



Working Paper No. 198

May 2007

## “Man Enough To Do It”? Girls and Non-Traditional Subjects in Lower Secondary Education

**Emer Smyth\* and Merike Darmody**

Subsequently published in "[Man Enough to do it? Girls and Non-traditional Subjects in Lower Secondary Education](#)", *Gender and Education*, Vol. 21, No. 3, May 2009, <http://dx.doi.org/10.1080/09540250802415124>, Published Online 15 October 2008

*Abstract.* This article examines the processes influencing the choice of non-traditional subjects by girls in lower secondary education in the Republic of Ireland. In particular, we focus on the traditionally ‘male’ technological subjects, namely, Materials Technology (Wood), Metalwork and Technical Graphics. Analyses are based on detailed case-studies of twelve secondary schools, placing them in the context of national patterns of subject take-up. Strong gender differentiation persists in the take-up of these technological subjects. Commonalities are evident across schools in the way in which the subjects are constructed as ‘male’. However, some students, both female and male, actively contest these labels, and school policy and practice regarding subject provision and choice can make a difference to take-up patterns. It is argued that the persistent gendering of subjects has implications for the skills acquired by students, their engagement in education, and the education, training and career opportunities open to them on leaving school.

\*Corresponding Author: [emer.smyth@esri.ie](mailto:emer.smyth@esri.ie)

*Keywords:* Gender; subject choice; stereotyping; lower secondary education.

*Acknowledgements:* The authors would like to thank the Gender Equality Unit of the Department of Education and Science in Ireland for funding the research project upon which this paper draws. The Gender Equality Unit was established under the National Development Plan (2000-2006) and co-funded by European Structural Funds. We are also grateful to the State Examinations Commission for access to anonymised exam data.

ESRI working papers represent un-refereed work-in-progress by members who are solely responsible for the content and any views expressed therein. Any comments on these papers will be welcome and should be sent to the author(s) by email. Papers may be downloaded for personal use only.

# **“Man Enough To Do It”? Girls and Non-Traditional Subjects in Lower Secondary Education**

## **Introduction**

Gender differences in subject take-up within secondary education remain evident across Western societies. Research on subject choice patterns has tended to focus on the impact of individual attitudinal factors and on gender stereotyping within the broader society (see, for example, Eccles, 1994). However, the extent to which schools contribute to gender differentiation in subject selection has not generally been well understood. This article focuses on the take-up of the predominantly ‘male’ technological subjects (namely, Materials Technology (Wood), Metalwork and Technical Graphics) within lower secondary education in the Republic of Ireland. It seeks to examine the role of school provision, school policy and student choice in shaping gender differences in the take-up of technological subjects. It draws on detailed case-studies of twelve secondary schools, with varying proportions of female students taking such subjects, exploring student perceptions and experiences along with the perspectives of school principals, guidance counsellors and teachers. The article addresses three key research questions:

- (i) What types of schools provide technological subjects and why do they (not) do so?
- (ii) What are the main school and student characteristics influencing girls’ decision (not) to take technological subjects?
- (iii) To what extent do schools contribute to the gendering of technological subjects, and does this process differ between coeducational and single-sex settings?

Ireland represents a useful example for the exploration of subject choice processes because secondary schools have a certain degree of discretion in deciding which subjects to provide and in how to structure the choice process for students. As a result, the timing and degree of subject choice open to students varies from school to school; in some schools, students are required to select their subjects on entry to secondary

education while, in other cases, students may 'try out' all subjects for part or all of first year before making a final selection (Smyth, McCoy & Darmody, 2004). Because the three-year lower secondary curriculum is relatively broad, with students typically taking ten or eleven examination subjects, students are not required to specialise in certain subject areas so may, at least in theory, take one or more technological subjects in tandem with humanities and science subjects.

The low representation of girls in technological subjects has significant implications for their schooling career and subsequent pathways. By not taking technological subjects, girls may miss out on developing a range of technological and design-based skills, which are relevant for later life. Previous Irish research has indicated that technological subjects can provide a path to achievement for less academically oriented students (Hannan, Ó Riain, 1993). The low take-up of these subjects among girls means that, with the exception of Home Economics, girls possessing more practically-based skills and competencies have few outlets for this orientation and may achieve lower exam grades as a result. There are strong connections between the subjects taken at lower secondary level and those taken at upper secondary level (Millar & Kelly, 1999). Thus, the selection of subjects within lower secondary education can act as a gateway to subsequent educational and career opportunities. The extremely low representation of young women within craft apprenticeships nationally (making up just 0.5 per cent of qualifying apprentices in 2004) must be seen, at least in part, as due to the low numbers of girls taking related subjects (such as Materials Technology (Wood)) within the school system.

The following section of the article places this study in the context of previous research on gender and subject choice while section three describes the methodology used in the study. Section four examines patterns of provision and take-up of the technological subjects across secondary schools in the Republic of Ireland while section five explores the way in which gender differences in subject take-up are produced and reproduced within the school setting. While focusing on the Irish context, the analyses have wider implications for our understanding of the processes shaping the take-up of 'non-traditional' subjects.

## **Gender and subject choice**

### *What informs subject choice?*

A good deal of research on subject choice has focused on the individual factors which shape educational decision-making. Thus, from the point of view of approaches such as expectancy-value theory, students are more likely to take subjects that they see as interesting and/or useful (for further study or employment) and ones in which they expect to achieve higher grades (Eccles, 1994; Stokking, 2000). Within this framework, gender differences in subject take-up are viewed as reflecting differences between male and female students in their level of interest and (perceived) abilities in certain subject areas. Perceptions of subjects in terms of interest and usefulness have, indeed, emerged as key factors in student choice across different national contexts (see, for example, Kelly, 1988; Smyth & Hannan, 2002). However, these individual-level theories tend to focus on the proximate causes of gender segregation in course choice, with the development of student interests and ‘abilities’ not generally forming the basis for investigation. Differences then are attributed to processes of gender role socialisation within the wider society or, more rarely, to ‘innate’ biological differences in spatial and mathematical abilities (for a discussion of the recent resurgence of biologically-based explanations, see Kaplan & Rogers, 2003).

