

Atuação e produção do grupo de pesquisa em educação estatística em 2024/2025: estudos, pesquisas e identidade

Activities and output of the statistical education research group in 2024/2025: studies, research, and identity

Actividades y resultados del grupo de investigación en educación estadística en 2024/2025: estudios, investigaciones e identidad

Activités et résultats du groupe de recherche en éducation statistique en 2024/2025 : études, recherches et identité

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Abstract

This article presents and analyzes the recent trajectory of part of the academic production of the Research Group in Statistical Education (GPÉE), focusing on the activities developed, the research completed, and the investigations in progress in the years 2024 and 2025. Inserted in the field of Statistical Education, the group brings together researchers working in Basic Education and Higher Education. The studies engage with the initial and continuing training of teachers, the teaching and learning of

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Statistics, Probability and Combinatorics, from Early Childhood Education to Higher Education, as well as through the analysis of curricular documents and textbooks, in light of Statistical Education, from a critical perspective. Methodologically, the work assumes a descriptive and analytical character, relying on the systematization of institutional records of the group, such as meetings, published academic productions, participation in scientific events, and research completed or in development by its members. The theoretical framework mobilizes discussions on literacy, reasoning, and statistical thinking, articulated with contemporary debates on curriculum, initial and continuing teacher training. The results highlight the thematic diversity of the research conducted, the consolidation of interinstitutional partnerships, and the group's commitment to investigative practices articulated with the reality of Basic Education. It is concluded that the GPEE productions contribute to the strengthening of Brazilian Statistical Education by integrating academic research, teacher training, and critical reflection on curricular policies, in line with the challenges and advances discussed within the scope of GT12 of SBEM.

Keywords: Statistical education, Research group, Document analysis, Statistical literacy, Academic production.

Resumen

Este artículo presenta y analiza la trayectoria reciente de parte de la producción académica del Grupo de Investigación en Educación Estadística (GPEE), con énfasis en las actividades desarrolladas, las investigaciones concluidas y los estudios en curso durante los años 2024 y 2025. Inserto en el campo de la Educación Estadística, el grupo reúne investigadores que actúan tanto en la Educación Básica como en la Educación Superior. Los estudios abordan la formación inicial y continua del profesorado; la enseñanza y el aprendizaje de la Estadística, la Probabilidad y la Combinatoria; desde la Educación Infantil hasta la Educación Superior; así como el análisis de documentos curriculares y libros de texto desde la perspectiva de la Educación Estadística crítica. Metodológicamente, el trabajo adopta un carácter descriptivo y analítico, apoyándose en la sistematización de registros institucionales del grupo, tales como reuniones, producciones académicas publicadas, participaciones en eventos científicos e investigaciones concluidas o en desarrollo por parte de sus integrantes. El marco teórico moviliza discusiones sobre alfabetización estadística, razonamiento estadístico y pensamiento estadístico, articuladas con debates contemporáneos sobre currículo y formación inicial y continua del profesorado. Los resultados evidencian la diversidad

temática de las investigaciones realizadas, la consolidación de alianzas interinstitucionales y el compromiso del grupo con prácticas investigativas vinculadas a la realidad de la Educación Básica. Se concluye que las producciones del GPEE contribuyen al fortalecimiento de la Educación Estadística brasileña al integrar investigación académica, formación docente y reflexión crítica sobre las políticas curriculares, en consonancia con los desafíos y avances debatidos en el ámbito del GT12 de la SBEM.

Palabras clave: Educación estadística, Grupo de investigación, Análisis documental, Alfabetización estadística, Producción académica.

Résumé

Cet article présente et analyse la trajectoire récente d'une partie de la production académique du Groupe de Recherche en Éducation Statistique (GPEE), en mettant l'accent sur les activités développées, les recherches achevées et les investigations en cours au cours des années 2024 et 2025. Inscrit dans le domaine de l'Éducation statistique, le groupe rassemble des chercheurs intervenant dans l'Enseignement primaire et secondaire ainsi que dans l'Enseignement supérieur. Les études portent sur la formation initiale et continue des enseignants ; l'enseignement et l'apprentissage de la statistique, des probabilités et de la combinatoire ; de l'Éducation de la petite enfance à l'Enseignement supérieur ; ainsi que sur l'analyse des documents curriculaires et des manuels scolaires à la lumière de l'Éducation statistique, dans une perspective critique. Sur le plan méthodologique, ce travail adopte un caractère descriptif et analytique, s'appuyant sur la systématisation des archives institutionnelles du groupe, telles que les réunions, les productions académiques publiées, les participations à des événements scientifiques et les recherches achevées ou en cours menées par ses membres. Le cadre théorique mobilise des discussions sur la littérature statistique, le raisonnement statistique et la pensée statistique, articulées aux débats contemporains sur les programmes d'études ainsi que sur la formation initiale et continue des enseignants. Les résultats mettent en évidence la diversité thématique des recherches réalisées, la consolidation de partenariats interinstitutionnels et l'engagement du groupe envers des pratiques de recherche articulées à la réalité de l'enseignement de base. Il est conclu que les productions du GPEE contribuent au renforcement de l'Éducation Statistique au Brésil en intégrant la recherche académique, la formation des enseignants et la réflexion critique sur les politiques curriculaires, en cohérence avec les défis et les avancées discutés dans le cadre du GT12 de la SBEM.

