

COMMENTARY

Putting the “Urban” in Mathematics Education Scholarship

William F. Tate

Washington University in St. Louis

How many candidates running for local, state, or federal office in the 2008 elections in the United States highlighted the importance of urban America as a site of opportunity, or even challenge? Briggs (2005) argued that the geography of opportunity in education, employment, safety, health, and other vital areas of the next generation are invisible in the nation’s public life and agenda. In her classic book titled *The Death and Life of Great American Cities* (1992), the late Jane Jacobs argued a successful city neighborhood is a place that is sufficiently aware of its problems so it is not defeated by them. In contrast, an unsuccessful neighborhood is a place that is engulfed by its deficiencies and is increasingly more powerless before them. She argued we Americans are poor at managing city neighborhoods as documented by the long collection of failures. Her treatise is one of numerous scholarly projects that underscore the unique importance of recognizing the urban context as a powerful influence on human development broadly defined (Orfield, 2002; Pattillo, 2007; Rusk, 2003).

The purpose of this commentary is to serve as a warning that developing and testing theories is central to making urban mathematics scholarship a visible research enterprise. More specifically, I will argue that there are lessons to be learned from the social sciences literature that can inform the advancement of a robust, theoretically based, empirical project in urban mathematics education research. In addition, these fields of social science are part of the rationale for why putting the “urban” in mathematics education scholarship is important. Perhaps there are some scholars who accept the notion of research focused on the urban context as relevant and of great consequence. They understand that urban cities and communities are unique contexts that require research and policy evaluation to support their governance function. Not everyone accepts this notion. Is there a growing research literature related to urban communities in mathematics education? Unfortunately, the answer is clear. Too many education researchers ignore

WILLIAM F. TATE is chair of the Department of Education, director of the St. Louis Center for Inquiry in Science Teaching and Learning, and Edward Mallinckrodt Distinguished University Professor in Arts & Sciences at Washington University in St. Louis, One Brookings Drive, Campus Box 1183, St. Louis, MO 63130-4899; e-mail: wtate@wustl.edu. He is immediate past president of the American Educational Research Association. Tate’s interdisciplinary scholarship concentrates on two main areas: mathematics, science, and technology education, specifically, in metropolitan America; and the social determinants of education and health disparities.

geospatial considerations. My hope is that the *Journal of Urban Mathematics Education* will create a new marketplace where theories related to urban cities and metropolitan regions across the world can be empirically tested and evaluated.

A major point of emphasis for the scholar interested in urban mathematics education is theory building and empirical evaluation. If there are no theories (small or grand) to test and evaluate akin to the efforts in other social science research, then the field will yield little more than polemic and empty ideology. To date, both are plentiful. A brief review of the social sciences literature will illustrate the importance of geography as part of theoretical construction and testing. Urban economics is a branch of microeconomics that examines urban spatial structure and the location of households and firms (O'Flaherty, 2005). The urban economics literature includes the study of industrial clusters and technology-based hubs in metropolitan communities across the globe (Gordon & McCann, 2000; Sorenson, 2003). How industries cluster is directly related to a range of social factors including employment opportunities and tax capacity. Incidentally, these two factors influence the quality and financial support for education (Orfield, 2002). Employment rates and tax capacity are important constructs in school finance. Moreover, employment opportunities and tax capacity are a part of an expanding literature in urban sociology. The point is that economic theories make it possible to test the nature and extent of relationships within economics and across fields of study including sociology. Urban sociology is the scientific study of social relations, human life, and human behavior in metropolitan areas. In this field, the Chicago School has been a major influence. For example, both social disorganization theory and the spatial mismatch hypothesis have been tested and studied as a part of this urban research tradition (Bursik, 1988; Foster-Bey, 2006; Wilson, 1996). The point here is not to review these two theories; rather, the intent is to make clear that there are important theoretical projects being tested and vigorously debated. If urban mathematics education research is to be taken seriously, this kind of theoretical and empirical interaction should be the norm.