While approaches such as expectancy-value theory do provide some insights into the impact of student attitudes on course take-up, they do not enable us to unpack the complex ways in which certain subject areas become gendered. Gender stereotypes regarding subject areas (and related occupations) are evident even among young children, with children developing stereotyped notions of ‘male’ and ‘female’ from what they see and hear around them and attempting to behave in ways consistent with these conceptions (see, for example, Bussey & Bandura, 1999). Gender identities also shape, and are shaped by, the occupational division of labour, with assumptions regarding the gender of job occupants often built into the labour process from the outset (Scott, 1994; Rubery & Fagan, 1995). Segregation in the types of jobs held by women and men and segregation in the types of subjects or courses taken by girls and boys are interconnected. Cross-national research indicates that countries with higher levels of educational segregation by gender tend to have higher levels of occupational

segregation in the labour market (Buchmann & Charles, 1995; Smyth, 2005). Subject choice will thus be influenced not only by cultural stereotypes regarding ‘male’ and ‘female’ jobs but by actual patterns within the workforce and students’ expectations about what jobs will be open to them on leaving school (Gaskell, 1984). As a result, strongly gendered patterns are evident in the occupational aspirations of young people (Helwig, 1998; Miller & Budd, 1999).

### *Schools and the (re)production of gender*

As well as being influenced by the labour market environment, students select their subjects within the context of a specific school situation. The subjects provided within a particular school may reflect school management’s assumptions about the interests and abilities of their students. In the United States, students in predominantly working-class schools tend to have less access to advanced science and mathematical courses (Oakes, 1990) and to foreign languages (Finn, 1998). Similarly, in Ireland, the number and type of subjects provided often reflect the gender and social class mix within the school (Hannan et al., 1983; Breen, 1986; Smyth et al., 2004). A distinctive feature of the Irish schooling system, in contrast to most other European countries, is the persistence of a large single-sex sector; in 2003 (the year to which this study refers), 38 per cent of secondary students attended single-sex schools (Department of Education and Science, 2004). Historically, girls’ schools have been less likely to provide technological subjects and Physics and more likely to provide ‘accomplishment’ subjects (such as Art and Music) (Cullen, 1987; Raftery, 2001). Controlling for student intake, schools themselves have certain discretion in subject provision, differing in the kinds of knowledge they deem appropriate for their students and consequently in the types of subjects they offer (Hannan et al., 1983; Breen, 1986; Smyth & Hannan, 2002).

Schools with similar characteristics not only vary in their provision of particular subjects but also in how these subjects are made available to different ability groups and to girls and boys (see, for example, Lee & Smith, 1993; Oakes, 1990; Hannan et al., 1983). Thus, students in lower tracks tend to have less access to advanced science and mathematics courses than students in advanced academic tracks (Oakes, 1990). Schools can also influence subject choice by how the subject is offered to students

through, for example, the packaging of optional subjects. Kitchen (1999), for example, highlighted the way in which timetabling requirements for Physics produced a gendered take-up in other subject areas. Similarly, Smyth and Hannan (2002) in the Irish context found that the timetabling of science subjects at upper secondary level could facilitate and reinforce gender differentiation in choices. As a result of these practices, schools with very similar student intakes can vary significantly in the proportion of the student cohort taking particular subjects (see for example, Smyth & Hannan, 2002; Davies et al., 2004a, 2004b).

While a number of researchers have indicated the role of school policy in structuring student choices, a good deal of research has focused on the more covert ways in which the gendering of specific subject areas is produced, and reproduced, within the school context through student interaction with their peers and with teachers. Gender identity thus becomes enmeshed with the labelling of a subject as 'male' or 'female'. A number of studies have indicated that students in coeducational schools seek to reaffirm their gender identity by choosing gender-typical subjects, with girls consequently less likely to take mathematics and science subjects in these contexts (Ditchburn & Martin, 1986; Stables, 1990; Dryler, 1999). In contrast, other studies have indicated no significant effect of gender mix on subject take-up patterns when account is taken of the more selective nature of student intake into single-sex schools (Shuttleworth & Daly, 1997; Smyth & Hannan, 2002). On the basis of these latter studies, the labelling of certain fields of knowledge as 'male' is just as evident in single-sex schools. Teachers and guidance counsellors also play a role in influencing student perceptions of different subject areas, with some evidence that female students may be more reliant on advice from school personnel in making their choices than their male counterparts (Stables & Stables, 1995; Stables, 1996). Advice from teachers may serve to reinforce, or to challenge, gender stereotypes regarding certain subjects.

### *Girls and non-traditional subjects*

Research on female take-up of traditionally male subjects has generally focused on the take-up of science (particularly Physics) and advanced mathematics (see, for example, Ayalon, 1995; Ditchburn & Martin, 1986; Kelly, 1981, 1985; Smyth &

Hannan, 2002). Somewhat less attention has been given to the extremely low take-up rates among female students in the craft-related or technological subjects at school level, although some empirical studies address the processes involved. As with other subjects, technological subjects tend to be selected by students who feel they would be useful for a future job, by students who find the subjects interesting and by students who feel they are good at the particular subject (Kelly, 1988; Nash et al., 1984). Both boys and girls are attracted to technology education because they enjoy working with their hands and like the opportunity for independence and creativity afforded by these classes (Silverman & Pritchard, 1996). Female students are found to be more reliant on advice and encouragement from family and teachers in choosing technological subjects (Silverman & Pritchard, 1996). The way in which subject options are packaged has also been found to be influential (Gillborn, 1990). Lack of information or knowledge about the nature and content of particular subjects play a role in students' decisions not to select technological subjects (Silverman & Pritchard, 1996; Nash et al., 1984) and, in some instances, teachers are seen as discouraging non-gender-traditional choices on the part of students (Gillborn, 1990).

On the basis of previous research, this article locates students' decisions regarding subject choice within the context of their interests and expectations in relation to school subjects, choice structures within the school and the social climate within which they make their decisions (including parents, teachers and peers). In particular, it focuses on the way in which gender differentiation in the take-up of technological subjects is produced and reproduced in different kinds of school settings. In doing so, choices are not seen merely as mechanistically resulting from school structures but students are seen as actively involved in, and even contesting, the decision-making process (see Laursen, 1993; Henwood, 1998). The following section describes the methodology of the study in greater detail.

### **Methodology of the study**

This article draws on a mainly qualitative study of student experiences of subject choice in Irish secondary schools. The first phase of the study used anonymised examination data for the Junior Certificate (the exam taken at the end of the three

years of lower secondary education) to explore patterns of provision and take-up of the three technological subjects across secondary schools. These patterns are briefly described in the following section. Analyses of the data were also used to identify schools with particularly high (or low) levels of take-up of the technological subjects among girls.

