a large number of variables. It concluded that parents' basic skills in literacy and numeracy had a strong positive effect on children's abilities and this was even after controlling for a variety of alternative potential explanations including parental qualifications and ability. The authors concluded that *'These results suggest that policy aimed at increasing parents' basic skills may have large effects on children's learning. There is particular scope for policies targeted at lowly-qualified adults and young parents, from whom these effects are especially strong.'* Or, as one US authority on intergenerational effects of literacy observes (Sticht 2008) *'…if we could find ways to provide education for adults we might get double value from education dollars because investing in the education of adults could improve the educability of their children. I have referred to this as getting "double duty dollars" when investing in adult education. We pay for the adults' education, and we get improved education for both the adults and their children.'*

Civic and Cultural Engagement

4.11 Measures of 'civic and cultural engagement' tell the same story. People with low literacy are more likely to report not being interested in politics and to have not voted in recent elections. Three times more men and twice as many women with low literacy report themselves not interested in politics by comparison with those at literacy level equivalent to NFQ 4. Measured in the same way, men were one third less likely and women half as likely to have signed petitions on public issues in a given period in the past. In the case of voting, about 40% of men and women with low literacy skills reported they did not vote in the preceding general election compared with about 30% of those with 'average' literacy abilities. Measuring engagement by participation in community activities shows that those with literacy at NFQ 3 were about 50% more likely to be active in their localities than those at lower levels.

4.12 Many of these aspects of social involvement do have economic implications but are generally not easy to measure. Community participation, trust and volunteerism can generate significant economic benefits for participants and their localities. But there appear to be no studies that evaluate such effects of literacy and indeed, it is not easy to see how such analyses could be structured.

Crime

4.13 It seems inherently plausible that literacy difficulties are linked to social exclusion and hence possibly to crime. The difficulty is to establish these relationships empirically and to quantify them in financial terms.

4.14 A correlation between low literacy levels and criminality has been identified by a number of researchers (Farrington, 1996; Sampson and Loub, 1993). Parsons (2002) finds a significant association between self-reported police contact or repeated offending and poor literacy and numeracy scores. Prison education programmes in the US have resulted in reduced re-incarceration rates (20% of prisoners who received prisoner education programme were re-incarcerated compared to 49% who did not receive the programme) (Hull et al. 2000), higher employment (77.9% compared to 54.6%), and increased earnings (prisoners who received the educational programme earned 30% more than those who did not receive the programme (Steurer et al. 2001)). The US National Institute for Literacy (2001) concludes that '*research shows that quality education is one of the most effective forms of crime prevention*'.

4.15 The KPMG report noted that 48% of the UK prison population had a reading level at NFQ 1 or 2 compared to 21-23% of the general population and that 25% of juveniles in custody have a reading age below that of the average seven year old. The report cited research by Parsons (2003), using data from BCS70, which found that poor basic skills were significantly correlated with criminality, even after controlling for social disadvantage, poverty, disruptive family environment, poor education experiences and early signs of emotional and behavioural problems.

4.16 KPMG went on to quantify the impact of literacy problems in the UK on the costs of crime. They concluded that the cost ranged from £150 - £300 million. These estimates are for court, probation and prison costs.

4.17 In Ireland, the only research on literacy and crime is a 2001 study of literacy in the prison population conducted by Morgan and Kett (2003). It can be seen (Table 4.1) that literacy levels are quite low: 70.6% of the prison population having a literacy level of IALS 2 or less. This compares with 51% in the population above IALS 2. Indeed the Irish figure would seem to be lower than that of the UK and would justify the application of the UK figures to Ireland pro rata to population, which would be €15 - €30 million.

4.18 It should be noted that these are only estimates of the costs that arise when individuals come to the attention of the authorities. The cost of crime far exceeds these costs as it includes loss to victims and the cost of policing and security. A fraction of these should also be attributed to literacy problems in which case the total cost of crime would be several orders of magnitude larger than those estimated by KPMG.

Table 4.1 Irish Prison Adult Literacy Survey 2001

IALS Level	% of Prisoner population
Pre-level 1	22.0
Level 1	30.8
Level 2	17.8
Level 3	14.0
Level 4/5	15.4

Health

4.19 There are a number of studies from the UK and the US which show an association between low literacy levels and high incidences of physical and mental ill health and risky habits relating to alcohol consumption, smoking and obesity. As one US authority (Rudd, et al 2004) puts it '*A growing body of literature cites limited literacy as an inhibiting factor in accessing health information and preventive services, in comprehending illness and disease components, for understanding regimens and medications, and for outcomes such as hospitalization or disease management.*' Indeed, it is easy to visualize that persons with low literacy will have difficulty understanding what is being said to them by health professions and in following their instructions. They will also find it difficult to absorb information about the recognition of symptoms and adoption of healthy behaviour that might avoid having to resort to health services in the first place. Research into these relationships has proceeded furthest in the US where it is estimated that low literacy costs the US economy in the range of $106-$236 billion annually in extra health care and other expenses.

