

## COMMENTARY

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# Positive Possibilities of Rethinking (Urban) Mathematics Education within a Postmodern Frame

Margaret Walshaw  
*Massey University*

Postmodernism and mathematics education are both crucial components of contemporary society, yet they have rarely addressed each other. Coupling mathematics education with postmodernism allows us to explore what positive possibilities might ensue for the discipline in general and for urban schools in particular beyond the traditional contours of mathematics education.

In discussing the postmodern potential, we first need to be clear about modernist thinking. That discussion takes us back to Descartes's search for certainty, order, and clarity—a search that was integral to the formulation of a modernist framework in the 17th century. From that time until recently, most Western thinkers understood reality as characterized by an objective structure, accessed through reason by an autonomous subject. These characteristically modernist beliefs have tended to shape thinking about knowledge, representation, and subjectivity within the Western intellectual tradition of which mathematics education is a part.

During the 1960s a number of literary critics began writing about the limitations of modernist thinking. Postmodern sensibilities then emerged and entered the full range of human sciences. This emergence was most keenly expressed through the publication of Jean-François Lyotard's (1984) *The Postmodern Condition: A Report on Knowledge*. In this work, Lyotard argued that the “grand narratives” of Western history and, in particular, enlightened modernity, had broken down.

Multiple factors have brought about postmodernism. They include political and social crises of legitimation, and the resulting changing nature of economies and social structures in Western societies. These changes place complex and sometimes conflicting demands on people in ways that they are barely able to understand or predict. For example, increasingly, within mathematics education, we are becoming aware of the complex construction of our work emerging from, among other things, new forms of inclusive political tendencies, changing vocational needs, and advances in informatics and communication systems. The effects of these processes for mathematics education are unsettling. Conceptual

tools and frameworks from postmodern thinking help us to develop an understanding of those effects. They help us to understand ideas that are central to mathematics education from beyond the standard categories of thought. In particular, they help us to understand cognition and subjectivity.

### **Cognition and Subjectivity as Explained Within Our Traditions**

Cognitive psychologists describe cognition as mental activity to do with interactions and reflections upon the environment. The tradition aimed to show that cognition can be structured and that it cannot *but* be inward directed. Cognition is equated to intrapsychic activity in response to factors in the environment. In the internal information-processing model, for example, it is Descartes's individual, and more specifically, the individual's developing internal representation within the mind that becomes the central unit of analysis. Drawing on humanist sensibilities about the individual, constructivists' accounts of cognition necessarily rely on the autonomous learner, understood as the stable, core, knowing agent. Such notions underpin the well know, post-Piagetian work of von Glasersfeld (see Steffe, von Glasersfeld, Richards, & Cobb, 1983). Within these accounts, the mind is privileged, while circumstances and conditions are minimized.

Sociocultural perspectives that draw their inspiration from Vygotsky's (e.g., 1978) work, developed largely independently of Western cognitive psychology. In opposition to cognitive psychology's privileging of interior mental processes, sociocultural theory highlights social contexts and experiences. In seeking to reverse the terms within the individual/social binary, sociocultural theory gives priority to shared consciousness, or intersubjectivity, arguing that conceptual ideas proceed from the intersubjective to the intrasubjective. Cognition involves active construction by the individual and evolves through social interaction. In this formulation, given that social practice is a mechanism that informs thinking, the way in which mathematical truths are constituted interactively by the classroom community is integral to analyses of classroom life.

In the route from cognitive psychology to sociocultural perspectives in the discipline, the "subject" (i.e., individual) has moved from the idea of self-centredness to one that is animated by negotiations of self with social structures and culture. Contemporary interests and issues within mathematics education now concern the complex transactions that take place between the subject-in-process and the structures and processes of mathematics education but what is curious is that many aspects of the Cartesian model continue to survive. Postmodernism offers theoretical pathways that move beyond the Cartesian self in order to account for the merging of the social, discursive, temporal, spatial, and the psychic. It achieves this move by explaining cognition in mathematics classrooms in relation

to the dynamics of the spaces people share and within which they participate. In such an explanation, power and conflict and other important issues come to the fore.

### **What Does Postmodernism Offer?**

What exactly does postmodernism offer? Broadly speaking, it offers a new attitude. It offers resources to help us understand an increasingly complex, plural, and uncertain world. Its focus is not on foundations and efforts to establish authority. Rather, its objective is to explore tentativeness and to develop scepticism of those principles and methods that highlight certainties. Specifically, it problematizes impartial knowing, disinterested objectivity, and value neutrality. Postmodern thinkers keep foremost in mind that reality does not have an objective structure, that research is fundamentally unrepresentable, and that representation is subjective and, hence, highly contested. Truth, then, is multiple, historical and contextual, as well as contingent, and political. This multiplicity is not to suggest that all views are equal, but it does imply an ethically responsible engagement with specific complex problems that do not have generalizable solutions.

