

Institutes of Technology and the Knowledge Society - Their Future Position and Roles

Report of the Expert Working Group

Council of Directors of the Institutes of Technology
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FOREWORD

Dr Mary Meaney, Chairperson of the Council of Directors

The transformation of the initial network of the Regional Technical Colleges, established in 1970, into the modern Higher Educational Technological sector it is today has been described as the success story of Irish Education over the past 30 years. It constitutes a major part of higher educational infrastructure and now recruits over half the new entrants to third level across a range of courses from short cycle to degree and post graduate.

In collaboration, the Institutes form a major national network offering a diverse range of high quality programmes with an emphasis on applied knowledge. Individually, they bring distinctiveness and accessibility to the regions they serve. Through their focus on applied research, they support both the regions' and the nation's economic, social and cultural development needs.

The manner of Ireland's recent economic success and the Government's recently published National Spatial Strategy now poses serious challenges for the Institutes of Technology. Economic progress, so strongly based on technology, contains the challenge of technological change. Creating one of the most open economies in the developed world underlines the continuing need for competitiveness, innovation and productivity. Economic change has been accompanied by major social change. The Higher Educational Technological Sector must continue to play a leading role in this change process.

The Council of Directors of the Institutes of Technology is determined that the Institutes will bring to Ireland's changing society the characteristics of excellence, relevance and flexibility that enabled them to contribute so strongly to recent economic success. To assist in developing appropriate responses to the present and future challenges they commissioned a Committee chaired by Dr. Pat Fottrell President emeritus of NUIG, to prepare a report. We are pleased now, in this document, to present that report.

The report is evidence of the degree of challenge we face, the central role of Institutes in meeting that challenge and also of the thoroughness of the deliberations of the Committee. We value strongly the professionalism, experience and time they brought to preparing this report which we now publish as a guide to discussion of the future strategies of the Institute of Technology sector. Those who read the report will, I know, join with us in expressing our gratitude to Dr. Pat Fottrell and his colleagues for their endeavours. Finally I would like to acknowledge the financial support from The Atlantic Philanthropies for this project.

FOREWORD

Prof. Pat Fottrell, Chairman of the Expert Working Group

The Directors of the Institutes of Technology established this Expert Working Group at the beginning of October 2002. The Group was asked to prepare recommendations for the future positioning of the thirteen Institutes of Technology within the higher education sector, informed by best international expertise and by the particular circumstances pertaining to Ireland.

The Directors also requested the Group to outline a policy framework that would maintain the rich diversity that characterises Irish higher education and, at the same time, contribute to the development of a more coherent sector.

The Institutes of Technology, formerly Regional Technical Colleges, were first established in the early 1970s. They have played a major role in transforming the education and economic opportunities for large sections of Irish society over the past thirty years. The Institutes currently account for about 40% of enrolments and 53% of first admissions to higher education. Despite their central role in Irish higher education, there has not been a comprehensive policy review of the Institutes. This report is, therefore, timely and should provide an appropriate framework for Government policies to facilitate the continuing provision of excellent education and research facilities in the Institutes.

The Group consulted widely and is very grateful to Directors and staff of the Institutes of Technology for their help and encouragement.

Dr Dermot Douglas provided outstanding administrative and research support.

We also thank Mr Joe McGarry (Secretary General, Council of Directors), Ms Margaret Coen, Ms Joan O'Connor, Ms Louise McQuinn, Ms Kate Wiseman and Ms Noelle O'Connell of the Council of Directors Secretariat for their help and administrative work.

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Finally, it was a great pleasure to work with my colleagues on the working group and I thank them very much for their time and professional contributions

Prof. Pat Fottrell (Chairman of the Expert Working Group)

Terms of Reference of the Expert Working Group

- To advance the development of the Higher education sector in Ireland through setting out a number of scenarios, with well-supported recommendations, in relation to the most appropriate future framework for the technological sector.
- To recommend how the Institutes of Technology can best position themselves within the overall higher education sector having regard to:
 - i dramatic demographic changes
 - ii changing student profile
 - iii increased differentiation and sophistication of the labour market
 - iv suitable international models
 - v the significance of Government regional policy and Spatial Strategy
 - vi proposed Higher Education Authority designation
 - vii the appropriateness of existing 'binary' arrangements
 - viii the need for appropriate partnerships with industry, business and community
 - ix the new roles and responsibilities of the Institutes of Technology in the context of the Qualifications (Education and Training) Act 1999.
- To examine, from the Institutes of Technology perspective, higher education inter-institutional co-operation, differentiation, collaboration and joint links.
- The Group will evaluate these scenarios and make recommendations as to future actions required, having regard to the views of those concerned with future policy making in higher education.

Membership of Expert Working Group

Professor Pat Fottrell, Chairman Dublin Institute of Technology, former President National University of Ireland Galway – Chairman

Dr Gay Corr, retired Director GMIT, former Chairman Higher Education Authority

Dr Kieran Byrne, Director, Waterford Institute of Technology

D. Richard Thorn, Director, Institute of Technology Sligo

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Mr Brian Sweeney, Chairman of Siemens & Science Foundation Ireland

Ms Jane Williams, Managing Director, The Sia Group, Board member Forfás, member of the National Competitiveness Council

Secretary to the Expert Working Group: Dr Dermot Douglas, former Registrar Institute of Technology Tallaght and currently with the Council of Directors' Secretariat

EXECUTIVE SUMMARY

The Institutes of Technology represent a dynamic sector within higher education in Ireland. They provide undergraduate technological higher education at Certificate, Diploma and Degree level, postgraduate education at Masters and Doctoral level, as well as offering opportunities for significant craft and apprenticeship education and an increasing provision for part-time learners. Over the last ten years, the Institutes have developed a rapidly growing research and development base, with a particular emphasis on applied research and technology transfer. The regional role of the Institutes is of primary significance - their geographical location and industrial focus ensure that they are important stimuli for local industrial development, as well as magnets in attracting new investment projects to the regions.

While there has been considerable debate about the structure and framework for higher education in Ireland, there has not been any comprehensive review of policy for the Institute of Technology sector. Ongoing public policy on higher education structure has been to maintain a binary system i.e. two broad separate sectors designed to ensure diversity of provision. There is, however, in common with binary systems established in Europe and elsewhere, a blurring of boundaries occurring between sectors. In Ireland's case, there is a developing differentiation within the Institute of Technology sector which is tending to set apart those Institutes adjacent to universities in Cork, Galway and Limerick, those which are the sole providers of higher education in their region, and those that form part of the higher education infrastructure in the greater Dublin area. This trend, together with the changing economic climate and regional demographic flux, requires that policy for the future development of higher education recognises this differentiation and enables each Institute to enunciate a mission and values relevant to the community that it serves and in keeping with regional and national priorities. What is clear is that a 'one solution fits all' policy will not provide a satisfactory response to the future positioning of the Institutes of Technology within the Irish higher education system.

There is a need for the Government to state clearly the future policy in relation to higher education. This policy should underscore:

- the achievement of a balance of opportunity and provision, through consultation, among all higher education institutions
- the maintenance of a diversity of levels, types and variety of programmes
- the provision of mechanisms for incentivising targeted provision
- the attainment of balanced regional development through maintaining and enhancing the potential of higher education institutions, located in the regions, as important hubs and gateways of knowledge and engines of new economic activity within the communities they serve.

Such a policy should be underpinned by the new legislative measures that will be necessary when the Institutes become designated institutions under the Higher Education Authority. This legislation should also emphasise the role of the Institutes, in common with other higher education service providers, in safeguarding the broader aims of higher education, namely the full development of the individual, independent enquiry and the pursuit of knowledge. The ability of Institutes to sense and respond to change, to innovate and to use resources flexibly requires institutional autonomy at a level equivalent to that available to universities. This deficit needs to be addressed in new legislation.

The challenges facing Institutes of Technology, as they enter a dynamic and changing future fashioned by regional imperatives, global competitiveness, a new National Spatial Strategy and the process of creating a new European Higher Education Area include the need:

- to articulate clear institutional missions and strategic plans which respond to their particular circumstances and positioning within the higher education system
- to commit to cooperation with other higher education institutions through networks and alliances in order to enhance excellence, avoid duplication and create the critical mass necessary to engage in competitive research and teaching at the highest level
- to implement a responsive and flexible system of programme design, course delivery, credit transfer and credit accumulation that will meet new and changing needs of both learners and employers
- to continue to provide multi-level/multi-discipline programmes, which are informed by national, regional and social priorities
- to emphasise the importance of humanities to the promotion of access for mature and disadvantaged groups. This type of provision can provide an initial bridge into tertiary education that may be used to promote the opportunities available in science and technology
- to ensure efficient and effective use of resources. Institutes will have to determine what courses remain attractive to applicants and relevant to the needs of the region and of the marketplace and adjust provision accordingly
- to strengthen further the strategic alliances with the Post-Leaving Certificate sector in order to facilitate progression and to jointly focus targeted provision in areas of special strategic importance such as information and communications technology, science and engineering
- to offer to the second-level education sector support and leadership in developing and implementing strategies to address under achievement in such areas as science and mathematics.

Engaging in research and development is a core function of Institutes of Technology. However, this role is compromised as a result of research infrastructure deficits relative to the universities. Additional forms of competitive funding should be assigned to institutes to redress this imbalance and enable the Institute of Technology sector play a more active role in collaborative research initiatives. At regional level, support for the development of a research capability in specific areas by Institutes should be provided, following consultation with the development agencies. The leading role that Institutes play in knowledge and technology transfer at regional level should be recognised and supported.

In order to help implement the changes required, the Institutes of Technology should:

- engage in dialogue with staff and their union representatives on the necessity for change
- underpin such dialogue with a commitment to an active and appropriately resourced staff development programme
- review their mission and strategic plans in order to provide a vision for the future which is attractive and encourages staff participation.

CHAPTER 1

Introduction

For thirty years, the Institutes of Technology have represented a dynamic, growing sector of higher education in Ireland. They currently account for 40% of the enrolments and some 53% of first admissions to higher education. Approximately 80% of higher education students at the Institutes are studying at National Certificate and National Diploma levels (i.e. short cycle), while the remainder are engaged at Bachelor Degree (honours) and Postgraduate levels. The Institutes have a significant provision for craft and apprenticeship education and a growing population of part-time students.

Over the last ten years, the Institutes have developed a rapidly expanding research, development and consultancy base, with a particular emphasis on applied research and technology transfer.

The establishment of the Institutes (or RTCs as they were in the early 1970s) was influenced to a major extent by the recommendations of The Steering Committee on Technical Education, which reported in 1967¹. This marked a significant change in educational policy as higher education, for the first time, was given a clear regional focus. These colleges were planned as regional institutions, each geographically sited close to an industrial growth centre, where it was expected to provide the technical/technological education services required within its catchment.

Education is fundamental and central to the competitive position of all advanced societies². Like businesses and the economy it serves, education faces constant transformation and the need to be flexible. Although there has been considerable debate about the structure and appropriate framework for education in Ireland³, there has not been any comprehensive review of policy for the higher education sector, despite growth and expansion of the Institutes themselves, changes in the country's economic profile and the changing requirements of the Irish labour market. This contrasts sharply with the major reviews of industrial policy⁴ that have taken place over the last 20 years.

Growth and Development of the Sector

Ireland, in common with many developed countries, has developed a binary system of higher education since the late 1960s. The establishment of the Regional Technical Colleges (now Institutes of Technology) and the upgrading of the Colleges of Technology in Dublin (now the Dublin Institute of Technology) constituted one side of a binary sector; the enhancement of existing universities and the establishment of two new universities (the University of Limerick and Dublin City University) make up the other.

¹ Steering Committee on Technical Education *Report to the Minister for Education on Regional Technical Colleges* (Government of Ireland, Dublin: The Stationery Office, 1967)

² Dorgan, Sean, *Economic Prospects in Ireland Post Celtic Tiger*; Paper given at the Colmcille Winter School, March 2003 *Report on the National Education Convention* (Government of Ireland, Dublin: The Stationery Office, 1994)

³ White paper on Education: *Charting our Educational Future* (Government of Ireland, Dublin: The Stationery Office, 1995); Report of the Steering Committee on the Future Development of Higher Education (The HEA, 1995); *Science, Technology and Innovation - The White Paper* (Government of Ireland, Dublin: The Stationery Office, 1996); *Learning for Life*, White Paper on Adult Education (Government of Ireland, Dublin: The Stationery Office, 2000); The Qualifications (Education and Training) Act, 1999.

⁴ (a) Telesis Consultancy Group *A Review of industrial policy* National Economic and Social Council, 1982); (b) Culliton, J. *A time for change: industrial policy for the 1990s: Report of the Industrial Policy Review group* (The Stationery Office, Dublin, 1992). Government Publications. (c) *Employment through Enterprise: the response of the Government to the Moriarty Task Force on the implementation of the Culliton Report*. (Government of Ireland, Dublin: The Stationery Office 1993).

The report of the Steering Committee on Technical Education informed the establishment of the Regional Technical Colleges (RTCs). On course provision the Committee saw RTCs as bridging the gap between second and third level, providing the final two years of technically orientated post-primary education, providing courses for junior and senior apprentices and technicians, and providing for adult and continuing education. Despite the lack of emphasis on higher education *per se* the committee anticipated the dynamic evolutionary nature of RTCs by their main recommendations:

'We do not foresee any fixed pattern of courses in colleges. If they are to make their most effective contribution to the needs of society and the economy, they must be capable of continuing adaptation to social, economic and technological changes. Initiative at local and national levels will largely determine how far this vital characteristic is developed. We are concerned that the progress of these colleges should not be deterred by any artificial limitation of either scope or the level of their educational achievements.'

A review of the progress of the RTCs, undertaken by the HEA in 1973⁵, showed that they had already become predominantly third-level institutions.

A Department of Education Report⁶ in 1989 commented that 'The development of the colleges has seen the phasing out of second-level education, a scaling down of apprentice training, a large involvement in Certificate courses and a strong development of Diploma and Degree courses.'

In 1992⁷ the Oireachtas established the RTCs as autonomous institutions having the following principal statutory functions:

To provide vocational and technical education and training for the economic, technological, scientific, commercial, industrial, social and cultural development of the State with particular reference to the region served by the Colleges.