On this basis, twelve schools were identified for case-study analysis: four schools which did not provide any of the technological subjects, four schools with relatively low take-up levels among female students in these subjects and four schools with relatively high take-up levels among female students in these subjects. Hereafter, these schools are referred to as ‘non-provision’, ‘low female take-up’ and ‘high female take-up’ respectively. The selected schools encompass all school types and cover schools of varying size, social mix and location; a summary profile of the schools is given in Table 1. Within each of the schools, semi-structured interviews were conducted with relevant personnel and students. Personnel interviewed included school principals, guidance counsellors and teachers of the technological subjects. These interviews focused on the rationale for the school’s approach to subject provision and choice, perceptions of subject content and views regarding the influences on subject choice among students. Interviews were carried out with groups of six students at a time. Within schools providing technological subjects, separate interviews were carried out with a group of boys, a group of girls taking the subject(s) and a group of girls not taking the subject(s) in each school. In all cases, second year students were selected because they had already chosen their lower secondary subjects but were not yet influenced by the information on upper secondary choices available to third year students. Student interviews explored the choice process and their perceptions of technological subjects. All interviews were recorded, transcribed and analysed using the QSR N6 package.

**Table I. Profile of the case-study schools**



School Name <sup>a</sup>	Provision and take-up	School characteristics
Park Lane	Non-provision of technological subjects	Girls' secondary, medium size, urban, designated disadvantaged status
Mountainview St.	Non-provision of technological subjects	Girls' secondary, large, rural
Greenbank	Non-provision of technological subjects	Coeducational, small, urban, designated disadvantaged status
Clonmacken St.	Low take-up of technological subjects among girls	Coeducational, large, urban, designated disadvantaged status
Oakleaf Ave.	Low take-up of technological subjects among girls	Coeducational, medium, rural
Downend	Low take-up of technological subjects among girls	Coeducational, medium, urban
Riversdale Lane	Low take-up of technological subjects among girls	Coeducational, medium, rural
Glenveagh Road	Low take-up in Technical Graphics and Materials Technology (Wood), medium take-up in Metalwork	Coeducational, medium, rural, designated disadvantaged status
Longwell Green	High take-up of technological subjects among girls	Coeducational, medium, rural, designated disadvantaged status
Southmead	High take-up of technological subjects among girls	Coeducational, large, rural, designated disadvantaged status
Churchwood	High take-up of technological subjects among girls	Coeducational, medium, rural, designated disadvantaged status
Oldham Way	High take-up in Technical Graphics and Materials Technology (Wood); non-provision in Metalwork	Coeducational, medium, rural

<sup>a</sup>Pseudonyms are used for the schools.

## **Provision and take-up of technological subjects across secondary schools**

This section discusses patterns of provision and take-up of technological subjects across different kinds of secondary schools in greater detail, with data relating to the year 2003. There are three main secondary school sectors in the Republic of Ireland: voluntary secondary schools, vocational schools, and community/comprehensive schools. These sectors differ in their historical traditions, management structure and student intake, with middle-class students and those of higher academic ability levels over-represented in voluntary secondary schools (Hannan et al., 1996). All school sectors fall within a nationally standardised curriculum and assessment framework. However, because of discretion at the school level, schools may differ markedly in the number and types of subjects on offer to students at lower secondary level.

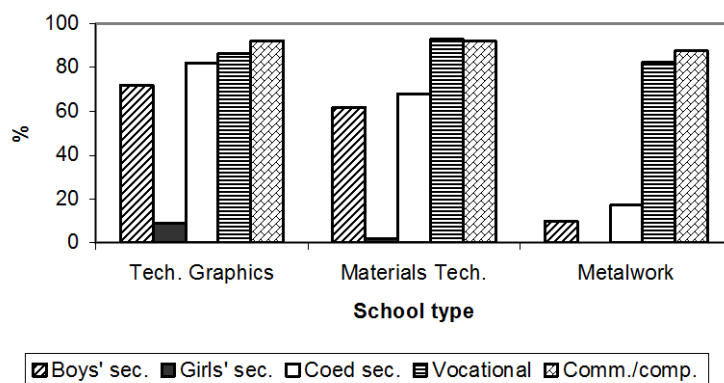
Looking at the technological subjects, Materials Technology (Wood) and Technical Graphics are provided in the majority of secondary schools while Metalwork is provided in only four out of ten Irish secondary schools. Whether the technological subjects are provided in a school is strongly related to school characteristics, such as school sector, size, designated disadvantaged status<sup>1</sup> and location. In other words, student access to these technological subjects depends on the school they attend. The three technological subjects are more commonly provided in the vocational and community/comprehensive sectors, reflecting, on the one hand, the historical tradition of an applied orientation within vocational schools and, on the other hand, the emphasis within the community/comprehensive sector on providing a broad curriculum for students (see Figure 1). What is especially striking is the fact that only a very small number of girls' secondary schools provide any of the technological subjects with no girls' school providing Metalwork, reflecting their historical emphasis on the provision of humanities and 'accomplishment' subjects (such as

---

<sup>1</sup> At the time-point in question, schools serving disadvantaged communities were allocated additional funding, with over a quarter of secondary schools being so designated. Disadvantaged status can be taken as a crude proxy for socio-economic mix in the absence of more detailed information at the school level.

Music and Art) (see Hannan et al., 1983). Additional analyses (not shown here) indicate that larger schools are more likely to provide technological subjects, reflecting the more ‘constrained curriculum’ in smaller schools. Furthermore, rural schools and those serving disadvantaged communities are much more likely to provide technological subjects than other schools (Darmody & Smyth, 2005).

Figure 1. Subject provision by secondary school sector, 2003



Source: Junior Certificate examinations database.

The subjects provided within a school, therefore, reflect historical tradition along with assumptions about the appropriateness of certain subjects for their student population. This is in line with previous Irish research that has indicated that the perceived ‘suitability’ of subjects for particular groups of students (in terms of their ability and gender) plays a role in school policy regarding subject provision (Smyth & Hannan, 2002). The extent to which subjects are seen as ‘suitable’ for a particular student population reflects the broader societal gendering of certain subject areas, a pattern that is seen to be reinforced by the historical tradition within a school.

Obviously you've got the whole historical perspective of what's been handed down in a particular school or area ... On the ground in a school I think the historical perspective has a huge role to play. I think it's very difficult to change the culture of any organisation, in particular a school, and I think single-sex schools introducing what's perceived as ... a different type of subject into that can be quite difficult. (Staff member, Park Lane, non-provision, girls' secondary, designated disadvantaged)

Similarly, technological subjects were seen as more ‘appropriate’ for working-class students, particularly working-class boys, who were likely to work in related occupations after leaving school.

