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The mathematics education journal *Educação Matemática Pesquisa* publishes a new issue! For over 20 years we have shared with our readers the results of scientific research in the field of mathematics education. The articles published in this volume disseminate results from scientific investigations of researchers from different regions of Brazil and abroad, revealing a plurality of national and international research groups and institutions. We understand that the scientific debate favored by the sharing of these articles contributes to the construction of knowledge in the field of mathematics education. In addition, the articles published in this issue present a plurality of theoretical and methodological references that also strengthen scientific research in our area.

Volume 22.1 presents 31 articles on state of knowledge and mapping, concept maps, digital technologies, problem solving, mathematical modeling, ethnomathematics, evaluation, teacher education, field education, early childhood education, curriculum materials and textbooks.

Below, we present briefly the texts that are part of this issue of our journal.

The first article, titled *Estado do conhecimento da produção científica sobre formação de professores para o ensino de Estatística* (State of knowledge of scientific production on teacher education for statistics education), by Karla Priscila Schreiber, Mauren Porciúncula, presents a state of knowledge of scientific production on teacher education involving statistics education. In analysing the content of the 17 articles they selected, the authors considered two categories. In the first category, focusing on the initial formation of the mathematics teacher, research emerged about undergraduate curriculum, pedagogical strategies and technological resources. In the second one, in which the continuous education of the statistics teacher was observed, investigations on training courses, collaborative contexts, pedagogical activities, teaching perceptions and profile

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characterization emerged. A leading role of the studies on continuing education, especially through courses and collaborative practices, was identified.

The article *A utilização de mapas conceituais em uma investigação acerca da prática docente* (The use of concept maps in an investigation about teaching practice), written by Cleusiane Vieira Silva and Saddo Ag Almouloud, presents an investigation about teaching practice and its influence on the construction of geometric concepts, using as collection tools a questionnaire and concept maps. One of the main results pointed out by the authors is that the teachers, in the moments of interaction when constructing the concept maps, observed the network of symmetry-related content.

The third article is entitled *A linguagem simbólica e a resolução de problemas matemáticos no 8º ano do Ensino Fundamental* (The symbolic language and mathematics problem solving in the 8<sup>th</sup> grade of Middle School), by André Ricardo Lucas Vieira, Pedro Paulo Souza Rios and Carlos Alberto de Vasconcelos. The aim of this paper is to investigate difficulties encountered by 8<sup>th</sup>-grade students from a state public school in the municipality of Senhor do Bonfim/BA to use mathematical symbolism in the process of problem solving. As a result, the authors point out, mainly, the non-association of mathematical contents with everyday events, the low appreciation of favorable environments for the exchange of experiences and the excess of formalism on the teacher's side.

The article *A produção brasileira em Educação Estatística avaliada pela análise das teses* (The Brazilian production in statistics education evaluated through the analysis of theses), authored by Lori Viali and Magnus Cesar Ody, maps the Brazilian production of statistics education theses produced until the middle of 2018. The authors point out that studies involving statistics education are growing slowly in the country, however the production of theses may increase due to the recent growth in the number of PhD courses in the area of teaching.

The fifth article, entitled *Limites e possibilidades no planejamento e desenvolvimento de atividades com complexos de estudo na Educação do Campo* (Limits and possibilities in the planning and development of activities with study complexes in field education), is written by Línlya Sachs e Larissa Geovana Corrêa. The authors analyze the limits and possibilities in the planning and development of a pedagogical proposal based on a complex study, entitled *Luta pela Reforma Agrária* (Struggle for agrarian reform). For this, a pedagogical intervention was carried out in a 7<sup>th</sup>-grade middle school class of a rural school in an agrarian reform area in Londrina, Paraná. According to the outcomes,

the following possibilities stand out: connection with reality, discussion of current issues, interest in homework, articulation with other students' knowledge and use of the reality inventory. On the other hand, interdisciplinarity and collective work among teachers appear as some limitations in the work with the complexes of the study.

The article entitled *Formação continuada do professor pedagogo em Matemática: reflexões a partir da abordagem de Stephen Ball* (The mathematics teacher's continuing education: reflections based on Stephen Ball's approach), written by Sueli Fanizzi, investigates continuing education actions in mathematics for teachers of the early years of elementary school through an interview with the teacher trainer. The researcher used for her analysis Stephen Ball's approach of the continuous cycle of public policies, revealing that official actions define and direct teaching practice to the detriment of the teacher's real demands.

The seventh article, by Juliana Alves de Souza and Regina Luzia Corio de Buriasco, is entitled *Influences of the nature of evaluation on the use of cribbing*. The text presents and discusses aspects of the influence of the nature of an evaluation instrument students use as a teaching strategy. Realistic mathematics education was used as a teaching approach, not intending to promote the traditional cribbing, but aiming to reconstruct the idea, and, through this reconstruction, use it as a study resource.