Other important additional functions include:

- Engaging in research, consultancy and development work
- Exploiting any research, consultancy or development work
- Entering into arrangements with other institutions in or outside the State for the purpose of joint programmes in both teaching and research.

Amendments to the 1992 Act in 1997, 1998 and 1999 resulted in a change of name for the colleges to Institute of Technology and the establishment of two new colleges in Dun Laoghaire and Blanchardstown.

In a submission to Government⁸ on the National Development Plan, the Council of Directors of the Institutes of Technology presented the following review of the sector:

⁵ Report on Regional Technical Colleges (Higher Education Authority, 1973).

⁶ Lindsay, N (1989): *Report of Committee on Third Level Courses leading to awards from NCEA and other bodies outside universities*, Department of Education

⁷ The Regional Technical Colleges Act, 1992

⁸ Council of Directors of Institutes of Technology (1999) *Technological Education – the Key to the Competitive Knowledge Society*; A submission to Government through the Department of Education and Science for inclusion in the National Development Plan 2000 – 2006

The success of the Institutes of Technology both in fulfilling their role of training and educating for industry, in adapting to industry needs in a rapidly changing environment, can be measured in their rapid expansion and increased enrolments - increasing from 3,234 in 1975/76 to over 32,000 in 1997/1998.⁹

The growth of the sector is given in Figures 1 and 2 below.

Figure 1 Growth in full-time Higher Education Enrolment in Institutes of Technology

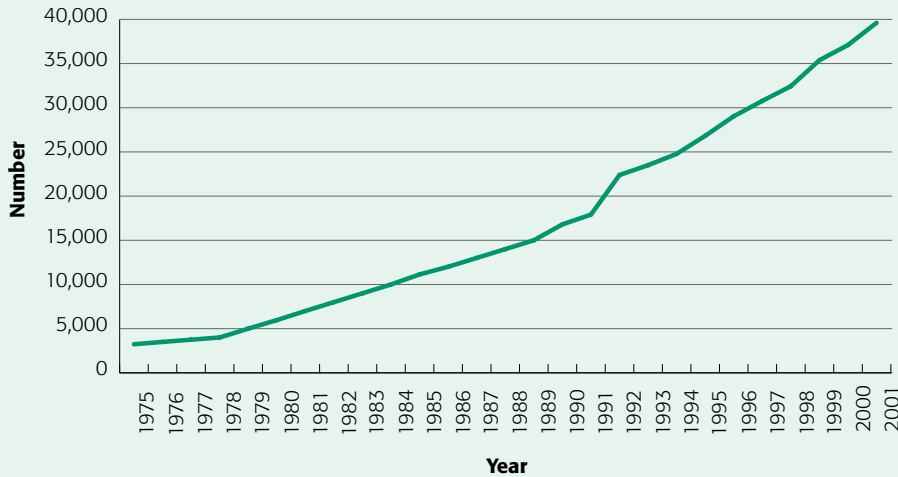


Figure 1. Growth of the Institute of Technology sector: Full-time enrolments – this shows a twelve-fold increase over the 26-year period represented in the figure. (The population of the institutes doubled approximately every eight years to 1997. In the next four years, to 2001 enrolments increased by more than 30%, but with demographic changes it is unlikely that growth will continue over the next few years).

Figure 2 Growth in Part-time Enrolment in IOTs 1996 - 2001

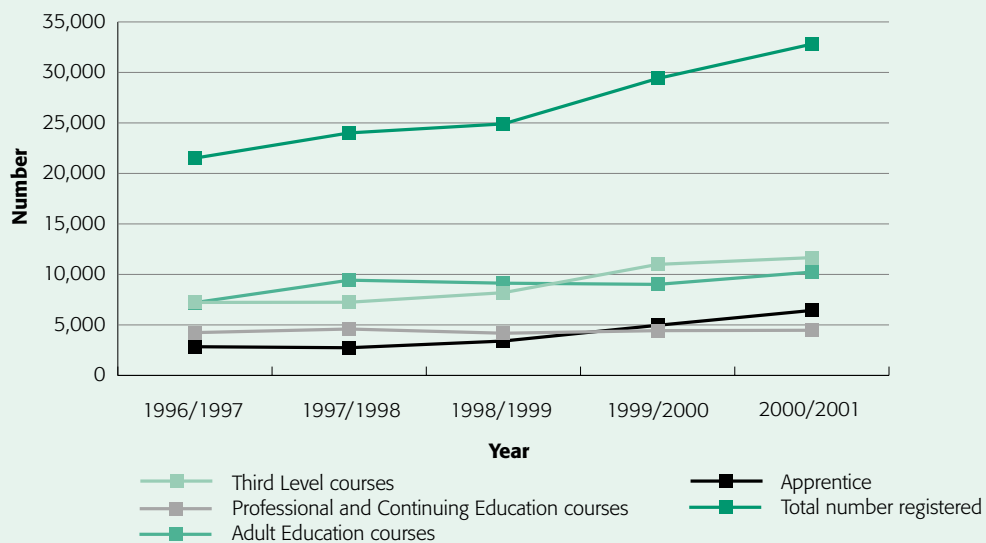


Figure 2. Growth of the Institute of Technology sector – Part-time enrolments (total number of students registered in each category).

⁹ This had grown to 46,111 whole time equivalents by 2001/2002.

The submission went on to state:

‘The thirteen institutes have undergone dramatic changes since the RTC Act, 1992, established the colleges as self-governing autonomous institutions of higher education. An extensive range of Applied Research Projects is now ongoing throughout the sector with industrial partners. Five of the thirteen institutes have campus-based innovation facilities and already institutes have assisted 250 new knowledge-based start-up enterprises. At regional level, the institutes have two main objectives:

- 1 To provide industry-relevant higher education in towns where none existed - Letterkenny, Dundalk, Sligo, Athlone, Carlow, Waterford, Tralee and Castlebar.
- 2 To provide alternative facilities to existing universities, but with a stronger industry focus where the population warranted - Cork, Galway, Blanchardstown, Dun Laoghaire, Tallaght and Limerick.

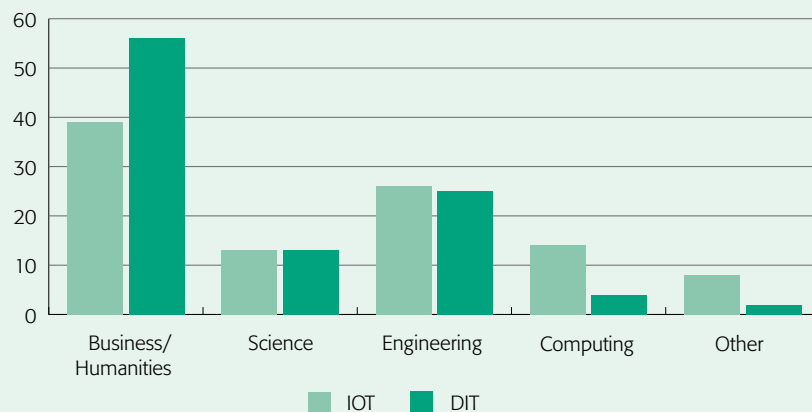
Institutes of Technology are focused on a two-way transfer of knowledge between themselves and industry through a two-standard approach.

- Firstly, a concerted range of activities is taking place at the level of individual institutes to stimulate R & D, enterprise development and technology transfer.
- Secondly, significant efforts are being made at a co-ordinated level to establish, operate and form strategic networks based on the combined expertise of the Institutes. Examples of these include Training of Trainers, a sector-wide staff development programme, Hibernia Learning Partnership, the National Skills Shortage Programme, MIS Project, as well as TecNet - a technology network jointly operated with Enterprise Ireland’.

Since their inception the Institutes have responded to national economic needs, the requirements of their students and the demands of local communities and industry. These responses have included curriculum development; increased access opportunities; flexible routes to awards (the so-called ‘ladder system’); continuing professional and personal development programmes and support for industry through research, consultancy and development programmes.

The mix of disciplines on offer in the technological sector is illustrated in Figure 3. The percentage of students taking engineering and computing is almost double that of the universities (7.5% and 7% respectively) while the percentage taking science is similar in both sectors. The percentage taking business or commerce is significantly higher in the technological sector than in the universities.

Figure 3 Percentage Enrolment by discipline



The Institute of Technology sector provides a flexible mix of programmes at National Certificate, National Diploma and Degree level. The total number of National Certificate and National Diploma awards conferred from 1997 to 2000 is given in Figure 4(a). This increase in sub-degree awards was accompanied by a growth in degree and postgraduate awards. The total output of graduates in the state in the period 1995 to 2000 is given in Figure 4(b)

Figure 4(a) Sub-Degree Awards : NCEA and DIT

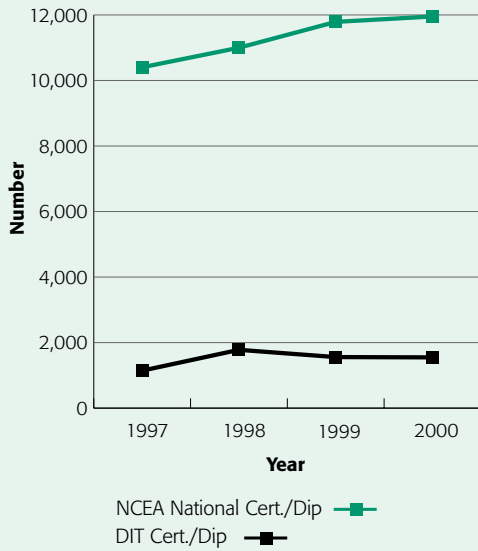
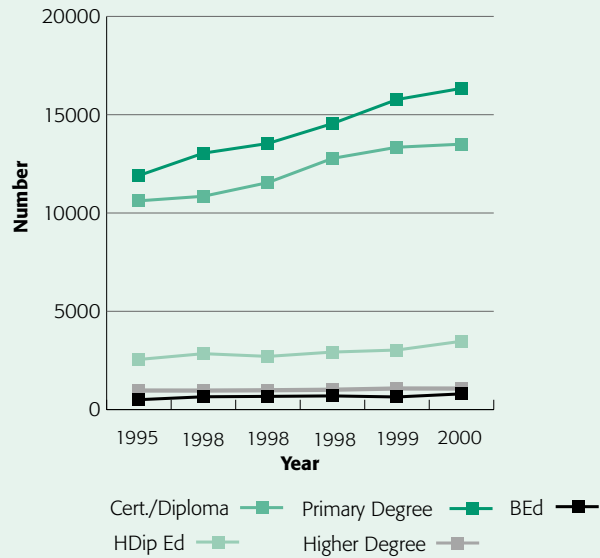


Figure 4(b) Total Number of Higher Education Award Recipients



One of the hallmarks of the provision of courses in the Institutes of Technology, over the past thirty years, has been the fostering of diversity, both in terms of the curriculum and the levels at which awards are made. However, embedded in this diversity is a complementarity that addresses the needs of full-time, part-time, continuing and professional education. Another characteristic of the sector is a dynamism and responsiveness to national and regional needs.

As part of the consultative process, Forfás¹⁰ and the IDA Ireland¹¹ highlighted the fact that Institutes of Technology had played, and continue to play, a critical role in securing Direct Foreign Investment (DFI). The factors that make the Institutes of Technology magnets of attraction for business investors include:

- the relevance of the skills of graduates
- the diversity of access to institutes
- the ladder of awards
- their regional location
- their responsiveness to local/regional demands.

¹⁰ Martin Cronin, CEO, Forfás (The National Policy Advisory Board for Enterprise, Trade, Science, Technology and Innovation)
Mr Killian Halpin Head of the Science, Technology and Innovation Division, Forfás

¹¹ Sean Dorgan, CEO, IDA Ireland (the Irish Investment and Development Agency)

It is clear, from these discussions that Institute of Technology graduates are highly regarded, largely because of the breadth of their education and training. Irish graduates, in general, are perceived as being less narrow and specific than graduates from other countries.

In order for the Institutes to deliver on the National Spatial Strategy, the view was expressed that a more flexible response to regional imperatives might be enhanced by greater institutional autonomy. While the role of the Institutes of Technology is seen as complementary to the rest of tertiary education provision, their key regional functions require that they can pursue a full range of graduate output to match the labour market requirements at local level.¹²

Characteristics of an Institute of Technology Education

The White Paper on Education¹³ describes the aims of higher education as follows:

'Higher education promotes social well-being through preserving, widening and advancing the intellectual, cultural and artistic accomplishments of society; through rigorous sustained and critical evaluations of the past, the present and the possible futures of society; through commitment to the highest standards of research in the various branches of learning; and through equipping society with the particular skills and qualities necessary for economic growth and prosperity.'

The Institutes of Technology share this philosophy of higher education and have designed their curriculum and interactions with the community and with industry to give effect to it. However, within this shared philosophy is a recognition of the individual mission of each institution and a focus on the needs of the region in which it is located. The Institutes have embedded this philosophy of education into operational procedures and have designed modern programmes that are:

- regionally accessible and regionally focused¹⁴
- focused on the needs of individual learners
- relevant and responsive to the needs of the economy
- flexible
- credit based, within a national system of credit accumulation and transfer
- promotional of life-long learning
- quality assured.

Institute of Technology awards do not have a narrow utilitarian function. Inbuilt into all programmes are safeguards to ensure the full development of the individual, independent enquiry and the pursuit of knowledge. Courses at all levels are built on a progressive framework of knowledge and understanding, skills and competence, in line with personal and professional development. The emphasis is on development of the whole person, with a particular

¹² According to a recent (2003) Communication from the European Commission (*The role of the universities in the Europe of knowledge*) the regional dimension of the university (IOTs are classified as universities in the Communication) is set to get stronger, given its essential role in the Europe of knowledge, particularly looking ahead to enlargement.

¹³ White paper on Education: *Charting our Educational Future* (Government of Ireland, Dublin: The Stationery Office, 1995)

¹⁴ Clancy, P (2001) *College Entry in Focus: A Fourth National Survey of Access to Higher Education*; (Chapter 6); The Higher Education Authority.

concentration on creative, critical, problem-solving and communicative skills. Awards are designed to permit exit and return (either on a full-time or a part-time basis). This promotes lifelong learning strategies.

