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# Editorial

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This is the first issue of Revista Educação Matemática Pesquisa published in 2022. This year, we are editing the issues of volume 24, sharing with our readers the results of scientific research in the field of mathematics education. The articles published in this first issue of volume 24 disseminate results from scientific investigations of researchers from different regions of Brazil and other countries, covering a diversity of national and international research groups and institutions. We have a differential in this issue, the publication of five important articles by Nicolas Balacheff, which have already been published, but which were specially translated for this journal.

We believe that the scientific debate that will be fostered by sharing those articles will contribute to the construction of new knowledge for the area of mathematics education. Moreover, the articles published in this issue bring a plurality of theoretical and methodological references that also strengthen scientific research in our area.

Volume 24.1 presents 20 articles that deal with problem solving, ethnomathematics, mathematical modeling, financial education, proportionality, algebra, teacher education, teachers who teach mathematics, use of videos and software, considering different levels of education. Adding to these 20 articles, five more articles by Nicolas Balacheff are published, translated by Saddo Ag Almouloud and Méricles Thadeu Moretti.

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Below, we make a brief presentation of the texts that are part of this first 2022 issue of the journal.

The first article, *Financial Education with Students of the 2nd Grade of High School of Youth and Adult Education (EJA) in the Municipality of Irupi – ES*, is authored by Luiz Paulo Xisto and Marco Aurélio Kistemann Jr.. The article presents an investigation into the presence of financial education in the context of Youth and Adult Education (EJA). The authors investigated the students' production of meanings and decision-making in solving problems on financial education and entrepreneurship. As a result, they present an educational product that contributes to the mediation of situations in scenarios for investigation with financial themes.

The article *A Study on the Additive Conceptual Field and Problem-situations of the Class of Extensions Elaborated by Students of the Degree in Pedagogy* is authored by Adriana Nogueira de Oliveira, Ana Carolina Costa Pereira and Maria Auricélia Gadelha Reges. The authors present a study that discussed problem-situations of the additive conceptual field, involved in the class of extensions, developed by a group of Pedagogy undergraduate students. They conclude that the undergraduates involved had some difficulties in developing problem situations that involve more sophisticated reasoning about the additive conceptual field, which reveals that the concepts of addition and subtraction must be deppened in the initial education of early years teachers.

The third article, by Nilton Cezar Ferreira, Egídio Rodrigues Martins, Glen Cézar Lemos, and Maxwell Gonçalves Araújo, is called *Knowledge Produced through Pibid Activities*. The authors investigated possible teaching knowings, built through activities developed by undergraduate students in Mathematics, members of the Institutional Teaching Initiation Scholarship Program – Pibid –, and the students' relationship with this knowings. As a contribution, they point to the importance of promoting studies and debates on interactionist

and phenomenological issues that evidence teaching knowledge during the effective work of Pibid.

Luana Letícia da Silva and Marcus Bessa de Menezes are the authors of the article *High School Equations in Videoclasses: a Praxeological Analysis on Youtube Edu*. The researchers analyzed video lessons from two mathematics channels on the Youtube Edu platform on quadratic equations from the perspective of mathematical praxeologies and ostensive objects. And they point out that in the mathematical praxeologies of the video classes, one of the techniques to solve the equations was priviledged. The ostensive objects evidenced in the video classes were different in both channels, and the use of ostensive technological editing more professional suggests greater user access to the platform.

The fifth article, *Analysis of Mathematical Knowledge for Teaching in a Lesson Study: a Path to Producing Professional Learning Tasks*, is authored by Silmara Ribeiro Rodrigues, Henrique Rizek Elias, and André Luis Trevisan. This study had two objectives: to analyze the mathematical knowledge for teaching mobilized by a teacher when participating in a lesson study cycle; and to present the process of constructing a professional learning task, developed from authentic samples of practice obtained from data produced during a cycle of the lesson study. The results indicate that the lesson study provides opportunities for the prospective teachers' development/refinement of mathematical knowledge for teaching (MKT).

The article *Mathematical Modeling as Pedagogical Practice: A Possible Characterization in Mathematics Education*, is authored by Maykon Jhonatan Schrenk and Rodolfo Eduardo Vertuan. The authors present a characterization of mathematical modeling as a pedagogical practice. And they emphasize that the pedagogical practice of modeling begins much earlier and extends beyond the performance of the activity in the classroom, denoting the importance of planning and reflection on the practice. They also indicate that it enables students

to understand the importance of mathematics for their education and for coping with different situations.

The seventh article, authored by Ingrid L. R. Gonçalves, Aleandra da S. Figueira-Sampaio, and Eliane E. F. dos Santos, is entitled *Didactic-Methodological Strategies with Sieve of Eratosthenes Software in Teaching and Learning of Divisibility Criteria.* The authors present didactic-methodological strategies with the software Sieve of Eratosthenes for teaching and learning the criteria of divisibility by 3 and by 5. With the study, they expect that the strategies can modify the school routine, allowing independence in the learning process and stimulating students' autonomy and cooperation with their classmates.