4.20 However, findings in the UK are probably more relevant to Ireland having regard to similarities in structure, processes and costs in the health sectors of both countries. Parsons and Bynner (2008) in a study in Scotland cited in the National Literacy Trust (Dugdale and Clark, November 2008) show that 44% of women with literacy levels equivalent to NFQ 1 to 3 are likely to report a long standing illness compared to 25% for those above level NFQ 3. Likewise, about 30% of those in these literacy categories report drinking 40 units of alcohol or more per week compared with 17% of those at higher levels. There is also a difference in relation to smoking. From data for England, cited in National Literacy Trust, measured in the same way, 34% of men in low literacy categories are likely to be daily smokers compared to 23% in other categories while the ratios for women are 36% compared to 19%. Symptoms of depression show a similar pattern: 18% to 11% for men and 26% to 16% for women. Roughly speaking, it seems that persons with low literacy are about 50% more likely to suffer ill health or engage in unhealthy lifestyles than those with the literacy attainments above NFQ 3.

4.21 As emphasized in paragraph 4.3, these associations are only approximate indicators of causality. But a multivariate analysis by Bynner et al (2001), in which the influence of educational level and family background were controlled, provides a good basis for estimating health effects of literacy and numeracy on health. The findings are summarized in Table 4.2 for men and women, and for numeracy and literacy, and after controlling for education and family background. In the top half of the table men and women with high numeracy are about 8% less likely to have a long-term illness at age 33 than those with low literacy levels. For literacy, the relationship is statistically insignificant. In the case of 'Malaise' (based on a scoring system for depression and taken as an indicator for mental illness) numeracy is again a significant factor for men but literacy is not and neither literacy nor numeracy is significant for women.

Table 4.2 Probability of Physical and Mental Health Problems and Low Literacy

	Men		Women	
	Coefficient	Standard Error	Coefficient	Standard Error
Probability of Long Term Health Problem at Age 33 (NCDS)				
Numeracy	-0.086	0.044	-0.075	0.036
Literacy	-0.027	0.054	0.014	0.039
Probability of Suffering 'Malaise' at Age 26 (BCS70)				
Numeracy	-.061	0.030	-0.018	0.038
Literacy	-.034	0.038	0.008	0.049

Control factors included in the model. Source: Bynner et al (2001)

4.22 The KPMG study endeavours to estimate some of the financial impact of low literacy on the cost of health care. One element is the cost of what KPMG calls NEET 'not education, employed, or training' and comprises costs of low health, substance abuse and teenage pregnancies in young people. The estimate is based on the differential incidence of these problems in people with low literacy as compared to those without a literacy difficulty. KPMG estimate this to amount to about £187 million or about €15 million in Irish terms. The other element comprises obesity and depression for which KPMG were able to obtain usable information. For the other, and by far the largest part of health costs, KPMG could obtain no evidence that could reliably reflect the impact of literacy. The obesity and depression costs were £34 million, about €3 million in Irish terms.

4.23 Again, data on the relationship between literacy and health in Ireland is negligible. However, a finding which is suggestive of a relationship in the case of mental health is given in Tedstone et al (2007). This reports a negative relationship between measures of mental distress, as determined by a questionnaire survey, and first, second and third level education. About 14.4% of those with primary education only reported distress, compared to 12.9% of those with secondary only education and 8.3% of those with third level education.

4.24 In summary, therefore it is clear that there are causal relationships between low literacy and certain types of social problems. Quantifying the effect is difficult yet there is enough evidence to suggest that the economic costs are, in the aggregate likely to be significant. Setting aside any part of the economic gains discussed in Section III, the cost seem likely to exceed the budget for literacy training of approximately €30 million.

V Conclusions and recommendations

Conclusions

5.1 There is little international research available on the outcomes of literacy training. However, the evaluation of the ITABE Programme in Ireland provides data on outcomes for this country. Though as the first and so far the only such evaluation, the ITABE evaluation has shortcomings, it does provide a basis for plausible calculations of the time and cost required to progress literacy trainees. These appear to be broadly in line with US estimates of outcomes.

5.2 This provides the basis for assessing the economic outcomes of literacy training for which, both in Ireland and abroad, there is strong mutually supporting evidence. Applied to Ireland this research indicates that the economic returns to public expenditure on literacy training are very positive. This is particularly so if the training is for those already in work.

