Ethnomathematics: Exploring Cultural Diversity in Mathematics

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This work aims to:

- **make sense of the literature known as ethnomathematics;**
- **investigate its philosophical, historical, anthropological, socio-political, and mathematical basis;**
- **thereby derive a definition and description of the field;**
- **and then explore the mathematical and educational implications of conceptualising mathematics in this way.**

Its thesis is that mathematics can be meaningfully characterised as culturally constructed, and that such a view is productive both for mathematics and for mathematics education.

Abstract

This thesis provides a new conceptualisation of ethnomathematics which avoids some of the difficulties which emerge in the literature. In particular, work has been started on a philosophic basis for the field.

There is no consistent view of ethnomathematics in the literature. The relationship with mathematics itself has been ignored, and the philosophical and theoretical background is missing. The literature also reveals the ethnocentricity implied by ethnomathematics as a field of study based in a culture which has mathematics as a knowledge category. Two strategies to over come this problem are identified: universalising the referent of 'mathematics' so that it is the same as "knowledge-making"; or using methodological techniques to minimise it.

The position of ethnomathematics in relationship to anthropology, sociology, history, and politics is characterised on a matrix. A place for ethnomathematics is found close the anthropology of mathematics, but the aim of anthropology is to better understand culture in general, while ethnomathematics aims to better understand mathematics. Anthropology, however, contributes its well-established methodologies for overcoming ethnocentricity. The search for a philosophical base finds a Wittgensteinian orientation which enables culturally based 'systems of meaning' to gain credibility in mathematics.

A definition is proposed for ethnomathematics as the study of mathematical practices within context. Four types of ethnomathematical activity are identified: descriptive, archaeological, mathematising, and analytical activity. The definition also gives rise to a categorisation of ethnomathematical work along three dimensions: the closeness to conventional mathematics; the historical time; and the type of host culture. The mechanisms of interaction between mathematical practices are identified, and the imperialistic growth of mathematics is explained. Particular features of ethnomathematical theory are brought out in a four examples.

By admitting the legitimacy of other viewpoints, ethnomathematics opens mathematics to new creative forces. Within education, ethnomathematics provides new choices, and turns cultural conflict into a useful tool for teaching.

Mathematical activity exists in a variety of contexts. Learning mathematics involves being aware of, and integrating, diverse concepts. Ethnomathematics expands mathematical horizons, so that cultural diversity becomes a richer contributor to the cultural structures which humans use to understand their world.

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A Note on Terminology

The word 'mathematics' has been used in a multitude of contexts and with a multitude of meanings. For most of this work its use will fall within normal parameters, but there are two particular features which require distinction.

It becomes necessary to distinguish between mathematics as broadly conceived to cover any quantitative, spacial or relational activity, and that particular academic subject which has become a feature of school and university curricula world wide. When it is necessary to make this distinction I shall use a capitalised 'Mathematics' to refer to the latter conception. In this I am close to (but not identical with) Bishop's use (1988, p19).

From Chapter 3 onwards I need to be able to use 'mathematics' in the plural. In most places the context makes it obvious when this occurs, but to avoid possible confusion I have used a following apostrophe (mathematics') to indicate a plural use.

Previous Publication

An early abbreviated draft of Chapters 1 and 4 are to appear in a special edition of *Educational Studies in Mathematics* (ed Steven Lerman), and Sections 2.1 and 2.2 are to appear in an International Handbook on Mathematics Education (ed Alan Bishop) to be released at ICME-8.

Contents

Fig 1: The Structure of the Chapters

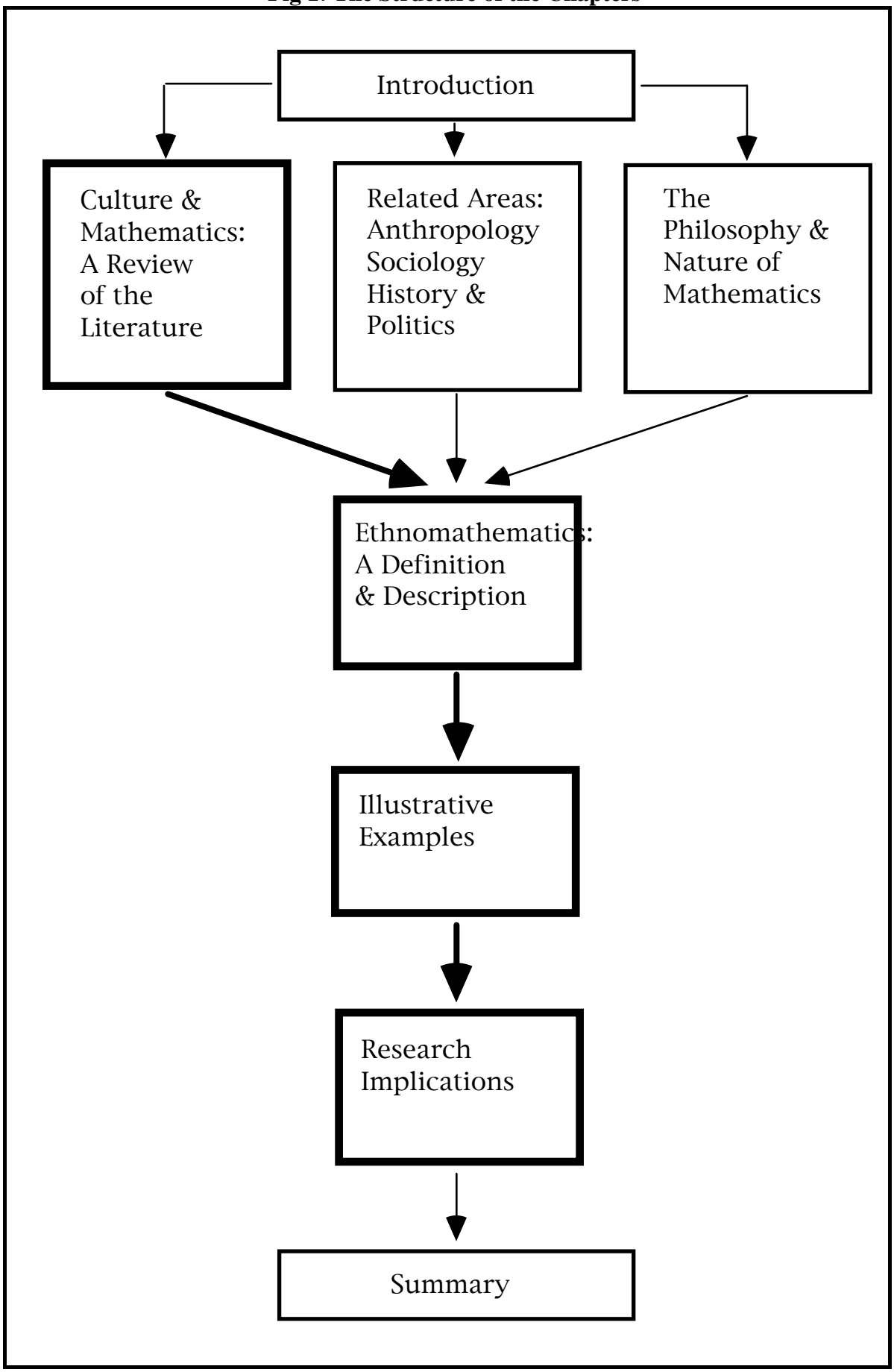

Table of Figures