Mathematics Education Research Journal 1995, Vol. 7, No. 2, 176–179

BOOK REVIEW

Language in the Mathematics Classroom: Talking, Representing, Recording

Rachel Griffiths and Margaret Clyne

Armadale, Victoria: Eleanor Curtain Publ.
1994, 157pp.
ISBN: 1-8753-2732-0

Reviewed by Anne Chapman
The University of Western Australia

Mathematics teachers keen to take up a language-based approach to classroom learning should find *Language in the Mathematics Classroom* a great activity resource. The text is a timely response to the current emphasis on the importance of language in mathematics learning. Taking a functional approach to language, it provides teachers (and parents) with a range of activities aimed at developing communication in order to foster mathematical understanding. Most activities are designed for the primary school level, with a few for "all ages," and adults.

The authors' perspective on knowledge and communication is underpinned by the notion of active involvement. They take the view that mathematical knowledge is constructed through activities such as "thinking, reflecting, organising, and applying what has been learned to other situations," and that it relies heavily on communication. The activities can be understood as strategies for linking these principles to classroom mathematics.

This theoretical framework, perhaps best described as a constructivist position, is not outlined explicitly. Rather, it is drawn out and illustrated, step-by-step, through the activities. To this end, the book has a somewhat prescriptive flavour, stating, for instance, how people communicate, what teachers' language should communicate, and what kinds of activities children need to be involved in—all of this with very little argument or theoretical discussion. Nevertheless, in demonstrating how these principles and beliefs can enhance mathematics learning, the activities are quite successful in bringing together theory and practice.

The book begins with an "activity overview" of the activities in the next five chapters. This states, for each activity, the audience, the focus (e.g., prior knowledge, ways of representing mathematical ideas), the language modes included (e.g., spoken, written, graphic communication) and the mathematical skills and concepts addressed. The layout of the overview allows the reader to focus on a particular aspect, be it age level, concept, or language mode, while recognising its link to the other features. This is a real strength of the book, making it much more than just a grab-bag of language-based activities. (Blackline masters of activities are included at the end of the book.)

The book has six chapters. The first chapter, *Language Modes,* explains in clear and simple terms the particular view of language and communication being taken; that people communicate and learn primarily through language, and that language practices can, indeed should, be used to foster and enhance mathematics learning. The starting point is that language is a fundamental part of the culture of classroom mathematics. The authors' position on the nature of this role is made explicit

through statements of what constitute language issues in the mathematics classroom, descriptions of how people communicate, and differences identified in "traditional" and "expanded" practices of language and communication. Setting the tone for the rest of the book, clear, prescriptive outlines—mostly in note and table form—show how communication modes can be expanded, and outlines the benefits for learners.

There are three activities in this introductory chapter. The first provides strategies to find out what children already know about a topic. The second, designed for an audience of teachers or parents, shows ways to generate discussion about mathematics and language. The third activity shows how to construct "good" mathematical questions. Together these give a feel for the kinds of activities to follow.

The authors point out here that later sections of the book will explore the complexities and meanings of issues in language and classroom mathematics; these issues include "links between the language and the mathematics curriculum," "language as a factor in learning mathematics" and "applying language learning principles to the teaching and learning of mathematics."

The second chapter, *Developing the Language of Mathematics,* considers the register of mathematics—the particular kind of language typically used in the context of the mathematics classroom. It is stated that the traditional focus on emphasising correct setting out and symbolic representations can inhibit learning, and that idiosyncratic expressions, including invented notation, should be encouraged.

Activities designed to foster mathematical expression, aimed mostly at the primary level, should appeal to teachers who are looking for ways to stimulate children's responses to mathematical situations. Examples of children's different ways of recording mathematics, and the variety of materials and media that can be used, illustrate quite powerfully the mathematics learning that these types of language-based activities can generate.

A very short section concerning second language learners deals briefly with a series of points, such as differences in mathematical conventions between languages, and the need for demonstrations as well as oral or written instructions. The final topic in this section, "Visualisation and visual thinking," is also dealt with briefly, but provides a good range of activities for helping children visualise mathematical problems and concepts.

Chapter 3, *Spoken Language and Communication,* presents activities which give children "opportunities to explore mathematics through talk and action." The aim is to develop the ability to use spoken language to enhance learning. Talk is proposed as a diagnostic tool; at the beginning of a lesson, to find out what students already know; or at the end of a lesson, to find out what they have learned. The authors have developed a framework for this approach, called *Finding Out.* It has three columns to which children can contribute. These have the headings "what we know," "what puzzles us" and "patterns." Case study examples show the framework in operation, taking the reader through the authors' own experiences, decisions and findings—a useful technique.

