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English editorial

Thematic Issue – Algebraic Education

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In 2003 it was created at the Pontifical Catholic University of São Paulo (PUC-SP) and accredited with CNPq the Research Group on Algebraic Education (GPEA). In these sixteen years of activity, the Group has produced research contemplating reflections on different aspects related to teaching and learning algebra at different levels of education. In order to contribute to the wide dissemination and discussion of investigations of Brazilian and foreign researchers dedicated to Algebraic Education, GPEA, through its members Profa. Dr. Barbara Lutaif Bianchini and Prof. Dr. Gabriel Loureiro de Lima, proposed the thematic issue entitled Algebraic Education of the Education Mathematical Research Journal - EMP, volume 21, number 3 of 2019. For this issue, was invited as special editor. Dr. Alessandro Jacques Ribeiro, researcher who has Algebraic Education as one of his focuses of interest and who, at the Federal University of ABC (UFABC), leads the Research Group "Mathematical Education for Teaching: professional teaching knowledge and curriculum development (FORMATE).

This thematic issue consists of 20 articles, three focusing on the Early Years of Elementary School; nine dealing with the teaching and learning of algebra in the final years of elementary school; one that brings reflections related to both the final years of elementary school and high school; two that present considerations on issues related to

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algebra in high school; two that refer to Algebraic Education in Teacher Education; a focused analysis concerning Algebra Undergraduate Education; and two articles that do not deal with a specific level of education: one is a research mapping and the other a discussion of algebra from the philosophical point of view. In this thematic issue, we had the contribution of authors from five different countries, namely, Brazil (14 articles), Portugal (2 articles), Chile (1 article), Spain (1 article), Mexico (2 articles, one of them in partnership with a Brazilian researcher and another authored by an Italian researcher, but who is linked to a Mexican university).

Bianchini, Lima and Machado, in *O Grupo de Pesquisa em Educação Algébrica (GPEA): mapeamento de algumas de suas produções*, based on dissertations and theses defended by GPEA members from 2003 to 2018, they aim to map some aspects of these productions, focusing on the five most recurring themes in the Group's research: Numbers and Operations, Generalization of Standards, Function, Linear Algebra and Equations.

In *O ensino de Álgebra e a filosofia de Wittgenstein: sobre regras e essência*, Teixeira Junior and Silveira the objective is to analyze some aspects related to the language involvement with Algebra, made possible by the approach of Wittgenstein 's therapy and that lead to new reflections on the teaching of this discipline.

Cabral, Oliveira and Mendes proposed in the article *O pensamento funcional e a capacidade de perceber o pensamento funcional de futuras educadoras e professoras dos anos iniciais*, to characterize the functional thinking of future educators and teachers their ability to perceive the functional thinking of early learners in solving tasks on growing pictorial sequences.

In the paper *Entendendo e discutindo as possibilidades do ensino de Álgebra nos anos iniciais do Ensino Fundamental*, Oliveira and Paulo bring reflections on teachers' understanding of algebraic thinking and the possibilities of teaching algebra in the early years of elementary school based on evidence from research in mathematics education.

Jungbluth, Silveira and Grando, in *O estudo de sequências na Educação Algébrica nos Anos Iniciais do Ensino Fundamental*, proposed to describe and understand the use of patterns in repetitive and recursive sequences, which may contribute to develop the idea of generalization, promoting the algebraic thinking of students of the Early Years.

In the article *O trabalho dos estudantes da escola média com variável algébrica: uma comparação entre a Itália e o México*, Ursini conducts a comparative study of the performance of 214 Italian students (11 to 14 years old) and 191 Mexican students (12 to

15 years old) working with the algebraic variable to detect similarities, differences and mistakes most frequently made.

In *A educação algébrica e a resolução de problemas numéricos no 6º. ano do ensino fundamental: prelúdio ao pensamento algébrico*, os autores Campos and Farias analyze the conditions and restrictions so that a Didactic Sequence elaborated for the teaching of natural numbers could be implemented in the 6th Elementary School Year, not as a teaching model, but as a proposal designed for the development of algebraic thinking.