The article *Era uma vez, um, dois, três: estudos sobre como a literatura infantil pode auxiliar no ensino da construção do conceito de número* (Once upon a time, one, two, three: Studies on how children's literature can help in teaching the construction of the concept of number) is authored by Rafael Montoito and Aline Vieira da Cunha. It presents a study about the presence of mathematical elements in children's stories (classical tales) that can contribute for children in early childhood education to develop the mental processes necessary for the construction of the concept of number. The text points out some examples with which the teacher can work on the concepts of correspondence, comparison, ranking and ordering.

The ninth article is titled *Ações do professor para promover discussões matemáticas produtivas em um contexto de modelagem e criptografia* (Teacher actions to promote productive mathematical discussion in a context of modeling and cryptography), and is authored by Angelina Alvarado Monroy and María Del Carmen Olvera Martínez. Some teacher's actions were analysed when developing activities in which cryptography was considered an encouraging context to motivate students and extract meaning from the

concept of function, as well as for the use and articulation of their different representations.

The article *Tecnologias móveis na formação inicial do professor de matemática* (Mobile technologies in the initial formation of the mathematics teacher), written by Fernando Oliveira Garcia, Caroline Subirá Pereira, Antonio Carlos Frasson and Virginia Ostroski Salles, investigates the perception of some mathematics degree-course students regarding the use of mobile technologies for the teaching of functions in mathematics. Opinion texts the students produced by performing some activities involving families of functions with the use of technological resources are analysed through the discursive textual analysis.

The eleventh article is written by Quércia Carvalho Eloi and Vladimir Lira Veras Xavier de Andrade and is called *Relações entre o Livro Didático e o Contrato Didático: a proposição do Contrato Didático Potencial* (Relationship between the textbook and the didactic contract: the proposition of the potential didactic contract). The authors present discussions about what they call potential didactic contract (PDC), which refers to the didactic contract existing in the textbook approach. Since the textbook is written for theoretical teachers and students, who have intentions on how knowledge should be negotiated in the classroom, the PDC is pointed as a fruitful field for the investigation of the textbook from the perspective of the didactic contract.

The article *Mobilização de crivos de curvas e de superfícies na resolução de problemas matemáticos: uma aplicação no ensino superior* (Mobilization of curved and surface screens in solving mathematical problems: an application in higher education) is written by Afonso Henriques, André Nagamine and Rogério Serôdio. It presents a reflection on representation registers that intervene in the study of curves and surfaces, as reference mathematical objects, exploring the geometric sieve technique. Problem-solving practices of students from a master's course in mathematics education are investigated. The results show that students master their geometric thoughts when treating objects in the two-dimensional plane, but find it difficult to represent geometric objects in the three-dimensional space.

The thirteenth article, written by Rosalino Subtil Chicote and Geraldo Vernijo Deixa, is called *Insucesso escolar: formação de professores de matemática em questão* (School failure: considering mathematics teacher training). The discussion reveals that about four out of five teachers in Cabo Delgado province, in Mozambique, stated that teacher training had contributed positively to building the foundations for them to address school failure in basic education mathematics classes.

The article *Contribuições do Instituto Anísio Teixeira para a educação matemática no estado da Bahia - período 1983-1991* (Contributions of the Anísio Teixeira Institute to mathematics education in the state of Bahia - period 1983-1991) is by Helaine Silva Souza, José Fernando Moura Rocha and Elder Sales Teixeira. The text is divided into three parts, the first, presenting the process of creation and installation of the Institute; the second, dealing with its implementation and consolidation; and the third, discussing the activities of the final years of the period under study, in which the Institute was boosted. The fifteenth article is written by Airam da Silva Prado, Andréia Maria Pereira de Oliveira and Jonei Cerqueira Barbosa and is entitled *A recontextualização de textos na produção de um material curricular para os jogos de linguagem da matemática escolar* (The recontextualization of texts in the production of curriculum material for language games in school mathematics). The authors seek to identify and describe how a community of mathematics teachers recontextualized some mathematical concepts. Their analysis point out that teachers tend to recontextualize texts that regulate not only the behaviour of symbols and words, but also student actions from academic mathematics, establishing controls over legitimate texts and their uses.

The article entitled *Construcción y lectura de la tabla de doble entrada por profesores de educación primaria en formación* (Construction and reading of the double entry table by teachers of primary education in training) was written by María M. Gea, Annalisa Gossa, Carmen Batanero and Jocelyn Pallauta. The authors analyze the responses of future teachers when they solve a task in which they are asked to construct a double-entry table from verbal and numerical information. The result shows that the main difficulties are observed in interpreting their representations.