It's a working class area here basically and most of the kids when they leave here, ... the lads in particular now would be very anxious to go into the trade. A lot of

them go into the trade area of carpentry, building, mechanics, that kind of thing. (Staff member, Clonmacken St., low female take-up, coeducational, designated disadvantaged)

[The school] would have that tradition of say practical subjects for a long, long number of years here. ... And then they do have a lot of engineering firms in [this town] and there would have been a link there with them. So that would be a big thing, the whole mentality of the town really in lots of ways was industrial in the past. (Staff member, Churchwood, high female take-up, coeducational, designated disadvantaged)

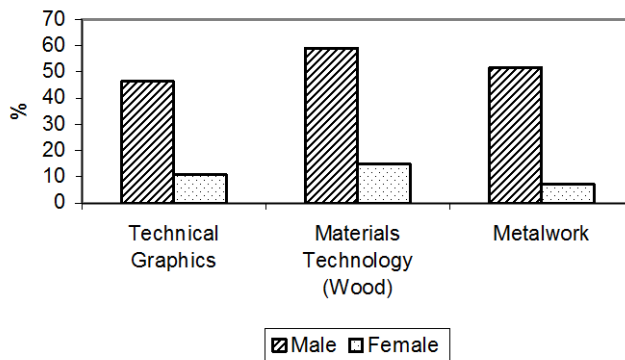
In addition, school personnel stressed the role of resource constraints in being able to offer technological subjects to students. Smaller schools were more limited in the number of subjects they could offer with consequent implications for the provision of technological subjects.

We don't have the resources to bring in extra staff for extra subjects. Because the Department [of Education and Science] won't give us, won't fund us that. (Staff member, Greenbank School, non-provision, coeducational, designated disadvantaged)

We can only provide a curriculum that corresponds with the numbers we have. (Staff member, Longwell Green, high female take-up, coeducational, designated disadvantaged)

In addition, lack of suitably qualified teachers (especially where the school has no historical tradition of providing these subjects) and the costs involved in the set-up of workshops and equipment operate as potential constraints on the introduction of technological subjects into a school.

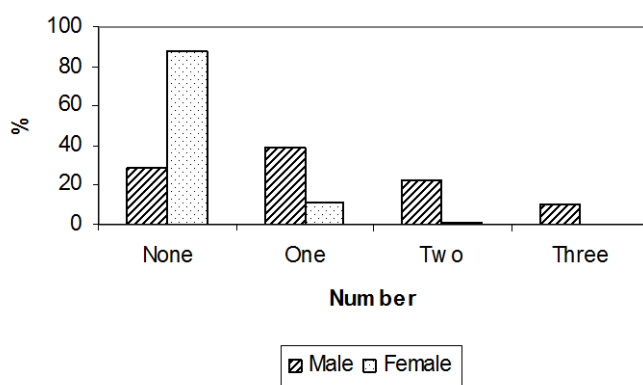
Figure 2. Proportion of students taking technological subjects within schools providing these subjects, 2003



Source: Junior Certificate examinations database.

The patterns of provision mean that one particular group of girls, those attending single-sex schools, is extremely unlikely to have any opportunity to take technological subjects. What is the case for those girls attending schools where these subjects are offered? Even in schools providing technological subjects, patterns of take-up are highly gendered (Figure 2). Male students are four times more likely than their female counterparts to take Technical Graphics and Materials Technology (Wood) (46% and 58% of male students do so respectively, compared with 11% and 15% of females). More strikingly, they are more than seven times more likely to take Metalwork than female students (52% compared with 7%). Patterns of provision and take-up across schools mean that male and female students have very different experiences of the field of technology; almost three-quarters of all lower secondary boys take at least one technological subject (with one-third taking two or more), while the vast majority (almost four-fifths) of girls have no exposure whatsoever to technological subjects (see Figure 3). The factors shaping these quite marked gender differences in take-up will be discussed in the following section.

Figure 3. Number of technological subjects taken by gender, 2003



Source: Junior Certificate examinations database.

## Subject choice within lower secondary education: the gendering of subjects

### *Influences on subject choice*

The timing of subject choice varied across the case-study schools; in two-thirds of the twelve case-study schools, students were required to choose their subject before or on entry to secondary education, while in the other schools, students could ‘sample’ the

subjects before making their selection.<sup>2</sup> Students in schools with a taster programme were potentially in a better position to make an informed choice based on their interests and competencies:

Student: You get to try out the subjects for a period of weeks. When you first come into the school, you try out the subjects and then whatever you like, you pick and whatever you don't like, you leave. (Male students, Oldham Way, high female take-up, coeducational)

A 'taster programme' could therefore potentially enhance non-gender stereotyped choices but only where student experiences of the subject(s) were positive.

Interviews with students in the case-study schools indicated that they were strongly reliant on their parents in making decisions about which subjects to choose (see also Smyth et al., 2004). Students who had to choose their subjects before school entry were even more dependent on their parents and older siblings in forming a view on the nature and content of new school subjects. There were no clear indications that parents actively discouraged their daughters from taking 'non-traditional' subjects. However, many parents were seen to encourage their children to take subjects that could potentially be useful in the future:

Interviewer: Were there other subjects also that you would have considered taking?

Student: Yeah, I wanted to do Metalwork.

Interviewer: Why are you then not doing Metalwork?

Student: Because my mother wouldn't let me.

Interviewer: What did she say?

Student: She wanted me to do Science instead. (Female students, Riversdale Lane, low female take-up, coeducational)

Where parents took a more directive stance, they were particularly likely to encourage the take-up of Business Studies, a pattern that may be related to perceptions regarding the recent economic growth in the Irish context:

Student: I really liked Woodwork but my parents wanted me to do Business Studies.

Student: Yeah, they said it would probably be more useful. (Female students, Downend, low female take-up, coeducational)

Student: Yeah, my mam and dad really wanted me to do a business subject. They were saying there's not much you can do without business. ...

---

<sup>2</sup> The sampling period ranged from eight weeks to the full school year.

Interviewer: What about you?

Student: Yeah my mam and dad wanted me to pick Business, so I picked Business and Art because if I did one serious subject then Art could be like a fun subject. (Female students, Mountainview St., non-provision, girls' secondary)

While not explicitly dissuading their daughters from taking technological subjects, parental constructions of what constituted 'useful' subjects appeared to reflect perceived employment opportunities for girls and thus indirectly facilitated the reproduction of gender differences in subject choice patterns.