Mots-clés : Educação estatística, Grupo de pesquisa, Análise documental, Literatura estatística, Produção acadêmica.

Resumo

Este artigo apresenta e analisa a trajetória recente de parte da produção acadêmica do Grupo de Pesquisa em Educação Estatística (GPÉE), com foco nas atividades desenvolvidas, nas pesquisas concluídas e nas investigações em andamento nos anos de 2024 e 2025. Inserido no campo da Educação Estatística, o grupo congrega pesquisadores que atuam na Educação Básica e no Ensino Superior. Os estudos dialogam com a formação inicial e continuada de professores; o ensino e aprendizagem de Estatística, Probabilidade e Combinatória; da Educação Infantil ao Ensino Superior; bem como com a análise de documentos curriculares e de livros didáticos, à luz da Educação Estatística, numa perspectiva crítica. Metodologicamente, o trabalho assume um caráter descritivo e analítico, apoiando-se na sistematização de registros institucionais do grupo, tais como reuniões, produções acadêmicas publicadas, participações em eventos científicos e pesquisas concluídas ou em desenvolvimento por seus integrantes. O referencial teórico mobiliza discussões sobre letramento, raciocínio e pensamento estatístico, articuladas a debates contemporâneos sobre currículo, formação inicial e continuada de professores. Os resultados evidenciam a diversidade temática das pesquisas realizadas, a consolidação de parcerias interinstitucionais e o compromisso do grupo com práticas investigativas articuladas à realidade da Educação Básica. Conclui-se que as produções do GPÉE contribuem para o fortalecimento da Educação Estatística brasileira, ao integrar pesquisa acadêmica, formação docente e reflexão crítica sobre políticas curriculares, em consonância com os desafios e avanços discutidos no âmbito do GT12 da SBEM.

Palavras-chave: Educação estatística, Grupo de pesquisa, Análise documental, Letramento estatístico, Produção acadêmica.

GPEE's Activities and Production in 2024/2025: studies, research and identity

Introduction

In 2024 and 2025, the Research Group in Statistical Education (GPEE) organized its activities through bi-weekly meetings held in a virtual environment using the Google Meet platform. This organizational method proved suitable for the group's profile, as its members are teachers from different cities and states in Brazil, working in Basic Education and/or Higher Education, in undergraduate and postgraduate courses. The meetings were conducted according to a participatory dynamic, in which the study topics and discussions emerged both from the collective needs of the group and from the demands related to the research developed and/or supervised by its members.

The GPEE has valued the democratic construction of the agendas for its bi-weekly study meetings. Therefore, the first meeting of each semester was dedicated to building the agenda for subsequent meetings. Thus, the first meeting of the period in question was structured based on the evaluation of the actions carried out in the previous semester. The semester meetings begin with and end with an evaluation and identification of needs for the following semester.

It is important to note that this planning is not inflexible, since, throughout the course of the semi-annual meetings, new demands, needs, and unforeseen events arise, leading the group to always be attentive to the need to readjust the actions taken. All agenda creation or readjustment is done democratically, considering the real and dynamic needs of the group.

Table 1 below summarizes the group's activities during the bi – weekly meetings throughout 2024:

Table 1.

GPEE meetings in 2024 (Authors, 2026).

Meetings	Actions
1st	Development of the agenda for the meetings of the first semester of 2024, carried out collectively, taking into account the evaluation conducted at the last meeting of the previous semester.
2nd	Reading and discussion of the book <i>Teaching Critical Thinking: Practical Wisdom</i> (HOOKS, 2020) .
3rd	Reading and discussion of the book <i>Teaching Critical Thinking: Practical Wisdom</i> (HOOKS, 2020).
4th	Reading and discussion of the book <i>Teaching Critical Thinking: Practical Wisdom</i> (HOOKS, 2020).