Adriana Jungbluth, Everaldo Silveira, and Regina Celia Grando are the authors of the article entitled *Algebra in the Mathematics Curriculum of the Early Years of Elementary School: The Teachers' Voice*. The authors investigated the knowledge of teachers in the early years of elementary school about algebra and its teaching. As a result, they point out that teachers did not show to have content and curriculum knowledge, in aspects such as the relationship between working with sequences and generalization, the importance of working with the sense of equivalence of equality, and the use of relational thinking, highlighting the need for training on topics that contribute to the development of algebraic thinking.

The ninth article, *Previous Conceptions and Continuing Education in Mathematical Modeling: Noticing this Relationship*, is authored by Marcio Virginio da Silva and Tiago Emanuel Klüber. The study aimed to investigate previous conceptions of teachers in continuing education on mathematical modeling. The authors suggest that it is exactly the teachers' fears, such as losing rigid control of the classroom dynamics, the indiscipline of the students, the insecurity when dealing with mathematical modeling, and the change in the dynamics of the classroom driven by the modeling, that make the student a dynamic agent of the class.

*The article Research as an Educational Principle in Interventions with Mathematical Modeling in Basic Education: Analysis of Theses and Dissertations through a Systematic Review of Literature*, by Jefferson Dantas de Oliveira and Isabel Cristina Machado de Lara, seeks to understand how research as an educational principle is approached in interventions with mathematical modeling in basic education. The results show that in an intervention with modeling, the search for content on websites of the World Wide Web or data collection are examples of the act of conducting research for students.

The eleventh article, by Neomar Lacerda da Silva and Andréia Maria Pereira de Oliveira, is entitled *Learning of Teachers who Teach Mathematics Mediated by Participation in Teacher Literacy Practices*. The authors investigated the learning of teachers who teach mathematics mediated by participation in teacher literacy practices. As a contribution, the study indicates learnings that were constitutive of the organization of the reading and writing practice itself, of what is read and written and how this was carried out in that context and how it had an impact on teaching practice.

Fabio Borges, Sani de Carvalho Rutz da Silva, Lucia Virginia Mamcasz Viginheski, and Elsa Midori Shimazaki are authors of the article *School Inclusion Process of a Blind Student in Mathematics Classes*. The methodological processes and didactic resources used in the teaching of mathematics to a visually impaired student and the process of inclusion in the school environment were analyzed. The authors point out that there are many challenges and barriers that are present in the implementation of the student's inclusion, in particular, the overcrowding of the class, the lack of teacher training for inclusive teaching, the lack of adapted materials, the absence of tactile flooring in the school, in addition to other forms of structural accessibility.

The thirteenth article is by Daniela Inês Baldan da Silva, Alessandro Jacques Ribeiro, and Márcia Aguiar, and is called *Unveiling Paths to Professional Learning for Teachers Who*

*Teach Mathematics in the Early Years: Analysis of a Educator's Actions.* It aims to investigate opportunities for professional learning made available to teachers during a teacher education activity and focuses on the analysis of the training planning and the educator's actions to develop it. The results suggest that the teacher's choices enabled articulating the mathematical and didactic dimensions, bringing academic mathematics closer to school mathematics, linked to algebraic thinking, and favored discursive interactions based on argumentation and justification and in moments of individual and collective work, with the aim of increasing knowledge.

Janaína Mota Fidelis, Camila Peres Nogues, Elielson Magalhães Lima, and Beatriz Vargas Dorneles are the authors of the article *The Influence of Reading Comprehension in the Resolution of Mathematical Problems: A Study with Children in the 3rd and 4th Grades of Elementary School*. The article aims to analyze the relationship between reading comprehension skills and performance in solving mathematical problems, also considering quantitative reasoning. The results show that there was no significant association between reading comprehension and problem solving, however a significant association was found between problem solving and quantitative reasoning and between quantitative reasoning and reading comprehension.

The fifteenth article is authored by Paulo Jorge Magalhães Teixeira and is entitled *"Grelha Retangular 3 x 4" Game: A Proposal for the Development of Probabilistic Reasoning*. The authors present a teaching and learning proposal about basic contents of combinatorics and probability, through a board game named *Grelha Retangular* 3 x 4 [rectangular grid]. As a result, they point out that the proposal aims to encourage the appropriation, exercise, and development of combinatorial reasoning, using a tree diagram to show possibilities for players' decision making when moving pet bottle caps on the board.