Knowledge, in postmodern thinking, is not neutral or politically innocent. Cognitive products are merely that—products constructed by cognitive agents, enmeshed in a site of knowledge production that is unavoidably political. Postmodern analyses might explore the contingency of power, privilege, and history on systems of knowledge, to reveal how knowledge implies forms of social organization and social practices that structure institutions and constitute individuals as thinking, feeling, and acting subjects. Meaning construction becomes a form of critique that acknowledges its own complicity in the analysis.

In this kind of thinking, mathematics education would be viewed, not in isolation, but head-on as a disciplinary endeavour situated at the interface of multiple and competing structures and processes. What would be emphasized are elements of practice characterized not only by regulatory practice but also the uncertainties of practice: both inside and beyond the classroom and school. For example, urban schooling would be interrogated as a construct, situated within institutions, historical moments, as well as social, cultural, and discursive spaces. Importantly, in this formulation, identities, social conditions, and political dimensions all become highly significant.

These kinds of priorities run up against portrayals within mass-mediated and ideological constructions of the roles and functions of urban schools that often assume an essentialist character. Such portrayals have a tendency to offer a set of myths through which transmission strategies of teaching and high-stakes assessment come to the fore. In rendering this familiar story problematic, the postmodern approach views teaching, curriculum, and leadership within urban schools as

constantly mobile, closely linked to interactions between people, past, present, and anticipated, situated in relation to one's biography, current circumstances, investments, and commitments. What are magnified in the postmodern approach are complex practices, involving multiple dimensions and conflicting discourses, all of which prevent anyone from generalizing across settings and across teachers, learners, and schools.

These ideas are helpful in understanding the current context in which many urban schools, searching for effectiveness and inclusiveness, struggle in their attempts to make a difference to all. On a day-to-day basis, they deal with diverse learner cohorts and are expected to minimize the effects of the differing behavioral and epistemic responses that go hand in hand with those cohorts. Not only that: typically, teachers and institutional leaders confront heavy workloads, new technologies, and new curricular policy mandates, all of which operate to normalize and regulate their pedagogical practice, and, importantly, undermine their sense-of-self within the schooling system.

These difficulties can be viewed within a much larger complex social, cultural, and economic phenomenon. In a context in which mathematical proficiency is the cornerstone of a student's self-empowerment, schools have become objects of scrutiny and critique. Students' lack of proficiency is, in the eyes of policy, to be blamed on schools, their infrastructure, their networks, and their teachers. Increased surveillance has become the order of the day. Demands for increased testing, scripted pedagogical interactions, and prescribed instructional leadership all operate within a context that privileges certain fundamentalist interests, values, and practices. Trapped within a law of diminishing returns, schools struggle for expression against hierarchies of power and against their own marginalization.

Within our contemporary environment, postmodernism becomes a key resource for interrogating and understanding mathematics education. As a "system" of ideas, postmodernism allows us to build new knowledge about mathematics education within contemporary social and cultural phenomena. It enables us to chart urban school practice and the way in which identities evolve. It provides the tools for us to track reflections; investigate everyday classroom activities; analyze discussions with instructional leaders, mathematics teachers, students, and educators; map out the effects of policy; and so forth. Such interrogations ask different kinds of questions. For example, we might ask: What power-knowledge lessons might be learnt for the discipline from the recent reconstruction of academic identities and new work environments, centred as they are on performativity and measurable research and publication outcomes? Where does the postmodern collapse of the distinction between knowledge and commodity, with regard to technology, lead to in terms of the production of mathematical knowledge?

In mathematics education research, postmodernism is associated with a range of different theoretical positions. Each theory offers explanatory power in

high-lighting and explaining particular aspects of mathematics education and each offers a new way of thinking. While different postmodern analyses have few concepts in common, all rely on the underlying assumption in the usefulness of new ideas for exposing aspects of practices previously situated beyond our vision. Each is committed to approaches to mathematics education that question given understandings.

When postmodern analyses explore lived experience, it is not with a view of capturing reality and proclaiming causes, but of understanding the complex and changing processes by which subjectivities are shaped. Such analyses do not seek to legislate over the constitution and nature of reality. Rather, they work at illuminating the dynamics of experience—how meanings are validated, and whose investments are privileged. In seeking to capture the fluidity and complexity of identity constitution, postmodern analyses reveal how different contexts carve out their own borders, and how each represents different and competing relations of power, knowledge, dependency, commitment, and negotiation. In doing so, they sensitize us to oppressive conditions, highlighting possibilities for where and in what ways practices, processes, and structures might be changed.