5.3 But a high proportion of literacy trainees are not at work. If literacy training of the intake of a typical programme has to be justified by reference to the cost of all trainees, including those not working, then the increased income from work has to cover the cost of all trainees. Even so, taking account of the income effect on those already working, plus an increase in employment among those initially not at work, the training yields a positive net value.

5.4 Indeed, considering only the revenues to the Exchequer in terms of reduced unemployment and other transfers and increased tax revenues, literacy training yields a good return.

5.5 It should be emphasized that these results are based on the ITABE Programme and it does not follow that they can be applied to other literacy training programmes in Ireland.

5.5 While literacy probably has effects on non-economic aspects of individual and social life, there is little data for Ireland on this relationship. However, there is a considerable volume of international material on these impacts of literacy. Areas in which evidence is emerging about literacy impacts include aspirations, civic engagement, intergenerational effects, crime and health. Some of these impacts have been quantified in financial terms and would seem likely to be significant if translated to Ireland.

Recommendations

5.6 These positive economic returns would tend to underwrite recommendations to expand the amount of literacy training provided in this country. The example of other English speaking countries, which have made literacy the focus of major efforts, is also worth consideration. A focus on work related literacy programmes, where there is a high proportion of workers and therefore the prospect of an early pay back on the investment, would seem to be particularly worthwhile.

5.7 Further reinforcement of this stems from the fact that there are only about 30,000 places for literacy training (excluding non-English speakers) in Ireland, whereas the IALS shows deep reservoirs of low literacy in the adult population.

5.8 However, this exercise shows that one impediment to progress is the absence of data upon which policy should be based. The IALS is still the main source of information on adult literacy in this country even though it is now 14 years old. The Irish authorities should therefore participate in the next international literacy survey in order to measure progress since 1995.

5.9 Cross section surveys, such as the IALS, while relatively easy to organize, are not as powerful as longitudinal surveys. Unfortunately, these are rather expensive and slow to yield results, as it is important to establish childhood factors. Nevertheless, it is important to obtain data from longitudinal studies. The DES should consult with the Department of Health and Children, and the research organizations concerned, about inserting a literacy module in the on going longitudinal study of children 'Growing Up in Ireland.' Alternatively, the DES should commence its own study.

5.10 The social gains from literacy in the areas of crime, health and intergenerational effects could be significant. But information on this is lacking. An important priority should be to strengthen research in this area.

5.11 The paucity of data on outcomes of literacy training was remarked on in Section II. It is difficult to understand why this should be a universal problem. It may relate to trainers' concern that tests create or resurrect antipathies among literacy trainees with unhappy recollections of school. However, without good data on outcomes, it is difficult to justify literacy training programmes, since benefits cannot be related to costs. Outcome data is also valuable as a means of evaluating alternative pedagogies. All adult training should be subject to careful evaluation.

Bibliography

Beder, H. (1999). **The outcomes and impacts of adult literacy education in the United States (NCSALL Report 6)**. Cambridge, Massachusetts, Harvard Graduate School of Education, National Center for the Study of Adult Learning and Literacy

Bynner, J., McIntosh, S., Vignoles, A., et al (2001) **Improving Adult Basic Skills: Benefits to the Individual and to Society**. DfEE Research Centre, London.

Chevalier, A., Finn, C., Harmon, C., Vittanen, (2006) **The Economics of Early Childhold Care and Education**. Technical Research paper for the National Economic and Social Forum, Dublin.

Comings, J (2003) **Evidence Based Adult Education: A Perspective from the United States**. National Center for the Study of Adult Learning and Literacy (NCSALL) Harvard Graduate School of Education, Massachusetts.

Comings, J., Sum, A., Uvin, J.(2000) **New Skills for a New Economy: Adult Education's Key Role in Sustaining Economic Growth and Expanding Opportunity**. Massachusetts Institute for a New Commonwealth, Boston, Massachusetts.

Coulombe, S., Francois, T. and Marchand, S. (2004) **Literacy Scores, Human Capital and Growth Across Fourteen OECD Countries**. Ottawa, Statistics Canada.

De Coulon, A., Marcenaro-Gutierrez, O. and Vignoles, A. (2007) **The Value of Basic Skills in the British Labour Market**. Centre for the Economics of Education. London

De Coulon, A., Meschi, E. and Vignoles, A. (2008) **Parents' basic skills and their children's test scores**. National Research Development Centre, London

Denny, K. Harmon, C. and Redmond, S. (2000) **Functional Literacy, Educational Attainment and Earnings: Evidence from the International Adult Literacy Survey**. Institute for Fiscal Studies (IFS) Working Paper 00/09, London.