Through research, development and consultancy activities, Institutes of Technology have positioned themselves as regional and national centres of specialisation and expertise¹⁵ in order to act as drivers of development in their respective regions. This has been achieved by fostering enterprise development, partnership with industry and participation in national and European-funded research initiatives.

The Institutional structure of Irish Higher education has been characterised by a binary system that seeks to maintain a diversity of Institutions and separate missions for two sectors i.e. University and Technological/non-university. Recent experience has shown some convergence between the sectors and raises questions as to how clear-cut and stable, in practice, are the separate roles assigned to the different institutions by the governing legislation.¹⁶

¹⁵ Examples of current specialised regional and national centres are given in Appendix 6.

¹⁶ The Regional Technical Colleges Acts 1992 - 1999; The Dublin Institute of Technology Act, 1992 (and Regulations); The Universities Act, 1997.

Chapter 2

Mission and Policy – Evolution and Future Development

The evolution of a mission for the Institutes of Technology began with the Mulcahy Report of 1967¹⁷. This report outlined the functions envisaged for the Regional Technical Colleges as:

'The main long-term function of the Colleges will be to educate for trade and industry over a broad spectrum of occupations ranging from craft to professional level, notably in engineering and science but also in commercial, linguistic and other specialities.'

The next phase of evolution of the mission of the sector was enunciated in the Regional Technical Colleges and the Dublin Institute of Technology Acts, 1992¹⁸. Section 5 of both Acts defines the function of the sector as follows:

'To provide vocational and technical education and training for the economic, technological, scientific, commercial, industrial, social and cultural development of the State with particular reference to the region served by the college.'

The Current Policy Framework

Throughout the 1970s and 1980s there was strong support among educational policymakers and government for the maintenance of two (institutionally separate) sectors in Irish higher education. In an appraisal of the situation in 1992, a government Green Paper¹⁹ concluded that it is important that the distinctive missions of the two sectors should be maintained and fostered, while it urged that links between the universities and the RTCs be improved to better serve regional needs. The binary structure was discussed at the National Education Convention²⁰ where the RTC Directors recorded their opposition to any capping of degree-level work.

The government White Paper²¹ that followed was clear and unambiguous on the preservation of the binary system stating:

'The diversity of institutions and the separate missions of the two broad sectors will be maintained to ensure maximum flexibility and responsiveness to the needs of students and to the wide variety of social and economic developments.'

It further stated that:

'the State will respect the autonomy of the institutions to determine the ways and means through which they will fulfil their particular roles, within the overall aims for the system and the policy framework articulated by the Minister.'

¹⁷ Steering Committee on Technical Education *Report to the Minister for Education on Regional Technical Colleges* (Government of Ireland, Dublin: The Stationery Office, 1967)

¹⁸ The Regional Technical Colleges Act, 1992; The Dublin Institute of Technology Act, 1992.

¹⁹ *Education for a Changing World*; Green Paper (Government of Ireland, Dublin: The Stationery Office, 1992)

²⁰ *Report on the National Education Convention* (1994); Government of Ireland, Dublin: The Stationery Office

²¹ White paper on Education: *Charting our Educational Future* (Government of Ireland, Dublin: The Stationery Office, 1995)

The report of the HEA Steering Committee²² (1995) supported the retention of the binary system stating:

'The Committee fully endorsed the maintenance of a diversified system of higher education to meet the varying needs of students, of society and of the economy'. The Committee went on to recommend 'that the non-university sector develop its distinctive role in the area of technician training, the practical orientation of its programmes, the engagement with Applied Research and experimental work in product development and the regional focus of its work.'

Commenting on this, Coolahan, in his paper on Third-Level Education in Ireland²³, states that, while such endorsements of the binary system are significant, it seems clear that the future will see more pressure from the extra-university sector for greater status within the higher education system. Events over the past five years i.e. the application by the Dublin Institute of Technology to become a university, the conferring of Institute of Technology title on Waterford RTC with the subsequent controversy which ended in all RTCs being re-titled Institutes, serve to confirm the desire to move towards a more open, even-structured higher education system.

It is important, in this context, not to confuse status with autonomy or to assume that diversity can be provided only through strictly differentiated institutions.

A report of responses to the EU Memorandum of Higher Education²⁴ in the early 1990s described the need to be met by higher education institutions in the future as:

'a great diversity of provision in terms of whole-time and part-time courses, long courses and short courses, single subject courses and structured courses. The tasks of higher education will be to fit all of these into a post-secondary structure, which best serves its new clientele. It is important that the component parts of such a structure, their tasks and their missions as well as the connections between them should be well defined in policy terms. Whatever the nature of the structure it is extremely important that it should not prevent students who are willing and able from progressing to the highest possible level of their studies.'

It went on to emphasise the importance of bridges between institutions, better relations and interconnections, and more permeability between institutions that allows for the movement of students between courses and institutions.

Skilbeck in his report, *The University Challenged*,²⁵ refers to the

'inflexibility of higher education systems, binary or otherwise, where there are not diverse and clear institutional missions, well-defined differences in the conditions affecting finance, course levels, qualifications on offer and teaching including remuneration of teachers, and well-developed linkages and articulation arrangements.'

²² Report of Steering Committee on Future Development of Higher Education (Higher Education Authority, 1995);

²³ Coolahan, John *Third Level Education in Ireland: Change and Development in Chapter 10* O'Muircheartaigh, F.(ed) *Ireland in the Coming Times: Essays to Celebrate T.K. Whitaker's 80 years.* (Dublin: Institute of Public Administration, 1997).

²⁴ Memorandum of Higher Education in the European Community (Brussels, 1991)

²⁵ Skilbeck, M (2001) *The University Challenged – A review of International Trends and Issues with particular reference to Ireland* (Higher Education Authority)

He goes on to say that:

'wherever more than one sector provides education at the tertiary level, there is a challenge to define relations between them, ideally in a well-articulated structure which might include study pathways in both directions, credit transfer, joint courses and study programmes, cross-sectoral institutions, joint R & D projects, agreed specialisation and concentration, strategic alliances, shared resources and facilities.'

One challenge facing Irish policymakers is that, having recognised that the higher education system has been transformed over the past thirty years from a small elite to a mass system, distinctive institutional missions must emerge to cater for the wide range of educational and research needs of a more diverse society and its labour market. It is self-evident that if Ireland is to continue to develop as a knowledge-based economy, at the forefront of technological innovation, the country requires a number of well-supported research-driven higher education institutions. Ireland, however, may not require, nor can it afford, an elite system of higher education.

The White Paper on Education (Charting our Educational Future), 1995 expanded on the Government's policy approach as follows:

'...will seek to balance institutional autonomy with the needs of public policy and accountability, having due regard to the respective rights and responsibilities of the institutions and the state.'

Underpinning the Policy is

'the recognition of the legitimate autonomy of institutions, particularly in relation to determining educational aims and content of programmes',

coupled with

'the preservation of diversity and balance of provision, within the system, while avoiding unnecessary overlap or duplication.'

A European Perspective

A comparative study²⁶ of higher education structures in nine European countries, by CHEPS, sought to map out recent developments. The countries studied were Austria, Denmark, Finland, Belgium (i.e. Flanders), France, Germany, The Netherlands, Sweden and the UK. The overall trends show the structure of higher education systems throughout Europe to be in constant change and, therefore, any clear-cut differentiation into university/non-university institutions is inadequate to describe the realities of the situation on the ground. Boundaries between sectors are becoming 'blurred' - convergence is occurring with universities displaying 'vocational drift' and non-university institutions engaged in 'academic drift'. The proposals under the Bologna Declaration²⁷ to have a two-cycle higher education system (i.e. Bachelors and Masters) has raised tensions between sectors in binary systems with some questioning the validity of retaining existing sectoral divisions. It is interesting that two types of non-university institutions - the German Fachhochschulen and the Dutch Hogescholen have recently been given the right by their respective governments to use the label 'university' when they present themselves internationally.

²⁶ Huisman, J. and Kaiser, F. (eds.) (2000) *Fixed and Fuzzy Boundaries in Higher Education*; Den Haag, Adviesraad voor het Wetenschaps- en Technologiebeleid (AWT)

²⁷ *Bologna Declaration: The European Higher Education Area*; Joint declaration of the European Ministers of Education Convened in Bologna on the 19th June 1999.

Identity and self-image is becoming an important issue for many institutions within the non-university sectors of higher education in the countries surveyed. While it is clear that in all the countries studied, alternative institutions to traditional universities were created in the 1960s and 1970s and these evolved in different ways depending on national and local circumstances. For instance, in the case of the Netherlands, Sweden and the UK, one set of legislation applies to the entire higher education system while in the other countries examined, separate legislation applies to the different sectors. A further point worth noting is that in the Netherlands, Flanders and Sweden, where there is co-operation between institutions in the different sectors (e.g. joint curriculum development, student transfer, joint use of infrastructure/facilities), policy frameworks which encourage and support, but do not regulate, the actions of institutions are very much to the fore.

Since 1992, the UK higher education system is no longer binary - the former polytechnics, and their equivalent in Scotland, have become universities to form a unitary system. The study refers to indications of the system being still divided or stratified informally, with the new universities generally being less rigorous in student selection, less engaged in research, and generally lower down the comparative league tables, published by the Press, than the longer-established universities. They are perceived, however, as more responsive to the needs of industry/business, more open in terms of access, and, having a university title, enjoy a social status both at home and abroad which is superior to that of other-named higher education institutions.

Sectoral and Institutional Missions

It is unlikely that there can be anything other than a very general mission for the technological sector.

The Council of Directors, in articulating a sectoral mission for the Institutes of Technology, has always taken this on board by emphasising the key attributes as, flexibility, responsiveness, relevance as well as a regional focus.

In a submission on the National Plan, referred to earlier, the Council described the Institutes as

'strategically located throughout the regions to give maximum effect to national development priorities in the areas of human resource development, lifelong learning, regional economic development, industrial training and skills upgrading, R & D, technology transfer, community, rural and tourism development.'

The submission refers to Institutes as significant instruments of regional economic development that give to some regional businesses their only access to higher education facilities and resources. While large centres of population often contain a variety of educational institutions and have the critical mass to execute change, smaller communities with marginal access to facilities may require special efforts to maintain their capability to compete. Thus the Institutes in towns where no other higher education services exist, such as Letterkenny, Dundalk, Sligo, Athlone, Carlow, Waterford, Tralee and Castlebar contrast with those capable of providing alternative facilities to those offered by universities in Cork, Galway, Limerick and the greater Dublin area.

Their geographical location and industrial focus, in different ways, make the Institutes important stimuli for local industrial development, as well as focal points in attracting new investment projects to the regions. The importance of the Institutes of Technology to inward investment in the regions was highlighted in a paper by the CEO of the IDA Ireland in 2001²⁸. Referring to education, skills and research, he said

'Given our emphasis on the knowledge economy and the role of technologies, our educational and research institutions will need to be more dynamic and flexible, and will have to develop to a stage where they are recognised as world class. It will not be sufficient for this knowledge and expertise to be the preserve of major conurbations only. The key to facilitating greater regional balance and dispersal of wealth and activity is for regions to develop a capability which will differentiate them from other regions and thus, like a magnet attract wealth generating activity to capitalise on such capability.'

It is of some significance, in this context, that in all cases an Institute of Technology is located at either a gateway or hub (i.e. centre of growth) in the National Spatial Strategy Plan²⁹ recently published.

The above reinforces the need to recognise that there are well-defined differences across the Institute of Technology sector and these should be expressed through clear-cut institutional missions. Such diversity is likely to intensify as institutional goals, ambitions and regional responsibilities are sharpened by competition due to market forces and the demands for relevance, efficiency and accountability coming from government and public agencies at both national and regional levels. As far as positioning within the higher education sector is concerned 'one solution fits all' will not provide a satisfactory answer for the Institutes of Technology.

²⁸ Dorgan, S (2001) *Location Strategy for Inward Investment*; IDA Ireland.

²⁹ National Spatial Strategy (Government of Ireland, Dublin: The Stationery Office, 2003)

CHAPTER 3

Meeting the Demographic and Social Imperative

Higher education in Ireland will continue to operate in a challenging landscape of major change. Achieving national educational, social, regional and economic objectives will require a clear understanding of national priorities and a consequent broad strategic framework for higher education. It is clear, because of major demographic, social, cultural, technological, economic and regional changes that the Irish higher education system in 2010 will differ significantly from that of 2000. The challenge for Government now is to manage that change so that it occurs in a fashion that addresses national priorities.

Student Flow Factors

As part of the strategic review undertaken by the Council of Directors in 2002, a comprehensive review of student flows to the Institutes of Technology to 2010 was commissioned.³⁰ The main findings report are summarised in this chapter.

Major factors affecting higher education enrolment include the following:

- **Demographic Change:** The number of persons in the school leaving age cohort will decline significantly in this decade. Over 90% of higher education intake comes from this age group. Table 1 shows that the decline varies by region – a significant fact for a higher education system where intake is strongly regionally dependent.

Region	2000	2002	2005	2010	2011
Border ³¹	100	94	87	76	73
Dublin	100	94	89	87	86
Mid East	100	95	89	85	84
Midland	100	93	83	71	70
Mid West	100	93	84	77	75
South East	100	94	87	78	76
South West	100	94	86	78	77
West	100	95	87	78	76
Total	100	94	87	81	79

Table 1. The proportion of the 16-19 age group by region: (2000 = 100) (Source: Population and Labour Force Projections 2001-2031, Central Statistics Office, 1999).

The demographic change demands a policy response to ensure that the attainment of national strategic, economic and regional objectives is not adversely affected. Clearly, major school-leaver decline requires rationalisation of some higher educational programmes in all sectors. Already, there is considerable evidence of under-subscribed courses - both *ab initio* and add-on. Managing such change in a manner that protects fundamental aspects of higher educational infrastructure and regional provision is a matter of national importance.

³⁰ McDonagh, S. and Patterson, V. (2002) *Some Factors Affecting the Flow of Students to the Institutes of Technology to 2010*. Council of Directors of Institutes of Technology.

³¹ A breakdown of the regions is given in Appendix 1

The higher education sectors are comprised of autonomous institutions. In the past, in circumstances of increasing applications for higher education entry, institutions competed for applicants. Managing higher education entry in the new circumstances of school-leaver decline may suggest the value of collaboration, articulation and alliances between all third level institutions in achieving national objectives.