Theory-driven, empirical research is the norm in other fields of social science as well. The political science literature includes a sub-field in urban politics (Brunori, 2003; Judd & Swanstrom, 2008). Urban regime theory is prominent in this field (Stone, 1993). The urban public health literature includes the examination of medical resources, risk factors, and disease (Airhihenbuwa & Liburd, 2006; Douglas, Esmundo, & Bloom, 2000; Jones-Webb & Wall, 2008). Epidemiological theories and method are central to urban public research. The literatures of community psychology and the developmental sciences examine child and adolescent development and cognitive outcomes in a variety of urban settings (Lee, 2008; Spencer, 2008; Spencer, Dupree, Cunningham, Harpalani, & Muñoz-Miller, 2003). In a range of research fields the study of social interaction

in the urban metropolitan regions of the world is ongoing. This study of social interaction has been the case in education research as well. Journals such as *Urban Education* and *Education and Urban Society* have articles that are retrievable in electronic databases dating back to the 1960s. *Urban Education* published a special issue focused on mathematics education (Tate, 1996). In sum, there is a long history of research that has taken seriously urban geography and related social interactions. This history suggests there is an intellectual space for urban mathematics education research. This intellectual space calls for scholars to fill the void.

Urban mathematics education is a rich topic with significant policy implications. During the 1980s and 1990s, both the Ford Foundation and National Science Foundation invested in mathematics education reform efforts and related evaluation studies in cities across the United States (Campbell, Bowden, Kramer, & Yakimowski, 2003; Kim, Crasco, Blank, & Smithson, 2001; Silver & Stein, 1996; Webb & Romberg, 1994). These large-scale interventions and evaluation studies brought attention to the topic of research and urban mathematics education. There is other mathematics education research focused on course-taking, teacher quality, and assessment practice that has a spatial dimension (Anderson & Tate, 2008). The geography of opportunity has been central to the mathematics education research involving urban communities. However, there are two interrelated challenges that must be addressed if this scholarship is to flourish going forward.

The first challenge involves theory. There is a need for theory building, testing, revision, and retesting. There are important lessons to be learned from closely examining the history of research in urban economics, urban sociology, urban health, urban politics, and community psychology. A second challenge is related to collective cognition. In their award winning book titled *Building Civic Capacity: The Politics of Reforming Urban Schools*, urban regime theorists, Stone, Henig, Jones, and Pierannunzi (2001) contended that collective cognition matters when the goal is to take on the task of problem solving in urban school reform. To this end, I have argued elsewhere that urban communities are in desperate need of research consortiums where the distinguishing features are comprehensive data archives that provide sustained opportunities to study and learn about human development in the region (Tate, 2008). The data archives should include at minimum the theoretically important measures related to urban mathematics education. In addition, this intellectual space is where researchers and practitioners should test and retest the theoretical project and push the boundaries of new knowledge. The challenge is to build theories and models that realistically reflect how geography and opportunity in mathematics education interact. If this challenge is addressed, the field will be one step closer to making scholarship in urban mathematics education visible.

Acknowledgments

A special thank you is extended to Celia Keiko Anderson, Debra Barco, Richard Milner, and Dorothy White for their feedback on this commentary. This article is based on research and development supported by the National Science Foundation under Award No. ESI-0227619. Any opinions, findings, and conclusions or recommendations expressed here are those of the author and do not necessarily reflect the views of the National Science Foundation.