Denny, K., Harmon, C. and O'Sullivan, V. (2003). **Education, Earnings and Skills: A Multi-Country Comparison**. Institute for Fiscal Studies (IFS) Working Paper 04/08, London

Department of Education and the Educational Research Centre (1997). **International Adult Literacy Survey: Results for Ireland**. Government publications, Dublin.

Dugdale, G., and Clark, Christina. (September 2008) **Literacy Changes Lives: An Advocacy Resource**. National Literacy Trust, London.
Dugdale, G., and Clark, Christina. (November 2008) **Literacy changes lives: The role of literacy in offending behaviour – a discussion piece Part 1**. National Literacy Trust, London.

Farrington, (1996) **Understanding and Preventing Youth Crime**. York: Joseph Rowntree Foundation.

Hull, K. et al. (2000) **Analysis of Recidivism Rates for Participants of the Academic/ Correctional/Transition Programs Offered by the Virginia Department of Correctional Education**, in Journal of Correctional Education, Vol. 51, No. 2, Lanham, MD: Correctional Education Association.

Johnston, G. (2004). **Adult literacy and economic growth**. New Zealand Treasury Working Paper 04/24. Auckland, New Zealand.

KPMG (2006) **The long-term costs of literacy difficulties**. KPMG Foundation, London.

Leitch, K. (2006) **Prosperity for All in the Global Economy - World Class Skills**, H.M. Treasury, London.

McCann, T. (2006) **Evaluation Report: Intensive Tuition in Adult Basic Education Pilot Project**. IVEA Intensive Training in ABE Project. Co. Dublin VEC, Dublin

McIntosh, S. and. Vignoles, A. (2001). **Measuring and Assessing the Impact of Basic Skills on Labour Market Outcomes**. Oxford Economic Papers 3: 453-481.

Morgan, M. and Kett, M. (2003) **The Prison Literacy Survey: Results and Implications**. Irish Prison Service, Dublin

National Research Development Centre (2005). **Three years on: what the research is saying**. National Research Development Centre, London

OECD (Organization for Economic Cooperation and Development). (1997) **Literacy Skills for the Knowledge Society**, OECD, Paris.

Parsons, S. (2002). **Basic Skills and Crime: Findings from a study of adults born in 1958 and 1970**. The Basic Skills Agency.

Rudd, R., Kirsch, I., Yamamoto, I. (2004) **Literacy and Health in America**, Educational Testing Service, Princeton, New Jersey.

Sampson and Loub, (1993) **Crime in the Making**. Cambridge: Harvard University Press.

Steurer, S., Smith, L., & Tracy, A., (2001) **The Three State Recidivism Study**, Lanham, MD: Correctional Education Association.

Sticht, Thomas G. (2007) **Improving Family Literacy By Increasing Investments in Adult Literacy Education**. National Adult Literacy Database

Tedstone Doherty, D., Moran, R., Kartalova-O'Doherty, Y., Walsh, D. (2007). **National Psychological Wellbeing and Distress Survey: Baseline Results**. Health Research Bureau, Dublin.

Torgerson, C., Brooks, G., Porthouse, J., Burton, M., Robinson, A., Wright, K., Watt, I. (2004). **Adult literacy and numeracy interventions and outcomes: a review of controlled trials**. National Research and Development Centre for adult literacy and numeracy. London.

Annex I: Outline of most relevant literature cited in report

Denny, K., Harmon, C. and O'Sullivan, V. (2003). "*Education, Earnings and Skills: A Multi-Country Comparison*". Institute for Fiscal Studies (IFS) Working Paper 04/08.

While there have been no cost-benefit studies on the impact of literacy training in Ireland to date, a study by Denny, Harmon and O'Sullivan (2003) using the IALS data provides useful estimates of the income gains associated with improved literacy in Ireland.

Denny, Harmon and O'Sullivan (2003) use the International Adult Literacy Survey (IALS) to conduct a multi-country comparison of the impact of education and functional literacy on earnings. The relative contribution of the Denny et al. study is that many of the traditional 'returns to education' analyses, which estimate the benefits of education on earnings later in life, typically do not control for measures of intelligence, basic skills, or functional literacy in their analysis. Yet, there is a strong relationship between educational attainment and literacy levels, with higher literacy levels typically being associated with higher educational attainment. Hence there is a correlation between education and literacy skills. In addition, they may both have an independent effect on earnings. Failing to control for such measures may upwardly bias the measured effect of education on earnings, as some of this effect is been driven by literacy. In other words, the additional earnings that are attributed to greater educational attainment are higher than they should be. On average, studies which exclude measures of such skills, find that each additional year of education increases earnings by 6-8% for men (Harmon, Oosterbeck, Walker, 2003). Some studies, which have included measures of literacy or basic skills in earnings models, find that the returns to education are lower once such measures are included (see Blundell, Dearden and Sianesi, 2005; Blackburn and Neumark, 1993).