- **Leaving Certificate Participation:** A key factor in successful higher education enrolments is participation up to Leaving Certificate examination level. The table below shows strong male/female and regional variations.

Region	Male	%	Female	%	Total	%	Where Male = 100 Female =?
Border	2,783	70.0	3,426	90.6	6,209	80.1	123.1
Dublin	5,678	63.5	6,227	70.9	11,905	67.2	109.7
Mid East	2,342	65.3	2,548	75.3	4,890	70.1	108.8
Midland	1,631	80.1	1,748	93.8	3,379	86.6	107.2
Mid West	2,193	71.9	2,421	85.5	4,614	78.4	110.4
South East	2,659	71.7	3,022	84.6	5,681	78	113.7
South West	3,834	76.2	4,240	87.2	8,074	81.6	110.6
West	2,572	73.1	2,782	84.0	5,354	78.4	108.2
Total	23,692	70.0	26,414	81.6	50,106	75.6	111.5

Table 2. Estimated Participation Rates to Leaving Certificate by School Candidates 2001.

A policy of maximising the achievements of young people must address the promotion of increased participation to Leaving Certificate level, with a special emphasis on male participation and under-performing regions. Under-achievement at Leaving Certificate and preparation for third level education must be addressed.

- **Changing Patterns of Enrolment:** The pattern of first preference Certificate/Diploma applicants to Institutes has varied considerably in recent years – with some institutions showing a significant decline.

Study discipline choice shows considerable volatility, underlining the importance of actions to ensure adequate participation in key skill disciplines. A strategic overview of the broad national future discipline and level requirements, in a comparative international context, should inform a definition of national skill priorities.

- **Gender Context:** Major differences between male and female subject choice and performance at Leaving Certificate level strongly affects the intake of all higher education institutions. The table below highlights the different discipline performances at Leaving Certificate by gender.

	Mathematics	English	Irish	French	Physics	Chemistry	Biology
Higher Level							
Proportion of Females (%)	45.6	57.9	65.6	63.7	29.5	56.5	71.5
Females: Grades A, B, C (%)	76.8	79.2	85.4	71.8	75.6	79.3	73.7
Males: Grades A, B, C (%)	73.3	72.5	80.4	62.4	63.9	74.1	69.9
Percentage Difference (+/-)	-3.5	-6.7	-5.0	-9.4	-12.0	-5.2	-3.8
Ordinary Level							
Proportion of Females (%)	53.6	44.4	50.0	56.2	14.2	35.7	63.9
Females: Grades A, B, C (%)	65.3	81.8	81.5	64.1	77.5	65.2	59.1
Males: Grades A, B, C (%)	59.3	71.5	68.8	58.5	68.6	50.6	49.9
Percentage Difference (+/-)	-6.0	-10.3	-12.7	-5.6	-8.9	-15.0	-9.2

Table 3. Leaving Certificate Results in key subjects in 2002.

Females 'outperform' males in many Leaving Certificate subjects including Languages, Mathematics and Physical Sciences. They dominate the 'points system'. A recent report by Emer Smyth and Carmel Hannan³² indicates, however, that science subjects tend to be elite (or selective) choices in that they seem to draw disproportionately on higher ability female students from professional backgrounds.

In its Third Report³³, the Expert Group on Future Skills Needs reiterated a concern (as expressed in the Second Report³⁴) at the falling numbers of school leavers interested in studying science at third level³⁵.

Three males enter Degree programmes for every four females, while males form a majority of Certificate/Diploma entrants. The discipline choices of males and females strongly differ. Females dominate Education, Health and Humanities programmes, while males form the strong majority in Engineering/Technology and Computing disciplines. Business and Science subjects attract a more balanced mix of students. In the recent volatility of discipline selection, females deserted Computing and some technology areas in greater proportions than males.

The Irish Apprenticeship system is a male-dominated activity, while females form the majority in the further education courses.

Maximising the achievements of young persons requires actions to address male comparative under-participation and under-achievement and the promotion of Mathematics/Physical Science-based courses to females with strong abilities in those disciplines.

³² Smyth, E., and Hannan, C. (2002) *Who Chooses Science? Subject Take-up in Second-Level Schools*. Liffey Press & ESRI.

³³ Expert Group on Future Skills Needs (2001) *The Third Report – Responding to Ireland's Growing Skills Needs*. Forfás.

³⁴ Expert Group on Future Skills Needs (2000) *The Second Report – Responding to Ireland's Growing Skills Needs*. Forfás.

³⁵ Despite this, however, the ratio of graduates in mathematics, science and technology per 1000 inhabitants (ages 20 –29) in 2000 was 23.9, ranking Ireland far ahead of other European countries. *European benchmarks in education and training: follow-up to the Lisbon European Council* (European Commission, Communication, 2002)

Equity Factors

There has never been a more opportune time to pursue, by diverse means, the promotion of a more equitable access to higher education qualifications. Currently, there is inequity in participation in higher education by social class, city, town, district, region, gender and age.

The table below summarises the deep inequity by social group in higher education enrolment.

Father's Social Class (% in population)	% of Age Cohort Entering Higher Education
Higher professional (14)	84
Lower Professional (20)	55
Other Non-Manual (19)	42
Skilled Manual (22)	40
Semi Skilled Manual (15)	25
Unskilled Manual (9)	22

Table 4. Social Background of those entering Higher Education.

A national agenda to achieve more equitable access and to attract under-represented groups may include new formats that combine work and study.

Apprenticeship is a work-and-study format where intake has grown and which is more socially equitable than higher education entry³⁶.

The strong regional variations in higher education entry are shown below.

Region	University Rate (A)	Institute of Technology Rate (B)	A+B	B/A
Border	13.3	26.4	39.7	2.0
Midland	16.6	24.6	41.2	1.5
South East	14.4	20.1	34.5	1.4
West	22.7	29.5	52.2	1.3
Mid East	18.0	20.6	38.6	1.1
Mid West	20.1	18.4	38.5	0.9
South West	24.9	23.0	47.9	0.9
Dublin	18.5	14.8	33.3	0.8
National Average	19.5%	21.7%	41.2%	1.1

Table 5. 1998 Full-time Entry Rates (%) to Universities and Institutes of Technology.

A regional spatial agenda should address both the regional entry rates and the level, sectoral and discipline mix by region.

Regional access to part-time courses varies strongly. In many key disciplines, part-time course access is restricted or not available³⁷. A new national objective, possibly through institutional alliance or collaboration, should seek to provide access nationally to a range of key skill-based courses.

³⁶ McDonagh, S. and Patterson, V. (2002) *Some Factors Affecting the Flow of Students to the Institutes of Technology to 2010*. Council of Directors of Institutes of Technology.

³⁷ Séamus Puirseil, Chief Executive, The Higher Education and Training Awards Council.

Retention/Underachievement

The issue of student success has received considerable attention in recent years. There are many factors that are increasing the urgency of the issue:

- School-leaver age cohort decline means that more courses will be under-subscribed or admit 'low-point' applicants, thereby potentially exacerbating the retention problem
- major employment change patterns have contributed a new, widespread phenomenon of term-time working by second level and third level students
- excessive term-time working affects student performance adversely
- employment opportunities attract some young people, thus making the objective of increased participation rates more difficult to achieve.

These circumstances impact on success rates in programmes and demand further measures of an academic, motivational, preparatory, organisational, collaborative nature to promote student achievement. It is also important to put more effort into the matching of course choices and delivery formats to student abilities and needs.

Recommendations

- 1 Institutes need to continue to implement and further develop responsive and flexible systems of programme design and delivery, credit transfer and credit accumulation that will meet the new and changing needs of students and employers.
- 2 Institutes should provide innovative formats of delivery that will facilitate the required new work and study formats in order to encourage student retention and completion. In this context, Institutes need to re-examine the current retention/completion paradigm.
- 3 Institutes should design the curriculum in a flexible manner to allow students vary their registration if they find, after a short period (i.e. of weeks or months) that they are not suited to the course they accepted.
- 4 The Institutes need to develop strategies to turn the comparatively good second-level performance of females in mathematics and physical sciences into applications for higher education courses in science, engineering, technology and computing courses.
- 5 In order to create equity of opportunity and to address equity and access to higher education, Institutes should design new and innovative programmes that will afford those students who have completed an apprenticeship programme the opportunity for further academic progression.
- 6 It is important to differentiate between social inclusion and participation rates. While initiatives to improve participation rates are well rehearsed, Institutes must continue to adapt and develop policies and procedures to facilitate access and to provide support for traditionally under-represented groups.
- 7 Funding agencies should recognise that the distinction between the full-time and the part-time student is blurring significantly, and that it is necessary to implement institutional funding models to accommodate this.

CHAPTER 4

Promoting Diversity of Provision and Flexibility of Delivery

Current Provision

In terms of award level, the Institutes of Technology have maintained a balanced mix of two, three and four year undergraduate courses. Figure 5 shows that some 74% of the total provision is at Certificate/Diploma levels, representing 80% of the students registered.

Figure 5(a) Numbers Registered for various awards in Higher Technological Education (2001/2002) - Undergraduate

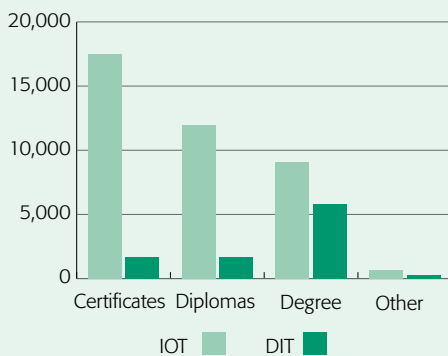
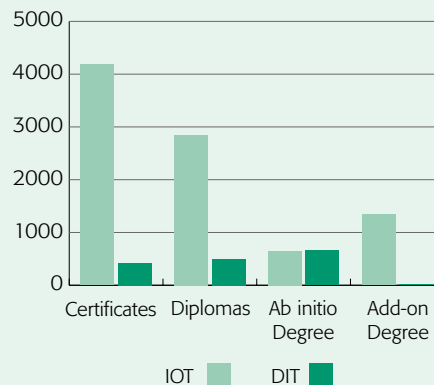


Figure 5(b) Total number of awards by category granted in 2001



The current provision of undergraduate full-time courses, by discipline, in the sector is shown below.

Discipline	Ab initio Degree	Certificate/ Diploma	Add-on Degree	Total
Accounting/Business/Commerce	18	52	49	119
Hotel Mgt./Travel/Tourism/Heritage	4	13	12	29
Sports Science/Recreation/ Leisure Studies	1	8	5	14
Construction/Surveying/Valuation	7	13	3	23
IT/Computer Science/Computer Applications	23	30	18	71
Engineering/Technology	8	65	41	114
Architecture/Architectural technician	-	5	1	6
Arts/Humanities	6	6	2	14
Music	2	-	-	2
Science/Applied Science/Food Sci. & Tech.	8	34	30	72
Agriculture/Horticulture	-	9	2	11
Health Sciences	-	4	1	5
Legal Studies	-	2	2	4
Social Studies/Social Care	2	7	4	13
Art/Design/Photography/Media	3	24	13	40
Nursing	15	-	-	15
TOTAL	97	272	183	552

Table 6. Course Provision in Institutes of Technology.

Together with this, the institutes offer postgraduate studies in business, computing, engineering, science and humanities. These are offered as postgraduate diplomas, Masters degrees (either taught or by research) and doctoral degrees (currently available through research and thesis only).

All of the institutes, to a greater or lesser extent, offer continuing professional and adult higher education programmes. However, the provision is patchy throughout the country, with the institutes in the larger urban areas dominating. The institutes provide professional qualifications through formal arrangements with some 62 professional bodies and international awarding bodies for some 32,000 students who are registered on part-time courses.

Future Provision

In the future, tertiary education will have to cater to the learning needs of a much wider clientele. This will involve a significant change in the demographic shape of higher education institutions, whereby the traditional structure of a pyramid with a majority of first degree students, a smaller number of post-graduate students, and finally an even smaller share of participants in continuing education programmes will be replaced by an inverted pyramid with a minority of first time students, more students pursuing a second or a third degree and the majority of students enrolled in short term continuing education activities (Salmi, 2001)³⁸.

The concentration within tertiary education can no longer remain narrowly focused on the 50% of the school-leaving cohort who currently participate, but must also address the educational needs of the remaining 50%, as well as the continuous professional development, renewal and up-skilling needs of the remainder of the population.

Tertiary education will be obliged to better address the learning needs of a diverse clientele through provision of short-term courses, weekend courses, work-based in-company courses, distance education courses, part-time courses (either by day or evening) or part-time provision of full-time courses (through single subject accreditation and credit accumulation, and out-of-term courses), or any combination of the above. Courses will, insofar as is possible, have to become independent of time and location.

The requirement for multi-skilling and for conversion programmes (e.g. business/humanities to science/technology), as a cost-effective and flexible mechanism to address emerging skills, should be developed further.

If the lifelong learning agenda is to be delivered, a re-thinking of the nature and structure of educational programmes is required, as well as a re-assessment of what is endorsed by an educational award. Increased use of flexible, modular/semesterised modes of provision and delivery is necessary if this is to be addressed in any meaningful way. A report by the American Chamber of Commerce Ireland (2001)³⁹ indicated that courses in Institutes of Technology, particularly at sub degree level, were too top heavy and needed radical overhaul. It suggested that Institutes should make greater use of experiential learning; practical experiments where students have to effectively communicate their findings to teachers and peers; more tutorials; the provision of more modules on communications and the philosophy of science; and better links to local businesses.

³⁸ Salmi, J (2001) *Tertiary Education in the 21st Century: Challenges and Opportunities*; Higher Education Management, Vol. 13, No. 2; 105 -130

³⁹ Gaffney, Maureen (2001) *Industry Supporting Innovation in Education in Science and Technology Future Proofing the Irish Economy*; American Chamber of Commerce Ireland.