A number of students, both male and female, selected technological subjects because of an underlying interest in the subject or because they felt they would do well in the subject, in keeping with previous international research (see Eccles, 1994):

Interviewer: What influenced your choice most of all?

Student: What we were capable of doing. (Female students, Oldham Way, high female take-up, coeducational)

Student: I liked the subjects so I picked them. People would tell me that they're good subjects. (Male students, Southmead, high female take-up, coeducational, designated disadvantaged)

Male and female students proffered a number of reasons for specifically selecting technological subjects. These students were often motivated by wanting a 'break' from more academic subjects, by the hands-on emphasis and by the more informal class atmosphere, with students allowed to move around and talk to other students in contrast to the teacher-dominated proceedings in many other subject classes.

Interviewer: Why would you like technological subjects?

Student: Easier to do.

Student: Less boring.

Student: You use your hands.

...

Student: It's using your hands, it's better than sitting in a classroom all day.

...

Student: When you're in your Woodwork class or Metalwork class you can walk around.

Student: You can enjoy yourself.

Student: In a normal class you can't.

Student: You just sit there.

Student: You can't speak either in a normal class. (Male students, Riversdale Lane, low female take-up, coeducational)

Student: There aren't as many 'sit there and be quiet' kind of rules in Woodwork as there would in English, Geography, History, all them, you'd do your work but you could do it while chatting to your friends. (Female students, Downend, low female take-up, coeducational)

The design aspects of the technological subjects were also seen as fostering creativity, in a similar fashion to the artistic subjects:

Interviewer: Why Technical Graphics?

Student: Because it was similar to Art and I liked it.

...

Interviewer: Why Woodwork?

Student: Because I like being creative.

...

Student: You can kind of be yourself more in it [Woodwork] and be more artistic or whatever in whatever way. (Female students, Downend, low female take-up, coeducational)

### *'Male' subjects?*

Research in the case-study schools revealed a very strong gendering of the technological subjects from the perspective of students and teachers. This labelling of technological subjects as 'male' derived from two interrelated sets of processes: the (perceived) 'intrinsic' nature of the subjects themselves, and the link between these subjects and 'related' occupations in the labour market. The technological subjects were frequently characterised by both male and female students as requiring physical strength and having a dirty and noisy work environment within class. In many ways, these perceptions reflected traditional stereotypes of skilled manual work. For female students, the use of machinery and the 'dirt' involved in classes were seen to inhibit take-up of these subjects:

Student: Girls are not interested in working with the machinery and everything.

Student: Girls would rather do something that they could use for the future.

Student: [We] don't want to get our hands dirty. Break a nail or something. (Female students, Longwell Green, high female take-up, coeducational)

Interviewer: Can I ask why did you not choose [technological subjects]?

In case I'd get a splinter or something in Woodwork and I think they're more boys' things than girls'. (Female students, Clonmacken St., low female take-up, coeducational)

In contrast, male students often commented favourably on the ability to use machinery in class and the necessity of adopting a hands-on approach was seen as a positive factor in choosing technological subjects. A number of male students asserted their 'natural superiority' in the technological subjects, characterising boys as having the physical strength and pace to perform well in these areas.

Interviewer: So do you think that the girls are better than boys in Metalwork?

Student: No.

Student: A good bit behind.

...

Interviewer: Why is that?

Student: We're quicker.

Student: Stronger.

Student: More strength.



Student: More strength yeah for filing and stuff.  
Student: Cutting through it [metal].  
Student: Bending and that.  
Interviewer: So you think that girls are not strong enough for Metalwork?  
Student: Some girls are.  
Student: Some of them are too slow. (Male students, Churchwood, high female take-up, coeducational)

Student: The girls weren't really able to do Metalwork.  
Student: [The girls] weren't very good.  
Student: They got all sweaty and all.  
Student: Only one girl came and she just left. (Male students, Glenveagh Road, low female take-up, coeducational, designated disadvantaged)

A similar pattern emerged in Oldham Way where male students described female students in their Materials Technology (Wood) class as 'alright' but 'not as good' at the subject as the boys. This invocation of physical strength as a basis for self-esteem parallels previous studies, such as that of Willis (1977), on the construction of working-class male identity and also echoes findings from labour market studies of skilled manual workers. Cockburn (1983), for example, highlighted the way in which male printing workers defended their skilled status by invoking physical strength and capacity to handle large machinery.

In curricular terms, the technological subjects are intended to develop a range of skill and design capacities among students at lower secondary level. In practice, many students saw these subjects as appropriate (only) for those who wished to pursue a career in a related craft occupation. In this way, gender differences in subject choice reflected existing patterns of occupational segregation by gender within the labour market:

Student: Because lads work with their hands more whereas we prefer more business, accounting and that.  
Student: They [boys] probably want to be like engineers or something because that's more of a man's job. (Female students, Longwell Green, high female take-up, coeducational, designated disadvantaged)

Student: I'd say the lads would probably go for a real messy job. If they're getting an apprenticeship, they'd probably want something like a plumber or something really, really dirty that a girl wouldn't go near (Female students, Oldham Way, high female take-up, coeducational)

All three technological subjects were characterised as 'male' by students across the case-study schools. However, some differences were evident between the subjects.

Metalwork in particular was seen as 'dirty' and 'noisy' while Technical Graphics was seen as somewhat more appropriate and closer to the 'female-friendly' arts subjects.

Student: Most girls would be more into drawing [Technical Graphics] than they would be into doing shelves. (Female students, Oldham Way, high female take-up, coeducational)

Student: I think they'd [girls] be better at doing Tech Graphics ... because they're usually neater when they write. (Male students, Downend, low female take-up, coeducational)

The designation of certain subjects as 'male' and 'female' based on intrinsic interests and abilities was also evident in student discussions of Home Economics, a traditionally female subject:

Student: They [girls] wouldn't really be interested in Woodwork as much as boys would, the same way I wouldn't be interested in Home Economics. I don't really like cooking and all that and girls, they want to be in groups, they want to be with girls on their own. ... It's the same thing, boys and girls, girls don't really like doing boys' subjects and boys don't really like doing girls' subjects. (Male students, Clonmacken St., low female take-up, coeducational, designated disadvantaged)

Student: [Boys are] more into it [technological subjects].

Student: Girls would be a bit afraid to do stuff.

