Inside Classrooms

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Like all major studies, the completion of this research was a truly collective effort. The not-so-visible members of that collectivity were our partners and families. We thank them sincerely for their kindness, patience and support throughout the project.

Introduction

What the book is about

Inspired by the use of video in the analysis of mathematics classrooms in the Third International Mathematics and Science Study (TIMSS) (Kawanaka et al, 1999), this book represents a unique venture in Irish educational research. With the co-operation of teachers and students, it takes a video camera into classrooms to analyse the ways in which mathematics (and some English) classes are taught in second-level schools. It also examines the relationship between teaching practices and attitudes to learning by listening to the voices of students, as well as their teachers and parents. While the primary focus of the study is on mathematics, it also offers insight into the teaching of English, highlighting similarities and differences in classroom environments.

The impetus for this study came from earlier research undertaken by the Economic and Social Research Institute (ESRI) study (Hannan, et al, 1996) on coeducation. The ESRI study indicated that certain girls in coeducational schools were underachieving in mathematics, and further research of the issue was recommended. The present study was designed to explore the inside life of coeducational and single sex classes across different types of schools. The main objective was to provide greater understanding of the pedagogical practices employed across different classes, and explore how pedagogical styles impacted on students' attitudes to, and experience of, learning mathematics. A related objective was to establish the impact that gender and social class had on the teaching and learning of mathematics in the context of different teaching styles and different tracking (streaming, banding or setting) systems.

The core part of the book is based on an intensive video study of twenty mathematics lessons and six English lessons involving second-year students in ten different second-level schools. The video studies are complemented by interviews with the students about their learning experiences; with teachers about their subject and about teaching; with principals about their schools; and with parents about schooling in general and mathematics education in particular. It is the first intensive video study

of its kind to be undertaken in schools in Ireland, and one of the very few to be undertaken internationally.

In preparation for the main video study, an analysis of Junior Certificate Mathematics Examination results for 1992 to1996 was carried out. This data is also reported in the book. It sets the scene for the video-study of classrooms, highlighting important issues in relation to the relationship between the gender of students, their social class background, and the status of different types of schools.

Outline of Chapters

The opening chapter, *The Teaching and Learning of Mathematics: Gender and Related Issues,* provides a background and framework for interpreting the findings of the study. It examines major trends in national and international thinking on mathematics education, focusing in particular on recent theoretical developments and research findings relating to the teaching of the subject. This chapter also sets the study in the context of debates about how students', teachers' and parents' attitudes to school mathematics impact on learning. As a primary objective of the study was to examine the impact of gender on learning climates of mathematics classrooms, the literature in this field is given particular attention.

Using Junior Certificate Examination data, Chapter 2 examines the *Take-up and Performance in Junior Certificate Mathematics* over a five year period, 1992-96. It outlines the differences in both take-up and performance rates at each of the three levels of mathematics (Foundation, Ordinary and Higher), focusing in particular on gender and school type differences over the five-year period. The analysis of the Junior Certificate data took place before the case studies of specific schools. Knowing the national patterns in take-up and performance enabled us to make informed choices in the selection of schools and classes for the case studies.

A brief account of the research methodology is provided in Chapter 3, *The Case Studies*. Special attention is given to the rationale for using a triangulated, multi-method approach. Using data provided by school principals, a profile of the schools and classes chosen for the case studies is also presented here. A profile of the teachers of mathematics who co-operated in the research is also provided in this chapter.

Chapter 4, *Core Themes in the Teaching and Learning of Mathematics,* is the first of five chapters investigating the mathematics classroom. It is based on the analysis of the videotape transcripts of twenty mathematics lessons in ten different classrooms. The focus is on describing and analysing the dominant teaching methodologies employed across the mathematics classes, including the physical and social environment of the

classroom, and on exploring the implications of these for learning mathematics.

Chapter 5, *Classroom Interaction: An In-depth Analysis*, explores in greater depth the nature and dynamics of teacher-student interactions in the context of the different pedagogical practices and climates observed in the mathematics classes. Interactions are analysed along two dimensions, in terms of who initiated them and in terms of their specific character or role. The private exchanges between the teacher and the students, or those among the students themselves, were not included in this analysis.

While there are certain normative trends in the teaching and learning environment of Irish classrooms, not all students are treated the same. Chapter 6, *Gender Differences in Classrooms,* examines the ways in which classrooms differ in terms of gender, particularly in terms of the relations between teachers and students. In so doing, it helps us understand why schools may produce different outcomes for female and male students. The chapter also examines the impact of particular gendered identities on students' attitudes to mathematics.

Both our study of the Junior Certificate data and international research had indicated clearly that gendered identities are not uni-dimensional in terms of their impact on mathematics learning. The students' social class and the track (stream, band or set) in which they are placed (and by implication, the level at which they study mathematics) also impact strongly on their learning experience. In the light of this, Chapter 7 is devoted to analysing *The Impact of Grouping and Social Class* on the learning environment in mathematics classes.

When we were designing the video study, it was decided that the research would be greatly enriched if we had some comparative data on teaching practices other than mathematics. A small number of English classes were videotaped therefore to give an indication as to whether the styles we observed in mathematics were specific to that subject. The focus of Chapter 8, *The English Classroom,* is on the teaching of English and in particular on the differences and similarities between the teaching of mathematics and English. The data provides many interesting insights into how the culture of English classrooms is different, but also similar in some ways, to that of mathematics.

To fully comprehend what was happening in classrooms, we elicited the views of the teachers and students we had observed, about their classroom experiences. We also interviewed a sub-sample of parents. Using data from questionnaires, interviews and focus groups, we explored the differences between all three groups in terms of their understanding of the learning and teaching of mathematics.

Chapter 9 is devoted to examining *Teachers' Perspectives* on teaching

and learning, while we outline the *Students' Perspectives* in Chapter 10. Through the interviews and questionnaires, we also explored the attitudes of teachers and students to the subject of mathematics itself. We devoted attention, however, to listening to how teachers interpreted gender and social class differences in their students' responses to mathematics.

As one of the first studies to examine parent views on the learning process, the study provides considerable insight into how parents and schools differ in their understanding of school education and mathematics education in particular. Chapter 11, *Parent Perspectives*, shows how some parents suffer from a serious knowledge deficit on education and mathematical matters (the Outsiders) while Insiders are relatively advantaged by both their experiential and researched knowledge of the educational system.

The book closes with an analysis of the major findings in the context of international research on classroom teaching and learning. It highlights in particular the over-riding impact of traditional, procedural approaches to the teaching of mathematics. It demonstrates how these practices are driven, not only by the deeply formal view of mathematics held by teachers, but also by the constraints of a traditional examination and syllabus framework.

Overall, the study offers many insights into students' experiences of mathematics classrooms, not only in terms of pedagogical practices but also in terms of how grouping procedures, gender and social class impact on their learning. The book also demonstrates the crucial role that emotions play in learning; the sense of fear and anxiety that many students felt about 'being wrong' in a mathematics class was clearly articulated by the students at interviews. The interviews and questionnaires completed by the students also suggest that whether girls or boys like mathematics, or whether they want to pursue the subject at more advanced levels, is as much about the identity that the subject offers them, as it is about the pedagogy that is employed in the classroom.