In addressing the European Area for Higher Education, envisaged under the Bologna Declaration⁴⁰, Institutes are expected to be more outward looking and to expand efforts to attract international students, not only from Europe but also from China, India, South-East Asia, Malaysia and elsewhere. The Minister for Education and Science⁴¹ has pointed to the enormous opportunities that exist, in this context, to utilise excess capacity. Such programmes are invaluable in enriching the educational experience of Irish students and may also be useful to build contacts which may have long-term economic benefits for the country. However, if this is to be successful, the sector must have a strong, marketable educational product. This implies that programmes of study must confer the type of awards that 'sell' abroad, that they must be 'kite marked' in terms of quality (i.e. quality of teaching and outcomes), as well as providing the levels of support demanded by international students. These initiatives must be well planned, resourced and executed.

Review of provision

In order to ensure efficient and effective use of resources, it is necessary to determine whether programmes of study remain relevant to the needs of the marketplace and continue to be attractive to applicants. Courses should continue to be reviewed regularly against the yardstick of the stated mission of each Institute. This approach would see enhanced effort being put into some areas of provision in order to achieve stated targets. It would also see a decision to discontinue some programmes because of diminishing labour market demands or a shortage of students.

Institutional quality assurance procedures should provide a clear 'trigger' mechanism to indicate when a poorly subscribed course needs to be critically examined from the viewpoint of a continue/discontinue decision.

Where a course is deemed non-viable by virtue of a small number of applicants or acceptances, Institutes should examine whether alliance or collaboration with other institutions might provide a solution. Such arrangements can provide useful transfer possibilities at current National Diploma and add-on Degree level. However, it is important to protect critical strategic course provision in the different regions, despite market downturns, and it is also recommended that Institutes, through association or collaboration, should be capable of offering access to a full curriculum for students in their regions.

Where courses are discontinued, Institutes need to invest in staff development and, where necessary, retraining in order to retain and re-deploy experienced faculty members.

The role of education in general, and higher education in particular, in supporting the new economic model of the 1990s was recognised, as follows, in the National Development Plan:⁴²

- *"There is a clear consensus that investment in education and training has a very high rate of return and that it accounts for a significant proportion of the observed variation in economic growth rates around the world."*

⁴⁰ *Bologna Declaration: The European Higher Education Area*; Joint declaration of the European Ministers of Education Convened in Bologna on the 19th June 1999.

⁴¹ Address by Mr Noel Dempsey, T.D., Minister for Education and Science at the official opening of a new fitness suite at the Institute of Technology, Athlone; 10th February 2003.

⁴² Ireland, National Development Plan 2000 – 2006; Government of Ireland, Dublin: The Stationery Office

- *"A survey of the largest multinational companies operating in Ireland in 1998 listed labour force flexibility, the educational system and labour force availability among the five most important determinants of competitiveness"*
- *"In addition, the Plan recognises the essential need to promote the success of the technological and university sectors in providing highly educated skilled young persons who are vital to the continued attraction of Foreign Direct Investment (FDI) to Ireland"*

A major factor fuelling the competitive advantage enjoyed by Ireland in the 1990s was the investment in education made by successive governments and the development and provision of regionally located third-level education and training infrastructure relevant to the economy's existing and future skills needs.

Continued economic development demands that higher education providers not only respond to the needs of society and the state but that they anticipate future requirements and prepare graduates for them. This will require responsiveness and flexibility in the design of appropriate educational programmes that cut across disciplinary boundaries. However, it will also demand responsiveness on the part of industry. A survey by the Chambers of Commerce of Ireland (1999)⁴³ indicated that only a third of Irish-owned companies had a staff-training budget (compared with 8 out of 10 foreign-owned companies). In total, more than 60% of companies did not have a training budget and this figure rose to 80% for companies with less than 10 employees.

The adoption of a modular approach to curriculum development will be critical to future success if Institutes of Technology are to connect appropriately with new national development priorities. While some worthwhile and ground-breaking industry/Institute of Technology courses have been accredited, current arrangements are neither sufficiently responsive nor agile enough to enable widespread interaction on curriculum design, delivery, assessment and the attainment of relevant awards. Institutes need to broker more flexible accreditation arrangements with HETAC for joint industry/Institute of Technology employee programmes.

In addition, there is a need for a radical reappraisal of the manner in which the learning environment in higher education institutions is designed, in order to allow for the multiple intelligences concept, the complexity of learning processes and the importance of collaborative group learning above individual isolated endeavour.

The Higher Education Authority, under its new remit which will include the Institutes of Technology, should advise government on the balance of levels and types of programmes that are appropriate, taking account of the National Framework of Qualifications as determined by the National Qualifications Authority of Ireland.

Recommendations

In order to maintain diversity and to improve delivery of courses, the following recommendations should be implemented:

1. Institutes of Technology should continue to provide and develop multi-level/multi-discipline courses that are informed by and related to national and regional priorities.
2. The Institutes of Technology should seek to collaborate and co-operate with other institutions of higher education in order to provide students with access to a full range of higher education opportunities.

⁴³ *Labour Force '99 – Skills and Training Survey*. (Chambers of Commerce of Ireland, 1999)

3. In order to deliver on lifelong learning agendas, it will be necessary to re-think the nature and structure of educational programmes and to build in flexibility in course design, delivery and structure of awards. To do this effectively, it is important to invest in further developing the skills needed to assess learning, wherever it occurs.
4. The meaning of the word 'technology', in the context of educational programmes, needs to be redefined to embrace a wider range of disciplines, including the applied humanities.
5. The relevance of many humanities programmes to the economic/social/cultural development of the regions needs greater recognition.
6. The importance of humanities to the promotion of access for mature and/or disadvantaged groups must be emphasised. This type of provision can provide an initial bridge into tertiary education that may be used to promote the opportunities available in science and technology.
7. Courses must have a flexible modular/credit structure and awards should be firmly based on the principles of credit accumulation and credit transfer.
8. When a course remains non-viable, due to a lack of social demand and after an Institute has exhausted all avenues, including collaboration with other institutions, it should be withdrawn.
9. Institutes need to broker more flexible accreditation arrangements with HETAC for joint industry/Institute of Technology employee programmes.
10. Institutes must examine the learning environment and, if necessary, redesign it to allow for a more complete participation of the learner in a multidimensional way.
11. In order to implement the initiatives required, at college level, Institutes of Technology should:
 - engage in dialogue with staff and their union representatives on the necessity for change
 - underpin such dialogue with a commitment to an active and appropriately resourced staff development programme
 - review their mission and strategic plans in order to provide a vision for the future which is attractive and encourages staff participation.

CHAPTER 5

Planning Strategic Interaction with Further Education and the Second level Sectors

The Post-Leaving Certificate (PLC)/Further Education (FE) sector has become an important provider of vocational education in Ireland during the last ten years. With a current enrolment of some 25,000 students throughout the country, the sector is providing valuable short course training (mainly one year) leading to over fifty types of National Vocational Certificate award. In the main, certification is granted in disciplines which parallel to some extent, provision in the Institutes of Technology. The courses are designed, specifically, to provide direct entry into the labour market on completion. However, more and more course design is being structured to cater for progression possibilities and to facilitate lifelong learning. The 'Links Scheme', implemented by the Institutes of Technology since 1994, provided a coherent route into higher education from PLC courses.

The Qualifications (Education and Training) Act, 1999 requires the National Qualifications Authority of Ireland to:

'establish and maintain a framework, being a framework for the development, recognition and award of qualifications in the State based on standards of knowledge skill or competence to be acquired by learners.'

A stated aim of framework design is to foster active citizenship, thereby securing greater social cohesion. All higher education institutes need to widen and deepen participation and achievement in education, especially in higher education, if they are serious about lifelong learning.

A key focus of the development of the framework is the increasing emphasis on lifelong learning. It will be a key issue for the technological sector to facilitate an increasing amount of diverse lifelong learning opportunities being taken up by the learner and this brings many challenges for the sector⁴⁴.

Development of the National Qualifications Framework provides the foundation upon which a lifelong learning culture can grow.

It is important that the Institutes of Technology acknowledge the particular relevance of the Further Education sector. The Institutes must develop greater collaboration and effective partnerships with PLC providers and with FÁS, CERT, Teagasc, BIM and with FETAC if duplication of provision is to be avoided, progression routes opened up and achievement granted appropriate recognition.

There is a history of cooperation, recognition and interaction between the PLC sector and the Institutes of Technology, as exemplified by the 'Links scheme'. This initiative was followed by a level of recognition for the small number of NCVA Level III courses, which developed subsequently. Unfortunately, lack of interaction and cooperation between the two sectors at the course design stage has reduced the transfer dividend somewhat.

⁴⁴ Sean O Foghlú, Chief Executive Officer, The National Qualifications Authority of Ireland.

At a higher level, several Institutes of Technology have entered into recognition agreements with individual PLC providers where Edexcel/BTEC HNC/HND qualifications have been accepted as meeting the entry requirements for 'add-on' National Diploma courses.

Institutes of Technology are significant providers of further education courses. As well as cooperating with the PLC sector, the Institutes have a history of teaching FETAC Level II modules as part of industrial training or retraining activity. A principal access route, namely the achievement of a National Foundation Certificate, is FETAC accredited and there is a tradition of Institute of Technology provision of (craft-based) CERT catering courses and FÁS apprenticeship courses (both of which now receive FETAC Certification).

A vision for the future:

The Institutes of Technology need to articulate a vision, that encompasses the highest possible level of cooperation with the PLC sector. Improved access for students holding FETAC awards to the institutes should be provided. A guaranteed pathway for Level II awardees to a National Certificate/Diploma course or *ab initio* degree programme should be limited only by the availability of places. This is particularly important as the changes encouraged by the Bologna Declaration begin to permeate our systems of education.

Institutes need to cooperate with PLC providers on the further development of Level III awards (to be replaced by Level VI awards on the new National Framework of Qualifications), where overlap will exist with higher education awards. It is necessary that an appropriate access/transfer dimension be incorporated into these awards at design stage.

Awards on the National Framework of Qualifications should be distinguished solely on the basis of credits earned at appropriate levels. At the interface, credits to a pre-determined maximum could be earned for either, or both, higher education or further education. The requirements of the progression course selected determines how many of these credits can count towards a full Higher Education award. Conversely, credits obtained on a National Certificate programme could count towards a further education award; this could provide certificated endorsement of achievement for learners who exit early from higher education courses. The high 'drop-out' rate among third level students, currently at an average of around 40%⁴⁵ in the European Union, is often the result of students embarking upon higher education without any real academic vocation. This proposal would provide for greater permeability and inter-changeability between the further education and higher education sectors, which may help focus, or refocus, student aspirations.

Institutes of Technology should be involved in course design at FETAC Level II and Level III - on a partnership basis - with further education providers in their regions. Courses could then carry guarantees of access, transfer and progression to appropriate (and agreed) levels within the higher education sector.

The Institutes of Technology are encouraged to consider seriously the possibility of closer regional association with FE/PLC colleges - possibly espousing the concept of 'Associated Colleges'. Such liaison would involve formal agreements between FE/PLC colleges and the Institute of Technology in their region, which would guarantee higher education access to PLC graduates. The development of FETAC Level III (and indeed, initiatives in relation to Level II), through the structure of Associated Colleges, would enable an active response to the out-centre

⁴⁵ *The role of the universities in the Europe of Knowledge* (European Commission, Communication , 2003)

'issue'⁴⁶ as well as providing a coherent and direct link to higher education from further education - one which would involve the further education colleges as partners rather than mere participants. The Associated Colleges mechanism could also be used to address the issue of HNDs and UK degrees in FE colleges. Such a development might also provide solutions for counties, such as Meath, where an examination of the effects of not having significant provision of higher education located in the county has been carried out. The county has identified a number of interesting solutions based around further education, and involving other providers cooperating with a range of higher education institutions⁴⁷.

The Links Scheme has served its purpose by providing a route which allowed the admission of students from further education into higher education. However, the course-linking element has proven counter-productive as it limited choice to a single linked course and, as a result, prevented Institutes from admitting students to alternate under-filled courses if the linked course was fully subscribed.

Leaving Certificate applicants are judged solely on the points they gain (irrespective of the subjects followed) and can make up to twenty, often widely unrelated, Degree and Certificate/Diploma choices. This facility must be extended to FETAC Level II applicants.

Other potential areas for cooperation between Institutes of Technology and further education Associated Colleges could include:

- i module /course development
- ii staff training/staff development through the provision of up-skilling, re-skilling and training-of-trainers courses
- iii Information and Communication Technology support and services through the existing Institutes of Technology network (ITnet)
- iv joint Courses – first year FETAC Level III /2nd year National Certificate
- v shared library initiatives, possibly in cooperation with the Local Authority library services with electronic access to OPACs of participating libraries and national interlibrary loan service
- vi using PLC colleges as Institute of Technology outreach centres, thereby widening participation and penetration within regions
- vii assisting with and participating in quality assurance, quality improvement procedures
- viii participating in Academic Councils which would underpin the quality of PLC provision
- ix expanding the industrial liaison service in IoTs to include PLC provision in Associated Colleges in their remit – thus providing economy of scale and a more rounded service to industry
- x Repatriation of awards currently offered by overseas awarding bodies, where appropriate.

⁴⁶ *Technical Working Group on the Review of Outreach Centres of Higher Education Institutions* (Higher Education Authority, 1999)

⁴⁷ *Meath: Strategy for Higher Education – A new approach.* (Farrell Grant Sparks in association with Intinn.ie ; 2002)

Addressing issues of scale

Clustering PLC providers in a region around the local Institute of Technology would produce 'a critical mass' that would go a long way towards overcoming the current limitations on the sector arising from the small scale operation of some individual PLC providers. This economy of scale could lead to better use of limited resources/facilities, while at the same time maintaining the benefits arising from local initiative and relationships.

Sectoral identity and status

Underpinning this would be the recognition of the independence of each PLC college to manage its own affairs, programmes and budgets. This would help maintain the separate identity of the Further Education sector while, at the same time, enhancing its status in the minds of students, parents and prospective employers. Students would have an identity that is clearly separated from second level and the direct link with an Institute of Technology as an Associated College would provide a coherent progression pathway. This would make the PLC sector more attractive to parents and employers. The synergies that could be achieved through cooperative efforts would also provide a powerful response to issues of access, retention completion and lifelong learning.