5th	Presentation of a Master's thesis in the qualification phase by a member of the group.
6th	Reading and discussion of the book <i>Teaching Critical Thinking: Practical Wisdom</i> (HOOKS, 2020).
7th	Reading and discussion of the book <i>Teaching Critical Thinking: Practical Wisdom</i> (HOOKS, 2020).
8th	Reading and discussion of the book <i>Teaching Critical Thinking: Practical Wisdom</i> (HOOKS, 2020).
9th	Finalization of the studies carried out in the previous meeting, evaluation of the actions and meetings held throughout the semester, and identification of future needs.
10th	The agenda for the meetings of the second semester of 2024 will be developed collectively, taking into account the evaluation carried out at the last meeting of the previous semester.
11th	Discussions about Civic Statistics after the GPEE members watched the lecture broadcast on YouTube: <i>Civic statistics</i> , by Prof. Daniel Frischemeier, from the University of Münster, Germany. (Available at https://www.youtube.com/watch?v=IOxw2kFmyNU).
12th	Study and discussion of the texts: Text 1: <i>Data Visualization Packages for Non-inferential Civic Statistics in High School Classrooms</i> , FRISCHEMEIER (2022). Text 2: <i>Introducing grade 3 students to digital data exploration</i> , (FRISCHEMEIER; PODWORNÝ; BIEHLER, 2022).
13th	Presentation of Master's research in the qualification phase by one of the group members.
14th	Previous reading, discussions, and presentation of a doctoral project by one of the group members.
15th	Previous reading, discussions, and presentation of a doctoral project by one of the group members
16th	Previous reading, discussions, and presentation of a doctoral project by one of the group members
17th	Evaluation of the actions and meetings held throughout the semester and identification of future needs.

Table 1 was prepared based on the agendas developed and approved by the members of the GPEE. From it, it can be seen that, in 2024, 17 meetings were held, the planning of which involved reading and discussing the book *Teaching Critical Thinking: Practical Wisdom* (HOOKS, 2020), discussions about the research developed and/or supervised by members of the group, as well as reading and discussing scientific articles.

Beyond the GPEE meetings in 2024, noteworthy events included the participation and presentation of papers by its members at several events, namely: the III Meeting of Professors, Researchers, Students, Alumni and the community surrounding the

Postgraduate Program in Mathematics Education (PPGEM) at the São Paulo State University Júlio de Mesquita Filho – UNESP, Rio Claro *campus*, the IX International Seminar on Research in Mathematics Education (SIPEM) held in Natal, Rio Grande do Norte, the X Minas Gerais Meeting on Mathematics Education (EMEM) held at UNIMONTES in Montes Claros, Minas Gerais, and the I PROFEDUCA – Exhibition of Educational Products, held at the University of Uberaba (UNIUBE) in Uberlândia, Minas Gerais.

Table 2 below summarizes the group's actions during the bi-weekly meetings throughout 2025.

Table 2.

GPEE meetings in the year 2025 (Authors, 2025).

Meetings	Actions
1st	Development of the agenda for the meetings of the first semester of 2025, carried out collectively, taking into account the evaluation conducted at the last meeting of the previous semester
2nd	Dialogue with Professor Dr. Celi Lopes, whose theme was Statistical Literacy and Creative Insubordination. Previous reading of the article: Tessitura possível entre Letramento Estatístico, Pensamento Crítico e Insubordinação Criativa.
3rd	Continuation of the previous meeting: further study of the base text: <i>Tessitura possível entre Letramento Estatístico, Pensamento Crítico e Insubordinação Criativa</i> .
4th	Presentation of doctoral research in the data analysis stage by a member of the research group.
5th	Presentation of a Master's thesis at the defense stage by one of the group members.
6th	Study and discussion of the text: Previous reading: Gould, R. (2017). Data literacy is statistical literacy. <i>Statistics Education Research Journal</i> , 16(1), 22–25. (Available at: https://iase-pub.org/ojs/SERJ/article/view/209).
7th	Study and discussion of the text: Previous reading: Halpern, D. F. The nature and nurture of critical thinking. In: Sternberg, R.; Roediger III, H. L.; Halpern, D. F. (Ed.). <i>Critical thinking in psychology</i> . Cambridge: Cambridge University Press, 2006, p. 1–14.
8th	Evaluation of the actions and meetings held throughout the semester and identification of future needs.
9th	The agenda for the meetings of the second semester of 2025 was developed collectively, taking into account the evaluation carried out at the last meeting of the previous semester.
10th	Preliminary reading, discussions, and presentation of a doctoral project by a group member (joining in 2025). Previous reading,

	discussions, and presentation of a doctoral project by a group member who joined in 2025.
11th	Study and discussion of the text: Rodrigues, D. Fundamentalism, complexity and inclusion: contributions to an inclusive education. Portuguese Journal of Educational Research, special issue, p. 214–227, 2020. (Available at: https://doi.org/10.34632/investigacaoeducacional.2020.8507)
12th	Study and discussion of the text: Vidal-Szabó, P.; Estrella, S. Exploring the extension of the MTSK model to the statistical domain: characteristics of learning from SOLO taxonomy. Revista de Educación Estadística, v. 2, no. 1, p. 1–25, September 2023. (Available at: https://doi.org/10.29035/redes.2.1.3)
13th	Previous reading, discussions, and presentation of a doctoral project by a group member who joined in 2025.
14th	Presentation of doctoral research in the data analysis phase by a member of the research group.
15th	Preliminary reading, discussions, and presentation of a doctoral project by a group member.
16th	Dialogue with Dr. Leandro de Oliveira Souza. In this meeting, Dr. Leandro shared with the GPEE the research he conducts and supervises in Statistical Education.
17th	Evaluation of the actions and meetings held throughout the semester and identification of future needs.

