What does it mean to learn and teach mathematics or science in a classroom where students speak a variety of languages but none has the language of learning and teaching (LOLT) as their main or home language? Such is the situation in a majority of urban classrooms all over the world. How is mathematical learning enabled and/or constrained in such complex linguistic sites? What strategies are appropriate for use in these classrooms? Embedded in these questions are theoretical and pedagogical questions about language and learning, and language and mathematics/science and political questions about language-in-education policy. In this presentation I will draw on my research experience in multilingual mathematics classrooms in South African to explore these broader questions. I will begin the presentation with a brief review of research in this area of study. Through this I will show how research in this area has moved from a conception of language-as-problem to language-as-resource. These discussions will provide a theoretical context for a description and analysis of a strategy that I have developed for multilingual mathematics classrooms in South Africa to ensure that learners are given the language support they need in order to succeed. From these empirical and theoretical bases I will draw out my argument for the deliberate, proactive and strategic use of the learners’ main languages as a transparent resource in the teaching and learning of mathematics and science in contexts of language diversity.