The seventeenth article is called *Portfólio de atividades de modelagem matemática como instrumento de avaliação formativa* (Portfolio of mathematical modeling activities as a formative assessment tool). It is authored by Karina Alessandra Pessoa da Silva and Jader Otavio Dalto. The paper presents an investigation that aimed to analyse how a portfolio of mathematical modeling activities is configured as a formative assessment strategy. The authors conclude that the feedback provided by the classroom teacher provided students with new learning opportunities.

The article *Etnomatemática: uma revisão bibliográfica do cenário internacional* (Ethnomathematics: a bibliographical review of the international scenario) was written by Manoel de Souza Lamim Netto, Adriele Ribeiro dos Santos and Renata Cristina Geromel Meneghetti. The authors discuss the academic production on ethnomathematics

in the international scenario. In their conclusions, they point out that studies of an epistemological and philosophical nature prevail over those intended for classroom applications.

The nineteenth article was written by Joice Rejane Pardo Maurell, Alessandro da Silva Saadi, Celiane Costa Machado and Elaine Corrêa Pereira, and is entitled *Práticas educativas de cálculo: um mapa teórico das pesquisas publicadas em anais de eventos de Educação Matemática* (Calculus educational practices: a theoretical map of research published in proceedings of mathematics education events). The text presents a theoretical map, aimed to analyse the themes that emerge in research on calculus educational practices in the last ten years in the proceedings of the Brazilian Meeting of Research in Mathematics Education (EBRAPEM, Portuguese acronym) and the International Seminar of Mathematics Education (SIPEM, Portuguese acronym). The data were analysed in five categories: digital technologies, educational methodologies, the use of software supported by an educational methodology, calculus educational practices and mathematical modeling.

The article entitled *A tecnologia digital como estruturadora do pensamento geométrico* (Digital technology as a structuring of geometric thinking) is authored by Margarete Farias Medeiros and Marcus Vinicius de Azevedo Basso. The text presents an analysis of a dynamic geometry environment (DGE) as a possible structuring resource of geometric thinking. The authors conclude that it is possible that the way of thinking changes with the use of the environment, and that this use improves the ability in tasks in which this technology is not used.

The twenty-first article is authored by Fernando Cardoso de Matos, José Carlos de Souza Pereira, José Messildo Viana Nunes, Renato Borges Guerra and Saddo Ag Almouloud and is entitled *Modelo Praxeológico de Referência: o caso da álgebra linear* (Praxeological reference model: the case of linear algebra). The authors aim to expose aspects of the constitution of a praxeological reference model for the teaching of linear algebra. The research focused on higher education with direct impact on teacher education, becoming an alternative praxeological model from the study of the object linear systems. To achieve this goal, they used the theoretical-methodological framework of the anthropological theory of the didactic (ATD) and instituted a study and research path (RSP) with undergraduate students in mathematics from a public higher education institution. The conclusion was that the model proposed was configured as a

praxeological reference model for the teaching of linear algebra in the mathematics degree course at that institution.

The article *O Modelo Referencial da Linguagem na aprendizagem matemática de alunos surdos* (The referential model of language in the mathematics learning of deaf students) was written by Walber Christiano Lima da Costa and Marisa Rosâni Abreu da Silveira. The authors investigated influences of the use of the language reference model in the translation-interpretation of the mathematical language in the learning of deaf Libras users. As a result, they point out that the students researched use the literal translation of the words that derives from the language referential model, performing a sign-word translation that does not favour the understanding of mathematical concepts.

The twenty-third article, *Competencia algebraica de profesores de matemáticas* (Algebraic competence of mathematics teachers) was written by Lilia P. Aké and Victor Larios Osorio. The text presents a characterization of the algebraic competence articulated to levels and indicators of development. To this end, the authors analyse the mathematical practice of teachers in service. Based on the results obtained, the authors suggest that teachers present inconsistencies in solving tasks that require a certain level of algebraic competence.

The article *Enseñanza por investigación en un curso de matemática de nivel universitario: los gestos didácticos esenciales* (Teaching by investigation in a university level mathematics course: the essential didactic gestures) is written by Diana Patricia Salgado and María Rita Otero. It presents results from two implementations of a study and research path (SRP) addressing a question related to mathematics and economics at the university level. The authors point out the importance of reading, but mainly of writing as proper gestures of an SRP.