Beyond the GPEE meetings, in 2025, we highlight the participation with and without the presentation of papers by its members, in some events, namely: XIV Inaugural Summer Activity of the Postgraduate Program in Mathematics Education, UNESP of Rio Claro-SP; XV Internal Conference of the Postgraduate Program in Mathematics Education, UNESP, of Rio Claro-SP; ICOCIME 4 – *The Fourth International Conference on Creative Insubordination in Mathematics Education, in Guaratinguetá-SP; III Forum of GT-12/SBEM, in Belém-PA; National Meeting of Mathematics Education, in Manaus-AM; and also Inaugural Summer and Winter Activity and Internal Conference of the Postgraduate Program in Mathematics Education, in Rio Claro-SP.* Among the events mentioned, ICOCIME 4 stands out, with strong participation from GPEE members, not only attending the activities but also presenting papers and actively participating in the organization of the event.

In the following sections, the methodological approach that guides the organization and analysis of this work is presented, as well as the theoretical frameworks that underpin the research developed within the GPEE. Next, some of the research and academic productions carried out within the group are discussed, with a

specific focus on the productions developed by the authors of this text, which are taken as the object of analysis in this study. Thus, the investigated contexts and particular contributions of these productions to the field of Statistical Education will be presented, without the intention of encompassing the totality of GPEE's production in the period considered.

Methodology

From a methodological point of view, this work is characterized as a descriptive and analytical study of the academic production and activities developed by GPEE in the period from 2024 to 2025.

According to Gil (2008), descriptive research aims to organize and characterize certain phenomena, seeking to make their main characteristics and relationships visible. In the field of Human Sciences, this type of research is not limited to the description of populations, but can also be used to gather, organize, and analyze institutional productions, practices, and processes. In this sense, the present study assumes a descriptive character in organizing and presenting the academic production and activities developed by GPEE, and an analytical character in interpreting this information in light of the field of Statistical Education.

The data used to construct this work originate from the systematization of the group's institutional records, published academic productions, papers presented at scientific events, and descriptions of completed or ongoing research conducted by its members. Thus, it is a documentary analysis, as it is based on work with primary sources, that is, in their original state, which have not received analytical treatment (SÁ-SILVA; ALMEIDA; GUINDANI, 2009).

To organize and interpret this information, the goal was to highlight the main themes investigated, the contexts in which the researchers worked, and the dialogues established with the field of Statistical Education.

Theoretical Framework

Considering the nature of this work, which aims to describe, analyze, and reflect on the formative and collaborative processes developed by a research group composed of members with different academic backgrounds and research interests, it was decided to define a theoretical framework that aligns with the concepts that unify the productions of the GPEE (Research Group on Statistical Education). Thus, instead of seeking to encompass all the theoretical frameworks used individually by its members,

this study prioritizes Statistical Education as a field of research, as well as the concepts of Statistical Literacy (GAL, 2002) and Probabilistic Literacy (GAL, 2005), understood as common foundations of the research and projects carried out in the group.

In the Brazilian context, Statistical Education has established itself as an expanding field of research since the late 1990s, following the growth of studies that have begun to problematize the teaching and learning of Statistics and Probability at different educational levels and contexts. This movement is directly related to the increasing presence of Statistics in contemporary social life, insofar as data-based information permeates the daily practices of students, workers, managers, and researchers.

In this context, the concepts of Statistical Literacy and Probabilistic Literacy constitute important references for the analysis of research and training activities developed by the group.

Statistical literacy is a central concept in the field of Statistical Education and has been widely discussed in the specialized literature. Based on Gal (2002), statistical literacy is understood as the ability to interpret, critically analyze, and communicate information based on data, considering different social contexts. This concept involves both elements of knowledge – such as reading and writing skills, statistical, mathematical, and contextual knowledge, as well as the formulation of critical questions – and elements of a dispositional nature, related to the beliefs, attitudes, and critical stance of individuals towards statistical information (SANTOS; ZUIN, 2024, p. 302).

Table 3.

A Statistical Literacy Model by Iddo Gal (Developed by the authors, based on the translation by Gal (2002, p. 4)).

Elements of knowledge
1. Literacy skills;
2. Statistical knowledge;
3. Mathematical knowledge;
4. Contextual knowledge;
5. Critical issues.
Layout elements
1. Beliefs and attitudes;
2. Critical stance.

Unlike statistical literacy, probabilistic literacy still occupies a more restricted space in the literature of statistical education, although its relevance to civic education

is being progressively recognized. Recent studies, such as that of Lopes, Almeida and Espasandim dos Santos (2024), indicate that the development of probabilistic thinking is intrinsically linked to statistical literacy, but involves specific conceptual and formative aspects related to the understanding of chance, uncertainty, and variability. According to the authors, probabilistic literacy presupposes not only the mastery of mathematical concepts, but also the ability to interpret probabilistic situations in different contexts, mobilizing appropriate language, critical analysis, and understanding of the social implications of decisions based on probabilities.