The article *Analysis of Effective Practices of Students in Spatial Geometry Mediated by Previous Descriptions of Techniques of Representation of Geometric Solids in a Paper/Pencil Environment*, by Márcio Silveira Ramos, Afonso Henriques and Elisângela Silva Farias, presents an analysis of the practices of high school 2nd graders when they perform tasks on the representation of geometric solids in the paper/pencil environment, from the manipulation of models of concrete object construction projects (PCOC). The results reveal that the students are able to represent the solids considered in the paper/pencil environment, but they do not indicate nor describe the techniques they use in those representations during the performance of the tasks.

The seventeenth article, *Subjectivity and Mathematical Learning: Mapping*, is by Marcelo Bezerra de Morais and Jhonatan Phelipe Peixoto. It presents a research of the state of knowledge type, which has a basic, exploratory nature, with a mixed approach, and bibliographic character, using 17 works to compose the research corpus. The study indicates a large concentration of productions in the South and Southeast regions of the country and in programs in the area of education. The authors also indicate that despite the importance of the theme, the volume of works is not very expressive, indicating the need for more productions addressing the subject.

Méricles Thadeu Moretti and Lucilene Dal Medico Baerle are the authors of the article *The Use of Auxiliary Representations in Mathematical Learning: a Semiocognitive View According to Raymond Duval*. The article aims to analyze the use of auxiliary representations in mathematics teaching from the point of view of Raymond Duval's semiocognitive theory of mathematical learning. In his analyses, a semiocognitive comparison is made between the didactic representations created and the main representation, which characterizes the mathematical object. As a result, he points out the relevance of these representations created to

understand better the semiotic systems used, as they can provide opportunities for the discrimination of significant units through the treatment operation.

The nineteenth article is by Reinaldo Feio Lima, Clélia Maria Ignatius Nogueira, and Clodis Boscarioli, and is entitled *Pedagogical Practices Mediated by Digital Technologies in Inclusive Mathematics Education: An Exploratory Study*. The authors analyze Brazilian scientific publications, with the aim of identifying what research in inclusive mathematics education that considers digital technologies indicates about teachers' pedagogical practice. The results show that the insertion of technologies in teaching leads to the displacement of pedagogical practices, which take place in a different context of the common classroom, exactly at the time of the development of the mathematical content, while the integration of technologies in the pedagogical practice promotes actions shared pedagogical, characterized by constant interaction between teachers and students. This article has a Portuguese and an English version.

Elisângela Aparecida dos Santos, Lucineia Oenning, and Márcio Urel Rodrigues are the authors of the article *Psychology, Educational Psychology or Mathematics Education Psychology in Mathematics Teachers' Initial Education in Brazil?* This article discusses how the discipline of Psychology is explained in the pedagogical projects of Mathematics degree courses in Brazil. As a contribution, the authors suggest that, in addition to the disciplines of Psychology and Educational Psychology, the discipline of Psychology of Mathematics Education should be incorporated into the curriculum in Mathematics degree courses, as they understand that the knowledge of psychology needs to be articulated with the mathematics education to contribute to the training of mathematics teachers.

The next five articles are translations of already published articles by Nicolas Balacheff. They were translated by Saddo Ag Almoloud and Mericles Thadeu Moretti.

The first article, *A Study of Students' Proving Processes at the Junior* High-School Level, seeks to identify the foundations of students' belief in the validity of a statement in their mathematical activity: what they recognize in practice as a proof and how they treat a refutation. Balacheff highlights that the teaching of proof is associated with what could be described as a cognitive break in student activity, related to the didactic break represented by the new requirement of mathematical tests.

The second article is entitled *Students' Conceptions: An Introduction to a Formal Characterization* and is authored by Nicolas Balacheff and Nathalie Gaudin. They propose to formalize the notion of "conception" as a possible tool to respond to the complexity of modeling students' mathematical knowledge. As a result, they present a case study to illustrate how the notions of "conception", "knowing" and "concept" are related to each other.

The third article, *Mathematical Argumentation: A Problematic Precursor of Demonstration*, aims to present the text by Balacheff discussed at the 2019 CORFEM conference. The article is divided into four parts: a) it clarifies the terms explain, argue, prove, and demonstrate and their relationships; b) emphasizes the importance of the connection between conceptions and argumentation; c) addresses the issue of the role of language; d) the return to validation situations allows to pose the problem of mathematical argumentation.

Balacheff's fourth article is entitled *Control, Proof, and Demonstration. Three Regimes of Validation*. The article questions the advances in research on the learning and teaching of demonstration and its ability to shed light on the implementation of current French mathematics programs.

And the last article, *Devolution of a Problem and Construction of the Case of the Sum of the Angles of a Triangle*, features the principles of design, implementation, and analysis of a sequence of situations designed to generate debate about proofs and refutations. The author

takes on the challenge of rejecting empirical evidence to pave the way for intellectual evidence on which teaching could base the introduction of mathematical proof.