Student: And cooking they'd rather.

Student: Do their nails.

Student: Housework and stuff. (Male students, Southmead, high female take-up, coeducational, designated disadvantaged)

Boys in the more working-class schools in particular were quite disparaging about the content of Home Economics, characterising it as related to 'female' issues such as housework, pregnancy and childcare:

Student: [B]oys doing Home Ec[onomics], there's something wrong with that.

Student: We're not going to want to sew or something. (Male students, Churchwood, high female take-up, coeducational, designated disadvantaged)

Student: Sure isn't it [Home Economics] all about pregnancy and everything as well? Boys would be no good at that I'd say. (Male students, Downend, low female take-up, coeducational)

Some of the female students also invoked gender stereotypes in considering that boys would potentially be 'clumsy and stuff' and 'a pack of messers' in Home Economics class (Mountainview St., non-provision, girls' secondary) and would find the subject more difficult ('they struggle trying to cook and sew', Oakleaf Ave, low female take-up, coeducational).

### *Gender boundaries: compliance or contestation?*

The discussion so far has highlighted the way in which technological subjects are labelled as 'male' within the case-study schools. However, it is worthwhile indicating the complexity of students' constructions of gendered subject identities since some students, both female and male, actively challenged this labelling and viewed the subjects as appropriate for all students.

Student: But there's nothing to say that it's [Woodwork] a guys' subject in any way.

Student: Whoever got that idea I don't know where they got it from. (Female students, Downend, low female take-up, coeducational)

Student: And Home Economics is more so for girls.

Student: Because you've the cooking and cleaning stuff.

Student: But lads can still cook, just because they're boys it doesn't mean they can't cook and girls can still do Woodwork as well. (Mountainview St., non-provision, girls' secondary)

Girls were somewhat more likely than boys to challenge the designation of technological subjects as 'male'. Even among students with gendered views, there were contradictions in students' perceptions. Two groups of boys had neutral, if not positive, views about girls taking technological subjects:

Interviewer: What do you think of girls doing Metalwork or girls doing Woodwork?

Boy: There's nothing wrong with it.

Boy: Don't mind it. (Male students, Churchwood, high female take-up, coeducational, designated disadvantaged)

Interviewer: What do you think of the girls who have chosen Metalwork or Technical Graphics?

Boy: Fair play to them.

Boy: Fair play to them, yeah.

Boy: At least they're trying it out.

Boy: They're man enough to do it. (Male students, Southmead, high female take-up, coeducational, designated disadvantaged)

However, the latter student expressed these views in highly gendered terms, with girls taking technological subjects perhaps seen as transgressing prevailing gender boundaries.

A number of female students reported being jeered by male students within technological subject classes:

Interviewer: Is there anything about Woodwork you don't like?

Student: The guys.

Interviewer: Why?

Student: They think they're so great, they think they're all like oh girls can't do Woodwork, even though we get higher grades than them, they're very chauvinistic about it. (Female students, Downend, low female take-up, coeducational)

However, one girl in Downend school who was the only one in a class of boys reported that 'they [the boys] treat me like one of themselves really'. The impact of the possibility of being jeered for girls' willingness to be a 'pioneer' in an all-male class was also raised by students and teachers:

I think loads of girls wanted to do Metalwork but they were afraid to because all the other girls were doing Geography. (Male students, Glenveagh Road, low female take-up, coeducational)

Students' perceptions of teacher attitudes to girls taking non-traditional subjects were similarly mixed. Two groups of students reported stereotyped views among some teachers:

Interviewer: Is there anything you don't like about the subject?

Student: No, the teacher a bit, you get a hard time because you're the only girl.

...

Student: The boys do be around our desk and he thinks if they don't do the work, it's my fault, that I'm disrupting their work. (Female students, Riversdale Lane, low female take-up, coeducational)

Student: Because some teachers think why would you want to do Metalwork, [it's] going to do nothing for you.

Student: The Geography teacher said we're not tomboys, we shouldn't be doing Metalwork, we should be doing Geography. (Female students subjects, Glenveagh Road, low female take-up, coeducational, designated disadvantaged)

However, another group of students felt that the subject teacher 'treats us all equally' (Oldham Way). In some cases, male teachers of technological subjects were even seen as being 'always nice to the girls' (female students, Downend) and as being more lenient with female students ('he lets us off with everything', female students, Oldham Way). In sum, however, the perceptions of the technological subjects as 'male' seemed to have a much stronger influence on students' decision-making than active dissuasion by teachers or male students.

### ***School policy and practice***

The construction of technological subjects as 'male' was apparent across all of the case-study schools, despite variation in the take-up of these subjects. The factor that clearly distinguished between the 'high take-up' and the 'low take-up' schools was the way in which subject choices were structured. Among the 'high take-up' schools, two patterns were evident: compulsion, and constrained choice. In two of the schools,

all students, both male and female, were required to take Materials Technology (Wood)<sup>3</sup>; furthermore, in another, all students in the lower stream class were required to take Metalwork. Interestingly, this element of compulsion did not appear to lead to greater student dissatisfaction with the technological subjects. The other pattern was one of ‘constrained choice’: in one of the case study schools, students were required to select two subjects out of Materials Technology (Wood), Metalwork and Home Economics, thus requiring female students to take at least one traditionally male technological subject.

The school’s approach, whether intentionally or not, can therefore challenge gendered subject labels. However, schools can also act to actively reinforce gendered patterns of subject take-up. In one school, Glenveagh Road (a low female take-up school), students reported that Metalwork had initially been over-subscribed, with the school’s solution being to allocate students to subject options on the basis of their gender, with Metalwork assigned to boys and Geography to girls. In the other low take-up schools, students were required to select technological subjects from a wider range of subjects. In some cases, option packages were such that students were required to directly choose between a traditionally male and a traditionally female subject; thus, in one of the schools, students were required to select between Home Economics and Materials Technology (Wood). While such packaging of subjects may be designed to facilitate student demand, it is also likely to reinforce gender differentiation in subject take-up.

The variation across schools nationally in the proportion of female students taking technological subjects must therefore be seen as reflecting, at least in part, the school’s approach to allocating subjects to certain groups of students and to the way in which the schools ‘package’ subject options through timetabling practices. These practices can serve to challenge or reinforce perceptions of suitable subjects for male and female students.

---

<sup>3</sup> In Longwell Green, both male and female students were also required to take Home Economics, which was seen as ‘equipping them for life’ (Staff member).