Interaction with Second Level

All of the Institutes of Technology interact with second level schools to provide information and advice on application and course choice. Admission officers attend career events and interact closely with guidance counsellors. However, there needs to be a much closer relationship between each Institute and its feeder schools. Institutes, through dialogue, should determine what support they could offer their colleagues in second level, particularly in the areas of science and technology. Individual Institutes have developed some worthwhile initiatives that could be replicated usefully throughout the sector. These include:

- special access programmes have been devised in several Institutes for students coming from schools that have been designated as disadvantaged. This involves the development of initiatives aimed at promoting awareness of higher education, such as taster courses and access to Institute facilities.
- some Institutes, in association with the home/school liaison officers, provide taster programmes for the parents of Primary school children to encourage them to promote the benefits of education.
- summer schools and specially targeted programmes such as TAPS (Technology Access Programme for Schools – designed particularly to encourage females into technology) are a feature of many Institutes.
- some Institutes provide technology workshops or work placements for transition-year students
- a number of Institutes offer support for primary school teachers as they attempt to implement the new science section in the primary curriculum
- the Institutes offer fully accredited courses in French, German and Spanish to primary school teachers.

- a number of Institutes offer the use of science laboratories to second level teachers, so that they can cover some of the practical work on the Leaving Certificate syllabus
- Institutes have offered facilities and technical support for in-service training of second level teachers following second level curriculum changes.
- awareness of science has been increased through Institutes hosting seminars such as 'Biology Today'.
- language support programmes - mainly aural and oral - have been designed in one Institute for Leaving Certificate classes.
- teachers' days have been offered in some Institutes to heighten awareness of assistive technology, teaching aids and trends in computing and information technology.
- several institutes collaborated in a 'Discover IT' initiative for transition year students
- one Institute runs a 'Saturday Maths' programme focused on disadvantaged schools at second level.

Recommendations

- 1 The Institutes of Technology need to articulate a vision that encompasses the highest possible level of cooperation with the PLC sector. This should aim to support course development, staff development and quality assurance/quality improvement in further education.
- 2 Institutes of Technology should look seriously at the possibility of closer regional association with PLC colleges through developing the concept of 'Associated Colleges'.
- 3 All FETAC Level II awards (of whatever type) should be accepted as meeting minimum entry requirements. If there is a special entry requirement for a specific subject, this can be satisfied, either as a compulsory element of a Level II course (e.g. mathematical methods, communications, biology, health science etc.) or through prior Leaving Certificate achievement.
- 4 The requirement that Level II courses are linked to specific National Certificates or *ab initio* Diplomas should be removed. Level II, therefore, would be taken as meeting minimum entry requirements.
- 5 The sector should adopt an interim policy whereby NCVA Level II awards with five distinctions would be accepted as meeting the minimum entry requirements for admission onto *ab initio* degree programmes. This policy to be revised in the light of development of the new National Framework of Qualifications.
- 6 Institutes need to review the support they can offer the second level sector, particularly in the areas of mathematics and science so that together they can begin to address underachievement in these disciplines at Leaving Certificate level.

CHAPTER 6

Contributing to Research and the Knowledge Economy

The Expert Working Group warmly welcomes the commitment of €2.5 billion for research, development and innovation in the National Development Plan⁴⁸. This is the largest allocation ever by any Irish Government and two major programmes are of particular relevance to third level institutions. One is the Programme for Research in Third Level Institutions (PRTLTI) which is managed by the Higher Education Authority and which focuses on financial support for world-class strategic research identified by third level institutions. The second programme is managed by Science Foundation Ireland (SFI), which Government has mandated to concentrate on funding basic research in the priority areas of Information and Communications Technology (ICT) and Biotechnology. Science Foundation Ireland's main function is the development of world-class research in Ireland in these priority areas, which may be extended in the future into other research areas. World-class research centres for science and engineering technology are being developed by SFI in our third level institutions in collaboration with leading high technology companies. Both programmes will involve expenditure of over €1.2 billion during the lifetime of the National Development Plan. As discussed later in this section, the Institutes of Technology have endeavoured to the best of their abilities to play an active role in these programmes, in collaboration with each other and with universities. The degree of success achieved by Institute of Technology staff in these highly competitive programmes is significant, when measured against high teaching loads and a relative deficit of research infrastructure in the Institutes of Technology.

The Group accepts that strategic research resources in Ireland should be concentrated in a relatively small number of targeted priority areas in world-class centres of excellence.

However, the success of staff in Institutes of Technology in winning research funds through SFI, PRTLTI, the Technological Sector Research Programme, Enterprise Ireland Innovation Partnership Programme and European Research Programmes has amounted to a capitalisation of the energies of Institutes of Technology to contribute near to market research, technology transfer and a deepening of the research, development and innovation culture within the Institutes. If investment in research, development and innovation in the Institutes of Technology is not continued and enhanced there is a significant risk of losing the rich capital of research experience they have striven so hard to accumulate. The success of the Institutes of Technology in these areas over the past thirty years, despite infrastructural deficits and shortness of funds, reflects the developmental capacity available in the Institutes.

The Government, in the National Development Plan, accepted that there is a strong link between investment in the research and innovation base of the economy and sustained economic growth. It also recognised that research is a core element of the mission of higher education. The extent to which higher education institutions are engaged in research and development activities has a key role in determining the status of these institutions and the contribution that they make to economic and social development.

Dorgan (2003)⁴⁹ emphasised the importance of research and development when he stated 'we must continue to invest strongly in research, in a coherent national effort, to deepen our

⁴⁸ *Ireland – National Development plan 2000 – 2006* (Government of Ireland, Dublin: The Stationery Office)

⁴⁹ Dorgan, Sean (Chief Executive Officer, IDA). *Economic Prospects in Ireland Post Celtic Tiger*. (Paper given at the Colmcille Winter School, March 2003)

human capital and advance knowledge as our most sustainable future competitive advantage'. Likewise, Thornhill (2003)⁵⁰ also advocating more research and development investment quotes from the world competitiveness report 'Ireland which has been tremendously successful in attracting foreign investment from manufacturing now faces the need to justify higher wages and higher local costs without yet having developed a world-class innovation structure.'

The Expert Working Group notes that core-funding, as an element of the recurrent budget, and unlike the situation in universities, is not available for research in the Institutes. The Expert Working Group strongly believes that, in order to deliver on the aforementioned benefits, particularly in terms of regional development, this needs to be addressed by Government as a matter of urgency.

Section 5 (1) (c) of the Regional Technical Colleges Act, 1992, provides for institutes to:

'engage in research, consultancy and development work and to provide such services in relation to these matters as the governing body of the college considers appropriate.'

Research, consultancy and development, in the Act are not simply optional or desirable activities in the Institutes of Technology, they are core functions under this Section.

Innovation is at the heart of productivity growth and social gain. National and Regional competitiveness is related to the capacity to transfer the potential of technological discoveries into innovation with products, processes, services and systems. Ireland, in recent years, has led developed countries in productivity growth. However, this was based, to a considerable extent, on research and innovation carried out elsewhere. Sustaining competitiveness demands a new analysis, a deepening of indigenous development and the full exploitation of the potential of the Irish innovative infrastructure, of which Institutes of Technology form a significant part. Institutes of Technology have invested heavily in the intellectual capital that is their staff. If they are to capitalise on this investment, in the interests of regional and national economic development, then they must be provided with the facilities and resources necessary to deliver on this part of their mission.

Institutes of Technology need to develop their research culture in tandem with their teaching culture. It is axiomatic that research and innovation support and enhance the teaching effort. Good research informs good teaching. The role of research in course development and the advancement of knowledge, in all disciplines, was recognised in the White Paper on education.⁵¹ Such activities help academics keep up-to-date in their subject areas, stimulate new thought and contribute generally to staff development. They can support innovation and competitiveness that will increase productivity growth and social gain at both national and regional levels.

The availability of research opportunities, as an important attractant in recruiting highly qualified staff, cannot be underestimated. By providing research and development opportunities, highly motivated and qualified staff can be attracted to these institutions thus increasing the intellectual capital available to stimulate innovation and economic development, particularly at regional level.

An analysis of the recent achievements of Institutes of Technology in research and development activities points to a growing potential to contribute nationally and regionally and to the need for a clear future strategy to make that potential most effective. While the pursuit of knowledge

⁵⁰ Don Thornhill (HEA Chairman) *Education and the Economy: What Can Business Do?* (Paper given at IBEC meeting in Cork, March 2003)

⁵¹ White paper on Education: *Charting our Educational Future* (Government of Ireland, Dublin: The Stationery Office, 1995)

occurs in an international context, its application has important national and regional economic implications. A future innovation policy for Institutes of Technology will be required to have a balanced view on these contexts, to recognise the diversity of Institutes and to take full account of the importance of the knowledge/innovation dimension of the Irish Spatial Strategy.

The recently published UK White Paper, *The Future of Higher Education*,⁵² laid emphasis on increased research funding and activity, on excellence in research and the importance of collaboration in achieving that excellence. It also stressed the need to support emerging researchers with the potential to progress further. The White Paper further emphasised the importance of knowledge transfer from higher education institutions to commercial life, in close association with Regional Development Agencies and resourced through a Higher Education Innovation Fund.

Examples of Recent Research and Development Activities in Institutes of Technology

The recent research and development related activities in Institutes of Technology have a wide and varied span. The information provided below covers research projects that are the result of success in international and national competitive research programmes. It also includes competitive research programmes specifically for the Institutes and those intended to encourage the development of research capacity; these vary over an interesting range of technologies and incorporate major postgraduate activity; they cover also research programmes in collaboration with industry and involving an element of industry funding. The recent extension of the funding for campus incubation centres builds on the growing experience of Institutes with on-campus business development and their wide experience of partnership with economic life.

Examples of the recent involvements and achievements of the Institutes of Technology in research and innovation is given in the following list (further examples of Institutes' research and innovation programmes are given in appendix 2 - 6):

- **Programme for Research in Third Level Institutions (PRTL):** Five Institutes lead successful research programmes, with resources gained competitively to a total value of almost €14m. These programmes include disciplines such as Biopolymer/Biomolecular Research (Athlone), Environmental Science (Sligo) and Biotechnology/Environmental Research (Carlow). Additionally, eight Institutes are collaborative partners on PRTL funded projects. For example Institute of Technology Tallaght collaborates with Dublin City University in the areas of Biotechnology, Sensor Research and Plasma/Surface Technology.
- **Science Foundation Ireland:** The Telecommunications Software Systems Group (TSSG) located in Waterford Institute of Technology has grown to 42 members – academic staff, full-time research staff, postgraduate students. It is the lead partner, with Cork Institute of Technology and Trinity College Dublin - in a €1m. Science Foundation Ireland project. This project builds on the record of TSSG, which has gained support from EU research projects, Enterprise Ireland and the Higher Education Authority.
- **Technological Sector Research Programme:** Under the National Development Plan Institutes have secured, to date (in a competitive process), €24m from the three strands of the Technological Sector Research Programme. These strands are (i) Post-Graduate R and D Skills Development (ii) the Enterprise Platform Programme and (iii) Core Research Strengths Enhancement Programme.

⁵² *The Future of Higher Education* (Department for Education and Skills, 2003)
<http://www.dfes.gov.uk/highereducation/hstrategy/>

- i through the postgraduate R and D Skills Development programme, some 140 post-graduate research projects valued at €4.55m have been funded from 2000.
- ii under the Core Research Strength Enhancement Programme, 17 projects aimed at developing R and D capabilities are on-going in 9 Institutes of Technology, involving 41 post-graduate and 9 post-doctoral researchers.
- iii the Enterprise Platform Programme is directed to promoting graduate enterprises. Six projects are on-going in Institutes. The programme has supported 135 graduates since 2000.

■ **Enterprise Ireland Innovation Partnership Programme:** In this programme, companies partner Institutes to resolve product or process development issues. Over the period 1999 to 2002 Institutes of Technology have secured €4.26m to which companies add 35-70% of the cost.

■ **TecNet** a joint Institute/Enterprise Ireland initiative seeks to promote inter-institutional research networks.

■ **Business Incubation Centres:** The first incubation centres were opened in border Institute of Technology campuses in the late 1980's to provide commercial R&D and business incubation space. In 2002 the Tánaiste, Mary Harney T.D., allocated €24m for the establishment of nine new on-campus business incubation centres and the expansion of three existing centres.

These examples illustrate the significant and diverse progress made in a sector where legislative under-pinning for a research and development role only came into place as recently as 1993. This progress has occurred in institutions resourced as teaching institutions and which, by and large, in 1993 did not possess the facilities or the administrative framework for research and development activities. If Institutes of Technology are to capitalise fully on their research and innovation potential, then a level of floor funding is essential to build and maintain capacity. A recent article by Feargail Ó Moráin⁵³ of Enterprise Ireland highlighted this

'Ireland must move to base its competitive advantage on its ability to generate and use knowledge – requiring high skills and a vibrant and active research community in industry and the academic system..... for the institutes to play the critical role that they must in regional innovation they should have an enhanced base level of research.'

Future National Policy for Research and Development in Institutes of Technology

The National Board for Science and Technology identified barriers to Research and Consultancy in the sector in 1986⁵⁴. Some of the regulatory impediments were dealt with in the Regional Technical Colleges Act, 1992 and success in competition for national and international research funding has addressed some of the resource issues. However, a number of key impediments, identified in the 1986 report, still remain. These include:

⁵³ Feargail O'Morain (2002) – *Vitamins R & D essential for building the Irish economy*. The Bridge (1) p 12. www TecNet.ie

⁵⁴ *Barriers to Research and Consultancy in the Higher Education Sector – A Discussion Document*, (The National Board for Science and Technology, 1986)

- staff complements and budgets are decided by the Department of Education and Science on a teaching requirement basis only
- Institutes have difficulty obtaining official approval for reduced lecture loads to facilitate research
- Institutes have low staff development budgets
- specialist research laboratory facilities are not provided
- a research staff grade does not exist to foster the development in Institutes of a research career, which could provide a core of qualified personnel around whom competencies and specialisation could be built.

The Group strongly recommends that Government should give a more vital strategic rationale to the research and development role of Institutes of Technology. This role should build on existing strengths and experience and seek to develop enhanced research capacity in the Institutes. The role should be intimately linked to the National Spatial Strategy, giving a necessary knowledge framework to that strategy. A new strategy should also assess, formalise and resource the Institutes role in knowledge and technology transfer.