The Denny et al. study develops this literature by examining the relationship between education, functional literacy and earnings in a comparative framework using the IALS data. By modelling the determinants of earnings across multiple countries[1] the study can compare the relative returns to education and the returns to functional literacy across countries with different labour market policies. The usefulness of this study for this current analysis is that they provide estimate on the returns to literacy among a sample of Irish respondents.

1 Belgium, Canada, Chile Czech Republic, Denmark, Finland, Germany, Great Britain, Hungary, Ireland, Italy, Netherlands, New Zealand, Northern Ireland, Norway, Slovenia, Sweden, Switzerland and USA.

The IALS is a cross-sectional survey, which was conducted between 1994 and 1998. The aim of the survey was to provide a common mechanism for measuring literacy across different populations. The aggregate measure of functional literacy provided in the IALS data is based on the average of three sub-scales (prose, document and quantitative) which range between 0-500, with 0 representing the lowest literacy score and 500 the highest. The IALS scores (both individual sub-scales and the aggregate score) can be divided into five empirically determined literacy levels[2]. The mean scores do not greatly differ across the prose, document and quantitative literacy sub-scales for the majority of countries (see OECD, 1997). For this reason, the Denny et al. study focus on the average score across the three sub-scales.

The average literacy score in Ireland among those who completed the IALS test (2423 respondents) is 262 (standard deviation 57) on a 0-500 scale. The number of respondents included in the Denny et al. Irish regression sample is less than the total number of sampled Irish respondents as the sample can only include those who report earnings data. Of the total 2,423 respondents interviewed, 1,189 reported that they were employed[3]. The analysis also excluded any individual who did not report information on any of the key variables included in the analysis including their educational level, gender, age, whether they live in a rural or urban area, immigrant status, and their father's education. This reduces the final regression sample to 937 respondents. The mean score for those included in the Irish regression sample is 279 (sample deviation is 51).

The earnings data collected in the IALS is on a continuous scale representing an individual's annual labour market earnings. However for reporting purposes, the IALS re-categorized this information such that each individual's income data was assigned to the appropriate quintile of the wage distribution (for their country), and reported in a 5-category banded scale. For the purposes of the analysis, Denny et al. re-created this continuous measure using the mid-points of each income band. They then estimated hourly earnings by dividing this pseudo-continuous annual income data by the number of hours the individual worked per year. The dependent variable used in the analysis is therefore the hourly wage.

They estimated a series of standard linear regressions models for each country individually. In Model 1, the earnings measure was expressed as a function of the set of basic control variables (gender, age, age squared, immigration status, father's education, living in a rural/urban area), plus one of the key variable of interest - number of years of education. As this variable is measured in terms of number of years of education completed, the estimated coefficient on this variable represents the amount (in terms of percent) by which earnings increase due to one extra year of education.

2 Level 1= 0-225. Level 2=226-275. Level 3=276-325. Level 4=326-375. Level 5=376-500.

3 The Irish sample comprises: 49% employed, 2.5% retired, 9.5% unemployed, 10% students, 25% homemakers, 4% other.

They find that the returns to education vary from between 3.6% in Sweden to 15% in Slovenia. For Ireland, they find that each additional year of education raises earnings by 7.9%.

They then re-estimated Model 1 but also included the measure of functional literacy (based on the average of the prose, document and quantitative scores in units of 100). Denny *et al*. estimate the earnings model by both including and excluding the functional literacy variable in order to determine how the returns to education are affected by the inclusion of the functional literacy measure. As expected, the inclusive of the literacy measure reduces the returns to education by 0.5-2.7% across all countries, suggesting that education and literacy are positively correlated. In Ireland, an additional year of education is associated with a 5.4% increase in earnings once literacy is controlled for - a fall of 2.5% compared to model 1.

This model also provides estimates on the returns to literacy. As the literacy score is measured on a continuous scale ranging from 0-500, the coefficients associated with this variable represent the amount (in terms of percent) by which earnings increase due to a one point increase on the literacy scale. The model shows that the returns to literacy vary from a low of 0.001% in Germany to a high of 0.33% in Netherlands. This can be interpreted as follows: raising IALS scores by 1 point is associated with a 0.33% increase in earnings in the Netherlands, subsequently raising IALS scores by 100 points is associated with an increase in earnings of 33%. Ireland has the second highest returns to literacy among all countries at 0.32%. Therefore moving an individual from IALS level 2 to IALS level 3 (~50 points) increases earnings by 16% (0.32 x 50) in Ireland.

