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FROM DESCRIBING TO DESIGNING MATHEMATICAL ACTIVITY: THE NEXT STEP IN DEVELOPING A SOCIAL APPROACH TO RESEARCH IN MATHEMATICS EDUCATION?

Commentary on the Special Issue of Educational Studies in Mathematics ‘Bridging the Individual and the Social: Discursive Approaches to Research in Mathematics Education.’

I am delighted and honoured to have been given the opportunity to provide a commentary on the papers presented in this special issue of Educational Studies in Mathematics, edited by Carolyn Kieran, Ellice Forman and Anna Sfard. It has given me the impetus to read with care accounts of research studies that define themselves as within the socio-cultural paradigm. The editors should be congratulated on bringing together a rich mix of papers that take different, but complementary, perspectives on the theme of the issue and together make a serious elaboration of the principles underlying this paradigm.

My starting point was as a learner. The papers collectively provided me with excellent summaries of a range of general theories underpinning the emerging social paradigm. I asked myself the following questions. What would the theoretical framing and methodologies of a socio-cultural approach add to the collective understandings developed in our field over the past thirty years? How can socio-cultural theory help us to understand and support students’ developing mathematical learning? Could I propose a novel slant on some of the ideas or analyses in the papers that might offer alternative but, to me at least, fruitful interpretative frameworks? Could I identify any omissions in analytic focus that, if addressed, might usefully form part of a future research agenda?

Given restrictions in space, my commentary cannot be exhaustive nor do justice to the wealth of insights offered in this rather large corpus of work. I have chosen therefore not to engage in theoretical discussion to reconcile (or not), for example, Vygotskian or Piagetian theories (some excellent discussions appear elsewhere, see Steffe and Thompson, 2000; Lerman, 1996; Cobb, 1996). Rather I choose to discuss theoretical issues only in so far as they have illuminated an agenda of a mathematics education researcher or, given the aim of this issue, served to move the
community beyond the unproductive split between individual and social research perspectives.

In seeking to specify my initial goals, I must state the obvious. My commentary will be personal, inevitably shaped by my past experience and my research in mathematics education. So let me start with a personal comment. Nobody, least of all myself, would wish to deny the influence of the social perspective on mathematics teaching and learning. It is almost a truism to argue that all learning is shaped by history, power relations and culture, and that social forces transform classrooms and the way individuals interrelate and react in them. It is important to investigate both distally and proximally social phenomena (using categories distinguished by diSessa, personal communication), but equally important to distinguish between them. How far is it legitimate to restrict attention to one category of phenomena when researching mathematics education? Is it possible to embrace both categories in any investigation in anything but a superficial way?

Before turning to the papers in the volume, I briefly discuss my own professional career in the spirit of the socio-cultural paradigm, in order to inform the reader of the background to my remarks. In our book (Noss and Hoyles, 1996), Richard Noss and I commented that the community of mathematics education was little more than 25 years old, (now 30 years) but already, in this short time, there had been swings of methodologies, realignments of theoretical frameworks, and occasional paradigm shifts. We traced some of this history and noted a fundamental shift from a focus on mathematical objects and how they were understood in the school population, initially, to a concern with strategies adopted during problem solving, later to a consideration of the construction of knowledge, and eventually to an acknowledgement of the essential complementarily in activity between process and content and of the importance of analysing the totality of mathematical experience. We noted how research had shown that taking the problem situation as the arbiter of meaning was fraught with pitfalls, not least because the mapping between the mathematical and situational elements of a problem turned out to be highly ambiguous, with respect to the mathematics deemed to be relevant, the aspects of the setting considered, and the extreme sensitivity of problem-meanings to social and cultural influences.

A key insight for our theoretical work at that time, was drawn from the seminal research of Vergnaud (1982), Nunes, Carraher and Schliemann (1993) and Lave (1988), who had shown how mathematical meanings constructed within a setting were inextricably interwoven with their representations. Thus structure, context (meant more as physical rather than