Recommendations

The new strategy on research and innovation should include the following:

- 1 The linkages established between Institutes of Technology and universities under PRTL1 and SFI in the establishment of 'centres of excellence' in research should be expanded and should be financially encouraged by the relevant funding authorities.
- 2 Because of research infrastructural deficits in Institutes of Technology, relative to universities, some additional forms of competitive funding should be assigned to the Institutes of Technology to redress this imbalance and allow them play a much more active role in collaborative research initiatives.
- 3 Selectivity should characterise the future expansion of research and developmental activities in Institutes, as excellence can be achieved in a limited number of fields. This selectivity should be influenced by capacity, collaboration and a spatial strategy.
- 4 National research programmes should encourage collaborative applications and, particularly in a spatial strategy context, should give resourced encouragement to projects including Institute of Technology partners.
- 5 In each of the development gateways and hubs, where an Institute is the only higher education institution a research, postgraduate and graduate capability should be supported in technological areas agreed with the Development Agencies. This should, where possible, build on an existing capacity or, if capacity is lacking, it should be created, preferably by collaboration between the local Institute and other higher education institutions.
- 6 Capacity building and facility enhancement programmes should be continued in the context of a strategic rationale.
- 7 A research staff grade should be created to foster the development in Institutes of a research career, which could provide a core of qualified personnel around whom competencies and specialisation could be built.

- 8 Procedures should be agreed to facilitate staff of Institutes to up-skill their research capabilities through sabbatical leave procedure similar to those operating in the universities.
- 9 Institutes of Technology, in collaboration with the Development Agencies, should be given a leading role in a knowledge and technology transfer function in their region. This function should be part-resourced through a new Higher Education Innovation Fund.

CHAPTER 7

Developmentally Positioning Institutes of Technology in Higher Education

There is general agreement that the economic development process of the past ten years, i.e. one driven mainly by Direct Foreign Investment (DFI), will not obtain for the next ten years. Future economic success is predicated on developing the indigenous entrepreneurial talents of our people, while still attracting inward investment. Given the fact that Ireland is no longer a low cost economy, future economic growth can only be achieved by moving up the knowledge. In this context, an active, and vibrant higher education sector is an essential prerequisite to deliver continuing economic development.

As Ireland evolves towards a knowledge economy, we require a responsive higher education sector that will produce the required types of graduates, in the required numbers, to sustain our new economic development model.

The development of the higher education sector over the past ten years has been characterised by:

- massification.
- the demands of the economy for skilled personnel across a range of discipline areas.
- the fundamental review of the research function by the state.
- the demand for balance regional growth.
- developments in the international higher education environment.

The Future Policy Framework

The Policy Framework required for higher education must now address the changing context in which provision is made and provide a flexible model, which addresses:

- the world of knowledge
- the European dimension
- the Irish context
- economic imperatives.

It must also be capable of underscoring the relevance and responsiveness of each sector of the higher education system to the diverse contexts in which it exists.

The Requirement for a New Government Policy Statement on Higher Education

In the context of a dynamic and changing future, Institutes of Technology will be constrained in their ability to deliver the types of graduate required by the nation until they have a coherent and responsive government policy for the sector, coupled with the necessary medium to long term planning to give effect to that policy.

Compelling reasons indicating the need for a new government policy in relation to the future operation of higher education in Ireland include:

- 1 the major demographic change affecting higher education intake.
- 2 the National Spatial Strategy and economic development.
- 3 the expansion of the European Union.
- 4 Ireland's dependence on changing technology.
- 5 commodification of education in the context of the European Higher Education Area and the global competitiveness of European higher education.
- 6 the requirement that a small open economy be served by a higher education system that is characterised in international comparison by excellence, relevance, creativity and diversity.

Such a policy statement, while respecting the autonomy of higher education institutions, should outline a direction for change and give a framework of national priorities.

A new Government Policy Statement on Higher Education should include the following:

- acknowledgement of the importance of safeguarding the traditional aims of higher education i.e. the full development of the individual, independent enquiry and the pursuit of knowledge
- set out the responsibility on all higher education institutions, which are publicly funded, to respond to the changing needs of society by maintaining the relevance of their programmes to the occupational and skill needs of the economy. This in turn should be matched by a commitment from Government that public resource allocation would favour institutional plans/strategies supportive of identified national priorities
- endorse the level of institutional autonomy required to provide the freedom to innovate and to use resources flexibly, albeit within a framework of democratic accountability
- measures and formats to promote wider access and increase participation and retention of school-leavers, disadvantaged groups and adult learners
- a commitment by Government to provide mechanisms which will give effect to the aspirations of the National Qualifications Authority, transforming its themes of quality, relevance, access, transfer and progression into reality. Institutes of Technology, because of the diversity of award levels and varied delivery mechanisms they provide, are major players and should be facilitated in further promoting continuing education, up-skilling the workforce and addressing lifelong learning issues
- policy initiatives for the entire higher education sector designed to support and maintain a diversity of provision. In this regard Government policy should respond in a way that the nature of higher education provision can be matched with future economic and social development plans at national and regional levels. This policy should underscore:

- i the achievement of a balance of opportunity and provision through consultation among all higher education institutions⁵⁵
- ii the maintenance of a diversity of levels, types and variety of programmes
- iii the provision of mechanisms for incentivising targeted provision
- iv the objectives of achieving balanced regional development through maintaining and enhancing the potential of Institutes of Technology to be important hubs and gateways of knowledge and, thus, engines of new economic activity within the communities they serve
- v a commitment to encouraging, supporting and resourcing cooperation through networks and alliances between higher education institutions in areas such as:
 - current programme provision
 - new forms of course delivery
 - sharing of academic resources
 - sharing of physical resources
 - research
 - services to industry and business

Major thrusts of such inter-institutional co-operation would be to:

- i maximise access to and ensure viability of courses
- ii avoid duplication of provision that would adversely affect institutions' competitiveness
- iii create critical mass necessary to engage in competitive research
- iv develop over time, a seamless higher education system permeable to students at all levels. This should be less dependent on institutional diversity than on diversity of provision, brought about through diverse missions and strategies enunciated by individual institutions.

Response from the Institutes of Technologies

In response to such a policy framework, institutions in the sector should have the scope through articulation of their missions, strategies and core values to position themselves in a manner most suited to their particular circumstances and regional contexts. These circumstances include:

- 1 the size of institutions and scale of provision by discipline and level
- 2 their location, with particular reference to:
 - i National Spatial Strategy proposals
 - ii the presence of an University in the same city
 - iii the three Institutes in Dublin

⁵⁵ Sean Dorgan (Chief Executive Officer, IDA Ireland) suggests that there is a case for asking universities to concentrate **more** of their available resources at fourth level (i.e. postgraduate), giving the Institutes of Technology more of the third level space. While he believes it would be a mistake for the Institutes of Technology to cater only for undergraduates, he feels that such a re-balancing would build on existing strengths in both sets of institutions. In *Economic Prospects in Ireland Post Celtic Tiger* (Paper given at the Colmcille Winter School, March 2003)

Institutes need the flexibility to sense change and to develop the capacity to respond to that change. A narrow interpretation of their role will seriously constrain this 'sense and respond' capacity. The potential dividends from the clear articulation of a new Government policy and philosophy towards higher education would include:

- a greater flexibility of institutional response to national and regional needs
- a greater responsiveness to the National Spatial Strategy
- improved access and completion
- a creative, proactive response to life-long learning issues
- better value for money, avoidance of waste, minimisation of duplication, rationalisation of provision
- sustaining a viable higher education capacity in less developed regions, which is promotional of local development
- an enhanced ability to compete nationally and internationally
- more strategic contribution to regional economic development, innovation and technology transfer
- a more finessed response to the higher educational requirement of 21st century Ireland, leading to a more richly differentiated higher educational system
- parity of esteem between sectors and greater personal fulfilment on the part of the learner and the educator
- retention of high quality staff – the life-blood of quality institutes

Response from Business/Industry

A characteristic common to multi-national and indigenous companies in recent years has been the requirement for higher-level skills in the workplace. New access models and modular approaches to curriculum development, which facilitate those already in employment to address their lifelong learning needs, will need to become part of every Institute's mainstream programme. Such developments will involve formal industrial placements, accreditation of work-based learning and the recognition of experiential learning. The success of new initiatives in these areas will require close interaction between Institute staff and their colleagues in business and industry in order to generate of the necessary synergy and to provide the clear link to productivity and performance, which will reposition learning as a strategic imperative for the companies. Industry and business should not see itself merely as a customer of higher education but as an active partner contributing to the process. In a recent address to IBEC, the Chairman of the HEA, Dr Don Thornhill⁵⁶, highlighted the need for more constructive relationships between business and education at all levels. He identified a number of areas of practical co-operation including:

- a voluntary code of conduct between employer and educational organisations for the employment of students

⁵⁶ Don Thornhill (HEA Chairman) *Education and the Economy: What Can Business Do?* (IBEC meeting in Cork, March 2003)

- a national 'best practice' framework agreed by employers in respect of employees participating in continuing education
- the institution of a fellowship scheme to facilitate science teachers at second level gain direct experience in industry
- a coordinated scheme at either sectoral or regional level to secure work-experience job placements for students

The Expert Working Group is supportive of these proposals and recommends that dialogue should begin between the Institutes and representatives of business/industry with a view to their possible implementation on a voluntary basis. The existing joint IBEC/Institute of Technology consultative group might address the proposals, in the first instance.

Process

With the impending change to HEA designation, a window of opportunity exists to make the necessary legislative changes to underpin a clear policy for the sector.

What is clear is that a "one size fits all" solution will not be adequate. As the views of the Institutes of Technology are essential to the framing of such a policy, a process of consultation between the Institutes, Higher Education Authority and the Department of Education and Science should be entered into as soon as possible.

Recommendations

- 1 The Government define adequately and authoritatively the separate strategic roles of the different components that make up higher education and do so in a manner that accords parity of esteem to each element of the system.
- 2 In response to such a policy framework, Institutes of Technology should, through articulation of their missions, strategies and core values, position themselves in a manner most suited to their particular circumstances.
- 3 The mission of each Institute of Technology must be rooted in the context of delivering diversity and flexibility in higher education and must resonate with the context of its regional location.

CHAPTER 8

Establishing Future Structures for Institutes of Technology

Future Role of Institutes of Technology

Despite strong policy commitments by successive Governments to maintain diversity of provision in higher education, experience in Ireland and elsewhere shows that, where you have a higher education system containing diverse institutional types, there is a built-in dynamic fuelled by institutional ambition to move towards a unitary system which aspires to the priorities, values and practices found in the university sector. The lack of a university 'label' is seen as a major disadvantage for Institutes of Technology seeking to recruit students or compete for research funds on the international market.

Consultation with the Directors of Institutes of Technology confirmed the view of the Expert Working Group that the separate mission and focus of the Institutes should be maintained to ensure a complementary provision to that of the universities. The Expert Working Group is of the view that, while changing the titles of Institutes to universities may confer on them a perceived status, if such a change also implies a unification of roles with those of the universities, competition and market forces would ensure that many of them would be perceived as 'second division'. The lack of social esteem enjoyed by the Institutes, compared to the universities (confirmed in consultations with the Careers Guidance Association), is largely based on poor public perception of the meaning and value of binary provision. However, the poor perception of the sector is, to some extent, associated with a generally poor perception among school leavers of careers in industry. This was highlighted in the American Chamber of Commerce Ireland report (2001)⁵⁷ where they state

'this report recommends that the industry⁵⁸ needs to seriously and rapidly address the issues of the negative perception of careers in the sector.'

Institutes of Technology must continue to affirm that higher education is not only for the best and most gifted students; that excellence can be achieved through the quality of graduate output rather than the criteria adopted for intake; that those with moderate prior educational attainment can excel provided they can enrol on courses designed to meet their particular needs and flexible enough to cater for their diverse aptitudes and aspirations. A major challenge facing the Institutes of Technology is to convince Government, policymakers and the general public of their unique role, importance and standing within the Irish higher education system. The parity of social esteem with universities, so often referred to in public pronouncements, will be a reality only when the 'equal but different' roles of these institutions are understood and recognised by state agencies, the employers and the general public.

Structural Issues

The rich diversity, fundamental to the effectiveness of higher education, can best be safeguarded by ensuring diversity of provision rather than compelling institutional differentiation through artificial sectoral distinction. There is not only a blurring of boundaries between sectors in higher education but also a differentiation within the Institute of Technology sector, largely as a result of

⁵⁷ Gaffney, Maureen (2001) *Industry Supporting Innovation in Education in Science and Technology Future Proofing the Irish Economy*. American Chamber of Commerce Ireland.

⁵⁸ i.e. the science, engineering and technology sector.

the location and/or the regional focus of each Institute. It is the view of the Expert Working Group that a top-down approach, which attempts to maintain sectoral rigidity by continuing to prescribe structures and limitations on Institutes, is inappropriate. Rather, a system that encourages each institution to develop a unique mission and strategic approach relevant to its regional context and national priorities, and in keeping with accountability criteria laid down by the State, should be adopted. Once the government lays down a framework for the maintenance of diversity of provision in higher education, Institutes of Technology, in delivering on their mission, will have to decide how best to position themselves. This may take the form of an individual institute seeking to establish its unique identity; two or more institutes associating to achieve a synergy in their activities; or two or more institutions deciding to merge/amalgamate in order to better address a regional mission. There is a range of options available, these include, but are not limited to:

- retention of the Institute of Technology designation under new legislation, which provides for the autonomy necessary to respond to regional, national and international challenges and opportunities
- the creation of a National Technological University with some or all of the Institutes of Technology being constituent colleges
- designation of the Institutes of Technology as University Institutes of Technology (The term university is a controlled description under Section 52 of the Universities Act, 1997)
- encouraging individual Institutes to seek constituent/recognised college status of existing universities (This is provided for in Section 8 of the Universities Act, 1997)
- examination of a case for separate university status following application under the Universities Act (This is provided for under section 9 of the Universities Act, 1997)

Having consulted widely, both nationally and internationally, the Expert Working Group is satisfied that there is no single solution that would accommodate the different regional dynamics facing each Institute. Whatever future structures may emerge, they will require underpinning by new legislation that must, at a minimum, provide a greater degree of autonomy for the Institutes. Dr Daniel O'Hare (2001)⁵⁹ identified autonomy in Institutes of Technology as a key requirement to promote innovation and an enterprise environment, to allow Institutes use their resources flexibly and to devise innovative solutions to problems. He recommended:

'to the Government I suggest that a new legislative framework for Institutes of Technology would be a fast and cost effective way of unlocking the untapped potential that is languishing now.'

