School Mathematics as a Social Practice
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Introduction
The literature on the 'social construction' of meaning in mathematics education marks a clear shift towards a concern with social interaction, meaning and learning in the classroom. However, there remain contradictions over just what it is that constitutes the social construction of mathematical meanings. In this paper, I want to problematize the idea of 'social construction' still further and, in doing so, makes a case for the centrality of language in mathematics teaching and learning. My concern with this particular role of language comes from the view that teachers and learners use language to talk about mathematics, to talk mathematically, to 'do' mathematics; in sum, to enact the social processes that constitute school mathematics. Language is undoubtedly a fundamental part of the culture of the mathematics classroom. Thus, I want to position school mathematics as a social practice in which language is a resource for learning. Moreover, I argue that learning mathematics is very much a matter of learning to speak 'mathematically'.

Social context
Despite the recent trend towards a concern with the social context of mathematics education, there is still a number of competing theories and perspectives on the nature of contemporary mathematics teaching and learning (Leder, 1989). Nevertheless, it is apparent that mathematics teaching and learning are now generally understood, even from very different theoretical orientations, as social events. Watson (1989), for example, acknowledges the importance of the social aspects of classroom education. She proposes that the work of philosopher and mathematician, Ludwig Wittgenstein, provides a framework for viewing mathematics as a social phenomenon.

Wittgenstein regarded mathematics as a functional form of communication; people play 'language-games' and 'sign-games' to invent, rather than discover, mathematics (Wittgenstein, 1978). Watson discusses the implications, for teachers, of a Wittgensteinian view of mathematics:

Recognising mathematics as a functional form of communication is to identify the purposeful and shared activity of a mathematics lesson as the making of meaning explicit; the practice of using words in the right patterns of discourse; the illumination of the role that words play when we do something either with material objects or with graphic symbols. In mathematics lessons we are inducting children into the use of a range of mathematics registers, we arrange things so that the words with more complex meanings build upon those words not so deeply embedded in the theoretical structure. In mathematics lessons children are appropriating a schema of meaning; a schema which grows from the
semantic structure of Indo-European languages; a set of concepts which are the historical product of the Western form of life. Recognising mathematics as a social product helps us identify that it is socially situated, and children as social agents, no less than their teachers, stand in a certain social disposition towards its meanings (1989: 25-26).

From this perspective, school mathematics is a practice in which meanings are made. Teachers and learners communicate with each other in ways that are characteristic of the mathematics classroom. They follow conventional routines for doing and saying mathematics. This is the social context within which school mathematics happens.

If mathematics is a functional form of communication, as the Wittgensteinian view proposes, then the meaning of language depends on its use. The mathematics lesson is a context where the conventions, patterns and texts of mathematics are produced, enabled and, to use Watson's term, 'consumed'. Watson points out that teachers adopting a Wittgensteinian approach 'understand that the criteria of understanding are being able to use words meaningfully ... and being able to explain meanings in all manner of semiotic systems' (1989: 27). The importance of this approach, for those concerned with the study of language and mathematics at least, is that it implies that learning mathematics is doing it. It is being able to say things, to mean, in appropriate ways, to produce spoken and written texts in appropriate forms.

Bishop (1988) also takes the view that mathematics education is fundamentally a social process. For Bishop, meanings are at once 'individual and personal' and 'socially constructed' (1988: 153, 154). His view is that people share and contrast their own personally achieved meanings in order to come to agreement over the sense of their different meanings; it is in this agreement that meanings are 'socially' constructed. Social semiotics, a synthesis of contemporary approaches to the social production of meaning, provides the contrasting perspective that meanings are perpetually constructed within, rather than prior to, the processes of social interaction. People talk together to argue, query, make claims, suggest and negotiate; these are the means whereby meanings are constructed. Meanings are contingent on human interaction, on context. These differences notwithstanding, Bishop's work importantly provides a strong case for understanding school mathematics as a social process. His case is that (mathematics) education is essentially interpersonal.

Whether meanings are made personally or socially, it is clear that social interaction is a critical element of classroom learning.

Culture
In examining the social aspects of mathematics education, Bishop determines five levels of scale: cultural, societal,
institutional, pedagogical and individual. At each of these levels, there are social influences shaping children's mathematics learning:

A child then, in a particular classroom group, with a particular teacher, in a particular school, in a particular society, participates in a very educational experience. And if the subject matter is mathematics, the child participates in a very particular kind of mathematical educational experience (Bishop, 1988: 15).