## **Conclusions**

Stark gender differences in the take-up of technological subjects are evident within lower secondary education in the Republic of Ireland. Low female take-up of these subjects serves to limit girls' development of a broad range of skills and restricts their access to specific education, training and employment opportunities. In so doing, the gendering of subjects at school level facilitates and reinforces gender segregation within the labour market.

Previous studies have highlighted the role of coeducational schooling in producing and reproducing gender differences in subject take-up patterns (Stables, 1990; Mendick, 2005). However, it is clear from our research that the gendering of subjects is actively produced within both single-sex and coeducational settings. In single-sex schools, the designation of particular subjects as less 'suitable' for girls, along with the historical legacy of female education, means that few girls can access these subjects. Within coeducational schools, gender differences in take-up reflect two interrelated processes. Firstly, many students, both male and female, saw gender differences in take-up of these subjects as reflecting underlying differences in interest in particular subjects with a view that 'girls don't really like doing boys' subjects'. The perception of the technological subjects, most notably Metalwork, as 'dirty', 'noisy' and requiring physical strength meant that many students felt that these subjects were more appropriate for male students. This contrasts with the feeling among technological subject teachers that curricular changes (especially in Materials Technology (Wood) and Metalwork), resulting in a shift away from a skills-based focus to an emphasis on design, have made the subjects, at least potentially, more 'girl-friendly'. Secondly, the labelling of the technological subjects as 'male' by many students reflected prevailing patterns of occupational segregation; thus, girls were seen as less likely to take these subjects because they were unlikely to pursue a career in a related trade (such as mechanic or plumber).

Our research supports the need to focus on multiple masculinities and femininities (Connell, 2002; Reay, 2001), since a number of students, both male and female, contested the designation of certain subjects as 'male' or 'female'. Furthermore, we find that school policy regarding subject provision, subject packaging and timetabling

can serve to either reinforce or challenge existing gendered patterns of subject take-up. In the context of the prevailing policy discourse on male underachievement in the UK and Ireland, persistent gender differentiation in the take-up of subjects has been relatively neglected. The findings of this article raise a number of issues for addressing gender equity in subject take-up. In particular, they indicate the importance of the school's role in reducing gender stereotyping through the nature of subject provision and the way in which the choice process is constructed for students.

## References

Ayalon, H. (1995) Math as a gatekeeper: ethnic and gender inequality in course taking of the sciences in Israel, *American Journal of Education*, 104, 34-56.

Breen, R. (1986) Subject availability and student performance in the senior cycle of Irish post-primary schools. (Dublin, Economic and Social Research Institute).

Buchmann, M. & Charles, M. (1995) Organizational and institutional factors in the process of gender stratification: comparing social arrangements in six European countries, *International Journal of Sociology*, 25, 66-95.

Bussey, K. & Bandura, A. (1999) Social cognitive theory of gender development and differentiation, *Psychological Review*, 106, 676-713.

Cockburn, C. (1983) *Brothers: Male Dominance and Technological Change* (London, Pluto Press).

Connell, R.W. (2002) *Gender* (Cambridge, Polity Press).

Cullen, M. (1987) Girls don't do honours: Irish women in education in the 19th and 20th centuries (Dublin, Women's Education Bureau).

Darmody, M. & Smyth, E. (2005) Gender and subject choice. Take-up of technological subjects in second-level education (Dublin, Liffey Press).

Davies, P., Telhaj, S., Hutton, D., Adnett, N. & Coe, R. (2004a) *Institutional and social background effects on the probability of taking an examination subject at age 16*, IEPR Working Paper, Staffordshire University.

Davies, P., Telhaj, S., Hutton, D., Adnett, N. & Coe, R. (2004b) *The myth of the bog standard secondary school: a school level analysis of students' choice of optional subjects*, IEPR Working Paper, Staffordshire University.



Department of Education and Science (2004) *Statistical Report* (Dublin, Stationery Office).

Ditchburn, G. & Martin, J. (1986) Education for Girls in Catholic and Independent Schools in the Western Suburbs of Melbourne and Gippsland (Victoria, Non-government Schools Participation and Equity Project).

Dryler, H. (1999) The impact of school and classroom characteristics on educational choices by boys and girls: a multilevel analysis, *Acta Sociologica*, 42, 299-318.

Eccles, J.S. (1994) Understanding women's educational and occupational choices, *Psychology of Women Quarterly*, 18(4), 585-609.

Finn, J.D. (1998) Taking foreign languages in high school, *Foreign Language Annals*, 31(3), 287-306.

Gaskell, J. (1984) Gender and course choice: the orientation of male and female students, *Journal of Education*, 166(1), 89-102.

Gillborn, D. (1990) Sexism and curricular 'choice', *Cambridge Journal of Education*, 20(2), 161-174.

Hannan, D. F., Breen, R., Murray, B., Watson, D., Hardiman, N. & O'Higgins, K. (1983) *Schooling and sex roles* (Dublin, Economic and Social Research Institute).

Hannan, D. F., Ó Riain, S. (1993) *Pathways to adulthood* (Dublin, Economic and Social Research Institute).

Hannan, D.F., Smyth, E., McCullagh, J., O'Leary, R., McMahan, D. (1996) *Coeducation and gender equality*, (Dublin, Oak Tree Press/ ESRI).

Helwig, A.A. (1998) Gender-role stereotyping: testing theory with a longitudinal sample, *Sex Roles*, 38(5/6), 403-423.

Henwood, F. (1998) Engineering difference: discourses on gender, sexuality and work in a college of technology, *Gender and Education*, 10(1), 35-49.

Jonsson, J.O. (1999) Explaining sex differences in educational choice: an empirical assessment of a rational choice model, *European Sociological Review*, 15(4), 391-404.

Kaplan, G. & Rogers, L.J. (2003) *Gene Worship* (New York, Other Press).

Kelly, A. (1981) *The missing half: girls and science education* (Manchester, Manchester University Press).

Kelly, A. (1985) The construction of masculine science, *British Journal of Sociology of Education*, 6(2), 133-154.

Kelly, A. (1988) Option choice for girls and boys, *Research in Science and Technological Education*, 6(1), 5-23.

Kitchen, A. (1999). The changing profile of entrants to mathematics at A level and to mathematical subjects in higher education, *British Educational Research Journal*, 25(1), 57-74.

Laursen, P. F. (1993) Students' choice and social selection, *Scandinavian Journal of Educational Research*, 37(4), 279-291.