Model 3 re-estimates model 2, however, it replaces the literacy scores with a normalized measure of literacy (which has a mean of zero and a standard deviation of one) to aid the comparisons of the literacy coefficients across countries. For Ireland, it shows that a one standard deviation increase in literacy scores is associated with a 17% premium in earnings. Improving literacy scores by one standard deviation of the scores (52 points) is associated with an increase in earnings of 17%. This is the second highest returns to literacy among all 18 countries, with the returns ranging from a low of 5% in Germany to a high of 18% in USA. Overall, the returns to functional literacy are higher in English speaking countries and are typically larger than the returns to education. In addition, there is far greater variation in the returns to literacy across countries than the returns of education.

The study also represents the results in terms of how many years of education is equivalent to moving an individual from the 25th percentile to the 50th percentile of the literacy distribution. For the Irish sample, moving an individual from the 25th percentile to the 50th percentile (i.e. the median score in the population) in the literacy scores, is worth the equivalent of about 2 years of schooling, in terms of the returns to earnings.

In order to determine whether policies for literacy improvements should be targeted at individuals at the lower end of the skills distribution or whether they should be directed at individuals over the whole distribution of literacy scores, Denny et al. estimate non-linear earnings models by replacing the literacy score with a set of literacy quintiles (using 5 dummy variables for representing each quintile of the literacy distribution). This model provides the returns to each quintile of literacy. For Ireland, moving an individual out of the lowest quintile (from the 20th to the 40th) is associated with a wage premium of 15%. The return from moving someone into the 60th quintile and the 80th quintile is the same at 23%. Finally, the return from moving someone to the highest quintile of literacy is 36%. These results suggest that literacy investment in Ireland can reap returns at all levels of the literacy distribution.

Table I.1 Gains in Income as a Function of Increase in IALS Literacy Level

	Coefficient	Standard Error
Quintile 2	.147	0.070
Quintile 3	.238	0.070
Quintile 4	.229	0.071
Quintile 5	.357	0.077

Note: Control variables included in the model.

Up to this point, the study has been assuming that the returns to education and the returns to functional literacy are independent of each other, however this is a strong assumption. Therefore to examine this potential complementarity they re-estimate their results by including an interaction term for literacy and education in the model. An interaction term essentially involves multiplying the two measures together in order to determine whether they have a joint effect in addition to an independent effect. They find that, both in general and for Ireland, these interaction terms are not statistically significant. However, rather than concluding from this that education and literacy are not complements or substitutes for each other, this result may be driven by data limitations such that there are not enough individuals in the data who have low literacy and high education, or low education and high literacy.

An important point to highlight with the Denny et al. study is that they do not discuss the potential endogeneity issue. Endogeneity would imply that there are some unobserved factors driving both an individual's level of literacy and their earnings. For example, some underlying personality trait such as contentiousness which drives an individual to have high literacy scores and also has an impact on their future success in employment. One potential consequence of endogeneity, if left unaddressed, is that the estimated results may be biased upwards. The Denny et al. study does not test whether this issue arises, as it is difficult to identify a plausible strategy to test and rectify this issue. Therefore, their results, along with the majority of other studies in this field, should be viewed in this light.

A limitation of the Denny *et al*. study for this current analysis is the data is now fourteen years old. There have been no new IALS surveys conducted in Ireland since 1995. In addition, there has been no other surveys measuring adult literacy in Ireland, the closest being the PISA survey which was conducted with 15/16 year olds. More up to date data on earnings and literacy would aid a more relevant analysis.

References

Blackburn, M.L., & Neumark, D. (1993). Omitted-ability bias and the increase in the return to schooling. *Journal of Labour Economics*, 11(3), 521-544.

Blundell, R., Dearden, L., and Sianesi, B. (2005). Evaluating the impact of education on earnings in the UK: Models, methods and results from the NCDS. Journal of the Royal Statistical Society, Series A, 168 (3), 473.

Harmon, C., Oosterbeek, H., & Walker, I. (2003). The return to education: Microeconomics. *Journal of Economic Surveys*, 17(2), 115-155.

OECD. (1997). Literacy Skills for the Knowledge Society: Further results from the International Adult Literacy Survey. Organisation for Economic Co-operation and Development, Human resource development, Canada.

De Coulon, A, Marcenaro-Gutierrez, O. and Vignoles, A. (2007). "The Value of Basic Skills in the British Labour Market". Centre for the Economics of Education. London School of Economics.