Probabilistic literacy presents specificities related to the understanding of phenomena marked by chance, uncertainty, and variability, requiring the student not only to master formal concepts but also to mobilize intuitions, languages, and critical analyses situated in different contexts. When discussing this concept, Gonzalez and Souza (2024) highlight that the probabilistic literacy model proposed by Gal encompasses both cognitive and dispositional dimensions, stating that this literacy involves “elements of knowledge, necessary for the student to be able to interpret random situations, and elements of disposition, associated with prior intuitions and personal aspects of the individual, which vary from context to context” (GONZALEZ; SOUZA, 2024, p. 5).

From this perspective, probabilistic literacy is understood as a progressive construction throughout the schooling process, articulating conceptual knowledge about probability with attitudes, beliefs, and critical stances towards situations of uncertainty. Based on this understanding, the probabilistic literacy model proposed by Gal (2005) is organized from two sets of complementary elements: knowledge elements, related to concepts, languages, and ways of interpreting probabilistic situations, and dispositional elements, associated with the attitudes, beliefs, and feelings of subjects in the face of chance, uncertainty, and risk. Table 4 summarizes these elements:

Table 4.

A Probabilistic Literacy Model by Iddo Gal (Developed by the authors, based on the translation by Gal (2005, p. 46)).

Elements of knowledge
1. Big Ideas: Variability, Randomness, Independence, Predictability / Uncertainty;
2. Finding probabilities: Ways to find or estimate the probability of events;

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3. Language: The terms and methods used to communicate probabilities;
 4. Context: Understanding the role and implications of probability problems and messages in diverse contexts and in personal and public discourse;
 5. Critical issues: Questions to consider when dealing with probabilities.
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Layout elements

1. Critical stance;
 2. Beliefs and attitudes;
 3. Personal feelings regarding uncertainty and risk.
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Publications by GPEE members in the years 2024 and 2025

Regarding academic productions, Luiz Gustavo Martins dos Santos, in partnership with two professors from the Federal Center for Technological Education of Minas Gerais (CEFET-MG), published, in 2024, the article Exploring Descriptive Statistics with students of Integrated Technical Education in the digital environment (SANTOS et al., 2024), in which a didactic-pedagogical sequence aimed at teaching Descriptive Statistics is described, based on references from Statistical Education. The proposal emphasizes the use of digital technologies, highlighting the construction and interpretation of histograms in Excel software, demonstrating possibilities for articulation between statistical concepts, technological resources, and pedagogical practices contextualized in Integrated High School.

In 2025, the researcher participated in national scientific events, presenting two papers at the VI National Online Meeting of Teachers Who Teach Mathematics (VI ENOPEM), both within the thematic axis of Teaching and Learning Mathematics in High School. The first, entitled Aspects of Statistical Education: considerations from the analysis of a mathematics textbook, was developed in co-authorship with Professor Elenice de Souza Lodron Zuin and aimed to analyze the statistics content present in the textbook Prisma Matemática: Estatística, Combinatória e Probabilidade (2020). Based on a historical-educational perspective of school knowledge and the methodology of Content Analysis (BARDIN, 2011), the study investigated how the textbook can favor more critical and contextualized teaching practices. The results indicated a significant presence of statistical literacy, especially in activities involving reading and interpreting data, although limitations were observed regarding the development of statistical reasoning and the use of digital technologies. Luiz Gustavo's article is published in the event's proceedings.

The second work presented at the VI ENOPEM, entitled "Graphs in the Classroom: Statistics Activity Focusing on Literacy", was developed in partnership with Professor Fernanda Aparecida Ferreira, also from CEFET-MG. The research reported on an activity carried out with classes from the integrated technical courses in Building Construction, Computer Science, and Computer Networks, highlighting the potential of teaching Statistics to promote statistical literacy through the analysis of graphs inserted in social, economic, and environmental contexts. The classroom discussions showed progress in reading and interpreting graphs, while also emphasizing the need to deepen the critical dimension of data analysis, especially in situations that reveal social inequalities. The study reinforces the understanding of statistical literacy as a formative and civic competence that goes beyond the mere decoding of information.

In addition to these publications, the researcher is active in the field of Combinatorial Analysis, participating in a scientific initiation project focused on this area, the output of which will result in a textbook currently in its final stages of development, with a planned release in 2026. The work articulates classic problems in the field, challenges arising from Mathematics Olympiads, and activities that explore the relationship between Combinatorial Analysis and programming, expanding the possibilities for teaching this content in both Basic Education and teacher training.

