People, Places, and Things: Multiple Perspectives on Learning Opportunities for Diverse Populations

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Abstract: In this symposium four researchers offer interconnected perspectives on diversity in learning. Each conducts learning and teaching research with different audiences, in different learning settings, different disciplines, and, sometimes, different language. All four, however, share related theoretical perspectives, common videographic data collection and analysis methods for studying the nature of learning, and an emphasis on analyzing dialogic and gestural communication. They all work, too, with populations that are typically excluded from advancement in academic pursuits. Their research settings span elementary and middle school classrooms, after school settings, and museums. Their common goal is to move beyond mere description of learning in varied contexts, towards abstracting features common to all four research agendas, in order to discuss how these common features impact academic access for diverse populations.

Overview

In this symposium, entitled *People, places, and things: Multiple perspectives on opportunities for diverse populations,* four researchers offer interconnected research perspectives on learning. The researchers' backgrounds, disciplines and areas of expertise differ greatly: Ash (science learning and teaching), Brenner (educational anthropology), Moschkovich (mathematics cognition and learning), and Wells (sociocultural theory and discourse analysis). However, we share related theoretical perspectives, common videographic data collection and analysis methods for studying the nature of the learning, and an emphasis on analyzing dialogic and gestural communication. We also work with populations that are typically excluded from advancement in academic pursuits. Our research settings span elementary and middle school classrooms, after school settings, and museums. Our goal is to move beyond describing learning in varied contexts, towards identifying features common to our research agendas, in order to discuss how these common features impact access for diverse populations.

Such analyses of learning are important for understanding the development of knowledge in both school and out-of-school settings, and they can have practical applications for designing activities that extend throughout the various contexts in which learners find themselves, including school, clubs and museums. Our common focus on learning and teaching goes beyond cognitive factors, to include affective, motivational and social influences. At the heart of such work is the assumption that learning can best be understood by investigating the situated activities in which groups of people engage, employing artifacts and discursive and gestural communication to mediate the achievement of goals that are emergent and negotiated as the activity unfolds.

Everyday Science and Other Antecedents to Scientific Meaning-making for Bilingual Families in Informal Learning Settings like Aquariums

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We know that learners in informal settings bring a rich assortment of prior experience and everyday knowledge to learning, and that they use these as foundations for moving toward scientific understanding. But, until now, research on learning in informal settings has focused on characterizing the activities of the mainstream visitor (Hein, 1999; McManus, 1994). There have been far fewer research studies that elaborate and analyze the science learning activities of culturally and linguistically diverse populations.

In order to document these types of transition, I rely on detailed videographic data of bilingual family dialogue during visits to a predetermined sub-set of exhibits at an aquarium. I use a standardized pre and post interview, and have developed new techniques for data analysis for both the visit and interviews (Ash, 2003). I will discuss the outcomes of these analyses, emphasizing how collaborative bilingual (Spanish-English) social groups, in this case Head Start families, make sense of life science. I analyze the kinds of everyday scientific knowledge that these families bring to the Aquarium setting, and I begin to outline the ways in which these understandings act as necessary antecedents and as linkages to more formal science. I rely on Vygotsky 's theories, specifically, the zone of proximal development, as the region where meaning is negotiated, incorporating both the content introduced by the Aquarium and families' everyday ideas, so that links are created between everyday and formal science.

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Vygotsky, L. S. (1934/1987). Thinking and speech. In R. W. Rieber & A. S. Carton (Eds.), The collected works of L. S. Vygotsky, Volume 1: Problems of general psychology. New York: Plenum.

Case Studies of Successful Mathematics Teaching with Yup'ik Native Alaskan Children

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Culturally relevant pedagogy deals with both the curricular content and the instructional methods used to bring academic content to targeted cultural groups. In the project entitled "Effects of a Culturally Based Math Curriculum on Alaska Native Students' Academic Performance", curriculum units based upon traditional Yup'ik Native Alaskan life (Lipka et al. 1998) have been developed and tested with a variety of elementary classrooms in Alaska, including native and non-native children in both rural and urban areas, with matched comparison classes receiving the standard mathematics curriculum.

Pre/Post test score gains showed that the experimental units significantly boosted mathematical learning and helped to close the achievement gap between rural children and urban children, although not all classes experiencing the units made equal gains. Fidelity of treatment analysis of videotapes made in each class did not explain the variation in achievement between the different classes. In particular, teachers with students who were transitioning from Yup'ik language to English had difficulty in engaging students in the mathematical communication as planned by the curriculum developers. This paper examines the discursive practices of native and nonnative teachers who had varying levels of success with the curriculum units. It is hypothesized that the successful teachers combined elements of traditional Yup'ik teaching, in particular nonverbal modeling, to engage students in the mathematics as a prelude to more verbal forms of mathematical communication (Brenner 1994).