As noted above, the Denny *et al*. study is constrained by a number of limitations in terms of the relevance of the 1990's literacy data, the relatively few control variables included in the analysis, and the potential endogeneity issue. One study which lends some support to the Denny *et al*. results, but addresses these limitations in more depth, is by De Coulon, Marcenaro-Gutierrez and Vignoles (2007) who use the British Cohort Studies to examine the impact of basic skills across the life-course.

One of the limitations of the IALS data used in the Denny et al. study is that it is cross-sectional in nature, that is, it represents a snapshot of the respondents at one point in time. This precludes the ability to examine literacy across the life-course or examine how circumstances early in life may influence later labour market outcomes. While the majority of studies in this area use cross-sectional data, the British Cohort Studies (BCS) allows a much richer analysis to be conducted as it is a panel study which follows individuals from their birth in 1970 until the present day. The advantage of this approach is that De Coulon *et al*. can control for a wide range of potentially confounding factors such as family characteristics (social class, financial hardship, parental education, parental interest in education), which may mediate the relationship between literacy and labour market outcomes. This should result in a more accurate and less biased estimate of the returns to literacy. This approach is not possible in the Denny *et al*. study as such information was not collected in the IALS.

The De Coulon *et al*. study presents a number of additional benefits. For example, the employment and earnings data was collected in 2004, providing more up-to-date statistics compared to the Irish IALS data. It should also be noted that while the IALS analysis included all individuals in employment between the ages of 16-64, the BSC data only considers the impact of literacy for a much younger cohort (individuals aged 34), which is a key demographic for this type of analysis. Similar to the Denny et al. study, De Coulon et al. examine the value of literacy in the labour market; however, they examine the returns to literacy and numeracy separately.

In terms of comparability across studies, the measure of literacy used in the BCS differs somewhat from the IALS measure. The BCS test is based on the *Skills for Life* assessments which include both open-response questions and multiple-choice questions. It is also measured on a different scale. However similar to the IALS measure it can also be divided into different levels. The aims of the IALS and BCS instruments are similar - they are both designed to assess the respondent's ability to perform everyday tasks that involve using numbers or interpreting writing communications. In addition, as the De Coulon *et al*. study uses a normalised measure of literacy (which has been standardised to have a mean of zero and a standard deviation of 1) as in the Irish study, we can readily compare the results across studies.

A key feature of the De Coulon *et al*. study, which could not be explored using the IALS data, is that they control for basic skills measured early in life. The advantage of this approach is any potential bias in the returns to literacy estimates, which is derived from the fact that more able individuals have both greater literacy and greater earnings potential, will be reduced. This is one method for dealing with the endogeneity issue which may arise when examining the returns to literacy.

As discussed above, many of the relationships identified between literacy and other economic and non-economic outcomes may not necessarily reflect direct causality. The positive correlation between literacy and earnings that is observed in the Denny et al. study may be driven by unobserved individual characteristics. It is often difficult to disentangle the effects of literacy and other life factors such as education and social background, on adult outcomes. The De Coulon *et al*. study attempts to estimate a causal model of literacy on earnings using a variety of methods. The first method involves including a wide range of observable personal and family characteristics (also referred to as control variables) in the analysis, to reduce the possibility that the results may be biased by excluding some factors which mediate the relationship between literary and earnings. They note that some of these observable characteristics may be proxies for unobserved factors that influence both literacy and earnings - hence reducing the possibility of endogeneity bias and increasing the likelihood that the observed relationship between literacy and earnings is causal.

Another issue that is not addressed in the Denny *et al*. study is the issue of measurement error associated with the literacy score. If the test scores are measured with error this would cause the estimated coefficients on the returns to literacy to be biased downwards i.e. they would be smaller than they should be. De Coulon *et al*. adopt an instrumental variable technique to address both this measurement error issue and the endogeneity issue. This involves identifying a set of variables that directly affect literacy, but have no direct effect on the outcome variable i.e. earnings. Their 'instruments' are test scores measured at age 5 and at age 10; the extent to which the child was read to as a child; and whether the mother smoked during pregnancy.

Their baseline results show that an additional standard deviation in literacy scores yields 20% higher earnings, on average, when they do not include any control variables. This figure is reduced to 16% once the measures of literacy in childhood are included and to 14% when the full set of control variables are included. Finally, including level of education in the model reduces the coefficient to 11%. This is somewhat below the comparable figure of 17% identified in the Denny *et al*. study. This is as expected as De Coulon *et al*. include a much richer set of variables than the Irish study. This suggests that the Denny et al. figure may be biased upwards and that if such comparative control variables were available, the returns to literacy maybe closer to 11%.