In 2025, Basic Education teacher and PhD researcher Roseli Rosalino Dias da Silva Angelino and Professor Solange Hassan Ahmad Ali Fernandes contributed the chapter "Counting, including and playing: explanations about active learning in Early Childhood Education" to the book *Inclusive Mathematics Education: pedagogical practices involving students with intellectual disabilities*. The work is awaiting publication by the Federal Institute of Espírito Santo and is currently in the final review phase.

Focusing on teaching strategies for students with intellectual disabilities (ID), the authors present various tasks and pedagogical materials that explore sensory and movement stimuli. These proposals are based on playful pillars such as play, music, and theater, valuing children's protagonism and reinforcing the importance of a teaching practice that respects diversity.

In 2024, doctoral candidate and Basic Education teacher João Luis Dias Almeida, in partnership with professors Celi Espasandin Lopes and Anne Karoline Espasandin dos Santos, published the article "Curriculum recommendations for the teaching and

learning of Statistics and Probability in Australia, Brazil and Portugal” in the International Journal of Research in Mathematics Education (RIPEM) (LOPES et al., 2024). This article aims to present an analysis of the curricular recommendations for the teaching and learning of Statistics and Probability for the 6–14 age group, present in the Mathematics curricula in Australia, Brazil, and Portugal. The documentary research sought to verify whether Statistical and Probabilistic Literacy is contemplated in these curricula.

According to the researchers, the results showed that the analyzed curricular recommendations are similar to the results of research in the field of Statistical Education. However, they emphasize that, in the Australian and Portuguese contexts, there is a direct intention regarding the development of Statistical Literacy and Probabilistic Literacy. In the Brazilian context, the list of knowledge objects and skills proposed in the National Common Curricular Base (BNCC) does not consider important aspects of these forms of literacy, in addition to not promoting the gradual and increasing development of statistical and probabilistic reasoning, thus hindering the expansion of critical thinking among students in this age group.

In the year 2025, João Luis Dias Almeida, in partnership with Gerlan Silva da Silva and Cármen Lúcia Brancaglion Passos, also published a comprehensive work in the proceedings of the XV National Meeting of Mathematics Education (ENEM), entitled "Continuities and changes expressed in the BNCC in relation to the PCNs for the teaching of Probability in Elementary School" (SILVA et al., 2025, adapted). The work sought to analyze the curricular guidelines present in the National Curricular Parameters (PCNs) of 1997 and in the BNCC of 2017 for the teaching of Probability in the final years of Elementary School, in order to identify continuities and changes between these proposals.

Dr. Antonio Carlos de Souza, who teaches undergraduate courses in Mathematics Education and also in the Stricto Sensu Postgraduate Program in Mathematics Education, co-authored, with Professor Cristiane de Arimatéa Rocha, the article “The construction of Combinatorics concepts evidenced in mind maps” (ROCHA & SOUZA, 2024), which investigated the use of mind maps as a pedagogical innovation for the construction of concepts about Combinatorial Analysis by undergraduate students in Mathematics. Twenty-five groups of students from a Mathematics Education course participated in the research, attending an elective course on the teaching of Combinatorial Analysis. As a result, it was observed that the different constructions of

mind maps provide indications of the breadth, depth, and personal notions about the subject presented by the groups.

In partnership with Heron Miguez Gonzalez, Antonio Carlos de Souza wrote the article “Probabilistic Literacy in the Curricular Documents of Brazil, Argentina, Colombia, and Mexico: A Comparative Analysis,” published in the journal *Bolema* (GONZALEZ & SOUZA, 2024), which presents a study on how probability is taught in curricular documents, focusing on probabilistic literacy in Brazil, Argentina, Colombia, and Mexico. The study observed a variety in the number of indicators related to probability in the years of Basic Education, a reasonable presence of basic elements related to probability calculation, but a worrying absence of critical questions, context, and probabilistic language.

Finally, as a collective production of GPEE members, the writing of the book chapter entitled “GPEE’s Performance and Production in 2024: studies, research, and identity”, published in the work III Forum of GT12/SBEM: New Directions for Statistical Education – Empowerment, citizenship and social justice in the data age (Volume 2), is highlighted. The text, authored by Sandra Gonçalves Vilas Bôas, Antonio Carlos de Souza, Ana Paula Gonçalves Pita, Cleibiane Susi Peixoto, João Luis Dias Almeida, Luiz Gustavo Martins dos Santos, and Roseli Rosalino Dias da Silva Angelino, presents the trajectory of the GPEE (Research Group on Statistical Education) in 2024, highlighting the research axes, training activities, academic productions, and the identity collectively constructed by the group in the field of Statistical Education. This production constitutes one of the bases for writing this article, which expands and updates this systematization by incorporating the activities, research, and productions developed by the group throughout 2025.

The next section discusses the ongoing research of the GPEE members, authors of this work.