Almeida and Santos, in the paper named *Níveis de desenvolvimento do pensamento algébrico de estudantes dos anos finais do ensino fundamental: o caso dos problemas de partilha*, the authors look for elements to answer the following question: What is the level of development of algebraic thinking of students in the final years of elementary school when solving sharing problems? For this study, they considered the problems of quantity sharing, which are the most proposed in Brazilian textbooks for the teaching of polynomial equations of the 1st degree.

In the work whose title is *Iconicidade: a produção de significações para o desenvolvimento do pensamento algébrico por alunos do 7.° ano*, Pereira and Nacarato aim to point out indications of the iconicity process for the development of algebraic thinking from the interactions and mediations in a 7th grade classroom.

Lasa, Cabezón, Wilhelmi and Abaurrea, in the article *El problema del caftán: Proporcionalidad como herramienta óptima en un problema de resolución de ecuaciones*, present a didactic analysis of the resolutions given by 13-year-old students to a classical Russian recreational problem entitled *The Caftán Problem*.

In the paper *Processos de objetificação no desenvolvimento do pensamento algébrico: o caso de Evandro*, Regis and Kawasaki analyze the objectification processes experienced by an 8th grade student (Evandro), when engaging in tasks of observing patterns and algebraically generalizing that integrated didactic interventions carried out with the aim of provoking the development of algebraic thinking.

In *Ensino de conceitos matemáticos para estudante com deficiência visual em situação de inclusão*, Mamcasz-Viginheski, Silva and Shimazaki aim to discuss a teaching proposal to promote the development of algebraic thinking in a class with a visually impaired student.

Langwinski and Bassoi, in the article named *A prática do professor no ensino de Álgebra e os Registros de Representação Semiótica*, aim to understand the way the teacher mobilizes the algebraic contents in mathematics classes.

In the paper *Ações de professores na elaboração e implementação de tarefas envolvendo conceitos algébricos*, Vieira, Trevisan and Baldini analyze the actions of mathematics teachers, empowering for the production of meanings to algebraic concepts, in the moments of elaboration and implementation of tasks constituted in the context of a study group.

In work entitled *Perfil conceitual de equação como uma abordagem de ensino: explorando diferentes significações*, Ribeiro and Alves has the aim to describe how the different meanings of the equation concept are mobilized and used by two teachers, when developing Mathematics classes in Basic Education, in an approach based on conceptual profile.

Campos and Parraguez in *Entendendo sistemas de equações lineares: um estudo de caso no contexto da escola no Chile*, has the goal to study and to highlight, from the Modes of Thought theory, the understanding, by students from 14 to 15 years old, of the concept of a set solution of systems of linear equations.

In the paper *Conhecimento do professor sobre dificuldades de aprendizagem no tópico adição de expressões algébricas no Ensino Médio*, Sosa, Guzmán and Ribeiro, objective to characterize the knowledge of two mathematics teachers in continuous formation about the students' learning difficulties related to the mathematical content and the addition of algebraic expressions.

Vale and Barbosa, in work entitled *Pensamento algébrico: contributo da visualização na construção da generalização*, characterize the algebraic thinking of future elementary school teachers (3-12 years) in solving tasks involving figurative patterns.

In *Generalização de padrões algébricos no ensino via resolução de problemas: compreensão de licenciandos em Matemática*, Proença analyzes the understanding of pre-service mathematics teachers in the process of generalizing algebraic patterns, focused on the work that involves teaching via problem solving.

Assis, in the paper *Formação do conceito de transformação linear de acordo com os pressupostos de Davydov*, aims to understand and analyze the contributions of Davydov 's theory of developmental teaching to the teaching of Linear Algebra, in order to learn the concept of linear transformation.

We hope you enjoy reading the articles in this thematic issue and that the reflections and results presented in them raise new horizons for Mathematical Education and, in particular, for Algebraic Education.

The Editors.