Brenner, M. E. (1994). A communication framework for mathematics: Exemplary instruction for culturally and linguistically diverse students. In B. McLeod (Ed.), *Language and Learning: Educating Linguistically Diverse Students (*pp. 233-267). Albany: SUNY Press.

Lipka, J, with G. V. Mohatt and the Ciulistet Group (Eds.) (1998). Transforming the culture of schools: Yup'ik Eskimo examples. Mahwah, NJ: Erlbaum.

"I went by twos, he went by ones:" Multiple Ways of Talking About Graphs

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Current mathematics education standards call for increasing mathematical discussions in classrooms. One reason for calling for more discussions is that we believe that content-focused dialogue supports learning and understanding mathematics (Brenner, 1994; Moschkovich, 1996; Tharp and Gallimore, 1991; Vygotsky, 1987). This paper explores how mathematical discussions support understanding and what resources participants use to develop understanding. The paper describes a particular kind of classroom mathematical discussion, one that involved multiple perspectives and ways of talking about a mathematical representation. I use a situated and sociocultural perspective on learning mathematics to address the following questions. What were the multiple interpretations of this mathematical representation? What resources did the participants use to socially construct

an understanding of the scales on the axes? I use transcript excerpts to illustrate multiple meanings for the phrase "I went by" and multiple views of the scales on a graph.

The data is taken from a yearlong series of classroom observations and videotaped lessons collected in a bilingual eighth-grade classroom. In this classroom students represented stories of bicycle trips using tables and graphs. The discussion occurred between two students and a teacher as they explained scales on the graphs they had constructed for a problem about a bicycle trip.

Brenner, M. (1994). A communication framework for mathematics: exemplary instruction for culturally and linguistically diverse students. In McLeod, B. (ed.), Language and Learning: Educating Linguistically Diverse Students, Albany, NY, SUNY Press, pp. 233-268.

Moschkovich, J.N. (1996). Moving up and getting steeper: Negotiating shared descriptions of linear graphs. Journal of the Learning Sciences, 5(3), 239-278.

Tharp, R., Gallimore, R. (1991). The Instructional Conversation: Teaching and Learning in Social Activity. The National Center for Research on Cultural Diversity and Second Language Learning, Research Report: 2.

Vygotsky, L. S. (1987). Thinking and Speech. In R. Rieber & A. Carton (Eds.), The collected works of L. S. Vygotsky, Volume 1 , Problems of General Psychology (pp. 39-288). New York: Plenum Press.

Diversity as Outcome of Education

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It is now widely accepted that states and nations should ensure that diversity in students' ethno-linguistic, class or religious backgrounds does not lead to inequitable differences in opportunity and support. This is an excellent goal, even though it is rarely achieved in practice. However, just as important as recognizing and valuing such diversity in incoming students' backgrounds is valuing diversity of outcome, in terms of the expertise, interests and aspirations they develop in the course of their education (Lemke, 2002). Such diversity of outcome is inevitable, of course, given the differences among students in their individual experiences. However, my argument is that, rather than attempting to overcome diversity, we should both value and encourage it, since the long-term ability of any society to survive and prosper depends on it.

The question to be addressed, therefore, is how this goal can be combined with the equally important goal of enculturating all students into the knowledgeable skills considered necessary for responsible and productive participation in society (Engeström, 1999). The answer I shall propose, drawing on both theory and research, is to approach the curriculum as a forum for inquiry, where students are presented with challenges and problems and assisted and encouraged to develop, argue for and revise explanations and solutions through practical investigation and collaborative and reflective discussion (Wells, 1999). In this approach, the mastery of skills and the acquisition of information are treated as means necessary to engage effectively with the presenting challenges and problems. At the same time, alternative values, beliefs and arguments are the very stuff from which the progressive construction of both individual and common understanding are achieved.

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Lemke, J. L. (2002). Becoming the village: Education across lives. In G. Wells & G. Claxton (Eds.), *Learning for life in the 21st century: Sociocultural perspectives on the future of education* (pp. 34-45). Oxford: Blackwell.

Wells, G. (1999). *Dialogic inquiry: Towards a sociocultural practice and theory of education*. Cambridge: Cambridge University Press.