Research by GPEE members is ongoing

Doctoral candidate Luiz Gustavo Martins dos Santos is conducting his research within the Postgraduate Program in Education at the Pontifical Catholic University of Minas Gerais (PUC-Minas). In 2024, the study was under the guidance of Professor Dr. Elenice de Souza Lodron Zuin and was situated within the field of Critical Statistical Education, focusing on understanding its articulation with Mathematics Education, especially regarding teacher training and the analysis of mathematics textbooks. During

this period, a state-of-the-art study was carried out, involving a review of academic productions on Statistical Education, analysis of textbooks and curricula of undergraduate mathematics courses, as well as a theoretical and methodological deepening of the frameworks that underpin Statistical Education.

In 2025, the research began to be supervised by Professor Dr. Eliane Scheid Gazire. The analysis of undergraduate Mathematics courses at higher education institutions in the state of Minas Gerais was concluded, focusing on the presence and approach of Statistical Education in their curricula. In parallel, through a survey conducted using the database of the National Textbook and Didactic Material Program (PNLD), a spreadsheet was created containing information about state public schools in Belo Horizonte, allowing the identification of the three most used Mathematics textbooks for secondary education in this network. These materials constitute the main corpus of the textbook analysis planned for the thesis. Currently, the introductory, theoretical framework, and methodology chapters are being finalized, in preparation for the qualification process, scheduled for 2026.

Also in 2025, as a result of his participation in the Research Group in Statistical Education (GPEE), the researcher was selected to participate in the interinstitutional course Statistical Literacy, held at the Federal University of Rio Grande do Sul (FURG), with an intercampus character and the participation of researchers from different Brazilian institutions. The course provided lectures, debates, and discussions with national and international researchers in the field of Statistical Education, culminating in the development and presentation of a teaching sequence.

Within the scope of initial teacher training, and under the guidance of Professor Dr. Eliane Scheid Gazire, a training activity was developed with a class of 12 students in the 4th semester of the Pedagogy course at PUC Minas, in the subject of Methodology of Teaching Mathematics in the early years. The proposal involved the discussion of the fundamentals of Statistical Education, statistical and probabilistic literacy, as well as the principles of statistical research in the early years, in accordance with the BNCC (National Common Core Curriculum) and the National Pact for Literacy at the Right Age (PNAIC). The students were challenged to plan statistical investigations focused on the context of literacy, developing problem situations, constructing concrete materials, and exploring graphical representations, in addition to initial situations of Probability and Combinatorial Analysis. The experience highlighted the formative potential of this type of approach for the construction of investigative practices in Early Childhood Education and the initial years of Elementary School.

By combining inclusion and mathematics education, Roseli Rosalino Dias da Silva Angelino's doctoral research seeks to contribute to the process of statistical literacy in early childhood education. The work proposes the creation of Inclusive Scenarios for Mathematical Learning (CIAM), an environment where statistics are taught through play and multisensory experiences. The proposal aims to promote the development of statistical concepts in early childhood education through play.

Methodologically, this research adopts a qualitative, participatory approach, grounded in a sociocultural perspective and theoretical frameworks from Statistical Education. Data collection will take place in a public school in a coastal city in the state of São Paulo, involving children aged 5 to 6 years old, where the researcher is the teacher.

The purpose of this research is to analyze the contributions of CIAMs (Centers for Access to and Improvement of Statistical Literacy) to the development of statistical literacy at this stage of education, facilitating access to certain statistical knowledge and promoting equal opportunities for all students. It is expected that this research will offer theoretical and methodological contributions in the field of Statistical Education from an inclusive perspective, equalizing learning opportunities from early childhood.

The feasibility of the ongoing research lies in the union of experiences: the researcher's trajectory in the field, which includes Master's work with multisensory stimuli and Inclusive Scenarios, and the teaching experience of the advisor, Antonio Carlos de Souza, as a researcher and teacher of Early Childhood Education. Both trajectories converge in the investigation of their own practice.

Currently, the research is focused on a literature review and, simultaneously, on the procedures for submission to the Research Ethics Committee (CEP), aiming for subsequent authorization to begin data collection.

Currently, under the guidance of Professor Dr. Antonio Carlos de Souza, João Luis Dias Almeida is developing a doctoral research project, tentatively titled "Curricular Guidelines: teaching and learning probability and statistics in Elementary Education". This is a qualitative research project, using a document analysis approach, which seeks to answer the following research question: what curricular indicators become essential when constructing a curricular proposal for teaching and learning Probability and Statistics in Elementary Education, after analyzing international curricular documents in Mathematics?

In its initial phase, this research proposes to analyze the mathematics curriculum documents of South Africa, Australia, Brazil, Spain, the United States of America,

Japan, New Zealand, and Portugal, in light of the scientific production of Statistical and Probabilistic Education. The data produced in this stage will be systematized, organized, and processed through Discursive Textual Analysis (DTA). This research also aims to highlight the great importance of working with Probability and Statistics topics throughout elementary school, as a way to enable students to experience a fuller sense of citizenship.

In the next section, we share guidelines that have been recently completed or are under development.

