

## EDITORIAL

### MATHEMATICS EDUCATION AND CULTURAL-HISTORICAL THEORY

We are very pleased to share this special issue of "Mathematics Education and Cultural-Historical Theory" with the public. We herein assume the challenge of promoting a debate between different forms and possibilities of taking ownership of the Cultural-Historical Theory in the mathematics education field and, at the same time, of explaining convergences and similarities that represent different groups of researchers in both Brazil and abroad. The Cultural-Historical Theory has originated from studies by Vigotski, Leontiev, Davidov, as well as from studies conducted by their followers. This theory has gained space as an important theoretical reference in studies of educational or psychological nature. A growing number of researchers has been using such approach to support their investigations, especially in the mathematics education field.

By considering aspects such as the theoretical and methodological foundations on language, mediated teaching and learning processes, conceptual movement, activity, cultural mediation, and teacher's learning and evaluation, the current special edition presents articles that take the Cultural-Historical Theory as basis to indicate possibilities of investigating issues involving both the mathematical knowledge and the mathematics teacher's education, as well as the teaching of mathematical knowledge and the learning of Mathematics, by revealing some of their classroom practices at different education levels. The current special edition presents 11 articles by authors from Canadian, Mexican and Brazilian universities.

The first three articles approach the mathematical knowledge. The first one was written by Wolff-Michael Roth from University of Victoria, Canada. It presents a Cultural-Historical critique of object-oriented learning activity notions. The author uses classroom episodes as examples and proposes an alternative based on Vigotski's commitment to social primacy, according to whom any higher mental function was once a social relationship between two individuals. Thus, his theory allows the final product to be available at the present time - as a relationship and without the student's awareness - and determines learning and development processes.

The second article, entitled "Theoretical approaches of the Historical-Critical Pedagogy to understand the universality of mathematical knowledge: implications for teaching", was written by José Roberto Boettger Giardinetto from São Paulo State University (UNESP - Universidade Estadual Paulista), Bauru Campus. The study approaches issues such as the mathematical knowledge universality, its concept, procedural logic and some implications for its teaching. The Historical-Critical Pedagogy is used as theoretical reference, since such pedagogical trend adopts the dialectical historical materialism as method to analyze the educational process.

Maria Lucia Panossian, Maria do Carmo de Sousa and Manoel Oriosvaldo de Moura continue the debate about mathematical knowledge, although with emphasis on algebra. Their article discusses the conceptual links of the algebraic knowledge under the perspective of the historical and logical movement of the concepts. The theoretical study was carried out by taking as singular some episodes evidenced in the history of algebra and by acknowledging, among their particularities (manifestations of language, of ways of thinking, etc.), the conceptual links forming the algebraic thinking, namely: the link between the overall varying quantities.

The fourth article in the current special edition opens the debate about mathematics teachers' education. It was written by Vanessa Dias Moretti, Edna Martins and Flávia Dias de Souza and presents the main theoretical assumptions of the dialectical historical method. Such method

justified the investigations conducted by Vigotski and his collaborators. It also presents some contributions from the Cultural-Historical approach to help in understanding the phenomena related to the human learning and development processes. The article is based on the analysis of theses and dissertations that have used such approach in studies about mathematics teachers' education. It highlights the fundamental aspects about the monitoring, understanding and analysis of the phenomenon investigated in the light of theoretical elements.

The fifth article was written by Anelisa Kisielewski Esteves and Neusa Maria Marques de Souza. It presents the results of a study focused on discussing the content and the form of the education activity of mathematics teachers who work in the early years of Elementary School. The research data come from a full-time continuing education course conducted by researchers with a group of teachers from a municipal school of Campo Grande County, Mato Grosso do Sul State, Brazil, during 2013 and 2014.

The article, entitled "Changing teachers' mathematical knowledge during their teaching activity", by Wellington Lima Cedro, discusses the changing process in the mathematical knowledge of future Mathematics teachers. Based on the theoretical framework provided by the Cultural-Historical approach of Psychology and, mainly, of the Activity Theory, the author focuses on the mathematical knowledge of teachers from the movement that inserts them in the educational activity. He analyzes data from an organized formative experiment developed with Mathematics pre-service teachers from a Brazilian public university, throughout a school year.

The seventh article, entitled "Program for solving problems as method for development of logic thinking in school children", was written by Yulia Solovieva and Luis Quintanar-Rojas of the Meritorious Autonomous University of Puebla, and by Yolanda Rosas-Rivera of the Child Psychology and Neuropsychology Institute (INPI - Instituto de Neuropsicología y Psicopedagogía Infantil), Mexico. It starts the debate about issues related to Mathematics teaching and presents the method used to teach the problem solving process in Primary School. The program was created for this purpose and takes into consideration the logical structure of the solution process, as well as the orientation content. The participants in the study were regular students of a private primary school located in Puebla County, Mexico. The children were assessed before and after their participation in the program. The qualitative assessment comprised tasks concerning logical relations and problem solving. The program was applied during 30 sessions in the classroom.

The article "Contributions of the Cultural-Historical theory to mathematics teaching in the early years of school" was written by Joselia Euzebio da Rosa, Ana Paula da Silva Galdino and Luciane Pandini Simiano. The authors focus on the principles of the Cultural-Historical Theory for the organization of Mathematics teaching and present an educational activity that approaches mathematical concepts such as quantity, unit, counting, number, addition and multiplication.

The article by Sueli Cristina Locatelli and Silvia Pereira Gonzaga de Moraes addresses issues related to the Mathematics teaching organization in the second year of Elementary School. The authors use the school tasks found in notebooks and books to understand how geometric concepts are developed in such education level.

The article by Maria Silvia Rosa Santana and Suely Amaral Mello assumes the need for a new school culture to emerge in order to encourage the development of a study activity able to guide and promote the development of Higher Mental Functions in the Elementary and High School. The authors discuss some concepts of the Cultural-Historical Theory and point out their implications on guiding the thinking and acting of teachers committed to developmental education.

The last article in the current special issue was written by Luis Radford, from the Laurentian University, Canada. It presents the Theory of Objectivity (TO) and its relation with the Cultural-Historical Theory. The author suggests reformulating the concept of activity as a joint work able to form the basis of rethinking the teaching and learning process as a Cultural-Historical ethical phenomenon, as well as of providing the TO with a different orientation in the socio-cultural research.

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Editors of the Special Edition