For Bishop, the mathematical educational experience is essentially a cultural one. He develops the notion of mathematics as a cultural product and mathematics education as enculturation. This cultural perspective is a powerful means of explicating mathematics learning. Bishop emphasizes the processes of mathematical enculturation, the 'shaping' of ideas and meanings through social interaction. The culture of the classroom comprizes sets of meanings and values. It is within and through the active processes of meaning making that teachers enculturate students into the culture of school mathematics.

Subject-area learning can be understood as cultural learning; more specifically, it is socialization into the culture of the meaning system of the subject (Green, 1988). The meaning system of mathematics includes its content matter and specific ways of thinking and meaning. The content can be described as cultural knowledge and the ways of speaking and acting as cultural behaviour. Competency with the meaning system primarily requires language. My argument is that learning school mathematics involves learning to operate its 'language system' and 'meaning system' together (Green, 1988; Chapman & Lee, 1990). Certainly language is a fundamental part of culture. Being socialized into the culture of mathematics necessarily involves learning its language.

Cultures produce their own texts, or realizations of meanings, and have their own ways of interpreting texts. The spoken and written texts of school mathematics are not only products, but also, processes of classroom interaction. Participating in mathematical activities involves using language appropriately, that is, producing texts to realize meanings. Moreover, it involves producing conventionalized forms of texts, or genres. There is clearly a close relation between context and text; specific subject-areas comprize specific texts and types of texts. Green suggests that subject-area learning may be linked to what he terms 'generic literacy': that is, 'competency with regard to a particular set of written genres pertaining to the subject-area in question' (1988: 25). Figure 1 illustrates the three very different written mathematical generic forms produced by a student in a single homework activity on the topic of functions: these genres are graphs, tables and algebraic rules.
Form is important in the language practices of school mathematics. Written genres, such as the proof in geometry and standard written algorithms in arithmetic, are unequivocal and precise. This rigour typically is reflected in the spoken language practices of the classroom. Spoken mathematical genres include definitions, theorems, procedures and descriptions. Each of these language activities has its own form and structure. Predictable and familiar classroom activities and topics generate recognizable genres. In geometry, for example, there is a way of talking about space and about shapes. In algebra, there is a way of explaining algorithmic procedure. Different mathematical areas require students to learn different genres. It is in this way, through the shaping and constraining of text by genre, that the social context of mathematics can be seen in part to influence language use.

Figure 1  Homework activity

Language and social practice
The discussion so far has considered the language practices of school mathematics in relation to social context and culture, illustrating the complex and pervasive part that language plays in mathematics classrooms. The point being made is twofold. Firstly, within the culture of the mathematics classroom, language is a fundamental social process. In any mathematics classroom, one inevitably sees teachers and students reading, writing and talking about mathematics. To adapt a term from Lemke (1982), they are 'talking mathematics'. Secondly, language works together with many other social practices to constitute school mathematics. Mathematical meanings make use of multiple semiotic resource systems, one of which is language. Others include, for
example, drawing, gesturing and measuring. The primacy of language in teaching and learning mathematics is evident.

Nevertheless, it cannot be understood apart from the many other semiotic practices of school mathematics, nor outside of the social context in which it occurs. What, then, does it mean to say that school mathematics is a social practice? Certainly it means that mathematics teaching and learning happen primarily through social interaction. Moreover, the social context of the classroom is paramount in shaping those interactions and the meanings they produce. Context both enables and constrains the social processes of teaching and learning, and the meanings they produce, in various ways. Essentially, context makes a difference to how people use language, to how they produce and interpret texts. It determines the choice of genres that realize mathematical meanings in particular situations. Learning mathematics is a matter of being socialized into the culture of school mathematics. This culture comprises many social systems, one of which is language. Language can be considered the primary social or semiotic system in the sense that it is the most readily 'seen' and 'heard' in the classroom. However, it works alongside other semiotic systems, such as graphing, ordering and constructing angles, and cannot be understood in isolation. Teachers and learners use language as a resource with which to negotiate and communicate mathematical meanings. It is a quite 'natural' part of the life of the mathematics classroom. Enculturation into school mathematics necessarily requires facility with its characteristic patterns of language use. The social practice of school mathematics thus engages the closely related dimensions of social context, culture and language.

REFERENCES
Geelong, Vic: Deakin University.