Ongoing or completed guidelines for the period 2024 to 2025

Professor Antonio Carlos de Souza has supervised research within the Postgraduate Program in Mathematics Education, at both the Master's and Doctoral levels, of the Postgraduate Program in Mathematics Education (PPGEM), at the São Paulo State University "Júlio de Mesquita Filho" – UNESP, Rio Claro-SP Campus.

Recently, Antonio Carlos de Souza also supervised the research entitled "Statistical Education in the training of teachers for Early Childhood Education and the Initial Years of Elementary School", developed by André Gonçalves Tavares (TAVARES, 2024). This research aimed to investigate the contributions of an extension course in Statistical Education to the initial training of teachers working in Early Childhood Education and the Initial Years of Elementary School. The course in question was offered to students of the Pedagogy course at UNESP in Rio Claro. This is a qualitative research study that used Discursive Textual Analysis as its methodology.

This research analyzed how the course can contribute to the development of statistical literacy skills, enabling future educators to interpret and use data critically in their pedagogical practices. Furthermore, it sought to explore how the course contributed to the improvement of statistical thinking, allowing future teachers to understand some statistical concepts in relevant educational contexts. The dissertation also investigated the impact of the course on the participants' statistical reasoning, seeking to contribute to the development of skills that enable problem-solving and data-driven decision-making, essential for the formation of critical and reflective students.

The results indicated that, as the course progressed, the participants became more confident and had a better understanding of the statistical concepts discussed, demonstrating greater ease in creating activities, as well as in thinking about and

addressing Statistics in the Early Years of Elementary School and in Early Childhood Education.

Dr. Antonio Carlos de Souza also supervised the research authored by Priscila dos Santos Pereira, entitled "Insubordinate Practices of Teachers Who Teach Statistics in the Final Years of Elementary School" (PEREIRA, 2024), which aimed to analyze creatively insubordinate teaching practices of teachers who teach Statistics in the final years of elementary school, as revealed in their narratives. The results indicate that the practices adopted by the teachers participating in the research contributed to the teaching of Statistics to their students, as they provided moments for them to have a voice and participate in their entire learning process, understanding and perceiving the importance of Statistics.

Recently, Professor Dr. Antonio Carlos de Souza concluded the supervision of Daniel Bazolli dos Santos' Master's research, entitled "Discussions of gender and sexuality in the Mathematics Teacher Training Program: how do the experiences of undergraduate students in a training process intertwine with these themes?" The main objective of this research was to analyze the relationships of pre-service mathematics teachers between the mathematical concepts they learn and some themes from Gender and Sexuality Studies. The research also sought to understand these relationships, as well as ways to plan mathematics lessons for Basic Education so that the concepts can be worked on together in an inclusive way.

Currently, Dr. Antonio Carlos de Souza is supervising three doctoral research projects within the Graduate Program in Mathematics Education (PPGEM) at the São Paulo State University "Júlio de Mesquita Filho" – UNESP, Rio Claro-SP Campus. Two of these research projects, already described above – those of João Luis Dias Almeida and Roseli Rosalino Dias da Silva Angelino – are in the project evaluation phase by the institution's collegiate body, and the other is in the initial project development phase.

Final Considerations

The analyses presented throughout this work demonstrate that the research developed within the GPEE has sought to maintain a permanent dialogue with Basic Education in its different segments. Throughout the years 2024 and 2025, the group consolidated itself as a collective space for study, reflection, and academic production, in which different formative trajectories and research interests are articulated around common concerns, such as initial and continuing teacher training, statistical and probabilistic literacy, critical analysis of curricula and textbooks, and the development

of investigative pedagogical practices. In this sense, the identity of the GPEE is built on the plurality of perspectives, the collaboration among its members, and the commitment to Statistical Education from a critical, contextualized, and socially referenced perspective.

In 2024, the meetings were predominantly guided by theoretical studies, with emphasis on the reading and discussion of Hooks' work (2020), as well as academic texts related to Statistical Education. These study sessions broadened the group's theoretical repertoire and supported broader reflections on criticality, teacher training, and the social role of Statistics, creating a common basis for the debates developed throughout the year. In 2025, the group's meetings began to focus more intensely on discussing research developed by the members themselves, highlighting projects in the qualification phase, ongoing research, and completed academic productions. These meetings consolidated themselves as spaces for exchange, listening, and collective problematization.

During this same period, GPEE expanded its dialogue with leading external researchers in the field of Statistical Education. Of particular note is the contribution of Professor Celi Espasandin Lopes, in a meeting focused on discussions about statistical literacy and creative insubordination, as well as the participation of Professor Leandro de Oliveira Souza, who shared research developed and supervised in the field of Statistical Education. These interactions contributed to strengthening theoretical reflections and maturing the research being developed within the group.

For the coming years, the group plans to deepen these investigations, expanding dialogues with researchers from different institutions and strengthening collective academic production through the publication of articles, participation in scientific events, and the development of collaborative projects.

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