The twenty-fifth article is written by Elivelton Henrique Gonçalves and Fabiana Fiorezi de Marco and is called *As implicações metodológicas para a formação docente da abordagem de Tecnologias Digitais em um curso de Licenciatura em Matemática na modalidade a distância* (The methodological implications for teacher training of the digital technologies approach in a distance learning mathematics degree course). The authors investigated the methodological implications that the approach to digital technologies (DT) in the distance learning mathematics degree of the Federal University of Uberlandia can bring to the formation of the future mathematics teacher from the perspective of teachers, tutors and undergraduates. Based on their conclusions, they

suggest formative situations that would allow undergraduates to develop knowledge on the integration of technologies as teaching tools in the mathematics classroom.

The article *Trajetórias e Perspectivas da Educação Estatística a partir dos trabalhos apresentados no SIPEM* (Trajectories and perspectives of statistical education from the papers presented at SIPEM) was written by Sidney Silva Santos, Geovane Carlos Barbosa and Celi Espasandin Lopes. It presents a mapping of the scientific production of research carried out in the field of statistics education published in the proceedings of the International Seminar on Research in Mathematics Education (SIPEM) of the Statistics Education Working Group (GT12), of the Brazilian Society of Mathematics Education (SBEM) in the last 18 years. The results show the studies and reflections on the conceptions, beliefs, formation, practice, knowledge and development of the mathematics teacher who teaches statistics.

The twenty-seventh article is authored by Gustavo Javier Daza Damian and Beatriz Garza González and is named *Estudio de las expectativas de estudiantes mexicanos del nivel medio superior con respecto al Cálculo Diferencial e Integral* (Study of the expectations of Mexican students attending higher middle-level education on differential and integral calculus). The authors investigate the expectations of Mexican students attending higher middle-level education on differential and integral calculus. They conclude that the exploration and valuation of expectations are an important reference in the process of school planning, mathematics teaching and decision making in order to create a dialogical environment between student and teacher.

Bruno Alves Dassie and Letícia Maria Ferreira da Costa de Moraes are the authors of the article *O Minicomputador de Papy: uma interpretação sobre sua produção no Brasil* (Papy's minicomputer: an interpretation of his production in Brazil). The text presents an interpretation of the production of Papy's minicomputer in Brazil, a didactic material designed by Georges Papy, linked to the movement of modern mathematics in school practices.

The twenty-ninth article, *Promovendo a Matemacia no Sexto Ano do Ensino Fundamental: O Projeto Água* (Promoting *matemacia* in the sixth grade of middle school: the water project) is by Ludmila Geralda de Paula, Ana Cristina Ferreira, and Edmilson Minoru Torisu. The text presents an analysis of mathematics tasks for the development of *matemacia* in a 6th grade of middle-school class of a public school. The results show the learning of concepts related to information treatment and the development of

*matemacia*, as well as point out greater autonomy and engagement of students in the tasks proposed.

The article *Estudo exploratório de pesquisas relacionadas ao tema currículo de cursos de licenciatura em matemática* (Exploratory study of research related to the curriculum of mathematics degree courses) was written by Reginaldo Guilhermino Cabral Liborio and Armando Traldi Jr. The aim of the article was to investigate the curriculum of mathematics degree courses. The results unveil three aspects: the first aspect refers to the understanding of the curriculum from the perspective of the implementation of curriculum recommendations, without questioning what the relevant knowledge in the initial teacher education is. A second aspect is on the use of official documents prescribed aiming at defining "what" and "how" knowledge should be treated. And, lastly, the quantitative increase in studies on the curriculum of mathematics degree courses, especially after the publication of the National Curriculum Framework for Teacher Education 2002.

The article *Rotação por estações no trabalho com equações do 2º grau: uma experiência na perspectiva do ensino híbrido* (Station rotation in work with 2nd degree equations: an experience from the perspective of hybrid education), is authored by Débora Sudatti Guimarães and Sonia Maria da Silva Junqueira. The authors investigated an experiment conducted from the perspective of the hybrid teaching, in the station rotation mode, aiming at verifying its viability in the context of a mathematics class in elementary school and the relationships that involve the autonomy and the protagonism of the students. The results suggest a range of possibilities for innovation in the classroom and require from the teacher a creative and efficient planning and a change in their role in the educational process.

And last of all, we present the article *Diversidade, investigação e emancipação humana como princípios da formação de professores de Matemática em cursos de licenciatura em Educação do Campo* (Human diversity, investigation and emancipation as principles of the mathematics teacher training in degree courses in field education), from the authors Aldinete Silvino De Lima, Iranete Maria Da Silva Lima and Hélia Margarida Oliveira. They aim to understand the principles that guide the formation of mathematics teachers in the case of the degree in field education (LEdoC, in Portuguese acronym). To this end, they assisted each other in the areas of critical mathematics education and field education. The results show that diversity, research and human emancipation are principles that guide the formation of mathematics teachers in the LEdoCs and, above all, highlight the

interest of the teacher trainers to bring the specificities of the field to the center of the formative process of the future mathematics teachers.