New Legislation for the Institutes of Technology

Any new legislation should impart parity of treatment to both sectors of higher education. In order to free Institutes to deliver on their missions, changes and additions to current legislation covering the following areas are required:

- the objects of an Institute of Technology
- the functions (including awarding powers)

⁵⁹ O'Hare, D. Whither Technological Education. Presentation at the 5th Annual Colloquium of Technological Sector Institutions, Change and Challenge for the Technological Sector. (Cork, 2001)

- academic freedom
- governance

These are amplified below:

The Objects of an Institute of Technology shall include:

- 1 to advance knowledge through teaching, scholarly research and scientific investigation,
- 2 to promote learning in its student body and in society generally,
- 3 to promote the cultural and social life of society, while fostering and respecting the diversity of the institute's traditions,
- 4 to foster the capacity for independent critical thinking among its students,
- 5 to promote the official languages of the State, with special regard to the preservation, promotion and use of the Irish language and the preservation and promotion of the distinctive cultures of Ireland,
- 6 to support and contribute to the realisation of national economic and social development,
- 7 to educate, train and retrain technical, administrative and professional personnel as well as addressing the continuing education and lifelong learning needs of the community, higher level professional, technical and managerial personnel,
- 8 to promote the highest standards in, and quality of, teaching, assessment, curriculum development and research,
- 9 to disseminate the outcomes of its research in the general community,
- 10 to promote equality of opportunity among students and employees

The Functions of an Institute of Technology

- 1 The functions of an institute are to do all things necessary or expedient in accordance with this Act to further the objects and development of the Institute
- 2 (1) Without limiting the generality of (1) above, an Institute
 - a Shall provide vocational and technical education and training for the economic, technological, scientific, commercial, industrial, social and cultural development of the State with particular reference to the region served by the Institute and, without prejudice to the generality of the foregoing, the Institute shall have the following functions -
 - b to provide such courses of study as the Governing Body considers appropriate,
 - c to confer, grant, or give diplomas, certificates or other educational awards, excluding degrees other than degrees provided for by order under subsection (2) (a),
 - d shall, subject to the Qualifications (Education and Training) Act, 1999 provide courses of study; conduct examinations and award degrees and other qualifications,

(Note: The review process for delegated authority could be adapted as the mechanism triggering a Ministerial order for full degree awarding powers based on Institutional maturity, size, diversity of provision, achievement of mission, etc. Full, but graduated, authority for awards would be possible under this arrangement. However, every Institute would be permitted, by law, to award at Levels 6 and 7 of the National Qualifications Framework – without further review.)

- e to enter into arrangements with the Higher Education and Training Awards Council, the Further Education and Training Awards Council, with the Dublin Institute of Technology, with any university in the State or with any other authority approved by the National Qualifications Authority from time to time for the purpose of having degrees, diplomas, certificates or other educational awards conferred, granted or given,
- f shall promote and facilitate and engage in research, development, innovation and consultancy work,
- g may establish by incorporation in the State or elsewhere, or participate in the establishment of, such trading, research or other corporations as it thinks fit for the purpose of promoting or assisting, or in connections with the functions of, the Institute,
- h may collaborate with educational, business, professional, trade union, Irish language, culture, artistic, community and other interests, both inside and outside the State, to further the objects of the Institute,
- i may collaborate with graduates, convocations of graduates and with associations representing graduates of the Institute, both inside and outside the State,
- j shall maintain, manage and administer, and invest all the money and assets of the Institute,
- k may purchase or otherwise acquire, hold and dispose of land or other property and
- l may accept gifts of money, land or other property on trusts and conditions, if any, not in conflict with this Act, specified by the donor.

(2) a. The Institute shall have such other functions, which may include the function of conferring degrees, postgraduate degrees and honorary awards as may be assigned to it from time to time, by order made by the Minister with the concurrence of the Minister for Finance.

Academic Freedom

Academic freedom is fundamental to higher education. Surprisingly, there is no provision for this in the RTCs Act. The only acknowledgement of academic freedom is a phrase in some teaching contracts that *'The Institute recognises that the principle of academic freedom is essential for the achievement of the Institute's functions.'*

Any new Act should replicate the provisions of the universities Act in this regard; the following Section detailing the rights and responsibilities of Institutes of Technology in performing their functions should be included.

An Institute, in performing its functions shall -

- (a) have the right and responsibility to preserve and promote the traditional principles of academic freedom in the conduct of its internal and external affairs, and
- (b) be entitled to regulate its affairs in accordance with its independent ethos and traditions and the traditional principles of academic freedom, and in doing so it shall have regard to -

- (i) the promotion and preservation of equality of opportunity and access,
- (ii) the effective and efficient use of resources, and
- (iii) its obligations as to public accountability,

and if, in the interpretation of this Act, there is a doubt regarding the meaning of any provision, a construction that would promote that ethos and those traditions and principles shall be preferred to a construction that would not so promote.

- (2) A member of the academic staff of an Institute shall have the freedom, within the law, in his or her teaching, research and any other activities either in or outside the Institute, to question and test received wisdom, to put forward new ideas and to state controversial or unpopular opinions and shall not be disadvantaged, or subject to less favourable treatment by the Institute, for the exercise of that freedom.

Governance

The RTC Acts (1992 and 1994) established each Institute as an autonomous legal entity conferring on each college a Governing Body, a Director and Academic Council. It is vital that Ireland's Higher Education Institutions' governing arrangements operate in accordance with best national and international practice.

The Expert Working Group notes the differences in the functions ascribed to the Governing Body, Chief Officer and Chairperson of Universities in the University Act of 1997 (the last time the Oireachtas visited these issues) compared to the RTC Acts. Difficulties have arisen and have been reported on in relation to the functions of the Director, Governing Body and the Chairperson.⁶⁰

There is a need to reconcile the functions of the Governing Body and the functions of the Director as set out in the RTC Acts to minimise overlap and to create discreet and transparent areas of authority and accountability. The University Act is significantly clearer in relation to the respective functions.

Recommendations

- 1 Institutes of Technology should, through improved internal and external communications, vigorously promote the sector and the individual Institutes to the community, to potential students, to industry and to funding agencies.
- 2 There is a compelling need for a new Institution of Technology Act that provides for greater autonomy in the Institutes and details the objects and functions of the Institutes.
- 3 Institutes should be granted awarding powers on a basis similar to that given to the Dublin Institute of Technology in the Dublin Institute of Technology Act, 1992.
- 4 Diversity should be preserved through responsive institutions being able to address identified needs and gaps, rather than through a rigid distinction between institutional providers.
- 5 Institutions, in delivering on their mission will have to decide how best to position themselves – individual Institutes may seek to establish a unique identity, others may decide to deliver on their mission through alliance, association or merger.

⁶⁰ *Report on Letterkenny Regional Technical College.* (Dr. Miriam Hederman O'Brien, Dublin: The Stationery Office, July 1994)

- 6 In relation to the functions of the Governing Body (Section 7 (1) (a) RTC Acts), it is recommended that the relevant section from the University Act 1997 (18.1(a)) provides the most appropriate benchmark and should be adopted in changes to current legislation.
- 7 In relation to the appointment of a Chairperson of the Governing Body, it is recommended that the provision in the Universities Act 1997 (Section 17 (3)), which precludes an employee of the university or a member of the governing authority being appointed Chairperson, be adopted in the new legislation.
- 8 It is recommended that consideration be given to an arrangement whereby an Institute submits a short list of names to the Minister for Education & Science for appointment of Chairperson.
- 9 In relation to the functions of the Director, the fourth schedule (Section 1 - 5 inclusive) of the Universities Act should replace the third schedule in the RTCs Acts.

APPENDIX 1

The Regions

Region	Counties	Population (2002)
Border		432,366
	Cavan	56,416
	Donegal	137,383
	Leitrim	25,815
	Louth	101,802
	Monaghan	52,772
	Sligo	58,178
Mid East		297,934
	Kildare	163,995
	Meath	133,939
	Wicklow	114,719
Midland		225,588
	Laois	58,732
	Longford	31,127
	Offaly	63,702
	West Meath	72,027
Dublin		112,2600
Mid West		339,930
	Clare	103,333
	Limerick	175,529
	Tipperary NR	61,068
South East		423,540
	Carlow	45,845
	Kilkenny	80,421
	Tipperary SR	79,213
	Waterford	101,518
	Wexford	116,543
South West		580,650
	Cork	448,181
	Kerry	132,424
West		380,057
	Galway	208,826
	Mayo	117,428
	Roscommon	53,803

APPENDIX 2

On-campus Business Incubation Centres

	Institute	Existing Facility	Enterprise Ireland Funding
1	Dundalk	Yes	Yes
2	Waterford	No	Yes
3	Letterkenny	Yes	No
4	Sligo	Yes	No
5	Galway/Mayo	No	Yes (Galway and Castlebar campuses)
6	Athlone	No	Yes
7	Tallaght	No	Yes
8	Blanchardstown	No	Yes
9	Dun Laoghaire	No	Yes
10	Cork	No	Yes
11	Tralelee	Yes	Yes
12	Limerick	No	No – applying 2003
13	Carlow	No	Yes

APPENDIX 3

Successful PRTL I Programmes lead by Institutes of Technology

	Lead Institute	Collaborating Institutions	Project	Value
Cycle 1	Athlone	NUIG, UU Coleraine	Centre for Biopolymer & Biomolecular Research (CBBR)	€2.25m
	Carlow		Biotechnology & Environmental Research Programme	€1.20m
Cycle 2	Cork	UCC, NUIG	Environmental Science Programme – Ecotoxicology, Waste Reduction, Air Pollution	€2.40m
	Sligo	UL, UCD, NUIG, LIT, Teagasc	Environmental Science – Sustainable Treatment & Recycling	€0.64m
Cycle 3	Sligo	TCD, UL	Environmental Science – Centre for Sustainability	€2.54m
	Waterford	CIT	Smart Space Management	€4.95m
			Total	€13.98m

APPENDIX 4

Institutes as Collaborative Partners in Successful PRTL I Programmes

Collaborating Institute	Cycle	Projects	Lead Institutions
Tallaght	Cycles 1 & 3 (3 programmes)	Sensor Research, Plasma Technology, National Institute for Biotechnology	DCU
Galway/Mayo	Cycles 1 & 2	Biomedical Engineering, National Institute for Regional and Spatial Analysis.	NUIG, NUIM
Athlone	Cycles 1,2 & 3	Biomedical Engineering, Environmental Change.	NUIG
Sligo	Cycles 1,2 & 3	Biomedical Engineering, National Institute for Regional and Spatial Analysis.	NUIG, NUIM
Cork	Cycles 1,2 & 3 (4 programmes)	Nanofabrication Technology, Environmental Research, Eco-electronics, Smart Space Management.	UCC, WIT
Waterford	Cycles 1,2 & 3	Materials and Surface Science, National Institute for Regional and Spatial Analysis,	UL, NUIM
Tralee	Cycles 2 & 3	Environmental Research	UCC
Carlow	Cycles 2 & 3	Environmental Research	UCC

APPENDIX 5

Technological Sector Research 2000-2006 Strand I – Postgraduate R&D Skills Development

Number of Approvals per Institute 2000-2002

Institute	2000	2001	2002	Total
Athlone	3	2	3	8
Blanchardstown	2	2	2	6
Carlow	4	3	2	9
Cork	5	12	6	23
Dundalk	1	3	2	6
Dun Laoghaire	0	1	2	3
Galway/Mayo	5	2	5	12
Letterkenny	0	0	1	1
Limerick	1	5	6	12
Sligo	2	1	2	5
Tallaght	7	9	15	31
Tralee	1	5	3	9
Waterford	3	10	11	24
Total	34	55	60	149

APPENDIX 6

Institutes of Technology: Centres of Expertise

1.	Waterford	<p>School of Business: Quality Management Research Group Centre for Economic and Social Research Centre for Marketing Studies Centre for Management Research in Healthcare Intra and inter-organisational Research Group</p> <p>School of Humanities: Centre for Social Care Research Research Centre for Health Promotion</p> <p>School of Engineering: Centre for Intelligent Manufacturing Technology Electronics Research Group Flexible Wireless Research Group Materials Research Group.</p> <p>School of Science: Telecommunications Software Systems Group (TSSG) Surface Science Research Centre Centre for Optoelectronics Separation Science Research Centre Mathematical Sciences Group</p>
2.	Athlone	<p>Engineering - Polymer engineering Centre for Biopolymer and Biomolecular Research, electronic engineering, digital signal processing, image processing, neural computing and software engineering. Science cell and molecular toxicology, ecotoxicology, separation and analytical technology. BioServ Ltd.</p>
3.	Sligo	<p>Centre for Sustainability (Includes Environmental monitoring and analysis, Biosolids Research Programme) Engineering Group Health Care Group</p>
4.	Carlow	<p>Biotechnology and Environmental Science</p>
5.	Tallaght	<p>Pharmaceutical Research and Development Group, National Pharmaceutical Education and Training Centre, Advanced Smart Materials</p>

6.	Galway Mayo	Product Design ICT Marine Biology and Natural Resources Energy Enterprise Development
7.	Limerick	Irish National Software Ergonomics Research Centre Midwest Bioanalysis Research Centre Envirosense Research Centre Centre for Industrial Control Networks (CICN) Centre for Research in Electrochemically Novel Technologies (CURRENT) Knit Technology Centre (KTC)
8.	Dundalk	Software Technology Research Centre (STORC) Centre for Entrepreneurship Research Centre for Borderlands Studies Centre for Electoral Studies Centre for Medical Imaging and Bionumerics
9.	Cork	Mass Spectrometry Research Centre for Proteomics and Bio toxins Adaptive Wireless Systems Group Scanning Probe Microscopy and Surface Analysis Laboratory Molecular Diagnostics and Cell Biology Unit: Advanced Control Group Air Pollution Monitoring and Space Research Group Energy Engineering Group Clean Technology Centre
10.	Tralee	Centre for Information and Communications Technologies Centre for Rural Extension Centre for Natural Resources ShaPE Centre Tourism Cultural Studies