Irrespective of the standpoint of postmodern analyses—such as Derrida’s (1978) work on deconstruction of taken-for-granted understandings; Žižek’s (1998) explanation of how identities are constructed in relation to the other; Bourdieu’s (1990) exposition of how everyday decisions are shaped by dispositions formed through prior events; Fairclough’s (2003) insights about the way in which language produces meanings and positions people in power relations; Foucault’s (1977) understanding of how practices are produced within discourses; Lyotard’s (1984) explanations of language games as fundamental to the social bond; and Gadamer’s (1989) insistence on interpretation as an ongoing process—the frameworks used and the questions prioritised are shaped in the belief that postmodernism offers a potential source of sophisticated analytical tools for understanding people and events in mathematics education. A few examples of how some of these frameworks might be put to use follow:

Walls (2010) used ideas drawn from psychosocial theory to explore the way in which teachers negotiate their way through contesting perceptions of effective teaching within a climate of compulsory standardized testing. In this work, identity is changeable and unpredictable, formed through a reconciliation of constructions of past, present, and future possible identity positions. Walls revealed how systemic forces are lived as individual dilemmas, by demonstrating the ways in which teachers embody practices that they had wanted to change. With a focus on why and how teachers structure their teaching identities in the way they do, she highlighted the way in which

teachers speak of their highly compromised (and limiting) practice within mathematics classrooms.

In their investigation of the fragility of mathematical learning, Stenoft and Valero (2010) began with the notion that language constitutes social reality rather than reflects an already given reality. Drawing attention to the interrelatedness as well as the fragility of classroom discourse, identity, and learning, they unpacked the ways in which students and teachers are involved with constructing multiple identities over the course of a mathematics lesson. They also showed how learning mathematics and constructing mathematical knowledge in the classroom is inextricably caught up in the discursive practices of the classroom.

Other approaches have used critical discourse analysis to study the classroom discourse and interaction. For example, de Freitas (2010) grounded her work in the understanding that language not only produces meaning but also positions speakers in specific relations of power. Discursive practices of mathematics education position people and contribute to the development of thinking in the classroom. They shape thinking by limiting the scope of what can be said and done. de Freitas reported on what teachers chose to say and the way in which they said it, and the power relations that descended from those decisions. In particular, her research demonstrated the ways in which the discursive practices of teachers contributed to the kind of thinking that is possible within the classroom.

Nolan (2010) explored the development of an inquiry-based classroom in an undergraduate teacher education program. She showed how inquiry-teaching approaches, that required a tolerance of ambiguity and uncertainty from students, met with resistance, challenge, and dissatisfaction from students. She drew on Bourdieu's conceptual framework to analyze the tensions between thought and action, knowledge and experience, and the technical and existential enacted in the pedagogical encounter. Specifically, in providing an account of the dilemmas in trying to establish teacher authority in a context fuelled with contestation, she offered an explanation as to why reforms in teacher education do not always enjoy an enduring effect.

### **Postmodernism as a Form of Social Critique**

A postmodern attitude demands a rethinking both of the question of research authority and of ways of representation. It offers a self-conscious consideration of the location of the researcher that can highlight the processes of meaning making

and consciousness, and increase our curiosity about the activities of researchers and respondents in the field. As a form of social critique, postmodernism offers an understanding of how identities are produced through social interaction, daily negotiations, and within particular contexts and arrangements that are already heavily laden with the meanings of others. Through such analyses, it is possible to develop insights about the struggle for self within wider meanings of and investments in schools and the way in which power insinuates itself into the discourses and practices of school and classroom life.

In that sense, postmodernism offers a more expansive way of invoking ethical deliberation. It does not involve an outright dismissal of the ethical problems that guide modern thinkers. Instead, it questions the specifically modern approach to confronting those problems. Indeed, in postmodern thinking, ethical responsibility precedes all engagement with the Other. Crucially, such engagement is not dependent on the reciprocation of the Other.

Educational transformation can be effected by making more visible the ways in which commonplace daily social relations are rearticulated. The process is important because it assists us in finding out where meanings and values are legitimated, whose investments are favored, and how those investments are sustained. Such inquiry allows us to discover why our interests are sometimes silenced, how we are caught up in conditions of constraint, and where we might find weak points to imagine a space for creative change. By unpacking what seems “natural” and by locating the effects of constitutive power, we begin to think differently about constructing practices that are responsive and appropriate to specific sites of struggle.

## Conclusion

Rereading the practices, processes, and structures within mathematics education through the understandings offered by postmodernism allows us to scrutinize the rules and practices of education. Stinson and Powell (2010) have shown that such understandings about mathematics practice—that neither stretch plausibility nor break with reality—emerge through practising teachers’ appropriation of postmodern ideas. Importantly, they have shown how exposure to and engagement with postmodern ideas, leads to significant changes in teachers’ thinking about practice. Standing up against discourses premised on remediation and salvation, an engagement with postmodernism reveals a commitment to engage in political struggle over the meaning of mathematics education itself, while simultaneously acknowledging that to speak of transformative change is to question the very meaning of empowerment.

What it also means is that, with a postmodern sensibility, all of us involved with mathematics in schools can begin to reflect on what we are today, how we

have come to be this way, and the consequences of our actions. It sensitizes us to our taken-for-granted assumptions and practices, and creates an opening in which knowledges, roles, and relationships are questioned and where new possibilities might be envisioned. Choices become more apparent about how to speak, write, teach, and lead in ways that move toward the kind of arrangements in mathematics education that are more desirable, for the geographical settings and material conditions in which schools are located at this particular moment in time. Such an opening is ripe for development within both the intellectual conditions and the material settings of our schools.

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