Despite the vast control variables included in the De Coulon *et al*. study, there is still a possibility that the results are being driven by measurement error. To address this they first include measures of earnings and literacy taken at ages 21 and 26 in their original model. These results are similar in magnitude to the original results. They then apply the instrumental variable technique which involves first modelling the determinants of literacy using the indentified 'instruments', and then including the predicted probability estimate from this model into the earnings model. They find that the returns to literacy in this causal model range from between 32-46%, implying that the original estimates were underestimated due to measurement error. As the Denny *et al*. study did not deal with measurement error, the returns to literacy may be higher than currently estimated, if measurement errors are present in the Irish data.

Finally, the De Coulon *et al*. study also examines the impact of literacy on employment. They estimate separate models for men and women. For women, they find that an additional standard deviation in literacy is associated with a 3.5 percentage point higher probability of being employed at age 33/34. The relationship between literacy and employment is not statistically significant for men once the control variables are included. The corresponding figure for women in the IALS Irish sample is 8 percentage points and 7 percentage points for men. Therefore literacy has a far greater effect on employment for the Irish sample compared to the UK sample.

Overall, the De Coulon *et al*. results provide some support for the Denny *et al*. results. In terms of earnings, the De Coulon return of 14% is slightly below the Denny return of 17%. For employment, the Denny *et al*. results are greater for women at 8%, compared to 3.5% in the UK sample.

Annex II: Impact of literacy on employment from Irish IALS

Note that the Denny *et al*. results are based on a sample of individual who were employed and hence reported earnings data. Their study did not examine the impact of literacy levels on employment. However, using the IALS data and following the same strategy as the Denny *et al*. study it is possible to estimate the relationship between literacy and the probability of being employed.

The measure of literacy used in the analysis is the same as described in Annex 1 – the normalised measure of literacy (with a mean of zero and a standard deviation of 1). The dependent variable is a measure of whether the IALS respondent is employed or unemployed at the time of the survey. It is important to emphasise that, for reasons stated in Section III, this includes all those who were not working including those who are retired, home makers, and students. As the dependent variable is a binary measure with two outcomes (employed or not employed) a series of probit models are estimated. Model 1 includes years of education and the same basic controls as in the Denny *et al*. study. Model 2 includes years of education, the set of controls and the normalised literacy score. Models 3 and 4 examine the separate effects for men and women.

Model 1 shows that an additional year of education increases the probability of employment by 2.7%. Model 2 shows that this effect is reduced to 1.5% when the measure of literacy is included. Therefore failing to control for measures of literacy when studying the determinants of employment, may upwardly bias the results on the education variable. Model 2 also shows that an additional standard deviation in the IALS score is associated with an 8 percentage point higher probability of being employed at the time of the survey. For this regression sample, one standard deviation in literacy scores corresponds to 55 IALS points. Therefore, raising IALS by 55 points results in an 8% higher probability of employment. These results are disaggregated for men and women in models 3 and 4. For men, an additional standard deviation in the IALS score is associated with a 6.8 percentage point higher probability of being employed. For women, the effect is 8.4 percentage points. Therefore the impact of literacy on employment is greater for women than men.

Table II.1: Models of Impact of Literacy on Employment

Dependent variable:	Model 1	Model 2	Model 3	Model 4
Employed/not working	All	All	Men	Women
Years of education	0.047***	0.034***	0.021***	0.049***
	(0.005)	(0.005)	(0.007)	(0.007)
Literacy score (normalised)	~	0.079***	0.068***	0.084***
		(0.015)	(0.020)	(0.021)
Controls included	YES	YES	YES	YES
Sample size	2027	2027	919	1153

*** Significance level .p <0.01

What is NALA?

The National Adult Literacy Agency (NALA) is an independent membership organisation, concerned with developing policy, advocacy, research and offering advisory services in adult literacy work in Ireland. NALA was established in 1980 and has campaigned since then for the recognition of, and response to, the adult literacy issue in Ireland.

www.literacy.ie

National Adult Literacy Agency
76 Lower Gardiner Street, Dublin 1
Telephone (01) 855 4332
Fax (01) 855 5475
Email literacy@nala.ie

NALA Mullingar
Telephone (044) 934 0374
Fax (044) 934 5834
Email pkiernan@nala.ie

NALA Cork
Telephone (021) 427 8655
Fax (021) 427 8665
Email mmurray@nala.ie

Useful websites

www.nala.ie
www.literacy.ie

NALA
National Adult Literacy Agency
Áisíneacht Náisiúnta Litearthachta do Aosaigh