To illustrate the use of *Finding Out,* the following table summarises the learning of a Year 4 class at the end of a

What I know	What I don't know/ What puzzles me	Patterns
How to measure length, width and depth	How to make a net for a box	The net for a cube is a cross
How to make a box 5 cm by 7 cm by 9 cm	Relation between a litre and a cubic metre	The area of a triangle is half the area of a rectangle
Area is measured in square centimetres		A thousand big MAB cubes fit into a cubic metre
Volume is measured in cubic centimetres		A million little MAB cubes fit into a cubic metre
100 cm = 1 metre		The area of a rectangle is length multiplied by width
How to change metres into centimetres		
You can't multiply centimetres by metres		

unit of work which included making boxes and investigating surface area and volume.

The authors claim that *Finding Out* is suitable for "all ages." I recently used the framework with a first year university class, most of whom are preservice primary education students. They had been working on group mathematical investigations, and having difficulties articulating what they were doing and what they had found out. Using the framework, the students were able to generate statements for each of the three columns. Most of this was in "non-mathematical" language, at least at first. What was really interesting was that, after reflecting on their initial statements, the students noted where they would like to be able to include more mathematical terminology and more formal language. This led to another topic on how to facilitate shifts towards more mathematical language.

Also in Chapter 3, strategies are suggested to promote whole class discussion and talk in pairs and small groups. These include drama and role play, listening games, and reporting on work. A range of activities to foster active communication are described.

The next chapter, *Extending the Modes of Written Language,* looks at the mathematics of everyday texts, such as newspaper reports, fables, books of mathematical puzzles, junk mail and factual texts, that can be used as a resource for engaging students in reading and writing mathematics. This approach is similar to work in the area of numeracy, especially in adult education, where learners are encouraged to learn mathematics by reading, writing and talking mathematics. The point in that work is that, very often, texts that are ostensibly non-mathematical actually involve a great deal of mathematics, and this can be more, or less, explicit. Griffiths and Clyne use this approach to develop a range of activities likely to interest students as they develop skills to access the mathematics of various texts.

This chapter also addresses the important distinction between the language of conventional mathematics texts and "everyday English writing."

Activities such as "To Bracket or not to Bracket" and "Reading and Writing Division" include strategies for dealing with the kind of mathematical language typically found in school textbooks. For example, learners need to determine the order in which the text is to be read; mathematics is not always read from left to right. Also, written mathematical language includes specialised systems of symbols, which are often combined with verbal language; readers need to be able to glean the meanings of symbols as well as words.

The links between reading and writing in mathematics are illustrated very well in this chapter, as the above examples show. However, what seems to be missing is a further link between the spoken and written forms. A feature of the spoken language of the classroom is that, as it becomes more mathematical, it often becomes closer to the written forms of conventional textbooks. This is evident in the section on "Mathematics vocabulary" in Chapter 2. The authors do state that all activities include spoken language: discussion. But little is done in terms of shaping or formalising the spoken-written connection.

Chapter 5, *Graphic Communication and Visual Representation,* considers strategies for reading and for making drawings, diagrams, graphs and maps. Activities with graphics such as tables, drawings, timetables and co-ordinates demonstrate how mathematical skills and concepts can be communicated and developed through these language modes.

The final chapter is aptly titled *Bringing It All Together.* It reiterates the language and learning principles developed in previous chapters, but focuses on their particular role in the relationship between classroom organisation and curriculum activities. That is, it describes the kind of learning environment in "a mathematics classroom which can extend children's use of language." This is an integrated learning environment that links the following features: the classroom climate; the organisation of teaching and learning; the planning and implementation of the curriculum; and methods of assessment. For those interested in following up the book's theoretical framework, this concluding chapter is a good place to start.

Language in the Mathematics Classroom achieves its aim of showing how the various modes of language can be used to improve and extend children's learning of mathematics. The activities will no doubt allow and encourage children to talk about and represent mathematics as they learn. It is easy to read, provides a rich source of activities, and gives the reader an idea of what a language-based mathematics classroom can look like.

Although the book therefore does what it aims to do, it also raises many complex issues concerning language and mathematics learning. To what degree is mathematical language an outcome of learning? What kinds of language practices are most important in mathematics? How does language enhance critical learning in mathematics? In following up these and other questions, readers will become aware of the increasing diversity in recent approaches to language and mathematics learning, and the popular view that classroom mathematics is a social event in which language is used to make meanings. What this book does most successfully in this regard is show how language can be regarded as a resource for learning mathematics.