Lee, V. & Smith, J. (1993) Effects of school restructuring on the achievement and engagement of middle-grade students, *Sociology of Education*, 66, 164-187.

Mendick, H. (2005) A beautiful myth? The gendering of being/doing 'good at maths', *Gender and Education*, 17(2), 203-219.

Millar, D. & Kelly, D. (1999) From Junior to Leaving Certificate: A longitudinal study of 1994 Junior Certificate candidates who took the Leaving Certificate Examination in 1997, (Dublin, National Council for Curriculum and Assessment).

Miller, L. & Budd, J. (1999) The development of occupational sex-role stereotypes, occupational preferences and academic subject preferences in children at ages 8, 12 and 16, *Educational Psychology*, 19(1), 17-35.

Nash, M., Allsop, T. & Woolnough, B. (1984) Factors affecting pupil uptake of technology at 14+, *Research in Science and Technological Education*, 2(1), 5-19.

Oakes, J. (1990) Multiplying inequalities: the effects of race, social class and tracking on opportunities to learn mathematics and science (California, Rand).

Raftery, D. (2001) The academic formation of the fin de siecle female: schooling for girls in late nineteenth century Ireland, *Irish Educational Studies*, 20, 321-334.

Reay, D. (2001) 'Spice girls', 'nice girls', 'girlies' and 'tomboys': gender discourses, girls' cultures and femininities in the primary classroom, *Gender and Education*, 13, 153-166.

Rubery, J. & Fagan, C. (1995) Gender segregation in societal context, *Work, Employment and Society*, 9, 213-240.

Scott, A.M. (ed.)(1994). *Gender segregation and social change* (Oxford, Oxford University Press).

Shuttleworth, I. & Daly, P. (1997) Inequalities in the uptake of science at GCSE: evidence from Northern Ireland, *Research Papers in Education*, 12(2), 143-156.

Silverman, S. & A. M. Pritchard (1996) Building their future: girls and technology education in Connecticut, *Journal of Technology Education*, 7(2), 41-54.

Smyth, E. (2005) Gender differentiation and early labour market integration across Europe, *European Societies*, 7(3), 451-479.

Smyth, E. & Hannan, C. (2002). Who chooses Science? Subject choice in second-level schools (Dublin, Liffey Press/ESRI).

Smyth, E., McCoy, S. & Darmody, M. (2004). Moving up: the experiences of first year students in post-primary education (Dublin, Liffey Press/ESRI).

Stables, A. (1990) Differences between pupils from mixed and single sex schools in their enjoyment of school subjects and in their attitudes to sciences and to school, *Education Review*, 42 (3), 221-230.

Stables, A. (1996) Subjects of choice: the process and management of pupil and student choice (London, Cassell).

Stables, A. & Stables, S. (1995) Gender differences in students' approaches to A-level subject choices and perceptions of A-level subjects: a study of first-year A-level students in a tertiary college, *Educational Research*, 37(1), 39-51.

Stokking, K.M. (2000) Predicting the choice of physics in secondary education, *International Journal of Science Education*, 22(12), 1261-1283.

Willis, P. (1977) *Learning to labour* (Hampshire, Gower).

Year	Number	Title/Author(s) ESRI Authors/Co-authors Italicised
2007	197	Analysing the Effects of Tax-benefit Reforms on Income Distribution: A Decomposition Approach Olivier Bargain and <i>Tim Callan</i>
	196	Heterogeneous Exporter Behaviour: Exploring the Evidence for Sunk-Costs and Hysteresis <i>Frances Ruane</i>
	195	The Regional Dimension of Taxes and Public Expenditure in Ireland <i>Edgar Morgenroth</i>
	194	Do Consultation Charges Deter General Practitioner Use Among Older People? A Natural Experiment <i>Richard Layte</i> , Hannah McGee and Ann O'Hanlon
	193	An Analysis of the Impact of Age and Proximity of Death on Health Care Costs in Ireland <i>Richard Layte</i>
	192	Measuring Hospital Case Mix: Evaluation of Alternative Approaches for the Irish Hospital System Chris Aisbett, <i>Miriam Wiley</i> , <i>Brian McCarthy</i> , <i>Aisling Mulligan</i>
	191	The Impact of the EU-US Open Skies Agreement on International Travel and Carbon Dioxide Emissions <i>Karen Mayor</i> and <i>Richard S.J. Tol</i>
	190	Comparing the Travel Cost Method and the Contingent Valuation Method – An Application of Convergent Validity Theory to the Recreational Value of Irish Forests <i>Karen Mayor</i> , <i>Sue Scott</i> , <i>Richard S.J. Tol</i>
	189	The Impact of Flexible Working Arrangements on Work-Life Conflict and Work Pressure in Ireland <i>Helen Russell</i> , <i>Philip J. O'Connell</i> and <i>Frances McGinnity</i>
	188	The Housing Tenure of Immigrants in Ireland: Some Preliminary Analysis <i>David Duffy</i>

- 187 The Impact of the UK Aviation Tax on Carbon Dioxide Emissions and Visitor Numbers  
*Karen Mayor and Richard S.J. Tol*
- 186 Irish Sustainable Development Model (ISus) Literature Review, Data Availability and Model Design  
*Joe O'Doherty, Karen Mayor, Richard S.J. Tol*
- 185 Managing Term-Time Employment and Study in Ireland  
*Merike Darmody and Emer Smyth*
- 184 The Effects of Human Capital on Output Growth in ICT Industries: Evidence from OECD Countries  
*Gavin Murphy and Iulia Traistaru-Siedschlag*
- 183 Real Interest Parity in the EU and the Consequences for Euro Area Membership: Panel Data Evidence, 1979-2005  
*Martin O'Brien*
- 182 Can Small Firms' Perceived Constraints Help Explain Survival Rates?  
*Seán Lyons*
- 181 Understanding the Implications of Choice of Deprivation Index for Measuring Consistent Poverty in Ireland  
*Christopher T. Whelan*
- 180 Economics in Ireland  
*Frances Ruane and Richard S.J. Tol*
- 179 Airline Emissions of Carbon Dioxide in the European Trading System  
*John Fitz Gerald and Richard S.J. Tol*
- 178 An Environmental Input-Output Model for Ireland  
*Joe O'Doherty and Richard S.J. Tol*
- 2006** 177 The Impact of a Carbon Tax on International Tourism  
*Richard S.J. Tol*
- 176 Economic Integration and Structural Change: The Case of Irish Regions  
*Edgar Morgenroth*