References

- Airhihenbuwa, C. O., & Liburd, L. (2006). Eliminating health disparities in the African American population: The interface of culture, gender, and power. *Health Education Behavior, 33*(4), 488–501.
- Anderson, C. R., & Tate, W. F. (2008). Still separate, still unequal: Democratic access to mathematics in U.S. schools. In L. English (Ed.), *International handbook of research in mathematics education* (pp. 299–318). London: Taylor and Francis.
- Briggs, X. (Ed.). (2005). *The geography of opportunity: Race and housing choice in metropolitan America*. Washington, DC: Brookings Institution Press.
- Brunori, D. (2003). *Local tax policy: A federalist perspective*. Washington, DC: Urban Institute Press.
- Bursik, R. (1988). Social disorganization and theories of crime and delinquency. *Criminology, 26*(4), 519–551.
- Campbell, P. F., Bowden, A. R., Kramer, S. C., & Yakimowski, M. E. (2003). *Mathematics and reasoning skills* (No. ESI 95-54186). College Park, MD: University of Maryland, MARS Project.
- Douglas, L., Esmundo, E., & Bloom, Y. (2000). Smoke signs: Patterns of tobacco billboard advertising in a metropolitan region. *Tobacco Control, 9*, 16–23.
- Foster-Bey, J. A. (2006). Did spatial mismatch affect male labor force participation during the 1990s expansion? In R. B. Mincy (Ed.), *Black males left behind* (pp. 121–147). Washington, DC: Urban Institute Press.
- Gordon, I. R., & McCann, P. (2000). Industrial clusters: Complexes, agglomeration, and/or social networks? *Urban Studies, 37*(3), 513–532.
- Jacobs, J. (1992). *The death and life of great American cities* (2nd ed.). New York: Vintage Books.
- Jones-Webb R., & Wall, M. (2008). Neighborhood racial/ethnic concentration, social disadvantage, and homicide risk: An ecological analysis of 10 U.S. cities. *Journal of Urban Health, 85*(5), 662–675.
- Judd, D. R., & Swanstrom, T. (2008). *City politics: The political economy of urban America*. New York: Pearson.
- Kim, J. J., Crasco, L. M., Blank, R. K., & Smithson, J. (2001). *Survey results of urban school classroom practices in mathematics and science: 2000 report*. Norwood, MA: Systemic Research.
- Lee, C. D. (2008). The centrality of culture to the scientific study of learning and development: How an ecological framework in education research facilitates civic responsibility. *Educational Researcher, 37*(5), 267–279.
- O’Flaherty, B. (2005). *City economics*. Cambridge, MA: Harvard University Press.

- Orfield, M. (2002). *American metropolitics: The new suburban reality*. Washington, DC: Brookings Institution Press.
- Pattillo, M. (2007). *Black on the block: The politics of race and class in the city*. Chicago: University of Chicago Press.
- Rusk, D. (2003). *Cities without suburbs* (3rd ed.). Washington, DC: Woodrow Wilson Press.
- Silver, E. A., & Stein, M. K. (1996). The QUASAR project: The “Revolution of the Possible” in mathematics instructional reform in urban middle schools. *Urban Education, 30*(4), 476–521.
- Sorenson, O. (2003). Social networks and industrial geography. *Journal of Evolutionary Economics, 13*(5), 513–527.
- Spencer, M. B. (2008). Lessons learned and opportunities ignored since *Brown v. Board of Education*: Youth development and the myth of a color-blind society. *Educational Researcher, 37*(5), 253–266.
- Spencer, M. B., Dupree, D., Cunningham, M., Harpalani, V., & Muñoz-Miller, M. (2003). Vulnerability to violence: A contextually-sensitive, developmental perspective on African American adolescents. *Journal of Social Issues, 59*(1), 33–59.
- Stone, C. N. (1993). Urban regimes and the capacity to govern: A political economy approach. *Journal of Urban Affairs, 15*(1), 1–28.
- Stone, C. N., Henig, J. R., Jones, B. D., & Pierannunzi, C. (2001). *Building civic capacity: The politics of reforming urban schools*. Lawrence, KS: University of Kansas Press.
- Tate, W. F. (Ed.) (1996). Urban schools and mathematics reform: Implementing new standards [Special issue], *Urban Education, 30*(4).
- Tate, W. F. (2008). “Geography of Opportunity”: Poverty, place, and educational outcomes. *Educational Researcher, 37*(7), 397–411.
- Webb, N. L., & Romberg, T. A. (Eds.) (1994). *Reforming mathematics education in America’s cities: The Urban Mathematics Collaborative project*. New York: Teachers College Press.
- Wilson, W. J. (1996). *When work disappears: The world of the new urban poor*. New York: Knopf.